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Professional Manpower

TRAINING, AND SUPPLY

NICHOLAS DEWITT
Russian Research Center
Harvard University

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Foreword

A knowledge of the capabilities of other nations in science and technology is an indispensable part of the background of our own national policies and programs in science. During the last few years there has been increasing speculation as to the rate at which the Soviet Union is producing scientists and engineers and the quality of their specialized manpower. Data on the Soviet educational system and the numbers of scientists and technicians coming up through that system have been fragmentary and incomplete, however.

The National Science Foundation has felt that a scholarly study of the Soviet educational system and its methods of training Soviet professional manpower, carefully compiled and analyzed from authoritative sources, would be in the public interest. Accordingly, we have been glad to furnish financial support to the project undertaken for this purpose by the Office of Scientific Personnel of the National Academy of Sciences—National Research Council, under the direction of Dr. M. H. Trytten.

The present volume is based on exhaustive research, done for the Academy-Council by Boris Gorokhoff, Head of Slavic Languages Section, Descriptive Cataloguing Division, Library of Congress, completed and prepared for publication by Nicholas DeWitt. Mr. DeWitt, who is completing work for his doctorate at the Center, is well qualified to perform this task. He received his master's degree in international and regional studies from Harvard University in 1953 and has been associated with the Russian Research Center for the last 5 years. His undergraduate studies were also taken at Harvard. In addition, he did undergraduate work in Europe and in Russia itself. He also has served as special language instructor for the Foreign Service Institute of the United States Department of State and has been engaged as a researcher, consultant, and translator for a number of organizations and institutions, including the Massachusetts Institute of Technology, the University of North Carolina, the National Bureau of Economic Research, the Battelle Memorial Institute, and others.

As indicated in the author's preface, the manuscript was circulated for review and comment to the acknowledged authorities in the field of Russian studies. The present volume has therefore had the benefit of the most authoritative criticism available. It is hoped that its publication and widespread distribution will result in the substitution of factual information for speculation and estimates based on obsolete data.

ALAN T. WATERMAN,
Director, National Science Foundation.

JULY 1955.

Preface

The role of science and technology in modern civilization is such that considerable interest attaches to information relative to the vigor of technology and technological education not only in our own country but in all the great powers of the world.

The aim of this study was to investigate the availability and growth of the specialized manpower resources of the U. S. S. R. insofar as they might be judged from the Soviet educational effort during the past 25 years.

Two studies of these problems originated independent of each other in two different organizations. One began in the fall of 1952 under the direction of Dr. M. H. Trytten, Director of the Office of Scientific Personnel of the National Academy of Sciences—National Research Council, because of a long and keenly felt need to assemble some meaningful quantitative data concerning the training and supply of specialists in the Soviet Union. The work was started under a grant from the Union Carbon & Carbide Corp. This effort resulted in the preparation by Mr. Boris I. Gorokhoff of an unpublished report, *Materials for the Study of Soviet Specialized Education*. The outstanding research involved in the preparation of this report by Mr. Gorokhoff was of great value in the development of this work.

The other study, by the present author, began in the spring of 1952 under the auspices of the Russian Research Center, Harvard University, with helpful advice and encouragement from Prof. Alexander Gerschenkron, Dr. Alex Inkeles, and Dr. Demitri B. Shimkin. This study resulted in the preparation by the author of an unpublished report, *The Soviet Professional Labor Force, 1928–53,* parts of which have since appeared in article form. The paths of the two research undertakings were bound to meet, and this encounter took place in the fall of 1953.

Work on this study in its present form began in the summer of 1954, under the auspices of the National Academy of Sciences—National Research Council, with encouragement and financial support from the National Science Foundation. It is a happy privilege to acknowledge the valuable assistance and support of the director, Dr. Alan T. Waterman, and his associate director, Dr. Eugene Sunderlin, and their associates, particularly Miss Lee Anna Embrey.

In the beginning the great mass of information which was available in Russian periodicals and which had been brought together by Mr. Gorokhoff and by me, was deceptive in that the amount of work necessary to verify available information and to develop consistent data was underestimated. Much sorting, sifting, checking, assembling,

and interpreting were necessary. From this work, it was hoped to arrive at the best possible and most meaningful picture of the growth and development of Soviet education, particularly with respect to specialized manpower. Soviet secretiveness, incomplete statistics, and many recent developments in Soviet education created difficulties in making the study complete and up to date. So far reaching is the subject, with its many ramifications into other related subjects, that the present study must be regarded as a first approach.

Most of the research, the reconciliation of material, and the preparation of the manuscript were done, in the main, at the Russian Research Center, Harvard University. To this institution, its director, Prof. William L. Langer, his associate director, Mr. Marshall D. Shulman, and other members of the executive committee, I owe a debt of gratitude for their willingness to have me engage in this work, for the use of their library and other facilities, and especially for their general cooperation throughout the course of the project.

I am equally indebted to Dr. Trytten for his guidance and interest throughout the course of the research and preparation of the manuscript. I am also indebted to Dr. J. H. Lapp and to his staff at the Fellowship Office of the National Academy of Sciences-National Research Council, for clerical and technical assistance in the final stages of preparation of the manuscript.

Our acknowledgments are numerous. After the preliminary draft of the manuscript was completed early in 1955, it was subjected to the constructive criticism of many scholars and observers of Soviet affairs. I am indebted to them for their many suggestions and comments all of which were of great help in revising this work for publication. Dr. Trytten joins me in these acknowledgments. To the many who willingly reviewed the manuscript in its preliminary version and for the many excellent comments which they made, I wish to express my gratitude. Specifically, to:

Dr. Eric Ashby, Vice Chancellor of the University of Belfast, for many valuable suggestions, additional information, and permission to quote his *Scientist in Russia.*

Prof. George Bereday, of Teachers College, Columbia University, for a thorough review of the manuscript and for numerous suggestions.

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The Research Program on the USSR, East European Fund, Inc., New York, Miss Margaret M. Moore and *Mr. Robert Slusser,* for their friendly cooperation and permission to use and quote from their valuable collection of refugee materials, both published and unpublished, written with the assistance of the Research Program.

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Prof. Nicholas S. Timasheff, of Fordham University, for some very useful comments of a factual and interpretative nature.

Dr. J. G. Tolpin, of the Standard Oil Co. (Indiana), for most helpful criticisms, comments, and suggestions for some additional interpretations.

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Prof. Fletcher Watson, of the Graduate School of Education, Harvard University, for a thorough review of the preliminary manuscript, valuable comments, and editorial suggestions.

Dr. Ruth Widmayer, of the University of Oregon, for comments on educational policy and Soviet primary and secondary education.

To those who preferred to remain anonymous but whose criticisms, comments, and suggestions in the preparation of the manuscript were of great help, I am equally grateful for their editorial assistance in preparing the final draft.

Last, but most, I am indebted to my wife, Ruth, who typed the manuscript through its labyrinths of charts, tables, appendices; who checked figures, footnotes, and bibliographic entries; and who took care of countless details in the course of the compilation and preparation of the manuscript, the subsequent revision, checking, and proofreading.

In spite of the many contributions in the way of suggestions and criticisms made by the foregoing, the author alone is responsible for the use or abuse of any interpretative data derived in this study.

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Source Abbreviations Used in the Text

Because of the frequency of citation, it was found convenient to abbreviate some titles of primary sources throughout this volume. For full titles, the reader is referred to the bibliography. When necessary for clarity, abbreviated sources have been cross-referenced in the bibliography. These references are preceded by an asterisk in the following list. A list of sources which were abbreviated in this volume follows.

Bartošek, *Vysoké.*
Beilin, *Kadry.*
**BSE.*
**BSE–SSSR.*
Gorokhoff, *Materials.*
**Itogi Pervogo FYP.*
**Kul't Stroi—1934.*
**Kul't Stroi—1935.*
**Kul't Stroi—1940.*
Medynskii, *Nar Obr.*
**Nar Khoz—1932.*
**Nar Khoz SBX.*
**Nar Obr RR—1943.*
**Nar Obr RR—1944.*
**Plan Kadrov—1930.*
**Plan Khoz.*
**Podgotovka.*
**SC-Eng—1936.*
**Sots Stroi—1933–38.*
**Sots Stroi—1934.*
**Sots Stroi—1935.*
**Sots Stroi—1936.*
Shtyl'ko, *Pod'yem.*
Sinetskii, *PP Kadry.*
**Tretii FYP.*
Voznesenskii, *Voyennava.*
**Vtoroi FYP.*
**VVSh.*
Zhirnov, *Kul'turnoye.*

1953 Plan: Gosplan SSSR (State Planning Commission of the U. S. S. R.), *Narodno-khozyaistvennyi plan na 1935 god* (National Economy Plan for 1935), Moscow, 1935.

1936 Plan: ——— *Narodno-khozyaistvennyi plan na 1936 god,* vols. 1 and 2, Moscow, 1936.

1937 Plan: ——— *Narodno-khozyaistvennyi plan na 1937 god,* Moscow, 1937.

1941 Plan: ——— *Gosudarstvennyi plan razvitiya narodnogo khozyaistva SSSR na 1941 god* (State Plan for the Development of the Economy in the U. S. S. R. in 1941), American Council of Learned Societies Reprints, 1941.

Introduction

The profound economic, political, social, and cultural transformations which have taken place in Russia during the last few decades are of great concern to the free world. It is a well-recognized fact that for 25 years the U. S. S. R. has made immense efforts toward the elimination of its economic backwardness and toward the increase of its industrial, military, and political power. For the achievement of these aims, the Soviet Union has concentrated heavily on general education, on the elimination of illiteracy, on the wide diffusion of technical knowledge, and on the strengthening of the political loyalty of its citizens. For over the last two decades, under the slogan "Cadres decide the outcome of everything," the Soviet Union has proceeded with the buildup of its skilled labor and of its professional and specialized technical manpower resources. It was realized that the success of these efforts was a necessary condition for industrial development, technological advance, and ultimately, military and political power.

The cold war—or the unsettled peace—and the responsibilities which fall to the United States, as the most powerful nation in the free world, have inspired a unique concern with the adequacy of our own resources of specialized, technical, and professional manpower. This concern has brought forth a careful, extensively documented inquiry regarding America's specialized manpower by the Commission on Human Resources and Advanced Training, prepared under the direction of Dael Wolfle,[1] as well as several studies of American policies towards specialized manpower by the National Manpower Council.[2] These studies shed new light on the problem of the adequacy of America's specialized manpower resources and upon the policies aimed at strengthening these resources, which are so indispensable for the preservation of America's technological and scientific leadership.

The emergence of a modern, increasingly complex, industrial and social organization is typified by a marked division of labor and specialization. Technological advance is either the cause or the result of economic growth. In effect, it may be both. It is not necessary to go into

[1] D. Wolfle, *America's Resources of Specialized Talent*, New York: Harper & Bros., 1954.

[2] National Manpower Council, *A Policy for Scientific and Professional Manpower; A Policy for Skilled Manpower; Utilization of Scientific and Professional Manpower*, New York: Columbia University Press, 1953, 1954, 1955.

the complexity of the causal relationships between technological advance and economic growth, however, or to consider the economic factors conditioning the capital formation essential for the achievement of both, in order to realize that the quantitative and qualitative aspects of labor are unique and paramount determinants of economic growth and technological advance.

The economic development, the technological change, and the social evolution of society under the impact of both depend upon a large number of people who, in varying degrees of importance and in a multitude of diverse fields, exercise their occupational skills. While the overall quantity of labor is primarily dependent upon population growth, the quality of labor is conditioned by the level and type of education, the extent and direction of specialized training, and the experience of an individual or of diverse groups of individuals who comprise the labor force. These three factors affecting the quality of labor become increasingly important in a modern industrial development, which is founded on the application of scientific knowledge to the production and distribution of goods and services.

Although the entire population and the entire labor force are affected by and are instrumental in the dynamic process of economic development, technological advance, and social change, there is one group within the confines of the population and manpower which merits attention for the particular role it performs in this process.

This group, which is more easily visualized than described, is probably, more than any other group, responsible for bringing about technological and social change. In fact, it emerges and gains numerical strength because of the progress made in science and technology and the increased complexity of modern industrial civilization. This group consists of a large number of specially trained men, specialists of one type or another, professionals of various kinds—doctors, engineers, teachers, scientists, and those engaged in a multitude of other occupations—all of whom have one thing in common. The common criterion which singles out this group and makes it distinct from any other is their professional competence and their special knowledge, which are more frequently acquired through the long process of formal education and through long years of training, and which are less frequently attained through unusual individual virtues or through many years of practical experience. This group of specialized professionals, within the confines of the Soviet population, constitutes the main object of this study.

The supply of professional personnel and, to a great extent, its qualitative characteristics, depend upon the ability of an educational system to adjust itself to the changing needs of a society and upon its ability to train a sufficient number of persons for a variety of specialized tasks. This volume will therefore deal extensively with the Soviet educational system,

which is one of the main sources providing the economy with a flow of specialized personnel. By devoting a great deal of attention to the educational system at large, to specific programs of training, to various aspects of educational policy and practice, it is possible to ascertain many of the qualitative and quantitative aspects of Soviet professional manpower.

At the same time, because professional manpower is an integral part of a country's population and labor force, the supply of specialized personnel must be considered in its relationship to these variables. This constitutes an additional problem, to be considered in the concluding chapter of this volume. Furthermore, because of the close functional relationship between professional activity and semiprofessional tasks, and particularly because of the special role which semiprofessional education plays in the Soviet Union, specialized semiprofessional manpower is to be considered also as an integral part of this study. Finally, within the professional group, there is a small segment of individuals who are engaged in various kinds of research, who are called upon to perform more creative or more advanced tasks than the majority of the professionals. The majority of this smaller group is composed of scientists in a variety of fields. This group also commands special attention in this study.

In order to pursue these tasks, a consideration of some of the problems concerning the use of definitions and social statistics, the availability of information, and its utilization is of primary importance. The first difficulty encountered in an investigation of Soviet professional and specialized manpower problems is that of defining this group as a whole or segments by specialty or field within it.

In defining specialists and professionals, various criteria may be employed. Five major criteria appear to be particularly useful in American practice,[8] but in the Soviet case only three of these can be usefully employed. The first is the educational record, the second is the employment of specialists, and the third is the census enumeration. Of these three, the educational record is the most useful in defining Soviet specialists and professionals.

The first reason for using educational criteria is that the type of training is definitely aimed at preparing a specialist in a narrow field of professional activity, thus diminishing opportunities to change his professional occupation. A second reason is the Soviet policy of involuntary placement of graduates in jobs which coincide with their field of formal training and their occupational specialties. A third reason is a set of totalitarian control measures, one of which is labor legislation restricting the individual's opportunity to change jobs and occupations at will. Fourth, there are a variety of incentives which encourage the individual to retain his professional occupation in the same field in which he received his formal training.

[8] Wolfle, op. cit., 17–20.

In addition, there is a very important practical reason for using educational records. There is a substantial amount of information available in regard to quantitative as well as qualitative aspects of training of Soviet specialists in a variety of fields. The data thus obtainable can be successfully used for ascertaining the quality of preparation and the numerical distribution of various professional and technical occupations.

Because of these factors, the educational record becomes a stronger criterion for the Soviet Union than for free, democratic societies. Data for the other two criteria—employment and the census enumeration—are less abundant, but some information is available and has been used, particularly in the last chapter of this book. These criteria have been used for verifying the validity of educational criteria.

Although information available from Soviet sources permits the use of these three criteria, it must be fully realized that reliance upon any of them in estimating the number of people in a given field of a professional specialty must suffer from numerous sources of error. Social statistics are not exact magnitudes. They invariably entail a certain lack of precision, and at best, they can be regarded only within certain limits as substantially correct approximations of actual magnitudes. These problems are universal and the difficulties caused by them are unavoidable.

Aside from errors which may be caused by definitions, there is a more general difficulty. We have to rely for our information upon data released by Soviet sources. There is a great difference between statistics which are compiled for internal use by various departments of the Soviet Government and those which are obtainable from published Soviet sources. Only on rare occasions do we get a glance at statistics compiled for internal use, and for the most part factual data and statistical information on the Soviet Union have to be abstracted from various sources. This external flow of information lacks refinement and orderly sequence. It has been painfully pieced together, labored over for possible checks on consistency, and searched through for ambiguities, changes in definitions, and various "tricks of the trade" resulting from substitutions of fragmentary reporting for the comprehensive release of statistical information. Despite this, there is enough information available to indicate, at least in general terms, the actual state of affairs.

Among experts on the Soviet Union, there is a general consensus that in spite of some "fairy tales," some official exaggerations and distortions, it is possible to penetrate Soviet data. But Soviet statistical data, especially for unwary users, are full of "perplexities and pitfalls," which "must be considered among the very basic difficulties in the way of getting facts about Russia." [4] However, despite "many harassing deficiencies it seems that the Soviet Government does not falsify those

[4] A. Bergson, "A Problem in Soviet Statistics," *The Review of Economic Statistics*, volume XXIX, No. 4 (November 1947), 234.

statistics which it elects to publish." [5] In other words, "Contrary to common supposition, the Russians seem generally not to resort to falsification in the sense of free invention and double bookkeeping." [6] It is commonly agreed that data obtained from official Soviet pronouncements and statistical publications have some meaning and significance. This, of course, does not preclude the use of statistical data in some instances for a "propagandistic presentation—a form of art in which lies of various dimensions may enter." [7] There is undoubtedly some bias in certain Soviet statistical series, especially those which "have developed with the passage of time and been allowed to continue uncorrected for an extended period." [8]

Such are the opinions of experts in regard to Soviet statistical data in general. In regard to Soviet educational and professional manpower statistics, it can be stated that neither this writer, in the course of several years of research, nor B. I. Gorokhoff, whose extensive study of Soviet sources was incorporated into the present work,[9] has found any evidence of out-and-out fraud. Of course, there is occasional juggling with statistics; there is the problem of changing definitions; there are occasional ambiguities as to dates of reporting; and there are some sudden aggregations of distinct categories in order to conceal unfavorable trends or to give Soviet propaganda a chance at otherwise unjustified claims of extraordinary success. Despite this, the data mirror the real situation to a great extent. Many checks were made, and by and large it appears that for those years where abundant data exist, they are as accurate as Soviet compilation procedures and information-gathering techniques permit. The greatest difficulty was caused not by the data themselves but by the lack of them. However, in many respects, what was found on educational statistics was often better and more reliable than data in certain other fields of statistical research on the Soviet Union.

What significance does this have? Professor Gerschenkron put it well when he stated that if research was to be based on admittedly deficient information, "counsels of pedantic purity are not necessarily the most helpful ones. At least, the present writer cannot decide to follow them at the price of foregoing acquisition of such little and uncertain knowledge as may result from preoccupation with admittedly poor and inaccurate Soviet materials." [10] In this research undertaking we have tried to follow this advice.

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[5] Idem.
[6] A. Bergson, "Reliability and Usability of Soviet Statistics," A Symposium, reprinted from *The American Statistician*, June–July 1953, 19.
[7] S. A. Rice, "Statistics in the Soviet Union," *Bulletin of the Atomic Scientists*, vol. VIII, No. 5 (June 1952), 159.
[8] Ibid., 160.
[9] B. I. Gorokhoff, *Materials for the Study of Soviet Specialized Education*, unpublished report prepared for the National Research Council, Washington, D. C., 1952, esp. 20–26.
[10] A. Gerschenkron, *A Dollar Index of Soviet Machinery Output, 1927–28 to 1937*, Santa Monica, Calif.: Rand Corp., 1951, 24.

CHAPTER ONE General Setting of the Soviet Educational System

Basic Aims of Soviet Educational Policy

In every country education is influenced by society, its cultural heritage, and, to a greater or lesser extent, by the "world outlook" upon which it is based. The mutual impact of political, economic, and social institutions and cultural factors upon educational policy and of education upon society is universally recognized. This general relationship holds true for any society, including such divergent systems as those of the United States and the Soviet Union.

The aims and the philosophy of American education have often been a subject of controversy. However, it is undeniable that training designed for the realization of the full capabilities of an individual remains the fundamental guiding aim and the cherished principle in the philosophy of American education. Such aims are a reflection of our faith in democratic principles, in individual freedom, and in equality of opportunity, however imperfect and circumscribed the latter may be by personal circumstances. We accept human nature as it is and try to bring out the best in it through the educational process. These are our ideals, ideals which our educational policy aims to pursue by various means.

Soviet education today has no such basic aims. It is not the individual around whom the educational system is built, but the state, which, by identifying itself with pursuits of the common good, attempts the ruthless subordination of the individual—his rights, tastes, choices, privileges, and his training—to its own needs. The substitution of the service-to-the-state notion for concepts of individual benefit or profit is the fundamental distinctive feature of Soviet educational philosophy and actual educational policies. Communist education does not limit

itself to instruction, but embraces the entire field of character training and the formation of attitudes, sentiments, and beliefs. This broader aim of the Soviet educational system is viewed as an attempt to create the "new Soviet man."

In view of these all-embracing aims of Soviet education, it has nowadays become quite fashionable to view this educational system as nothing but an effective instrument of totalitarian thought control. This view is an erroneous oversimplification and one which is detrimental to the proper understanding of the problems of Soviet educational policy and practice, especially those phases of it which are related to the training of specialized and professional personnel.

It is true that Soviet propaganda tries to convince its own people and the world at large that monolithic, unanimous, and all-embracing conformity to communist ideology has been achieved in every walk of life in the U. S. S. R., including education. Actually, however, it is entirely debatable how successful these indoctrination efforts have been in the past or will be in the future. Many passages could be quoted which would illustrate the totalitarian aspects of Soviet education and reveal the ideological and doctrinaire interference in education. Various statements could be cited which would describe the pattern of apparently rigid control of Soviet educational establishments by a central administration, which is in turn permeated and dominated by party organs. Hundreds of sources could be listed which would reveal how teachers are instructed to be active propagators of communist ideology, how pupils are indoctrinated through the school system, through the party-dominated media of mass communication, through their membership in communist youth organizations and their participation in various extracurricular activities. If this were all that there were to Soviet education, we would not need to go any further in this survey since we would indeed be faced with a country of the blind and the Orwellian inferno.

There have been, in the past, a number of scholarly books and monographs dealing with Soviet educational policy and practice, either specifically or in relation to more general problems of political, social, or cultural development in the U. S. S. R. It has been emphasized that political aspects seem to dominate every level of education in the U. S. S. R.[1] It has also been stated that Soviet education is primarily a weapon of communism and that it is used predominantly as an instrument for achieving political conformity.[2] It has been observed that Soviet educational philosophy and actual educational policy have their origins

[1] K. Hulicka, "Political Education in Soviet Schools," *Soviet Studies*, vol. V, No. 2 (October 1953), 138–150.

[2] G. S. Counts and N. Lodge, *The Country of the Blind*, Boston: Houghton Mifflin Co., 1949.

in the Marxist theory of education and their adaptation in the doctrines of Soviet ideology.[3]

The problems of education and cultural life in the U. S. S. R. have been analyzed under the impact of the emerging bureaucratic power structures.[4] The institutional role of the Communist Party and its impact upon the Soviet educational structure and policy have been stressed.[5] The emergence of the totalitarian state in the Soviet Union and its impact upon educational practice have been explored.[6] The general problem of Soviet psychology has been studied in its complex relationship to Soviet educational aims, and the dilemma of Communist attempts to create the "new Soviet man" has been studied.[7] The history of Russian education and West European influences upon it, and the subsequent influence of this heritage upon Soviet educational institutions and practice have been extensively explored.[8] Soviet educational policy has been analyzed in the light of political, rational-technical, and traditional elements conceived as the guiding forces of Soviet social development.[9]

This survey does not attempt to duplicate any of these efforts in exploring the problems of Soviet educational policy in its enormously complex set of relationships to Soviet society and the guiding forces within it. However pertinent these and certain other approaches to the problem of Soviet educational policy may be, however true various observations and rationalizations concerning Soviet education or a particular aspect of it are or are not, this study will concentrate to a lesser extent on interpretative data and will stress primarily the factual, i. e., quantitative and qualitative, aspects of Soviet education.

Reduced to its fundamentals, Soviet educational philosophy rests on three major premises.[10] The first of these is that the advancement of science and technology is best promoted through the central planning of education and research. The second is that scientific and educational efforts are primarily a means for the advancement of the social, economic, political, and military interests of the nation. The third is that the basic truths of human life, of nature and of the universe, and of

[3] M. J. Shore, *Soviet Education: Its Psychology and Philosophy,* New York: Philosophical Library, 1947.
[4] W. Rostow, *The Dynamics of Soviet Society,* New York: W. W. Norton & Co., Inc., 1953.
[5] R. Widmayer, *The Communist Party and the Soviet Schools, 1917–37,* unpublished Ph. D. thesis, Harvard, 1952.
[6] M. Fainsod, *How Russia Is Ruled,* Cambridge: Harvard University Press, 1953.
[7] R. Bauer, *The New Man in Soviet Psychology,* Cambridge: Harvard University Press, 1952.
[8] W. H. E. Johnson, *Russia's Educational Heritage,* Pittsburgh: Carnegie Press, 1950.
[9] B. Moore, Jr., *Terror and Progress, U. S. S. R.,* Cambridge: Harvard University Press, 1954.
[10] H. Berman, "The 'Right to Knowledge' in the Soviet Union," *Columbia Law Review,* vol. 54 (May 1954), 749–764.

social, political, and economic reality, have been discovered and proclaimed and are beyond debate, so that the task of the teacher and of the scholar is to demonstrate and to apply these truths rather than to question them or to seek alternative truths.

What do these maxims imply? While there is undoubtedly a considerable degree of coercion—conformity to blind and dogmatic beliefs—applied at times with moderation and occasionally with open ruthlessness, there is also a quite realistic approach to the training of personnel for an economy in the process of rapid industrialization and for a social system permeated by bureaucratic structures. In such a system mere ideological conformity is not enough. Professional competence and applied technical know-how are also necessary. The character and kind of training are determined by the simple and obvious necessity for various types of trained manpower—scientists, engineers, managers, teachers, supporting personnel, skilled labor. There is a demand for trained manpower, regardless of whether individual members have or have not been thoroughly indoctrinated, whether they sincerely conform to or only outwardly embrace communist dogma.

In order to meet the growing demand for specialized and skilled manpower, Soviet educational policy has been increasingly more heavily aimed, at all educational levels, toward the promotion of those types of training which stress concrete knowledge. Because of this stress the rational-technical feature became one of the prominent aspects of Soviet education.[11] Stress on the mastery of specific subjects and on the acquisition of technical and scientific skills has become dominant in all fields and on all levels of the educational system.

For more than two decades, under the pressure of expediency for a large and ever-increasing demand for specialists, there has existed a shortage of physical facilities, of school space, equipment, and qualified teaching personnel. All of these conditions have automatically led to enforced selection at every educational level. This process of selection serves to channel the academically gifted rather than the merely competent into more advanced stages of training. Although selectivity stresses intellectual criteria, its proper functioning is interfered with by considerations of class position, the individual's ambition, personal circumstances, nationality, and, of course, political reliability. As a result, there is in the Soviet Union a certain inequality of educational opportunity. Under such circumstances, education itself has become a powerful factor in social stratification and mobility.[12] As a consequence, extensive and keen competition for the opportunity to continue education prevails.

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[11] Moore, op. cit., 208.

[12] E. Koutaissoff, "Soviet Education and the New Man," *Soviet Studies*, vol. V, No. 2 (October 1953), 122–123; and R. Feldmesser, "The Persistence of Status Advantages in Soviet Russia," *The American Journal of Sociology*, vol. LIX, No. 1 (July 1953), 19–27.

Despite the impediments to the full operation of academic selectivity, the state-oriented educational policy succeeds to a great extent in recruiting available talent, which is then trained and molded in such a way as to maximize its utility to the state. In this process, of course, the individual does derive some benefits for himself, but these are by no means the primary objectives.

The Soviet Educational System

To achieve its aims in its planned efforts to channel individual talent into various occupations, the Soviet state maintains very extensive educational facilities. In order to facilitate its task, the state also maintains an extensive bureaucratic apparatus of control, which not only supervises a particular set of institutions and particular type of training, but also is directly concerned with the placement policies of educated and trained manpower.

Chart I shows the structure of Soviet regular schools as they were after the school reforms of the mid-1930's, as well as subsequent additions during and after the war. In order better to understand this system, a comparison between the Soviet school system and that in the United States was made on an age-and-grade-progress basis.

In addition to the regular school structure presented in chart I, there are in the Soviet Union various parallel structures of alternative or equivalent educational facilities, which are of some importance and which are discussed in the text. The text will also discuss some prereform institutions in terms of the postreform educational setting. Also, the discussion of the Soviet school system below will give English terminology for Russian terms to avoid any ambiguity in the use of basic definitions.

Parallel to the system of regular schools, the following structures of alternative training facilities can be singled out: (1) the system of military and security police schools; (2) the system of party schools and managerial personnel training facilities; and (3) the system of adult education and extension-correspondence schools. In addition, there are many kinds of formal training which are not integrated into the structure, although they can be equated in some instances to a certain level of training in the regular schools.

For lack of any better concept, we have called a set of educational facilities alternative equivalents to regular schools; however, they may in fact not be equivalent in the true sense of the word. We shall call them equivalent to one another on a certain level throughout this discussion, but it is obvious that they are far from being so in terms of actual quality, direction, and, occasionally, extent of training, all of which will be discussed in subsequent parts of this survey. The concept

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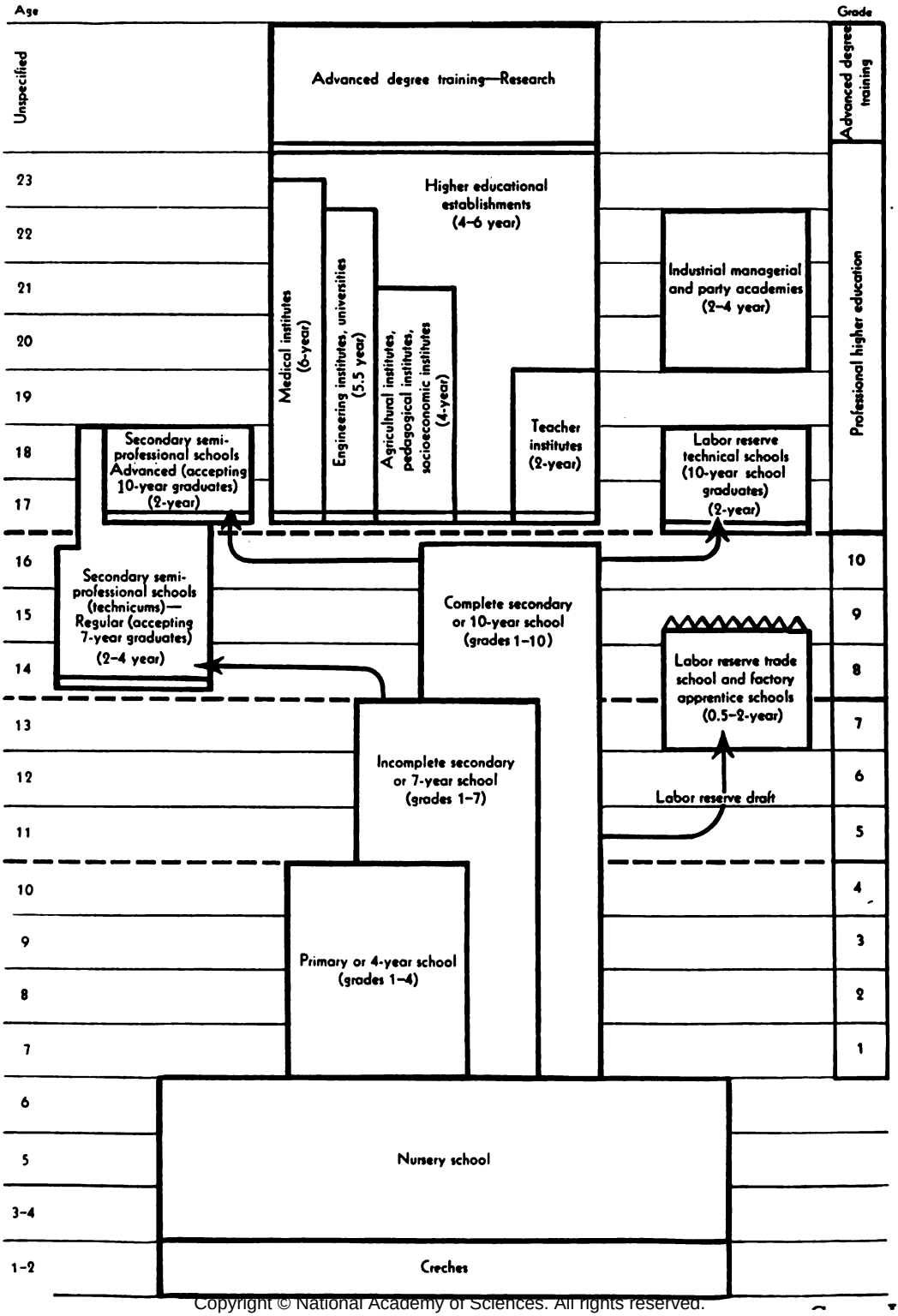
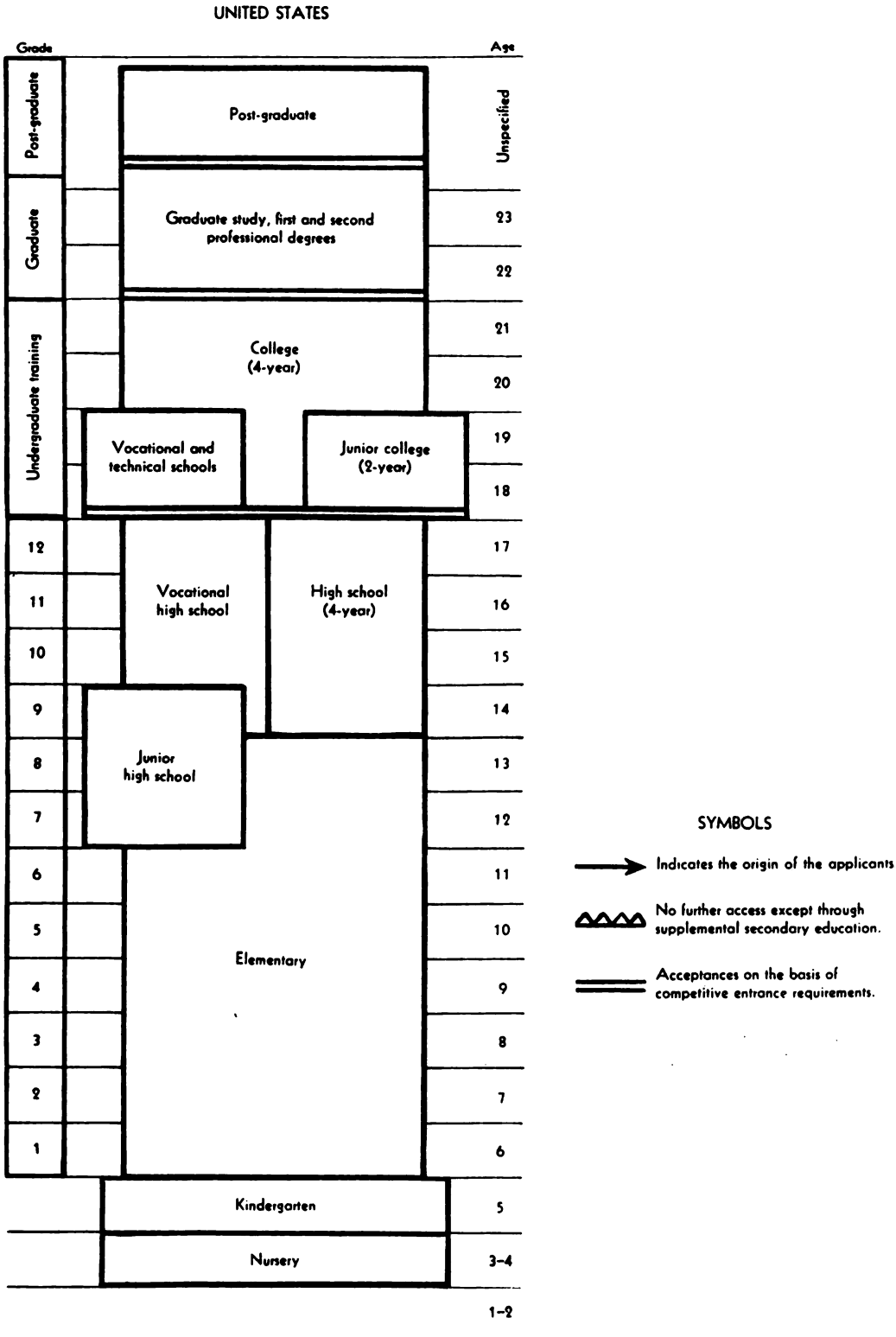
STRUCTURE OF THE SOVIET EDUCATIONAL

UNION OF SOVIET SOCIALIST REPUBLICS



SYSTEM, COMPARED WITH UNITED STATES



of "equivalence" is based on Soviet certification procedures. The certification of completion of education on a certain level is essentially a prerequisite for entering the next level. Such certification, however, should not be confused with *opportunity* to enter subsequent levels of training. Opportunity is limited by other factors, but a certificate of completion of a certain level of education, whether of regular or "equivalent" to regular, is an unavoidable criterion for access to certain training.

Educational facilities in the Soviet Union may be grouped into four levels. The regular school structure has all four levels, while alternative, equivalent training structures do not. The four levels of training are: (1) preschool, (2) elementary and secondary, (3) higher education, and (4) advanced training. We shall discuss each of these levels, first in terms of regular school structure as indicated in chart I, and then in terms of equivalents.

1. *Preschool Level* (*doshkol'noye obrazovaniye*)

The facilities on this level are creches (*yasli*) and nursery schools (*detskiye sady*). The latter facility is often called kindergarten, a term which is confusing because of its different connotation in the American educational setting. All Soviet creches and most nursery schools operate on a full-day schedule (about 9 hours) of child care and guidance service. The age range of children in creches is from a few months to 3 years, in nursery schools from 3 to 7 years.

Creches and nursery schools came into existence in the early 1920's, and their facilities were greatly expanded during the 1930's, primarily as an aid to working mothers. Most nursery schools and all creches are operated by local economic enterprises, producers cooperative enterprises, trade unions, collective farms, etc. A few nursery schools are operated directly by local educational authorities which, however, exercise control over the form and kind of preschool training in all operating facilities. In addition, the union-republic Ministry of Public Health supervises all activities in creches, as well as physical education and medical care in nursery schools. Neither creches nor nursery schools are universally available facilities. Parents are required to pay from 25 to 35 percent of the actual cost of maintaining a child. In most nursery schools enrollment is restricted to children whose parents are employed in either a certain occupation or in the given economic unit which maintains them. For obvious reasons, there are no alternatives or equivalents on this level. Children simply either do or do not enjoy the availability of these facilities.

2. *Elementary and Secondary Level (nachal'noye i sredneye obrazovaniye)*

This level consists of various types of training, which may be grouped as follows:

a. *Regular Elementary and Secondary Schools.*—The major structural component on this level consists of regular elementary, incomplete secondary, and complete secondary schools. The system is often called general education schools (*obshcheobrazovatel'naya shkola*) but we shall refrain from using this term because of the unique connotation of "general education" in the American educational setting. This sytem, in its present form, emerged in the mid-1930's, and the regular school consists of 10 grades grouped together according to the 4–3–3 system, as opposed to the United States 6–3–3 system (elementary, junior high, high school) or 8–4 system. The entrance age for the first grade of the Soviet regular school is 7.

Since 1934 the fundamental unit has been called complete secondary school (*polnaya srednyaya shkola*) or 10-year school (*desyatiletka*). The 10 grades are grouped into three levels: (1) elementary—grades 1–4; (2) intermediate—grades 5–7; (3) upper—grades 8–10. In the process of the gradual development of school facilities, there emerged two other types of schools. One, which is encountered most frequently in rural areas, is the elementary school (*nachal'naya shkola*), which contains *only* the first four grades. The other is the incomplete secondary school (*nepolnaya srednyaya shkola*) or 7-year school (*semiletka*), which has grades of the elementary and intermediate level (i. e., 1–7). To what extent any of these levels is either available or compulsory will be discussed in chapter II.

Elementary and secondary schools are operated by the ministries of education of each of the 16 republics comprising the U. S. S. R. These 16 republic ministries of education have local and regional branches which exercise day-to-day operational control over the schools. Programs, curricula, methods of instruction, and other aspects of educational practice are uniform for any given republic. Although there are minor differences in educational setting among individual republics, such, for example, as the existence of a preparatory grade in the Baltic republics and in the Georgian S. S. R. (which results in an 11-year school), or a difference in native language, history, and literature instruction, it can nevertheless be stated that, on the whole, the curricula and program requirements are uniform for the entire U. S. S. R. Supervision of methods, programs of instruction, and the activities of each of the 16 ministries are coordinated by the Ministry of Education of the Russian Republic.

Just as there are three distinct levels in the elementary and secondary school, there are also three levels of certification: elementary (4-year); incomplete secondary (7-year); and complete secondary (10-year) graduation certificates, which are based on special examinations at the end of the 4th, 7th, and 10th grades. These examinations are given in addition to the regular promotion examinations from one grade to another. Since the late 1930's, particular attention has been paid to the examinations following completion of the 10th grade. In 1944 such emphasis resulted in the establishment of the maturity certificate (*attestat zrelosti*), which is granted upon passing examinations covering the program requirements of the entire 10-year course.

In the period preceding the school reforms of the early 1930's there was great confusion as to the terminology employed for elementary and secondary schools. Briefly, the Soviet school structure in the 1920's was as follows: the fundamental unit was the 9-year school (*devyatiletka*), which consisted of a people's school (*narodnaya shkola*), including the first four grades; a first division school (*shkola pervoi stupeni*), including usually 3 additional grades (but occasionally only 1 or 2); and finally a second division school (*shkola vtoroi stupeni*), including ordinarily the 2 last grades. The basic school formula was thus 4–3–2; however, this was not followed universally.

b. *Equivalents and Alternatives to Regular Elementary and Secondary Schools.*—There are many types of alternative training, both formal and informal, which are to be considered for the sake of convenience as "equivalent" to a certain level of regular school education. As stated previously, although some alternative training is considered "equivalent" in the Soviet educational setup, this term should not be taken literally in all cases. Most of these so-called equivalents equate certain forms of adult education to the regular school. In the first place, it must be mentioned that there existed in the past an extensive network of evening schools for the elimination of illiteracy (*shkoly po likvidatsii negramotnosti i malogramotnosti*). In addition to these schools for adult education, there were also in operation in the prereform period adult education schools of the first level (*shkoly vzroslykh pervoi stupeni*), which were considered the equivalent of the regular primary schools, and adult education schools of the second level (*shkoly vzroslykh vtoroi stupeni*), which were considered the equivalent of from 7 to 9 grades of regular school. Today, evening schools for adult education on the elementary and secondary level are simply equated to corresponding grades of regular school.

In the latter part of this survey we shall encounter two other types of training. One is preparatory courses (*kursovaya podgotovka*). Until the mid-1930's this training was common, and it was considered the equivalent of the upper two grades of the regular school prior to the reforms.

This type of training should not be confused with the large number of programs which are also called "course training" but which refer primarily to the training of skilled labor. These preparatory courses were given to adults who had completed the 7-year school. They were conducted by the regular secondary schools and were designed to prepare persons for entrance into either higher educational establishments or secondary semiprofessional schools.

The other form of training was called workers' faculties (*rabfak*). Workers' faculties offered day or evening training lasting 4 years, which supposedly covered the entire program of the regular elementary and secondary school. They were operated jointly by higher educational establishments and the commissariats in charge of a given segment of the Soviet economy. Today, both the preparatory course training and the workers' faculties are defunct, but the "equivalent" to primary and secondary education may be still obtained through other channels of preparation.

Today, those who did not attend either a regular school or a secondary semiprofessional school or their equivalent must obtain a maturity certificate as proof that they have completed secondary education. This may be done, on rare occasions, by informal training (*eksternat*), which consists simply of registration in a regular school for the purpose of taking examinations only, without required attendance, homework, etc., or by attending various schools, which, with great delay in years, provide, at least in the formal sense, training equivalent to that of the regular elementary and secondary school.

It has already been mentioned that evening adult education on the elementary and secondary level is conducted today on a limited scale by the regular schools. After the war, however, another type of educational establishment on this level emerged. These are the schools for working youth (*shkoly rabochei molodezhi*) and the schools for rural youth (*shkoly sel'skoi molodezhi*), both of which were organized in 1943–44. Two factors were responsible for their establishment. The first was the draft into the schools of the State Labor Reserve (see sec. c–2 below). The second was the direct impact of the war, when a large number of youths in the 12- to 17-year-age bracket were required to take employment and when elementary and secondary instruction was terminated in many war-devastated or occupied areas. The establishment of these schools was originally an emergency measure, but they have become, since the war, what appears to be a permanent feature of the Soviet school system. These schools absorb youths in the 14- to 25-year-age group, who have either quit regular school, or who have been forced to take employment, or who have been discharged from military service. Finally, they take in a number of those who were originally drafted into the schools of the State Labor Reserve and then assigned to various

jobs. In short, these schools represent an outlet for all those who, for one reason or another, are not able to attend regular schools.

The schools for rural youth have the two lower levels of the regular school (i. e., elementary, grades 1–4, and intermediate, grades 5–7). Schools for working youth have the two upper levels (i. e., intermediate, grades 5–7, and upper, grades 8–10). The latter also have a preparatory grade, which is designed for those who have not received elementary grade instruction. Schools for rural youth operate in the evening only, while schools for working youth operate on three shifts (morning, afternoon, and evening), so that students may arrange their attendance according to their work schedule. Soviet educational authorities claim that these schools are the "equivalent" of the corresponding levels of the regular school, and graduates are therefore provided with certificates identical with those for the regular school. Schools for working youth and for rural youth are administered by the republic ministries of education in the same manner as regular schools.

c. *Secondary Semiprofessional, Trade, and Other Vocational Schools on the Elementary and Secondary Level.*—Schools in this category may be subdivided as follows:

(1) *Semiprofessional Training Schools.*—The first and largest component are the secondary semiprofessional schools. These institutions trace their origin to the pre-Revolutionary period, though they were greatly expanded during the 1930's. They are commonly called technicums (*tekhnikumy*), although they are known by a variety of other names (*uchilishche, shkola*), usually stating a specialty, as technicum for machine-building technicians (*mashinostroitel'nyi tekhnikum*), school of dentistry (*zubovrachebnaya shkola*), or teachers' school (*pedagogicheskoye uchilishche*) (normal school). The variety of types of training offered in these institutions is commonly designated secondary specialized training (*sredneye spetsial'noye obrazovaniye*). Throughout this report the term secondary semiprofessional, or simply semiprofessional training will be used as the common designation for the various types of training on this level.

Technicums are operated, administered, and financed by the various ministries which have jurisdiction over a particular segment of economic activity or public service. However—and this is quite important for the future understanding of Soviet specialized manpower problems—all their programs, teaching methods, curricula, and even enrollment quotas are determined and controlled by the Main Administration on Specialized Secondary Education of the Ministry of Higher Education.

Students who have completed 7 years of regular school, or who have a certificate of completion of education which is the equivalent of the 7-year school, are eligible for admission to a secondary semiprofessional school. Admission to these institutions is determined by competitive

entrance examinations embracing the program of the 7-year school. The discussion in chapter III is devoted entirely to this type of training, and for present purposes we shall make only a few pertinent remarks. First, the completion of this type of training is considered by Soviet educational authorities as a terminal point in the educational process. Graduates of semiprofessional schools are called upon to perform special functions on the job for which they have been trained and to which they have been assigned upon the completion of training. Therefore, although there are exceptions, most graduates of semiprofessional schools do not continue their education beyond this level. On the other hand, this training is regarded as equivalent to a completed secondary education, and a graduation certificate from a semiprofessional school is regarded as equal to the maturity certificate obtained by graduates of regular 10-year schools. Therefore, for purposes of access to higher education, these graduates are considered as having completed secondary education only.

Most semiprofessional schools operate on a daytime schedule, but there are some which operate evening divisions. Until very recently, training in the semiprofessional schools lasted from 3 to 4 years. In 1953 a number of new semiprofessional schools were set up, and some existing institutions or their divisions were converted to 2-year training programs for those who had entered this type of training not after the completion of the seventh grade, but after graduation from a 10-year school. This development will be discussed further in chapter III.

Finally, it should be noted that secondary semiprofessional schools offer extension-correspondence training. This training has expanded in the postwar period and is considered the equivalent of regular semiprofessional training. Extension-correspondence training is offered either by the divisions of regular semiprofessional schools or by institutions set up exclusively for this particular purpose. The first type, which offers both types of training, are called permanent semiprofessional training establishments (*statsionarnyye spetsial'nyye sredniye uchebnyye zavedeniya*); the latter are called extension-correspondence semiprofessional training establishments (*zaochnyye spetsial'nyye sredniye uchebnyye zavedeniya*).

(2) *Skilled Labor Training Schools.*—The second type of institution under this category are the schools of the State Labor Reserve. These schools were set up in 1940 when the Main Administration of the State Labor Reserve was organized. Their function consists in training skilled labor. During the 1940's these schools were filled through the draft calls of youths in the 14- to 17-year-age group. The draft was based on several draft eligibility principles. First to be drafted were those youths who neither attended school nor were employed. The second category included over-aged pupils (*pererostki*) attending the intermediate grades (5–7). Over-aged pupils in most instances were those who were required

to repeat a year in one of the lower grades because of poor scholastic or attendance records. In the third draft category were regular students in the intermediate grades of rural areas only. All pupils in the upper grades (8–10) were automatically exempt from the draft. In recent years it has been stated on several occasions that the draft was applied to only a limited extent because of the sufficient number of "volunteers," a term to be used with great caution, since Soviet authorities may apply it to describe the process of forceful persuasion (you might as well volunteer, for we will draft you anyway).

There are various types of State Labor Reserve schools, but they may be grouped into three categories: (1) trade schools (*remeslennyye uchilishcha*), which usually offer 2 or 3 years of training; and (2) factory schools (*FZO—shkoly fabrichno-zavodskogo obucheniya*), which offer training of only 6 months to a year. Both kinds of schools prepare skilled labor. Training in the trade schools is regarded in most instances as equivalent to that of the intermediate grades (i. e., 5–7) of regular schools. Factory schools are regarded as schools training skilled labor exclusively, and they offer no training whatever which could be regarded as equivalent to any level of the regular schools.

In recent years (after 1953) a third type of State Labor Reserve schools has been added. These are schools preparing skilled labor for Soviet agriculture, which are apparently regarded as offering training on the level of the trade schools.

Graduates of trade schools may gain access to further formal education by attending either semiprofessional schools or schools for working youth (see above). Trainees of factory schools may gain access to further education only by attending schools for working youth.

In 1954 the Main Administration of the State Labor Reserve set up a number of vocational technical schools (*tekhnicheskiye uchilishcha*), which also train skilled labor. These new establishments accept graduates of the 10-year school (see chs. II and III for further comment).

Finally, there are various formal and informal training programs for skilled and semiskilled labor which are operated by various economic units. There are countless permanent or temporary apprenticeship programs, individual apprenticeship, group apprenticeship, courses of various types, etc. All these programs obviously cannot be equated to a specific level in the formal educational setting.

(3) *Military Schools.*—The third type of schools in this category of alternative schools on the elementary and secondary level are the military schools. These schools were established before the war and were called special secondary schools (*spetsial'nyye sredniye shkoly*). These facilities expanded greatly during the war and were called Suvorov schools (*Suvorovskiye voyennyye uchilishcha*) for boys entering ground or air-force officer careers, and Nakhimov schools (*Nakhimovskiye*

voyennyye shkoly) for boys aspiring to become naval officers. For all practical purposes these schools are equivalent and almost identical to the regular 10-year school, although there is no first grade and a considerable part of their curriculum is devoted to special military subjects and to extensive physical and military training. These schools are administered by the appropriate branches of the armed forces. They are called "schools of closed access" (*zakrytyye shkoly*). In theory entrance to these schools is reserved primarily for the descendants of living or killed-in-action members of the Soviet armed forces. In practice, however, access is reserved for sons of the Soviet Officers Corps.

A second type of military school which operated in the past (see below for more details) on the upper grade (8–10) level were the company grade commissioned officers schools (*voyennyye uchilishcha*). Until the outbreak of the war, a large number of these military schools accepted males who had completed at least the seventh grade of regular school. Graduates of these schools were considered to have completed secondary education (or partial higher education). The MVD (formerly NKVD, the security police) also operates a network of schools on this level.

(4) *Party Schools.*—The fourth component in this category is the network of Communist Party schools. This network was very extensive in the late 1920's and throughout the 1930's. They were commonly called Soviet and party apparatus schools (*sovpartshkoly*). Training lasted from 6 months to 3 years and was designed to train managerial personnel on the lower and intermediate levels of the Soviet bureaucratic setup. Most of these schools operated during the day, but there were some evening schools as well. These schools were discontinued around 1937. Training in this type of school was considered the equivalent of intermediate and upper-grade training of the regular secondary school.

At the same time the party operated, and still does operate, a network of schools for party functionaries, agitators, organizers, etc. These are usually called simply party schools (*partinyye shkoly*), occasionally party schools for such-and-such a purpose. Training in this type of school is not equated to any specific level of the regular secondary school and constitutes special training in addition to the actual level of education attained by a person elsewhere.

3. *Higher Education* (*Vyssheye obrazovaniye*)

Higher education in Russia traces its origin back to the 18th century. All Soviet higher educational establishments are commonly called by abbreviation *VUZ* (*Vyssheye Uchebnoye Zavedeniye*—Higher Edu-

cational Establishment). Since the mid-1930's only persons with completed secondary education or its equivalent have access to higher educational establishments, and applicants are required to present either a maturity certificate or a certificate of completed secondary semiprofessional education. Acceptances are based on competitive examinations, which embrace the basic subjects of the secondary-school program. There is a large variety of names by which higher educational establishments are known, but the majority are called university (*universitet*) or institute (*institut*). Training lasts from 4 to 6 years, except in teachers' institutes (*uchitel'skiye instituty*), which up through 1955 prepared intermediate grade (5–7) teachers, where the training lasted for only 2 years. In recent years these institutes have been converted to 4-year training institutes, and it is contemplated that from now on most teacher-training institutes will offer 4-year training only. All higher educational establishments are considered to offer professional training.

All universities and a large number of institutes are under the direct administrative jurisdiction of what is now called the Union-Republic Ministry of Higher Education. Some higher educational establishments are still operated by other ministries, but their programs, as well as various other aspects of educational practice, are supervised and coordinated by the Ministry of Higher Education.

Persons who have successfully completed training in higher educational establishments are required either to pass state accrediting examinations or to defend their thesis-dissertation project before a specially appointed board or in some instances, to do both. If successful, they receive a diploma-certificate, which accredits them as having completed a certain type of professional training in a higher educational establishment. No actual degrees, as in the West European or American educational setting, are granted, the diploma-certificate serving as an accrediting substitute.

Higher educational establishments may offer either regular programs of training or extension-correspondence training. The latter is offered either by extension-correspondence divisions of regular or "permanent" higher educational establishments (*statsionarnyi VUZ*) or by extension-correspondence higher educational establishments (*zaochnyi VUZ*) engaged exclusively in this type of training. Some higher educational establishments operate evening divisions (*vecherneye otdeleniye*). Extension-correspondence training in higher educational establishments has expanded greatly, especially since World War II, and such training is regarded as equivalent to regular higher education. From an administrative point of view, all extension programs of higher education are supervised in the same way as regular higher educational establish-

ments. Throughout this volume, extension-correspondence training will be termed simply extension training (for discussion, see chs. III and IV).

In addition to regular higher educational establishments, there is a network of military, security police, party, and managerial higher educational establishments. Training in these institutions is regarded as equivalent to that in regular higher educational establishments in terms of level of certification.

As was mentioned earlier, however, the training in some military (company grade) officers schools is regarded as equivalent to that of secondary semiprofessional education or *partly* completed higher education. However, there are other military commissioned officers (company grade) schools (*voyennyye uchilishcha*) where the training is regarded as equivalent to *fully* completed higher education. Again, a similar situation exists in regard to officers and other professionals trained in schools of the security police administration (*NKVD, MVD—uchilishcha*). Some of these schools are equated to one level, others to another level of the regular educational structure.

Another type of military higher educational establishments are the military academies (*voyennaya akademiya*). These are regarded as fully accredited higher educational establishments. Military academies offer two types of training. First, they offer professional military training, which lasts from 4 to 6 years and is viewed as equivalent to training in regular higher educational establishments. Soviet military academies do not train cadets, and students entering these academies are primarily commissioned officers (who are often graduates of military officer schools discussed above). Such training usually leads to a promotion to field grade. Second, Soviet military academies perform the same function as does the system of graduate institutions in the Military Establishment in the United States (see further comment below). All military schools are operated by the appropriate branches of the Soviet armed services.

In the late 1920's and during the 1930's, the Communist Party operated a network of higher educational establishments. Training in these establishments was regarded as equivalent to that of regular higher educational establishments. Some of these were called Communist higher educational establishments (*Kom VUZ*); others were known as supreme communist schools of agriculture (*VKSKhSh—Vysshyye Kommunisticheskiye Sel'skokhozyaistvennye Shkoly*). The latter type trained primarily administrative and managerial personnel for agriculture; the former trained both party functionaries and managerial personnel. Both types of establishments were closed shortly before the war. In the postwar period the party has continued to operate an institution called the Higher Party School (*Vysshaya Partiinaya Shkola*), which is an accredited higher educational establishment.

Finally, there is a special type of institution, training in which is also regarded as equivalent to that in regular higher educational establishments. These are the industrial, managerial and trade union academies (*promakademii*). The network of these facilities was large in the 1930's, but after the war the number of such institutions grew smaller. These academies offer 2 to 4 years of training for leading managerial personnel. They are operated by various ministries and trade unions.

Although these party and managerial personnel training establishments are regarded as the equivalent of higher educational establishments, they are the only institutions on this level which do not require a certificate of completion of secondary education. At the same time, they are most restrictive in the selection of candidates for the training program, from the point of view of loyalty, party standing, past performance, etc.

4. *Advanced Training*

Persons who have completed higher education and who enter teaching, academic, or scientific research careers are permitted to enter advanced training-research (called *aspirantura; doktorantura*), which leads to two types of advanced degrees—the lower called candidate (*kandidat*), and the higher, doctor (*doktor*). The awarding of advanced degrees was reestablished in 1934. From the time of the Revolution and until 1934, advanced degrees were neither granted nor recognized in the Soviet Union. Before 1934, although advanced degrees were not granted, advanced training was in operation (see Chapter V for details). Advanced training-research programs are offered by higher educational establishments and by various research institutes, which do not participate in ordinary professional training below the level of advanced degrees. The selection of applicants is on a competitive basis, with some examinations, but selection is based almost entirely on the record of past performance. Advanced degrees may be awarded not only on the basis of advanced training-research, but also for certain scientific performance, published works, etc. In other words, advanced degrees may either be earned as a result of training or awarded as honorary degrees for certain accomplishments. Residence for the lower degree, that of candidate, theoretically should not exceed 3 years, and for the higher degree, that of doctor, should not exceed 4 years. Again, in theory, these degrees are sequential, and if they are obtained through regular advanced training-research, the higher cannot be obtained before the lower. All those who are engaged in advanced degree training-research—thus excluding those whose degrees are bestowed for individual merit—must publicly defend their dissertations before special boards of official opponents. Degrees are not awarded by the academic institutions or research establishments themselves, which

merely recommend the award to the Supreme Attestation Commission (called the *VAK—Vysshaya Attestatsionnaya Komissiya*), which is a special division within the Ministry of Higher Education and which accredits the recipient with the advanced degree.

Higher educational establishments and research institutes also offer extension training advanced degree programs, which are considered equivalent to regular advanced degree training.

It is important to note that in addition to the ordinary higher educational establishments and the research institutes operated either by various ministries or by various Academies of Sciences, all military academies offer advanced degree-training research. Furthermore, the party has its own Academy of Social Sciences, which offers advanced degrees to party theoreticians or functionaries.

Before World War II there were two other types of establishments concerned primarily with advanced political training. These were called the Institute of Red Professors (*Institut Krasnoi Professury*) and institutes of Marxism-Leninism. These institutes were most active before the reestablishment of advanced degrees in 1934.

Finally, there are in operation various graduate (advanced training) programs which do not result in the awarding of degrees. These are called either professional qualification improvement courses (*kursy usovershenstvovaniya*) or professional qualification improvement institutes (*instituty usovershenstvovaniya*). The former courses are given by higher educational establishments or research institutes on a temporary basis. The second type is given by establishments especially set up for this purpose. Training lasts anywhere from 2 months to 2 years.

As was mentioned above, military academies offer training programs which resemble the courses for the improvement of professional qualifications, but which is highly specialized training in given arms or levels of staffwork.

In summary, we may say that regular elementary and secondary education in the Soviet Union takes about 10 years. Pupils begin attending school at the age of 7, and if they are successful in all grades, complete regular school at the age of 17. Less fortunate or less competent pupils are diverted from regular school in the intermediate grades and are channeled into outlets training skilled labor, thus leading to employment at age 14 to 16. As an alternative to training in the upper grades of the regular secondary school, there is available specialized secondary semiprofessional training, which leads to employment at age 16 to 19. The diversion of a student from training in regular schools to a skilled labor training program, or the termination of regular education for any other reason, does not entirely restrict the chances for further education, which may be obtained, with considerable delay in years, in a roundabout fashion by making use of alternative educational facilities.

Completion of secondary education and an actual certification to that effect is an essential prerequisite for all types of higher education. If a student goes through regular 10-year school, he may enter a higher educational establishment at the age of 17 or even younger (see discussion in chapter IV in regard to the recent abolition of the minimum age requirement) and complete it at the age of 21 to 23. More frequently after several years of experience, and sometimes immediately upon graduation from a higher educational establishment, a student may enter advanced degree training-research, which lasts anywhere from 3 years on. Finally, there are numerous outlets which offer either extension education or special training and are officially considered equivalent to formal regular training. It is through these channels that a student may, with great delay, gain access to education at various levels.

How does this educational progress compare with that in the United States on an age basis? Children in this country start elementary school at the age of 6 and complete high school at the age of 18. College usually takes 4 years, and thus they are graduated at the age of 22. This may be followed by advanced degree training, which usually lasts from 1 to 4 years. Usually the first advanced degree is considered as essential for professional standing. Thus there is a close parallel in educational progress and age in the two countries.

In this section an attempt has been made to survey the structure of the Soviet educational system in all its complexity. It was intended as an introduction to the detailed discussion of various topics which are of particular interest. The next four chapters will deal with the details of Soviet elementary and secondary education, secondary semiprofessional training, professional education, and advanced degree training programs. Let us turn now to other aspects of the Soviet educational setting which are of great importance in understanding the problems of training of Soviet specialized personnel.

Administrative Supervision and Control over the Soviet Educational System

In the preceding section of this chapter, passing mention has been made of how the various educational institutions in the Soviet Union are administered or their training coordinated by various divisions of the Soviet Government. Since jurisdiction over Soviet education is divided among many outlets of Soviet governmental apparatus, one might think, at first glance, that there is a pattern of decentralization in the supervision and planning of Soviet education. In reality, however, there is centralized control. The operational features which bring together these seemingly independent units of institutional jurisdiction over Soviet education will be explored briefly in this section.

Preschool education, regular elementary and secondary schools, schools for rural youth, and schools for working youth are all supervised by the local departments of public education, which in turn are subordinate to regional officers of education, the latter, finally, being under the jurisdiction of the Republic Ministries of Education, one in each of the 16 republics which comprise the U. S. S. R. These ministries issue specific regulations in regard to methods of instruction, curricula, the use of textbooks. They supervise the allocation of funds, capital repair, and the construction of new school facilities. They handle appointments to teaching staffs and supervise teacher training. Finally, through a network of school inspectors, they make checks on the quality of instruction and on adherence to rules and regulations in individual schools.

These 16 Ministries of Education, however, make their specific directives and enforce their execution in accordance with decrees or laws issued by the Council of Ministers of the U. S. S. R. Furthermore, the Central Committee of the Communist Party, which has a Section on School Affairs, from time to time issues various educational policy directives which are binding for all republic ministries in the formulation of their policies or in the issuing of specific regulations. Finally, the Ministry of Education of the R. S. F. S. R. (Russian Republic), largely through its Section on Instruction and Methodology (*Uchebno-Metodicheskoye Upravleniye*), acts as a clearinghouse in regard to the use of textbooks, teaching methods, slight modifications in curricula, the scheduling of examinations, etc.

The actual mechanics of operation of this form of control appear to be as follows. The Central Committee itself, or jointly with the Council of Ministers, issues educational policy directives. These policies are then embodied into laws or regulations announced by the Council of Ministers of the U. S. S. R., and are binding for the U. S. S. R. at large. The Ministry of Education of the R. S. F. S. R. is the first to work out a set of ordinances in meticulous detail. Other Ministries of Education follow this pattern in their ordinances, with minor modifications, to suit certain local conditions.

Programs of formal training for skilled labor are supervised by various ministries in charge of given branches of the economy or given industries. Various schools and on-the-job apprentice courses, which are set up to train skilled labor, are administered directly by local economic units, plants or enterprises. One group of these training facilities, however, consists of schools (factory schools [*FZO*], trade schools, vocational technical schools) which are administered by the Main Administration of the State Labor Reserve, which is subordinate to the Council of Ministers of the U. S. S. R. It finances training programs, determines the program and length of training, supervises the draft of students, etc.

Training offered in military, MVD, party, and managerial personnel

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educational establishments is supervised by the respective administrative units. These administrative units are in turn directly subordinate to the Council of Ministers or to the Central Committee of the Communist Party.

Secondary semiprofessional establishments are financed and operated also by various ministries in charge of given branches of the Soviet economy or social services. However, the Main Administration of Secondary Semiprofessional Education, a division of the Ministry of Higher Education, supervises their curricula and training programs and determines the use of textbooks and the methods of instruction. It also determines enrollment quotas, the establishment of new facilities, and coordinates the placement of graduates.

Control over higher education, professional training, and advanced degree training is concentrated in the hands of the Ministry of Higher Education.[13] It controls teaching staff appointments, enrollment quotas, use of textbooks, and methods of instruction. It determines the program of training and specialization. In short, it is concerned with the overall supervision of all higher education in the U. S. S. R. However, some higher educational establishments are operated by various Soviet ministries which have jurisdiction over a given field of economic activity or social services. Thus, for example, the training of elementary and secondary school teachers in pedagogical institutes, teacher institutes, as well as advanced degree training in education, are administered by the 16 Republic Ministries of Education; the training of medical doctors is administered by the Union-Republic Ministry of Public Health, etc. Therefore the Ministry of Higher Education supervises all Soviet higher educational establishments in all aspects of their training programs. It also handles economic and administrative matters in most institutions; however, in some fields the latter are still handled directly by other ministries.

It is obvious, therefore, that either through the direct supervision of all aspects of administration or through the coordination and supervision of all aspects concerned directly with the process of instruction, the Ministry of Higher Education controls the formal training of professional and semiprofessional personnel in the U. S. S. R. This ministry, like any other ministry in the U. S. S. R., issues scores of ordinances and

[13] Former predecessors: (1) Prior to 1932 there was a decentralized pattern of administration, but the overall coordination was effected through the Section on Training of Cadres of the Gosplan; (2) 1932–36—administration called VKVTO (All-Union Committee on Higher and Technical Education) under the Central Executive Committee; (3) 1936–46—Administration called VKVSh (All-Union Committee on Higher Education) under the Council of Peoples Commissariats; (4) 1946–53—All-Union Ministry of Higher Education (called MVO); (5) 1953–54—Main Administration on Higher Education of the Ministry of Culture of the USSR; (6) 1954–55—All-Union Ministry (MVO); (7) in the spring of 1955, reorganized into the Union-Republic Ministry on Higher Education; and at that time also the Ministry of Higher Education for the Ukrainian Republic was organized.

operational directives, all of which are designed to implement certain aspects of educational policy. This latter, however, as in the case of elementary and secondary education, is decided upon jointly by the Central Committee of the Communist Party and the Council of Ministers of the U. S. S. R.

It is evident that the seemingly independent channels of administration over Soviet education converge at the top. This pyramid, as well as other pyramids of bureaucratic administration in the U. S. S. R., is permeated by other instruments of control. In any educational institution the party maintains its local cells; the subdivisions of the Ministry of Finance control budgets and financial transactions; the MVD maintains its security units; the Central Planning Commission controls various planning operations; regional units of the Central Statistical Administration check on the compilation of various statistics, etc. Through these multiple and interlocking instruments of control, the pyramid of Soviet administration over education is integrated further with other pyramids of the bureaucratic machinery of the Soviet state.

This section has indicated some of the administrative aspects of the Soviet educational system. The radical differences between the Soviet administration of education and that of Western Europe or the United States are obvious. In the Soviet Union, important educational policy decisions are reached not by individual educational establishments, but by central bodies of the Soviet governmental structure. Individual educational establishments or groups of facilities joined under certain branches of the educational administration have only limited autonomy in reaching day-to-day operational decisions. Such decisions are merely tools in the implementation of a certain aspect of educational policy, and the overall educational effort remains centrally coordinated and centrally supervised.

Military Draft and the Soviet Educational System

Power politics and international tensions are commonly translated by governments into requirements for military training and for military service. Military needs affect the pattern of utilization of existing manpower resources and particularly affect the flow of new additions to trained and specialized manpower resources of a nation. In most countries of the world today, military demands exercise their impact upon the educational opportunities of many individuals. The educational progress of many individuals is either terminated or considerably delayed by the military service policies.

The bureaucratic structure of Soviet society is such that militarization or mobilization of various branches of economic activity, services and personnel can be accomplished with relatively more ease as compared

with open democratic societies. Soviet society is organized in such a way that it is constantly kept in a state of partial mobilization which, with less effort than in other countries, can be transformed into total military mobilization. The overall pattern of administrative control and the concentration of authority in the Soviet system reflect the semimobilized state. This must be borne in mind when military training and military service policy concerning students, scientists, and professionals are being discussed.

Although obligatory military service has been the law in the Soviet Union since the early days of its existence, particularly during the 1920's and also during the 1930's, military draft laws contained various selective provisions. The administration of these laws prior to 1930 is of historical importance only.[14] It is interesting to note, however, that from about 1930 until 1939, all students in higher educational establishments and most students in secondary semiprofessional establishments were deferred from the military draft until they had completed their education, provided they were not over 28 years old. Thereafter, they could be drafted according to law, but were required to serve for 1 year only. However, as was pointed out by Marshal K. Voroshilov, Chief of the Soviet Armed Forces, in his speech in 1939,[15] graduates of higher educational institutions and trained semiprofessionals settled themselves in large part in various establishments, where they often managed to obtain new deferments even up to the age of 30, when they would be completely free from the draft. In 1939 this situation was denounced as an injustice to those who did not continue their education. Actually, the expediency of the times was more responsible for the change in the draft law, which had been in existence during the 1930's and which granted deferments to all those who continued with their education.

In September 1939, a law on universal military duty was adopted by the Soviet Government.[16] This law lowered the age of induction into military service, increased the length of service, and allegedly established new provisions as to deferment policy. The length of service was set at from 2 to 5 years. The age of induction was differentiated according to the former education of the draftees. It was stipulated that all males with completed secondary education were to be drafted at 18, and those without completed secondary education, at 19. Registration for the draft was set for January of each year, and actual induction into the service took place in September or October. The induction age, of 18

[14] Details may be found in H. J. Berman and M. Kerner, *Soviet Military Law and Administration*, Cambridge: Harvard University Press, 1955, passim.

[15] Verkhovnyi Sovet S. S. S. R.: Vneocherednaya Chetvertaya Sessiya (Supreme Soviet of the USSR: Fourth Extraordinary Session), August 28, 1939, *Stenograficheskii otchet* (Stenographic Recording of the Proceedings), Moscow, 1939, 185–186; *Pravda*, September 1, 1939.

[16] Verkhovnyi, Sovet S. S. S. R., op. cit.; *Pravda*, September 3, 1939. A discussion of the various provisions of this law is given in Berman and Kerner, op. cit., 35–43.

or 19, was specified as that which had been reached by the inductee during the draft year.[17]

At the same time article 20 of the new law stated that "no one [except the physically unfit, of course] is excused from induction except persons deferred to complete their education." [18] Another article (29) of the same law stated that all students attending a 10-year school could be deferred up to age 20 for the completion of their education. Despite these provisions, the law was proclaimed a drastic change designed to restore justice and to create equality for all Soviet citizens subject to the military draft. It was believed that this law would put an end to the preferential treatment of students in Soviet higher educational establishments and that graduates of the Soviet 10-year school would be called into service the very year of their graduation.

The second provision of the universal military duty act, article 29 mentioned above, was aimed at secondary-school students only. Overaged students in the upper grades of the Soviet 10-year school were deferred for a maximum of 2 years beyond the normal graduation age (18) in order to complete their secondary education, after which they would inevitably be drafted.

But the first provision of this law (art. 20) requires further attention. It does not single out secondary-school students only. It simply states that excuses from induction are granted to those who have received deferments to complete their education, the level and type of which is unspecified. This provision has become one of the most useful tools for promoting the selection of students for higher educational establishments and has undoubtedly exercised some impact upon secondary-school students.

In the 1930's the 10-year schools accepted children at the age of 8, but in many instances children who would not become 8 until some time during the academic year were also accepted. Thus the actual age of acceptance was 7 *or* 8, the latter being the common acceptance age among rural children.[19] At the same time, double promotions in the elementary grades were in common practice, and a child whose aptitudes permitted might be promoted from the first to the third or from the second to the fourth grade. Thus, even by 1939–41 there were children graduating from 10-year schools, not at age 18, but at 17 or even 16, the latter probably the brightest children (from urban areas primarily).

[17] Consequently the actual age of inductees during the fall draft was 18 to 18 and 8 months (for persons with completed secondary education) or 19 to 19 and 8 months (for persons without completed secondary education).

[18] *Pravda*, September 3, 1939. Summary in Gorokhoff, *Materials*, 16.

[19] In addition, in rural schools it was also common practice to postpone acceptances entirely in 1 year and have joint acceptances into the first grade of children in two age groups, 8 and 9, the next year.

In 1944, however, the entrance age for pupils in Soviet 10-year schools was lowered from 8 to 7 years.[20] Again, the specified acceptance age 7 includes those who are to become 7 during the academic year; i. e., they are still 6 when they enter the first grade. Consequently, the graduation age was also lowered from 18 to 17. In effect, this change assured that not only some, as formerly, but the majority of 10-year-school graduates could enter higher education without being subject to military service immediately upon graduation from the 10-year school. Upon entering the higher educational establishment, the student received deferment from the draft.

Until recently, Soviet higher educational establishments, according to law, accepted persons at age 17 to 35. The minimum age 17 was again interpreted loosely as referring either to those who already were 17 at the beginning of the school year or to those who would become 17 during the academic year; i. e., 16 when they entered. In 1955, however, in conformity with the lowering of the entrance age for pupils in the 10-year schools from 8 to 7, the minimum age requirement for acceptance into higher educational establishments was abolished.[21]

In 1940 the Committee on Higher Education issued a "clarification" that only those applicants who were already *registered* for the draft (*prizyvniki*) or who had had previous deferments (without further "clarification" of their draft status) were *not* to be accepted by higher educational establishments.[22] Thus, even in 1940, it was possible for 16- and 17-year-olds, commonly called predraftees (*doprizyvniki*), with completed secondary education to enter higher educational establishments upon meeting the other requirements (see ch. IV for further details) without even being perturbed by the legal requirements of the universal military duty law. Once a student entered a higher educational establishment, he could be deferred until the completion of his education according to the provisions for deferments in article 20. In effect, therefore, the practice of deferments from one year to another continued with only one difference: the less fortunate or less able secondary-school graduates were drafted immediately upon graduation,[23] while the rest could continue their education.

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[20] A. Danev (compiler), *Narodnoye obrazovaniye—Osnovnyye postanovleniye prikazy i instruktsii* (Popular Education—Major Decrees, Ordinances and Regulations), Moscow, 1948, 28. The decree of September 8, 1943, stipulated that beginning with the academic year 1944–45 *all* elementary schools would accept children at age 7. Actually, children of both ages (7 and 8) were accepted in the falls of 1944 and 1945, and only since the fall of 1946 have acceptances of the 7-year-old group become fully effective.

[21] *Trud,* May 21, 1955. This provision apparently became necessary because it is about 10 years (i. e., 1944) since the entrance age for the 10-year school was lowered.

[22] *Pravda,* June 25, 1940.

[23] According to the Voroshilov statement in 1939, about 145,000 secondary-school graduates were about to be drafted (*Pravda,* September 1, 1939). This represents about 60 percent of the 10-year school graduating class for that year.

At the height of the war and at the turning point in the German invasion of Soviet territory, a new law went into effect.[24] This law stipulated that all students in a list of some 85 higher educational establishments, primarily in the field of engineering, and also students in the two upper classes of all other higher educational establishments, as well as all students in the last year of secondary semiprofessional schools, were exempt (*osvobozhdayutsa*) from the military draft.

Until recently, this law has been overlooked by Western observers, and it has commonly been stated that everybody save the physically unfit were subject to military conscription in the Soviet Union. Only in Berman and Kerner's recent volume on Soviet military law has attention been given to the 1943 decree. The following interpretation regarding the military obligation of Soviet students was advanced by these authors:

> The 1939 law [i. e., the universal military service act] says nothing about exemption or deferment of students of higher educational institutions. A decree of the Council of Ministers of September 15, 1943, listed some 85 technical schools whose students were to be exempted from military service [i. e., the law just discussed]. The authors have found no other legislation on this subject. Apparently exemptions, and not mere deferments, are given rather generously to students who are engaged in pursuits considered vital for general military purposes, while other students are subject to conscription in their 18th year, if they have then completed secondary school, whether or not they are in a higher educational institution.[25]

Although Berman and Kerner recognize, in a footnote, exemptions for upper-course students, this interpretation stresses an exemption policy to only a limited number of higher education students. The situation is complicated further, however, by the fact that since students today enter the 10-year school at the earlier age of 7 and therefore graduate at 17, the majority of 10-year school graduates can enter higher education immediately upon graduation without being subject to the draft, and upon entering higher education, they may receive deferments and exemptions.

Today, therefore, the Soviet Union has a clear-cut policy of preferential treatment toward higher education students concerning the military draft. *Successful* secondary school graduates can enter higher education unperturbed by the draft law at age 17. From a number of articles which

[24] Verkhovnyi Sovet S. S. S. R., *Sobraniye zakonov, postanovlenii i rasporyazhenii* (Collection of Laws, Decrees and Ordinances), 1943, No. 12 (September 15, 1943), 216 ff. This source lists all institutions in the fields of: aviation, military supply, armaments, shipbuilding, ferrous metals, nonferrous metals, coal, electric power, tanks, medium machine building, machine tools, heavy machine building, oil, chemicals, rubber, construction, railroads, river and sea transport, communications, and other polytechnical-industrial engineering institutes. About 85 establishments listed give blanket draft exemptions.

[25] Berman and Kerner, op. cit., 38.

have appeared in the Soviet press in the last few years, it appears certain that students in higher educational establishments are accepted in the fall, primarily from among graduates of secondary schools who were graduated in the summer of the same year and, because of their age, are not yet subject to military draft. In other words, if one manages to enter and stay in a Soviet higher educational establishment, he is not likely to be inducted into military service.

Although it is conceivable that some of those who enjoy such preferential treatment are not necessarily the best students, on the whole the impact of the military draft policy creates an additional element in the selection of students both in secondary schools and in higher educational establishments. A student whose grade progress in secondary school is at least normal for his age has a good chance, because of the 1-year escape clause, to enter higher education. This is not feasible in the case of repeaters or for pupils entering school at an age over 7. In higher education, the draft policies exercise an additional force for maintaining a satisfactory academic record since failures lead to expulsion and subsequent loss of preferential status as far as military service obligation is concerned.

Before the war, graduates of higher educational establishments received, on the job, either exemption from military service or continuing deferments, which amounted to exemption. During the war mobilization, many branches of the Soviet economy were simply militarized; and many specialists, particularly in engineering and technical-managerial positions, were simply left on their jobs, though frequently a commissioned officer's rank was assigned to them. After the war there seems to have been a return to the prewar practice. The policy of straight exemption from military service, or deferments (which in the long run amount to exemptions), of students in higher education apparently constitutes an integral part of those policies offering preferential treatment to Soviet professionals, whose efforts in many instances are already integrated with the Soviet industrial and scientific buildup of military power potential.

CHAPTER TWO Soviet Primary and Secondary Education

The close interrelationship of the various levels of an educational system is universally recognized. The educational process consists in the gradual accumulation of knowledge and experience. The size of enrollment, the kind and methods of instruction, as well as many other factors, affect the quality of education on any given level of the educational system, and determine, to a great extent, the success of educational progress on the next level.

Accordingly, the successful performance at the secondary level depends upon primary education. The supply, quality, and preparation of secondary-school graduates affect not only the size of enrollment in higher educational establishments but frequently the quality and character of instruction. These facts are well recognized everywhere. Because of these broad considerations, it is important, before turning to an analysis of the training offered in the upper levels of the Soviet educational pyramid, to give some consideration to Soviet education on the various levels which precede it.

Preschool Education

Much has been said by American writers concerning the early socialization of Soviet children through state-operated creches and nursery schools. The fact is that very few children are affected by it, very few are placed in creches, and up to now only a small minority of all children have attended nursery schools.

Although creches are regarded as preschool educational establishments, their primary function consists of the nursing and care of infants in the age group from a few months to about 3 years. The operation of creches, where children are cared for from 9 to 14 hours daily, is supervised by the public health administration. If we give maximum benefit

to Soviet pronouncements, in the prewar period (1938–39), there were facilities for 700,000 to 800,000 children in creches. This number of places was sufficient to accommodate only about 7 percent of all children in the pertinent age group.[1] In the postwar period, Soviet sources have given considerably less publicity to creches than in the prewar years. Although there may have been some postwar increase in the number of places in creches, it is undoubtedly not great enough to have radically altered the situation which prevailed in the late 1930's.

Soviet nursery schools perform a function on the whole identical with that of our own nursery schools, though children in Soviet nursery schools remain there for about 9 hours daily. Nursery schools accommodate children from 3 to 7, and they are considered to be the first step in the Soviet educational system. In 1940 there were about 1,130,000 children enrolled in Soviet nursery schools.[2] Since there were in 1939 about 13 million children in the age group 3–7,[3] less than 9 percent of all eligible children were attending these establishments. It was planned that by 1950 there were to be 2,260,000 children in these nursery schools.[4] There is no confirmation that this figure was attained, but even if it was (which is doubtful), it would still represent a very low proportion of all children in the given age group.

While the overall enrollment in Soviet nursery schools is relatively small, it must be noted that the majority of them are operated in large urban and industrial centers. According to planned targets for 1941, Soviet collective farms maintained only about 14 percent of the total 21,100 nursery schools. It was planned that these collective farm facilities would accommodate only about 9 percent of the total 1,545,000 children scheduled to enroll in Soviet nursery schools in 1941.[5] These planned targets for 1941 represent a maximum which was not attained either in 1941 or in any other prewar year. These data illustrate the sharply pronounced rural-urban difference in the availability of preschool facilities throughout the 1930's. There is no reason to believe that the situation has changed markedly since then.

It has already been noted that, on the whole, Soviet nursery schools perform about the same function as nursery schools in this country. In addition, however, to the usual games, organized play, singing, gymnastic exercises, etc., most children who attend Soviet nursery schools learn the fundamentals of reading and arithmetic. In this connection, of course, it must be noted that the learning of such fundamentals by the relatively few Soviet children who attend nursery schools takes place at about the

[1] This statement is based on 1938 creche data and the population census of 1939. *Sots Stroi—1933–38,* p. 134; and F. Lorimer, *The Population of the Soviet Union: History and Prospects,* Geneva: League of Nations, 1946, 238.
[2] *Pravda,* March 15, 1946 (Voznesenski speech on 1946–50 plan).
[3] Lorimer, op. cit., 238.
[4] *Pravda,* March 15, 1946.
[5] *1941 Plan,* 621.

same age as for children in the United States. Some Soviet children are still attending nursery schools at 7, while the majority of American children in this age group (95 percent) are by this time enrolled in the first or second grade of the elementary school. The importance of this, however, lies in the fact that those Soviet children who do attend nursery schools in the U. S. S. R. have some advantage over other children when they enter the first grade of the primary school.

General Aspects of Elementary and Secondary Education

In recent years the general aspects of Soviet primary and secondary education, as well as various ideological, political, and cultural impacts upon it, have received considerable attention from Western observers of Soviet affairs. This study does not intend to duplicate these efforts and will forego a lengthy discussion of topics which have received consideration elsewhere. Since the emphasis here is on a factual account of certain developments in education, certain factors which highlight Soviet educational practices will be pointed out here only in a cursory fashion, and the reader interested in further detail is referred to other studies on this subject.

There are several major factors which highlight primary and secondary education in the U. S. S. R.[6] These are: (1) the monopoly of the State over all educational practices; (2) the complete secularization of education; (3) an introduction to productive work as an integral part of training; (4) the presence of physical and military training; (5) political indoctrination both in and out of school through partisan youth organizations; and (6) extensive emphasis on scientific subjects at all levels of training. Although most of these factors are recognized by the majority of Western observers of Soviet education, often individual observers select and emphasize only some of them. The factors which have been emphasized time and again are the monopoly of the state and political indoctrination. It is true—and most observers agree—that whatever the resolutions on educational matters may be, they frequently either originate directly in the central organs of the Communist Party or are approved by various echelons of it. It is the Marxian doctrine, augmented or modified in day-to-day interpretations by the central bodies of the Communist Party of the Soviet Union, which continues to be the dominant factor in Soviet educational policy. No religion, no private schools or instruction, no ideas alien to Soviet official dogma are tolerated in Soviet primary and secondary education. A materialistic outlook and service to the "cause" (i. e., the Soviet state) remain the

[6] N. Hans, *Comparative Education*, London: Routledge & Kegan Paul, Ltd., 1949, 214.

guiding principles of instruction. Ideas, facts, history, biology, and whatnot—all are held and taught in conformity with the prevailing interpretation. These facts are well known and have been justly emphasized on numerous occasions.

There are, however, other factors which are important in a consideration of the actual state of affairs in Soviet education. Some of them are probably implicit in the ideology or in the overall political, cultural, and social order of the Soviet system. However, they may be singled out without venturing into elaborate interpretative schemes.

Radical Shift in Educational Policy

From the time of the Revolution until 1931, Soviet education was a highly experimental and extremely permissive system.[7] This period in Soviet education is sometimes called a phase of courageous and brilliant experimentation with the ideas of Western liberal educators (Dewey, Kerschensteiner, Decroly, Parkhurst, Montessori). More frequently, however, this phase is termed by impartial observers, by former Soviet teachers, and by most Soviet educational pronouncements after 1931, a senseless and deplorable state of affairs. During this period there was widespread contention of the eventual "withering away of the school." Labor practice was advocated to replace schooling, and mere observation of life and environment was viewed as a substitute for learning. Collectivism was practiced to such an extreme that individual learning was replaced by group practice and individual grading was replaced by very uncertain group performance criteria. Social and political participation overshadowed all other pursuits. The teacher's authority was nil.

A radical change took place after 1931, when Soviet education went back to the old, well-tried, traditional methods of instruction. Emphasis began to be placed upon discipline and obedience, individual learning and grading, and the mastery of certain skills and knowledge. Training and a deliberately directed process of education replaced the emphasis on observation and environment. Social and political participation were pushed into the realm of extracurricular activities, and student interference with teaching was drastically curtailed. The authority of the teacher was restored.

This drastic change is associated by some observers with the consolidation of absolute power in the hands of a few, or of Stalin alone, and subsequent adjustments to this pattern of authority in the Soviet state. This change is also associated with an overall adjustment in ideological

[7] R. Bauer, *The New Man in Soviet Psychology*, Cambridge: Harvard University Press, 1952, 43–46.

and doctrinaire orientation and as a reflection of the general pattern of the restoration of the traditional symbols of authority. The results of this change are viewed as one of the first steps instrumental in the emergence of inequality. All of these interpretations have merit, each in its own way.

It is apparent, nevertheless, that the most important factor which motivated this reform was the simple practical consideration of the great and pressing need for young people to know the fundamental principles of science, to have adequate preparation in physics, mathematics, chemistry, and other natural sciences, to acquire habits of order and a sense of systematic learning. Aside from any ideological and political motivations or pronouncements which accompanied this radical reform, the rapid emergence of an industrial order demanded young people with such knowledge and habits as would be immediately useful and who would have sufficient preparation for further training in higher educational establishments. The original decree of September 1931, and others which followed, together with various forceful ideological and dogmatic rationalizations, embodied these aims and set forth the scope of Soviet elementary and secondary education as general education with stress on adequate literacy, general knowledge, and especially on a basic knowledge of the natural sciences.

From 1931 to 1934 various decrees were issued which embodied this educational policy in specific terms, such, for example, as the establishment of regular class instruction, home assignments, required attendance, regular composition of class contingents, individual grading, restored authority of the teacher, etc. These measures were all aimed at raising the standards of learning and tightening discipline. At the same time, of course, children were still indoctrinated in the Communist outlook on life. Finally, in 1934, entrance examinations, which covered the general program of study in secondary schools, were introduced for entrance into certain higher educational establishments. They replaced the tests used from 1926–27, which were very limited in coverage (mostly tests of literacy and "political understanding"). These requirements were made uniform for all higher educational establishments in 1936. From the mid-1930's, and until recently, upper grade instruction in secondary schools has been regarded primarily as preparatory to higher education.

Since about 1952, however, Soviet authorities have begun to stress the fact that whereas the upper grades of secondary schools used to prepare candidates primarily for higher educational establishments, at the present time the secondary school is supposed to prepare youth for what is now called "practical activity and freedom in the selection of occupation." Why this change of emphasis has taken place will become apparent from the presentation below. It is related to the principle of

polytechnical instruction in general education, which has again today come to the fore and therefore deserves special attention.

Polytechnical Instruction in General Education Schools

Polytechnical education (or polytechnism, as it is often called) is an essential part of the Marxian theory of education.[8] Marx envisaged that under communism every individual should have a many-sided development, which he claimed to be unattainable under capitalism because of the division of labor. With communism supposedly ending the division of labor and achieving unity between mental and physical labor, education would give each individual a broad and thoroughly integrated training in the theory and practice of all branches of production. Since none of these visions has materialized, the original Marxian concept in its adaptation in Lenin's slogan—"unity of theory and practice"—has meant a wide variety of instruction efforts in Soviet education.

For the last few decades "polytechnical education" has been a glorified phrase, with many Soviet educators of note and most official pronouncements on educational policy squeezing in a statement about it in one context or another. Among other things, "polytechnical education" has meant simply a study of applied subjects, a study of principles of agricultural or industrial techniques, vocational training of one sort or another, productive work in school workshops, laboratory work in science courses, the use of visual aids in teaching, excursions to industrial plants, etc. In fact, almost anything short of a textbook or a teacher's word has been referred to as "polytechnical instruction" at one time or another. Since there were so many instruction efforts which were called polytechnical, these policies have failed to gain precise and meaningful expression. In different periods they have meant different things.

After the Revolution and until about 1926–27, there was much talk about polytechnical instruction in its original Marxian concept, but neither facilities nor teaching staffs nor a comprehensive instruction program were available for its undertaking. During this period the very concept of organized learning was ambiguous and uncertain. Often the policy of the "proletarization of education"—i. e., preferential treatment of workers or their children, with total disregard of their intellectual capacity—was regarded as a sufficient condition to insure polytechnism. It was considered that by giving a bare minimum of learning to those who had previously toiled, polytechnism would automatically be achieved and the problem solved.

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[8] For an extensive discussion of the origins and development of this concept, see M. J. Shore, *Soviet Education: Its Psychology and Philosophy,* New York: Philosophical Library, 1947, esp. 146–150, 227–240.

Then, rapidly, under the expediency of the forthcoming industrialization of the late 1920's, the whole elementary- and secondary-school structure—and not merely its upper levels as was originally contemplated—was swept into vocational training under the slogan that "the school is nothing but a branch of the factory." At the same time everything practical and applied came into the forefront and every form of instruction went "polytechnical" whichever way one stretched this term. The majority of secondary schools were transformed into technical and vocational schools to meet the immediate need of supplying industry with skilled labor.[9] Narrow vocational training (monotechnism) was viewed as serving the goal of polytechnical education.

Before long, however, this rapid vocationalization had a sobering effect because of the drastic decline of scholarship in general. In 1931 and shortly thereafter, a series of decrees put an end to these extreme undertakings, and Soviet educators, armed with party and Government policy pronouncements, shaped the new concept of polytechnical education. From that time until the present, polytechnical education has been interpreted as the firm acquisition of applied knowledge and learning of the natural sciences, physics, chemistry, and mathematics. Once this pattern was established, around 1937, there was less talk about polytechnical instruction, for a short period at least. Since 1952, however, the drive to reinforce polytechnical education in the primary and secondary schools, has not differed from the concept [10] which establishes that practical instruction is designed to supplement theory taught in regular classes by traditional and conservative instruction methods.

It thus appears that whatever the reasons, cause of debate and ideological arguments about polytechnical education which have raged with varying intensity since the early 1920's, the practical result is that science subjects are taught in Soviet secondary schools with much greater emphasis than they would be otherwise. The orthodox interpretation of Lenin's original pronouncement of "unity of theory and practice" during the last two decades has been such that the fundamentals of science are taught in the classroom first and then supplemented by the "practical application of science in the formation of work habits.[11] At the present time there seems to be a unanimous contempt for what is called naked technicism or applied vocational training without theoretical foundation.

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[9] Interesting observations on this process may be found in R. Widmayer, *The Communist Party and the Soviet Schools, 1917–1937,* unpublished Ph. D. thesis, Harvard University, 1952.

[10] M. N. Skatkin, *O politekhnicheskom obrazovanii v obshcheobrazovatel'noi shkole* (Concerning Polytechnical Education in Secondary Schools for General Education), Moscow, 1953. Of course there are many other articles on this subject which have appeared recently, but this particular reference is cited because its author is a member of the Research Institute on Methods of Instruction of the Academy of Pedagogical Science of the R. S. F. S. R.

[11] Ibid., 13.

Up until now polytechnical instruction has not gained ground in the U. S. S. R. because of a lack of facilities—laboratories, equipment, tools, and other essentials necessary to its proper conduct. Furthermore, the teachers are not prepared and do not know how to handle the various implements of polytechnical education. Polytechnical instruction is an expensive undertaking which frequently does not produce as satisfactory results as are expected of it. Verbal instruction, textbook learning, classroom explanations are undoubtedly much cheaper and frequently more effective ways of instruction. The recent drive may eventually result in overcoming some of the obstacles, and industry may be able to supply the essentials so that Soviet schools can conduct polytechnical training. This, however, is still in the future.

What effect has the polytechnical principle had upon the actual program of instruction in elementary and secondary schools? There are some schools which have workshops and laboratory facilities in which the students are required to work. On the whole, however, since there is still a lack of sufficient laboratory space, physical equipment and other aids in the schools themselves, the students are taken out on frequent excursions to factories, power stations, fields, forests, etc. There they are shown the operation of mechanical equipment, technological processes are explained to them, and the processes of nature are observed. In addition, they are assigned problems either worded in technical language or adopted directly from technical practice. They are instructed to prepare various drawings and charts. In addition, whenever the facilities are available, the students are urged to participate in various clubs (*kruzhki*), such as amateur radio, electrotechnical, aircraft modeling, etc. These frequently time-consuming undertakings are evidently carried out in addition to regular classwork. This type of instruction, strictly speaking, is not what was originally meant by polytechnical instruction, but even in modified form it serves some definite purpose. On the one hand, it undoubtedly helps to arouse natural curiosity in applied technical fields, and, on the other, to some extent at least, it satisfies this curiosity and provides some practical answers.

However, these various undertakings place additional burdens upon the Soviet teacher as well as on the pupils themselves. In this connection, it may be mentioned that the recent influx of students into grades 8–10 (see enrollment trends, below) has meant that the Soviet teacher is faced with a more mediocre student body, which may not be as interested, as well prepared, or as academically capable of mastering the curriculum. As a result, it must be modified and filled with practical examples and applications, partly to hold the student's interest, partly to arouse it, and partly because these future graduates of the 10-year school will not all go on to higher educational establishments but will go to work in industry or elsewhere. This is one of the reasons for the most recent

modification of the curriculum in the Soviet primary and secondary school. Limited as it is, polytechnical education provides some tangible benefits to the process of learning by supplementing class instruction, the verbal transmission of knowledge and traditional methods of teaching, which today are still not undermined, at least on the secondary-school level, by applied pursuits in any drastic way.

Curriculum

As has already been mentioned in the previous chapter, there are three levels of instruction in the Soviet school: elementary, intermediate, and upper. In the United States the educational system is administered locally and the programs of instruction vary and are frequently affected by local conditions. In the Soviet Union, however, although the primary- and secondary-school system is theoretically not centrally administered, the program of instruction offered by various schools throughout the country is centrally prescribed and regulated. It is therefore justifiable to speak of uniformity of curricula and scope of instruction in the U. S. S. R. This of course does not mean to imply that the educational standards are uniformly upheld or enforced with equal rigidity in various localities. There are undoubtedly some regional differences as to standards of instruction, but this has to be considered separately since this is already a problem of implementation rather than uniformity of curricula. Uniformity of curricula is one of the distinctive features of Soviet education on all three levels of the 10-year school.

One of the fundamental criteria in the assessment of primary and secondary education, as well as any other formal program of training, is the instruction curriculum. Table 1 presents a summary of the general curriculum of the Soviet elementary and secondary school.[12] During 10 years of school attendance a Soviet pupil is expected to spend about 2,000 days in school, which does not differ markedly from the number of days required in many of our own schools for a 12-year period.[13] The Soviet 10-year school curriculum is based on a 6-day week and on 33 weeks of instruction per year, or roughly 9,700 class instruction hours during the 10-year period, which again compares favorably with the required time input of our own primary and secondary school pupils during the 12-year period. Of course, it must be noted that

[12] For more details, see appendix to chapter II, table B, and comments to table B.
[13] U. S. S. R.: 198 attendance days per annum, or a total of 1,980 during 10 years. United States: depending upon locality, the number of attendance days varies; the national average is about 180 attendance days, or a total of 2,160 during 12 years. It should be noted, however, that the Soviet hours are instructional hours only and exclude time spent in preparing for and in taking final examinations in all grades after the fourth. The time thus spent varies from 2 to 4 weeks.

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actual attendance at school is lower for both countries because of absences for one reason or another.

If we analyze the time allocated to various subjects, we find a strong reflection of the tendencies which were already mentioned above. Table 1 follows:

TABLE 1.—*Summary of curriculum in Soviet primary and secondary schools*

Group of subjects	Allocation in percent of class instruction time by level of grades			
	Elementary grades 1–4	*Intermediate grades 5–7*	*Upper grades 8–10*	*All grades 1–10*
1. General education	57. 5	54. 2	50. 0	53. 9
2. Mathematics and science	28. 5	36. 3	40. 8	35. 2
3. Other	14. 0	9. 5	9. 2	10. 9
Total number of class instruction hours	3, 300	3, 135	3, 234	9, 699

Source: Table B, appendix to ch. II. See this appendix for further details on individual subjects and their grouping into the generalized version of the curriculum.

More details about the curriculum are given in the appendix, which presents a summary of syllabi in individual subjects. Also the teaching of individual subjects has been extensively discussed by Ashby.[14] For the purposes of the present discussion, it is important to stress that on several counts the Soviet curriculum is substantially different from that in American schools. Among the general education subjects, foreign language and geography are emphasized to a much greater extent than in this country. Mathematics and science courses are stressed extensively, especially in the upper grades, where almost 41 percent of all instruction time is devoted to these subjects. It is difficult to make a meaningful comparison of the time devoted to science and mathematics courses in the Soviet Union with the American curriculum because of the wide variation in the amount of time devoted to science and mathematics courses by American high schools.[15] This becomes even more significant when it is considered that Soviet 10-year schools do not offer any optional or elective courses, which are usual in American secondary education. Despite the variations in the time allocated to science in American high schools, it is obvious that in most instances it is substantially less than in the Soviet case. In addition, because of the electives system, only a

[14] E. Ashby, *Scientist in Russia,* New York: Penguin Books, 1947, esp. 51–55.

[15] Aside from the smaller number of instruction hours devoted to these subjects, in 1947–48 only about one-half of United States high-school students were enrolled in one of the commonly offered science courses (general science, biology, chemistry, physics). The proportion of students who took any one of these subjects was, of course, substantially smaller. U. S. Federal Security Agency, Office of Education, *The Teaching of Science in Public High Schools,* Bulletin No. 9, Washington, D. C., 1950.

small portion of all students in American high schools ever take courses in science and mathematics at all. Of course the great concentration on science instruction in the Soviet Union may be at the expense of what many of our educators would consider essential subjects for a balanced general education. However great the latter sacrifice may be, the fact remains that the Soviet educational system offers much more than our own in the teaching of science at the secondary-school level. In summary, high concentration on science instruction is a distinctive feature of Soviet secondary education.

Some Qualitative Aspects of Primary and Secondary Education

The expression "quality of education," though used by many people and by this author as well, cannot be defined with precision. It is a relative concept. It is an aggregation of observations to which specific weights cannot be assigned. Some of the components which determine it are intangible, while others, though occasionally immeasurable, are nevertheless observable magnitudes. One of the observable and measurable determinants of the quality of education is the curriculum discussed above. Another which will be discussed below is a combination of measures and particularly their effectiveness in enforcing standards of learning.

The student-teacher ratio is an important criterion in any educational setting. During the last 25 years there has been a considerable improvement in this ratio in the Soviet Union. While in 1930 there were 36 primary and secondary school students per teacher and in 1940 there were 28 students per teacher, by 1950 the student-teacher ratio had been reduced to 23 to 1.[16] This ratio has improved even more in the 1950's because of the general drop in enrollment (see discussion below). The training of teachers will be discussed in subsequent parts of this study. For now it is sufficient to note that there has been a marked improvement in teacher training, and that the proportion of teachers with special pedagogical education has increased considerably. Although Soviet press reports occasionally still complain of the poor quality of teaching, in recent years these complaints have been both less frequent and less urgent than in the early and mid-1930's.

The teaching load of a Soviet teacher is quite heavy. In the elementary grades he teaches all the subjects offered, which amounts to about 30 teaching hours per week. In the intermediate and upper grades, the time spent in instruction each week is from 18 to 24 hours. When all other activities which he is required to pursue are considered (i. e.,

[16] See supplement to table C–1, appendix to ch. II.

grading, class preparation, staff meetings, etc.), the total time invested by the Soviet teacher is probably upwards of 40 hours a week.

The methods of instruction vary from one subject to another, but they invariably stress traditional classroom instruction procedures. In all syllabi at least 20 percent of the time is devoted to repetition,[17] and the golden rule of the traditional school—*repetitio mater studeorum est*—is honored in Soviet schools.

Over the last 25 years, or since the late 1930's, about 1 billion copies of textbooks have been printed. While the supply of texts has been adequate, many are reprints of books the content of which has remained unaltered for almost two decades. This is especially true of mathematics, physics, chemistry, and grammar texts, which have not been withdrawn for revisions or modifications. In other fields, like biology, literature, and—particularly—history, there is a chronic mania for revision (ambiguously called improvements), and the changes are but a reflection of required conformity and adjustment to ideological pronouncements and shifts in policy. Consequently, in these fields there has been little stability in the use of texts and the supply has been irregular.

Textbooks are therefore one of the first elements in the educational process to be affected by political and ideological pressures. Ideological and political interference is present at every level of the Soviet educational system. Many studies have already dealt extensively with this aspect, and this presentation can therefore be limited to the following observations.

Political and ideological bias is present in all subjects and is explicitly written into syllabi. Efforts to form a definite world outlook go far beyond the commonly accepted practice in Western educational policy of interpreting certain facts or events.[18] They also involve distortion of such facts whenever it usefully serves the ends of molding opinion. Since ideological and political interference occurs in various subjects, the question arises as to what extent this phenomenon affects the quality of learning.

As other observers have pointed out,[19] official Soviet pedagogy stresses the fact that all subjects must be taught in such a way as to develop in the young the "world view" of Marxism and Bolshevism. This represents an aim which determines what *ought* to be, an aim which requires further comment.

To begin with, there are various subjects of instruction (i. e., history, geography, literature, and biology) where there is abundant room for the application of ideological bias. When this bias is applied, the student

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[17] NKP–RSFSR *Programmy srednei shkoly* (The Programs of the Secondary School), Moscow, 1941, passim.

[18] In this regard, see the interesting observations by Ashby, op. cit., esp. 50–51 and passim.

[19] See particularly G. S. Counts and N. Lodge, *The Country of the Blind,* Boston: Houghton Mifflin Co., 1949, esp. 258–261.

is faced with distorted facts. At the same time, however, there are other subjects (i. e., mathematics, physics, chemistry, and other natural sciences) where the free application of ideological bias is limited. Arithmetic, algebra, trigonometry, geometry, the laws of classical physics, chemistry—these remain the same whether politically biased phraseology is used or not. In this regard, one must remember that advanced scientific theories are not, of course, taught on the secondary-school level (and hence a student would have no notion of why certain propositions of quantum mechanics or the theory of relativity were attacked on ideological grounds). In these subjects the student must master basic principles and be able to apply them in the solution of problems. Laws and the solutions to problems remain the same whether the problem is stated in verbalisms glorifying the Soviet state or is stated contemptuously in words depicting capitalist conditions. Thus the teaching of these subjects suffers less than in those fields where an interpretive bias can be freely applied. These conditions are but the starting point in a race in which the sciences win and the humanities lose in the Soviet educational setting.

A second proposition to be borne in mind is that even though we know of the imposing aims of indoctrination, we cannot be certain of how effective this indoctrination actually is. There is some evidence that it is not as overwhelming and as detrimental to the acquisition of knowledge as one might expect. One clue is that a million or more refugees, who had for many years been subjected to these processes of indoctrination, later—when they were in no imminent physical danger—rejected what they had been taught. A second clue is the cry of Soviet propaganda, after a generation has grown up under conditions of indoctrination, that there are heretics, there is "formalism" and "mechanical" learning of the principles of Marxism-Leninism and their application in various subjects of instruction, that the teaching of these principles and their "conscious understanding" must be strengthened, etc. A third clue is the pronouncements of those who escaped and lived to tell about the actual state of affairs in the Soviet Union.

Some observers have noted, in processing refugee interview data, a pattern of outward ideological conformity among former Soviet citizens in general, and among Soviet intellectuals, scientists, and teachers in particular.[20] One former Soviet teacher even claims that he does not recall any "sincerely convinced Communists" among the Soviet teachers that he knew.[21] While such an extreme statement is not always applicable, the effect of political and ideological interference on Soviet

[20] B. Moore, *Terror and Progress, U. S. S. R.*, Cambridge: Harvard University Press, 1954, passim, and A. Herzer, *Bolschewismus und Menschenbildung*, Hamburg, 1954, esp. 153 ff.

[21] "The Soviet Party School," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 29.

education is so extensive that a correct understanding of it is necessary if its detrimental effects upon the quality of instruction are to be weighed honestly.

Political and ideological interference in Soviet education is strong in some subjects and weak in others. While there are undoubtedly residual effects upon the mental outlook of individuals brought up under Soviet rule, there is also evidence that such interference does not create an insurmountable obstacle to the acquisition of knowledge, especially in fields important for technical development and scientific activity.

Finally, the changing role of partisan youth organizations in the Soviet Union must be mentioned. In the 1920's and at the beginning of the 1930's, Communist youth organizations, both the Young Communist League (Komsomol) and its outlet for younger children ages 9–14 (Pioneers) caused considerable interference with the actual day-to-day operation of and the teaching in primary and secondary schools. However, today, after the reforms of the mid-1930's and the various measures introduced during the war, these two political organizations have become a useful tool in the hands of the regular school administration and the Soviet teacher. Prior to the early 1930's these two political organizations were in fact elite groups and had a free hand in various forms of interference with the work of the teacher and with various school affairs. In 1948, however, the primary and secondary schools had 12 million Pioneer members [22] and over 1 million Young Communist League members,[23] which made them such extensive mass organizations that their membership included almost one-half of the entire school enrollment. Over the last two decades their right of direct interference with the instruction program has not only been almost completely curtailed but their functions have been redesigned to aid the teacher and the school administration in maintaining discipline, in promoting learning and in coordinating extracurricular activities, which in most instances bear greater emphasis on sports, recreation and creative pursuits rather than on politics per se.

Soviet refugee accounts almost without exception emphasize the fact that the popularity of these organizations stems not from their political appeal, but from various tangible benefits they offer to children. By their own observation or through their parents' suggestion, children begin to realize at an early age that such membership is proper, beneficial for their future career, and that it provides immediate rewards as well. After all, few pupils can resist the temptations of wearing the red scarf of a Pioneer if it means 2 weeks of summer camp free, admission to clubs where all sorts of gadgets can be observed and made, and

[22] *Komsomol'skaya Pravda,* October 29, 1948 (Mikhailov, Secretary General of Komsomol, speech).
[23] Ibid., August 27, 1948 (Mikhailov article).

admission to puppet shows and movies at half price. The youth's conscience is apparently not bothered by applauding once a month at a general meeting of the Young Communist League local some oratory concerning what Lenin said 40 years ago, if his presence establishes for him a "good record" which may eventually improve his chances of being admitted to a higher educational establishment or of getting a slightly better job than he actually deserves. Under such conditions it can be openly debated how much of these activities and participation are just a sham and how much they contribute to the training of ex fide fortis.

It is evident from the foregoing discussion that these and other aspects must be considered before a statement concerning quality of instruction in Soviet schools can be made. Some Soviet refugees who are bitter opponents of the Soviet regime admit that while in the early 1930's scholarship in Soviet primary and secondary schools was drastically low, "by 1940 the 10-year schools were graduating thoroughly literate and educated boys and girls." [24] Another half dozen refugee accounts state in a more general fashion that the quality of primary- and secondary-school training underwent considerable improvement toward the end of the 1930's.

Examinations and Grading

In any educational setting it is difficult to judge to what extent standards of learning are enforced. In the Soviet Union all textbooks used in schools throughout the country are prepared, approved, and even printed and distributed through the central organs of educational administration. Syllabi in most subjects are also uniformly prescribed throughout the country. Nevertheless, variation of instruction standards or deviation from the prescribed curriculum are possible, as Soviet press reports reveal. In the last 20 years, however, an elaborate system of control which tends to diminish such possibilities has been developed.

There are two major devices which are designed both to enforce uniform standards of learning and to foster adherence to the centrally prescribed syllabi of instruction. The first of these is an extensive hierarchy of school inspectors, who are concerned not only with school accommodations or buildings but also and primarily with the quality and program of classroom instruction. These inspectors make periodic checks on the teacher's performance, his adherence to standard grading techniques and to the prescribed coverage of instruction material in any given subject. They may make sudden appearances in classrooms, examine

[24] "My Experiences as a Soviet School Teacher," unpublished manuscript, in English, New York: Research Program on the U. S. S. R., 14.

the teaching record book (*klasnyi zhurnal*), in which the teacher enters topics covered during the instruction period and home assignments, and the student record book (*klasnyi dnevnik*), in which the teacher keeps a record of grades received by a pupil during the year in oral recitation and written quizzes. Finally, school inspectors may order written examinations for the entire class or may quiz individual pupils orally.

Since the early 1930's Soviet educational authorities have established standard grades and quite elaborate rules for grading procedures. There are five numerical grades (1 to 5), with passing grade 3 or higher.[25] Pupils receive cumulative grades during the year, and at the end of the year must take examinations in a number of subjects. A passing grade in all subjects is required for promotion to the next grade, or for graduation.

There are two types of final examinations. Regular promotion examinations are given at the end of the 5th, 6th, 8th, and 9th grades. Certification examinations are given at the end of the 4th, 7th, and 10th grades (i. e., at the completion of each level of the primary and secondary school). For the last 15 years examinations for all grades have been prepared by the central educational authorities, are conducted on a nationwide basis, and are delivered, just prior to examination time, to the individual teachers. It is known that in 1955 the teachers themselves were permitted to prepare their own promotion examinations (i. e., in grades 5, 6, 8, 9),[26] but the certification examinations (i. e., in grades 4, 7, 10) are still prepared by the central educational authorities. Thus, although certification examinations are *conducted* by individual teachers locally, the teachers have no control over the actual examination questions. The same set of examinations is given simultaneously in various localities. Since they are based on a standard curriculum, the teachers are forced to adhere to it or else face the consequences if their class is not well prepared.

Examinations may be of the oral or written type. Oral questions for certification examinations are prepared by the central authorities on printed cards. Written examinations are corrected by the individual teachers, but are spot checked by an outsider, usually a teacher of the same subject, from another school, who is appointed by the local educational authorities. Two outsiders are also present at all oral examinations, which are conducted and recorded in accordance with an elaborate set of rules.

Until recently there were about 44 final examinations given during the 10-year school course. In 1954 the total number of examinations (pri-

[25] The numerical grading system came into existence at the beginning of the 1940's, replacing the earlier descriptive grading system (very poor, poor, passing, good, excellent), which made for difficulty in ascertaining cumulative grades.

[26] *Uchitel'skaya Gazeta*, January 8, 1955; *Trud*, January 9, 1955.

marily promotion examinations) was reduced to 26.[27] This reduction, however, did not affect the rules regarding certification examinations. As others have also pointed out,[28] all final grades received by a pupil during his 10 years of study are very important since they facilitate or deter his admission to other educational establishments. If a student has excellent (i. e., grade 5) grades in 90 percent of his subjects, he may be admitted to a higher educational establishment without entrance examinations after he has completed the 10th grade, or to a secondary semiprofessional school after the 7th grade (see chs. III and IV respectively).

Beginning in the mid-1930's, Soviet educational authorities waged numerous campaigns against laxity in grading. The devices described above were designed primarily to establish some degree of check upon a teacher's bias in the evaluation of a student's performance. In Soviet schools, even though an honor code is implicit in grading procedures, as in any other school system, it is sometimes difficult to account for the various factors which may affect a teacher's decision in grading a student's academic performance. Prior to the reforms in the 1930's, direct and extensive pressures were exerted on teachers by student political organizations and school administrations to violate the honor code by favoring certain pupils (i. e., descendents of "proletarian classes," Young Communist League members, pupils active in the Pioneers, etc.). Refugee accounts stress invariably that prior to the mid-1930's there was marked laxity in grading children of party members and politically active students. With the restoration of the teacher's authority, these direct pressures were probably relieved to a large extent, but not eliminated altogether.

There is a further factor which is important in this connection. Before World War II the teacher's own performance was subject to judgment by Soviet educational authorities on the basis of the rate of passing grades his students received. This phenomenon was a motive for some of the laxity in grading which was in existence. During the war, however, numerous regulations were issued designed to put an end to this erroneous practice. To what extent these measures were successful is impossible to ascertain, but at least various steps were taken to restore and to uphold the academic honor code in grading.

In regard to the situation in the 1930's, one former Soviet secondary-school teacher reported from his own experience that while teachers usually gave at least passing grades to about 90 percent of their pupils,

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[27] *Izvestiya,* May 20, July 26, 1954. In the past there were 38 scheduled subject examinations, 6 of which were both written and oral, thus bringing the total to 44 final examinations. In the spring of 1954 this total was cut to 26.

[28] Ashby, op. cit., 55–58.

truly unbiased grading would justify passing grades to only 55 percent.[29] He noted, however, that the situation improved immensely toward the late 1930's in that a teacher could exercise the prerogative of flunking, when he felt this was justifiable, without having his reputation suffer. From various accounts appearing in the Soviet press, biased grading and favoritism have not disappeared entirely, but have undoubtedly been curtailed drastically over the last 20 years.

Although it is difficult to ascertain the overall effects of the various devices mentioned above upon the quality or uniformity of instruction, there has at least been a conscious attempt to suppress local variations and to discourage personal ties between teachers and students by insistence on uniform adherence to a general curriculum and standard grading practice. Despite this, the Soviet teacher is faced with the dilemma of adhering to a standard curriculum and rigid grading requirements and at the same time of meeting the mass-oriented standards of learning with the inherent pressure to see that his students receive passing grades.

The Process of Selection

Any educational system may be likened to a pyramid, each successive level of which offers training to a smaller number of individuals than the preceding one. The means by which some individuals ascend this pyramid and which at the same time prevent others from ascending it are conditioned by a variety of factors. These factors account for what is commonly called the process of selection and they may be grouped into two general categories: academic factors and all other nonacademic factors. This division is an arbitrary one, since the successful operation of the first group is greatly influenced by the second.

In the Soviet educational system the selection process is of great importance. It is a device through which Soviet propaganda can make extravagant claims that every Soviet citizen has a right to education and to the limitless development of his intellectual capacity. In reality, however, it operates to give extensive education to a few of the fittest and limited education to the many, who get what Stalin has called "education sufficient to become active participants in social development." [30] What constitutes a "sufficient" amount of education is determined primarily by various factors which occur in the process of selection.

The heavy curriculum, elaborate examinations, and grading procedures, the requirement stipulating that students have all passing

[29] "Teaching of Russian in Secondary Schools in Kirghizia," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 32.

[30] J. Stalin, *Ekonomicheskiye problemy sotsialisma* (Economic Problems of Socialism), Moscow, 1953, 68–69.

cumulative annual grades before even being allowed to take final examinations, promotions based on the requirement of passing grades in all subjects—all of these factors account for what an American who attended a Soviet 10-year school has called "a pace of schoolwork far more rigorous than any encountered in the United States." [21] He was referring to the situation in Soviet schools in the late 1930's when many of the devices fostering selection were already in operation.

The results of academic selection can be shown by the success rate of students. In the prewar period Soviet authorities used to publish the success rate and the termination (dropout) rate for each grade in the Soviet elementary and secondary schools. Table 2 shows these rates for the academic year 1937–38, when enrollment was approximately at its peak for the prewar period. The data reveal that during that academic year, from 4 to 9 percent of pupils in most grades dropped out of school before the end of the year.

[21] G. Fischer, "My Soviet School Days," *The Reporter*, vol. I, No. 9 (August 16, 1949), 5.

TABLE 2.—*Termination rate and academic success rate in Soviet elementary and secondary schools in 1937–38*

Grade	(A) Termination rate (in percent)[a]	(B) Annual success rate (in percent)[b]	(C) Computed hypothetical cumulative success rate per 1,000 entering students [c]	Promotions and graduations
			1,000	Entering class.
1	93.4	89.9	840	To grade 2.
2	96.9	91.5	745	To grade 3.
3	96.0	88.7	634	To grade 4.
4	95.1	78.8	475	To grade 5.
5	90.7	73.5	317	To grade 6.
6	93.0	75.0	221	To grade 7.
7	94.0	75.9	158	To grade 8.
8	75.8	72.9	88	To grade 9.
9	80.7	77.7	55	To grade 10.
10	91.8	88.6	45	Graduated.

Source: *Kul't Stroi—1940*, 78.

[a] Termination rate: Students in school at the end of the year in a given grade in percent of the students in that grade at the beginning of the year.

[b] Annual success rate: Students who were present at the end of the year and were promoted to the next grade or graduated.

[c] Hypothetical cumulative success rate: Computed from columns (A) and (B) for each successive year on the base 1,000 pupils entering the 1st grade.

However, a substantially larger proportion (20 to 25 percent) of students enrolled at the beginning of the year dropped out in grades 8 and 9. Promotions to the next grade were about 90 percent in grades 1 through 3. In the 10th grade, when many of the less fit had by now been eliminated, graduations were also close to 90 percent. In grades 4 through 9, only about 75 percent were promoted to the next grade each year. From these rates a hypothetical success rate for students in the entire 10-year school may be obtained, which indicates that in the 1930's only about 45 students per 1,000 entering pupils were graduated after 10 years of school.

This hypothetical success rate is verifiable by actual figures. In the fall of 1930 there were about 5,798,000 pupils in the first grade.[32] In 1940 about 285,000 students were graduated from the 10th grade.[33] From these figures, we may ascertain that 49 students per 1,000 who entered the first grade in 1930 completed their 10 years of school in 1940.[34] This is a slight variation from the hypothetical data presented in table 2; but the data in this table are of greater interest since they provide some information on the process of selection by grade level.

While the termination rate suggests that there are in operation various nonacademic factors of selection (especially in grades 8 and 9 when many students drop out to take employment), the success rate illustrates vividly the process of selection of the academically fittest. It can be argued that such a low cumulative rate of success (i. e., less than 50 graduations per 1,000 acceptances) indicates the inefficiency of the school system in its inability to adjust its instruction methods to accommodate the many average students and to use more flexible policies in order to get more students through school. However, if the Soviet rate of success of students in the 10-year school is compared with that in other countries, it is apparent that while in the United States many more students complete primary and secondary school, in most European countries, and particularly in England because there the process of selection is even more stringent, the success rates are lower than those in the Soviet Union. Therefore, it is the capacity of the school facilities and the deliberate educational policies, rather than the quality of those who survive under the pressure of academic selection and personal circumstances, which account for the low success rate. In other words, the Soviet school succeeds in weeding out the least fit rather than in attracting and harnessing dormant intellectual talent.

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[32] *Nar Khoz—1932*, 520.

[33] See table A–2, appendix to ch. II for sources.

[34] Of course it should be noted that these figures do not account for secondary semiprofessional school graduates. If graduates of regular 10-year schools, together with graduates from technicums are considered, then in 1940, there were about 70 graduations per 1,000 acceptances in 1930.

As a result of this process of selection, in 1939, for example, about 82 percent of children of school age (at that time 8 to 18) attended the Soviet 10-year school. Table 3 reveals the approximate relationship between age and school attendance in 1939. The data reveal that because of compulsory education in the elementary grades (see further discussion below) and the consequently relatively small rate of dropouts, some overaged pupils are kept in the elementary grades as repeaters. Thus there are more pupils in these grades than there are in the respective age group. Selection sets in at the intermediate-grade level, and the percentage of the appropriate age group attending school drops to about 72. Finally, in the upper grades, only about 20 percent of the appropriate age group remains in school. In this connection, if we assume that the normal age for graduation from the 10th grade is 18, it is evident that in 1939 only about 7 percent of a given age group graduated from the 10th grade.[35]

The recent expansion of upper grade enrollment (see discussion below) has undoubtedly modified the success rates of Soviet 10-year-

[35] This statement is based on the assumption that there were about 3,400,000 persons aged 18 in the U. S. S. R. in 1939 (Lorimer, op. cit., 231, estimated as a projection of the age group 4 from the 1926 census) and graduations of 232,000 (table A–2, appendix to ch. II).

TABLE 3.—*Approximate relationship between age group and school attendance in the U. S. S. R. in 1939*

Grade	(A) Enrollment in thousands	Age group	(B) Thousands	(C) Correlation between age and school attendance, percent of col. (A) to col. (B)
1–4	20, 472	8–11	16, 500	124. 0
5–7	9, 715	12–14	13, 410	72. 4
8–10	1, 871	15–17	9, 129	20. 4
Total 1–10	32, 058	8–17	39, 039	82. 1

Sources and notes

Col. (A): *Kul't Stroi—1940*, 246. School enrollment in fall of 1939.
Col. (B): Lorimer, *The Population . . .* 141. Population as of January 17, 1939.
Col. (C): Computed percentages, col. (A) to col. (B).
This table is valid as an approximation only because the population census was taken at the beginning of the year, and school enrollment by grade is given for the fall of that year. If the 1938 enrollment is correlated with the 1939 age grouping as another approximation, the trend discussed in the text holds true also, though the percentages attending intermediate and upper grades are somewhat lower.

school students, and there has also been moderate relaxation in the process of academic selection. For the postwar years it is difficult to ascertain the proportion of a given age group of students attending various levels of Soviet schools because of a lack of reliable estimates of Soviet population by narrow age cohorts. However, from the data for the R. S. F. S. R. (Russian Republic), which accounts for about 60 percent of school enrollment in the U. S. S. R.'s total, it is apparent that in 1954 the graduation rate from the 10th grade was less than 126 students per 1,000 acceptances in the 1st grade in 1944.[26]

Although the process of academic selection does not indicate in a direct way the quality of instruction, nevertheless it suggests that academic standards are enforced to a great extent. Since there are many other outlets into which an individual may be channeled even in the secondary school (i. e., especially in grades 5–9), the Soviet state does not hesitate to apply extensive direct selection. Thus far, as has been stated, this results primarily in the selection of the academically fittest.

It may be argued, however, that when uniformity is introduced into a mass system of education, academic standards are *lowered,* since otherwise the system could not accommodate a mass student body. This argument may apply to the Soviet educational system after 1952, but the process of selection described above indicates clearly that for the last 20 years Soviet secondary schools, especially the upper grades (8–10), have hardly been concerned with the task of meeting mass oriented standards.

Another argument is that academic selection in the U. S. S. R. is far from perfect because of the operation of nonacademic factors which limit its effectiveness. This argument is based on the assumption that tuition fees in the upper grades of the secondary school, the labor reserve draft, and the military draft discriminate at least as much by class as by academic fitness. In addition, educational policy toward national minorities and the differential in rural-urban availability of educational facilities must be considered. All these factors deserve further attention.

Tuition Fees

The impact of the introduction of tuition fees in 1940 has been widely discussed in American sociological writings on the Soviet Union. It is a measure associated primarily with a pattern of emerging economic inequality in the Soviet Union, and it is argued that whatever the reason

[26] 1944 acceptances in the first grade were 3,728,000 (*Nar Obr RR—1944,* 171). *Anticipated* graduations in the R. S. F. S. R. in 1954 were about 470,000 (*Izvestiya,* May 20, 1954), with actual graduations probably about 90 percent of the anticipated. This gives less than 126 graduations from the 10th grade per 1,000 acceptances in the 1st grade.

for the introduction of tuition fees, their impact was a discriminatory one and they served as a means to further economic differentiation. Admittedly the establishment of tuition fees has made for some hardship and frustration for parents in low-income groups (peasants and unskilled labor). Of course, it should be noted that in special hardship cases tuition fees for needy but able students, orphans, students from one-parent families, children of large families, were in the past paid for by welfare agencies (those of local Soviets or trade unions). However, in 1940, at the time of the introduction of tuition fees (150–200 rubles per year in grades 8–10 of the Soviet secondary school),[37] these tuition fees represented only from 4 to 5 percent of the average annual earnings of Soviet workers and employees.[38] Since 1940 Soviet wages have risen considerably; and since tuition fees have remained fixed, their relationship to average annual income for Soviet wage earners has declined. Thus tuition fees in the secondary school actually represent a relatively minor obstacle. There has been no formal repeal of the 1940 law on tuition fees, but a recent visitor to the Soviet Union has stated in an interview that tuition fees were abolished in 1952–53 as a result of the recent drive to increase upper grade enrollment.[39]

Regardless of whether tuition fees have or have not been abolished recently, their introduction in 1940 and their existence throughout the 1940's introduced a further element for consideration by parents in sending their children to regular school. In simple terms this consideration is as follows. Since going to school costs money and since scholarships are not available in regular secondary schools, parents undoubtedly urge their children to take this into account. If a student does not get enough out of regular school, he can select another educational outlet which is either entirely tuition free (labor reserve schools, military schools), or has a lower tuition (alternative equivalents such as various types of extension-correspondence training), or, finally, an educational outlet which is abundantly provided with sufficient scholarship-stipend funds to offset the tuition charges and to provide supplemental income (secondary semi-professional schools). Although the introduction of tuition fees has caused

[37] M. Movshovich (compiler), *Vysshaya shkola. Osnovnyye postanovleniya, prikazy i instruktsii* (Higher Education. Major Decrees, Ordinances and Regulations), 2d ed., Moscow, 1948, 547.

[38] Annual average earnings in 1940 were about 4,000 rubles. For a further summary on Soviet wages, see M. Yanowitch, "Changes in the Soviet Money Wage Level Since 1940," *The American Slavic and East European Review*, vol. XIV, No. 2 (April 1955), 219.

[39] Information given to the author by a source he considers reliable but who prefers not to be identified. The new edition of the Soviet encyclopedia (*BSE*, 2d ed., 1954, vol. 29, 140) states explicitly that grades 1 through 7 are tuition free and compulsory. However, although it says that grades 8–10 are universally available, it fails to mention that they are tuition free. Thus although recent visitors to Russia report that there are no tuition fees in the upper grades, there is still uncertainty as to whether they have been abolished.

some hardship to low-income families, it is easy to conceive how they have to some extent influenced the process of selection and the channeling of individuals into other than regular upper grade secondary school education.

Effects of the Labor Reserve Draft

Each fall since 1940, several hundred thousand youths aged 14 to 17 have been drafted (or forced to "volunteer") into schools of the State Labor Reserve.[40] While some Western observers [41] have already noted that this draft often absorbs the dullest boys, Soviet authorities have never made this fact explicit. However, as was already discussed, according to official sources the sequence of the draft calls indicate that it is a selective one, and that it in fact absorbs those pupils who are less successful academically in the regular secondary school.[42] Thus, although there may be some students among draftees who have enough qualifications to continue in regular school, the majority of those who are channeled through this compulsive device into skilled labor occupations do not have sufficient qualifications to continue their education in the regular secondary school.

As to the discriminatory nature of the draft, it should be stressed that the labor reserve draft is aimed primarily at rural youths, many of whom quit school after a few years of elementary education. In 1947, during one of the draft calls for example, out of about 300,000 draftees, about 254,000, or almost 84 percent, were recruited from rural areas.[43] In this regard, therefore, the draft serves the function of transferring youth from rural occupations into the industrial labor force. The training offered in these schools, limited as it may be in comparison to that offered in the regular secondary-school program, still represents an addition to education which may not have been attained otherwise by an individual in rural areas.

Effects of the Military Draft

Although details concerning the military draft have been discussed in chapter I, it is worth noting again here that the military draft also fur-

[40] The draft takes place usually in the fall of each year, but in 1946 and 1947 when there was the largest enrollment (close to 1 million), there were several draft calls during the year (*Trud,* February 12, August 15, 1947; *Proizvodstvennoye Obucheniye,* No. 2, 1947, 4).

[41] Ashby, op. cit., 64.

[42] See discussion in ch. I. Also *Izvestiya,* September 1, 1945 (Moskatov article. Moskatov was head of the Main Administration of the State Labor Reserve).

[43] *Trud,* February 12, 1947.

thers the selection process. If a secondary-school student starts school at the appropriate age of 7 and is successful in all grades, he will complete the 10-year school at age 17. Consequently, since the military draft of persons with completed secondary education is scheduled for 18-year-olds, there is 1 year left for successful secondary-school graduates to enter higher education. Since many higher educational establishments offer either exemptions or deferments, this means that an able and successful secondary-school student can in all probability continue his education by virtue of this 1-year escape clause. The military draft therefore in a sense serves a dual function. On the one hand, it is a compelling mechanism to do successful academic work and to secure annual promotions from one grade to another. On the other hand, it absorbs either the less able or less fortunate secondary-school graduates immediately upon completion of school and thus serves as an additional mechanism of compulsory selection.

Tuition fees, the labor draft, the escape clause in the military draft—all exercise an impact upon the educational system. They are admittedly discriminatory devices. However, they promote to some extent the process of selection. While some talent is undoubtedly lost under the impact of these policies, at the same time they serve indirectly as compulsive devices to stimulate learning among those who do remain in the regular secondary school.

Rural-Urban Educational Opportunities

The quantitative contrast between those who get education in the cities and those in the rural areas of the Soviet Union is a very drastic one. In addition to quantitative contrast, there is undoubtedly a qualitative one. The teacher-student ratio, the school facilities, the preparation of teachers—all are superior in urban areas, and rural pupils find themselves at a disadvantage as compared with urban students of regular schools. The quantitative contrast may be illustrated by an example, using the year 1939. In that year, according to the census, the Soviet population was about 170 million, and about 33 percent of this was urban population.[44] Students in Soviet primary and secondary schools represented about 19 percent of the population in that year. The data in table 4 reveal that the share of rural enrollment in grades 1–10 was about 69 percent of the total enrollment in Soviet primary and secondary schools. The share of rural enrollment was about the same as the share of rural population (67 percent) in the U. S. S. R.'s total population.

In grades 1–4 the rural-school enrollment surpassed urban-school enrollment by a ratio of 3 to 1. In grades 5–7 the share of rural-school enrollment declined and was below the share of rural population in the

[44] Lorimer, op. cit., 241.

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TABLE 4.—*Differences in urban and rural enrollments in the U. S. S. R. in 1939*

Grades	Total enrollment (thousands)	Urban enrollment		Rural enrollment	
		Thousands	Percent of total	Thousands	Percent of total
1–4	20, 472	5, 165	25. 2	15, 307	74. 8
5–7	9, 715	3, 578	36. 8	6, 137	63. 2
8–10	1, 871	1, 104	59. 0	767	41. 0
Total 1–10	32, 058	9, 847	30. 7	22, 211	69. 3

Source: *Kul't Stroi—1940*, 246.

U. S. S. R.'s total population. Finally, in the upper grades (8–10), urban schools accounted for about 59 percent of all enrollment, thus representing almost the complete reverse of the trend for rural-urban population distribution.

In the postwar period there has probably been some improvement in attendance of schools in rural areas, but various decrees of the Soviet Government concerning universal 7-year education and expansion of 10-year education place their emphasis on the urban school. Furthermore, numerous stories in Soviet newspapers continue to point out that enrollment in the intermediate and upper grades in rural schools is not what it should be (it lags below target quotas, many who register for school do not attend, schools are not available in the immediate vicinity, etc.).

In this connection it is worth noting that the rate of expansion in the intermediate and upper grade enrollment in rural areas over the last 30 years has undoubtedly been greater than in the cities, simply because there was a smaller base initially. Therefore, although pointing to shortcomings, Soviet pronouncements frequently stress the higher rates of expansion of enrollment in rural areas as compared with that in the cities. Although gains have undoubtedly been made, these statements tend to overlook the great disproportionality between secondary school enrollment and population in rural areas, which has existed in the past and still continues.

There are three main reason for the sharply pronounced differences in rural-urban enrollment on various levels of the Soviet school. One is simply lack of facilities; another is the probable lack of motivation for attending school. The third and probably most important reason is the enormous economic pressure exerted upon Soviet collective farmers, a pressure which forces young boys and girls to engage in agricultural labor at an early age.

Soviet Nationalities and the Regular School

Another important factor in Soviet primary and secondary education is the cautious but persistent policy of linguistic and cultural Russification of national minorities in the U. S. S. R.[45] which exercises a great impact upon the educational opportunities of various nationalities in the Soviet Union. The problem implicit here is a very complicated one; and although it deserves extensive attention, this survey can deal with it in only a cursory fashion. From 1939 data[46] it is evident that except for the Transcaucasian Republics (Armenia, Georgia, and Azerbaidzhan), rural intermediate and upper grade enrollment drops off very sharply. Therefore rural communities in most republics lag far behind the more industrialized areas in school attendance at educational levels higher than the first four grades.

During the last three decades there have certainly been some gains in expanding primary and secondary education in the Soviet Republics. Soviet pronouncements always stress the rate of increase in various republics (especially that in Central Asia and national minority areas of the Russian Republic), where educational opportunities before the Revolution were scarce indeed. However, it is obvious that both in the past and in recent years the per capita attendance of schools is lower in most areas populated by national minorities than in areas populated by Great Russians, Ukrainians, and Transcaucasians. This is especially true of rural areas, where native language and culture have stronger roots.

The Soviet Union claims that all national minorities, if they desire, may attend the national schools which conduct instruction in the native language with a curriculum about the same as Russian schools, but all of which require study of the "official language," i. e., Russian. The fact is that a large proportion of these national schools offer instruction in the native language only on the elementary school level and occasionally only in grade 1–2. Recent data for the R. S. F. S. R. (Russian Republic) tend to indicate the following picture. In 1951 instruction in grades 1–4 was conducted in 46 native languages; in grades 5–7, in 34 languages; and in grades 8–10, in 22 languages.[47] In the same year in the Russian S. F. S. R. there were 10,452 national schools and about 2,890 "mixed" schools (instruction partly in the native language).[48] But this represents less than 10 percent of all primary and sec-

[45] J. Kuchera, *Language Policy in the Soviet Union,* unpublished Ph. D. thesis, Harvard University, April 1952, passim.

[46] Lorimer, op. cit., 200–201. This source relates Soviet school enrollment by level of grades and by rural-urban division to the population in each republic in 1938 and 1939.

[47] *Uchitel'skaya Gazeta,* April 4, 1951.

[48] Idem.

ondary schools. By enrollment these schools accounted for less than 2 million pupils,[49] which is about 11 percent of the R. S. F. S. R.'s total enrollment. In short, therefore, only one-half of the national minorities in the R. S. F. S. R. could have had instruction in their native language in all grades[50] with the proportion of those attending native schools rapidly decreasing in the upper grades.[51]

The policy of Russification in Soviet primary and secondary schools[52] must be emphasized for other reasons as well. The majority of higher educational establishments and of secondary semiprofessional schools conduct instruction in the Russian language exclusively. However, even those establishments which conduct instruction partially in the native language require the Russian language on the entrance examinations. Thus, knowledge of the Russian language becomes indispensable for persons aspiring to receive professional or semiprofessional education.

Coeducation and Military Training

Since the time of the Revolution, the Soviet primary and secondary schools, as well as all other forms of education (except, of course, military schools on all levels), have been coeducational. It is important to stress this because many writers on the Soviet Union in the postwar period have assigned exaggerated importance to the war measure introduced in 1945, which stipulated the segregation of sexes in a limited number of schools in about 200 cities. This measure was introduced under the stress of war and the consequent necessity for intensive military training for boys. Syllabi, textbooks, instruction methods—all remained identical for both sexes. In some schools separation was carried out in the intermediate and upper grades only. In other instances the entire school (i. e., all grades 1–10) was made separate for each sex. In 1943–44 the Russian Republic had about 1,600 schools of this type with 978,000 pupils, or about 7.2 percent, of the total enrollment.[53]

When limited separate education was abolished in 1954,[54] it was revealed that in the Russian Republic there were only 2,300 schools which conducted separate instruction out of 41,200 schools, and that by

[49] Idem.

[50] In 1926 the R. S. F. S. R. had about 100 national minorities comprising about 22 percent of the total population. For further details, see Lorimer, op cit., 50–65, on the ethnic composition of the U. S. S. R. and the R. S. F. S. R.

[51] This is indicated by 1954 data (*Uchitel'skaya Gazeta,* January 22, 1955).

[52] A recent article in *Narodnoye Obrazovaniye,* No. 2, 1955, 8–21, reveals many interesting details in regard to this process in non-Russian schools.

[53] *Nar Obr RR—1944,* 9.

[54] *Pravda,* July 18, 1954 (decree about the abolition of limited separate education).

enrollment about 13 percent of all pupils were affected by it.[55] Except for this limited occurrence of separate education, which lasted about 10 years and affected a relatively small number of pupils, the principle of universal coeducation has remained in effect at all levels of the Soviet school system.

While the reason for the introduction of separate education was stated quite explicitly by Soviet authorities, the sudden restoration of coeducation needs further comment. Soviet sources explain it in terms of an expediency which has now passed. They also indicate that boys' schools were noted for laxity of discipline, which in extreme instances led to the teacher refusing to teach in these schools.[56] Valid as these reasons may be, there is another practical reason which should be considered. The declining enrollment in the elementary grades and the expanding enrollment in the upper grades obviously created additional complications in regard to the utilization of both school facilities and teachers. Under such conditions, the merging of even a limited number of schools conducting separate education undoubtedly eliminated some of the complications involved in the utilization of schools and teachers.

In the 1920's more boys than girls attended Soviet primary and secondary schools. The male-female ratio was about 60 to 40. By 1938, however, this distribution had changed, and there were about 52 girls to 48 boys.[57] In 1950 it was claimed that "this relation was about the same and was in correspondence with the distribution of the population by sex." [58] It is impossible to ascertain to what extent this is true, especially in the upper grades of Soviet schools, but recent visitors to the Soviet Union invariably report that considerably more girls than boys attend school.

The introduction of separate education is strongly linked with military training for boys. Preservice training [59] in its present form emerged shortly before the war. In the 1930's, boys in the intermediate and upper grades used to have 1 hour per week of military instruction, but this was usually integrated with the physical education program. Shortly before the war (in 1939), military instruction became an independent subject in the Soviet curriculum. During and after the war its purposes were more rigidly defined as an integral part of the preservice training

[55] *Pravda,* July 20, 1954 (Kairov, Minister of Education of the R. S. F. S. R., article). It should be noted that figures on the number of schools refer to 10-year schools only.

[56] *Literaturnaya Gazeta,* August 6, 1953; and numerous references in *Uchitel'skaya Gazeta* since April 1953.

[57] Medynskii, *Nar Obr,* 2d ed., 1952, 83.

[58] Idem.

[59] For further details, see H. Berman and M. Kerner, *Soviet Military Law and Administration,* Cambridge: Harvard University Press, 1955; and discussion in ch. I above.

program. In grades 5–7 at the present time, some military training is conducted in conjunction with physical education. In grades 8–10, however, it is a separate subject in which youths are required to learn the elements of military conduct, the use of light arms, mapreading, etc., along with the usual drill exercises. In addition to the curricular instruction, the *DOSAAF* (formerly *Osoaviakhim*), a paramilitary organization, offers military training as an extracurricular activity.

Enrollment Trends in Regular Primary and Secondary Schools

The analysis of enrollment trends given in chart II illustrates with sufficient clarity the extent of selection in the Soviet 10-year school. On the one hand, we observe increasing enrollments at all levels of primary and secondary schools, but at the same time, despite the increase in upper grade enrollment, the relative share of upper grade enrollment has until quite recently been a relatively small proportion of the total enrollment.

1. *Total Enrollment in Primary and Secondary Schools*

In 1920, shortly after the Revolution, the total enrollment in Soviet primary and secondary schools (line A on chart II) reached the level of almost 10 million. Then, after a drop in the period 1921–24, it increased steadily to almost 33 million at the beginning of World War II. After a drastic fall during the course of the war, by 1945 the total enrollment had recovered to the level reached in 1935, or about 25 million. The postwar recovery was a rapid one, and by 1950 the prewar level of about 33 million total primary- and secondary-school enrollment was reached. It has been declining since then, primarily because of the effects of the war, which, as Dr. Eason's study of Soviet population indicates, resulted in a birth deficit over the 5 war years of probably 8 million.[60] It is reasonable to suppose that the birth deficit was increasingly heavier after 1942, and consequently its full impact began to be felt in the elementary grades of Soviet schools only around 1949–50.[61]

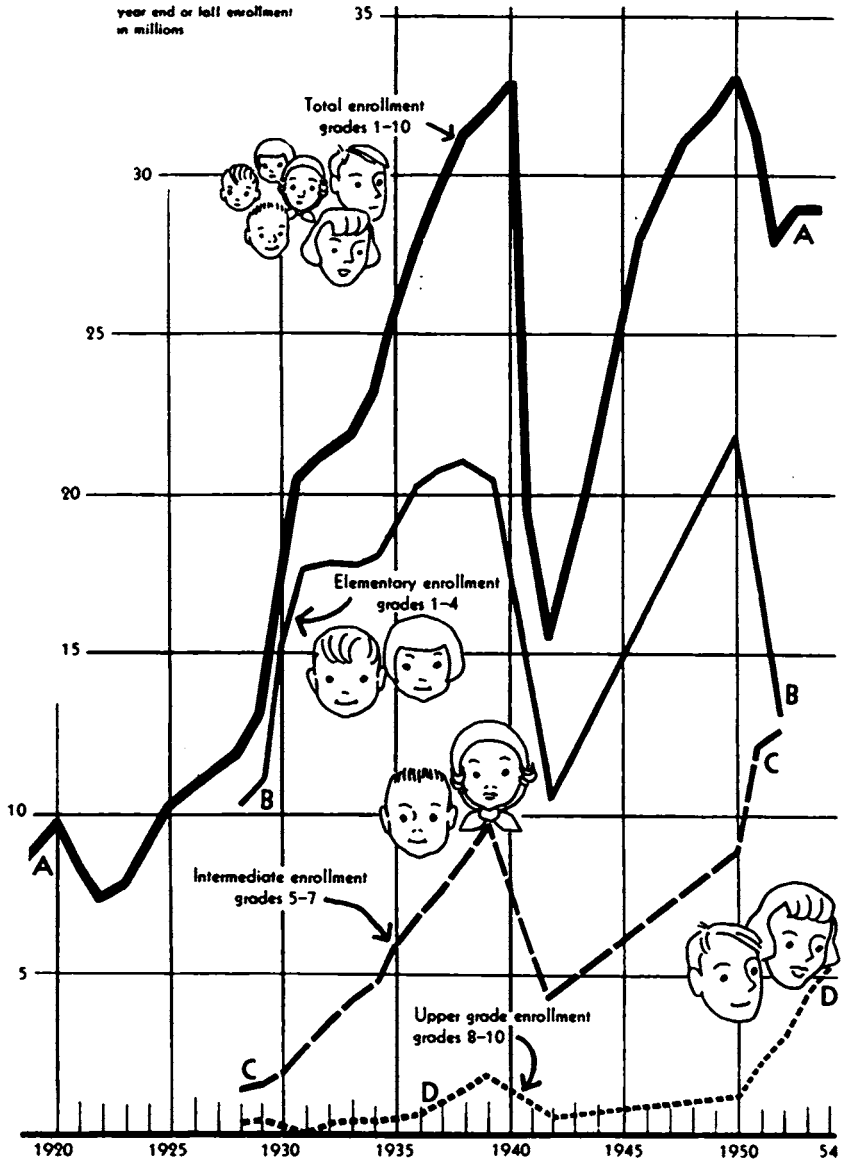
2. *Primary-School Enrollment*

Elementary grade (grades 1–4) enrollment (line B on chart II) is closely parallel to the trend in total enrollment. The introduction of

[60] W. Eason, "Population and Labor Force" in A. Bergson (ed.), *Soviet Economic Growth*, Evanston, Ill., 1953, 103; and W. Eason, *Population and Labor Force*, Appendix, copyrighted manuscript for private circulation.

[61] In this connection, see also N. Timasheff, "The Post War Population of the Soviet Union," *American Journal of Sociology*, vol. LIV, No. 2 (September 1948), 152–155.

PRIMARY- AND SECONDARY-SCHOOL ENROLLMENT IN THE USSR, TOTAL AND BY LEVEL OF GRADES, 1920–54



Source: Table A and table A–1, appendix to chapter II.

CHART II

compulsory 4-year elementary education in the fall of 1930 caused a spectacular increase of 7 million pupils in the elementary schools between 1929 and 1931. Thereafter elementary-school enrollment increased only very gradually, reaching the highest prewar level of about 21 million in 1938. It declined both before and during the war as a result of a birth deficit in 1931–32, and of war conditions and German occupation during the war. After a rapid postwar recovery, by 1950 it was again at about the same level as in 1938. After 1950, however, it again experienced a sudden, sharp drop, caused by the World War II birth deficit and the excess death rate among infants during the war.

3. *Secondary-School Enrollment*

Enrollment in the intermediate grades (5–7) of the 7-year school and in grades 5–7 of the 10-year school (line C on chart II) reveals a picture of gradual and uninterrupted growth, excluding, of course, the period of World War II. Postwar data indicate that the introduction of *compulsory* 7-year education in major urban and industrial centers, which was decreed in 1943,[62] was responsible not only for the maintenance of but also for a considerable increase in enrollment in these grades between 1939 and 1950. The 1949 pronouncements concerning the universal *availability* of 7-year education in rural areas are another reason for the postwar expansion in intermediate-grade enrollment. In this connection, it may be noted that although Soviet authorities claim that 7-year education is compulsory, it still is uncertain whether *compulsory* 7-year education is fully in effect in rural areas.

Figures on enrollment in the upper grades (8–10) of Soviet secondary schools reveal the following trends. Until the 1934 decree on the 10-year school reorganization, a consistent policy towards expanding upper-grade enrollment was absent. Expansion of upper grade enrollment, as has already been suggested, was hampered by conflicting ideological and political attitudes embodied in educational policies. The frequent transfer of upper grade students into technicums, the most drastic of which took place in 1931, and the frequent reorganizations of schools were common phenomena. After 1934 a steady growth is visible. The 1939 level of slightly less than 2 million was probably reached by 1950, and after that a rapid and spectacular expansion, based on a policy announced in 1952 to increase the upper grade enrollment, is noticeable. Despite this expansion, attendance has not been made compulsory. This

[62] A. Danev, *Narodnoye Obrazovaniye—osnovnyye postanovleniye, prikazy i instruktsii* (Popular Education—Major Decrees, Ordinances and Regulations), Moscow, 1948, 36. Most references to official decrees prior to 1947 were verified by using this source. It is important to note that the goal of compulsory 7-year education in urban centers was announced as early as 1931.

expansion in the early 1950's was facilitated undoubtedly to a great extent by the drastic fall in elementary-school enrollment, which presented unforeseen opportunities to utilize school facilities for the expansion of upper- and intermediate-grade enrollment. In turn this expansion in the upper grades softened somewhat the effect of the drop in elementary-grade enrollment upon the total primary- and secondary-school enrollment.

4. *Recent Trends in Enrollment in Primary and Secondary Schools*

Thus it appears that while the elementary-school enrollment over the 25-year period has experienced sharp setbacks, the expansion of enrollment in the upper grades (5–10) has proceeded, except for the war years' interruption, quite rapidly and steadily within the period. Within the last 25 years total enrollment in the peak year (1950) was about 33 million and showed about a 2.7-fold increase over enrollment in 1928. Meanwhile, however, within this 25-year period, enrollment in grades 5–7 increased about ninefold, to about 13 million, and enrollment in grades 8–10 increased almost 30-fold, to about 4,500,000, by 1953.

In view of the drop in elementary-school enrollment in the early 1950's, it is possible to anticipate that the rapid expansion of upper- and intermediate-grade enrollment will in all probability be checked by 1956–58 because of the smaller wartime age cohorts entering these grades. Although this expansion may be checked temporarily, there will still be a substantial number of students—that is, sufficient to sustain the level of enrollment reached in the preceding years.

According to recent pronouncements, enrollment in grades 8–10 in Soviet secondary schools should increase by 1956 fourfold in all urban and major industrial centers, and 4.5-fold in rural areas over enrollment in 1950.[68] Enrollment data suggest that by 1956, therefore, there will probably be 6 million to 7 million enrolled in these grades. This enrollment probably can be sustained, but not radically increased for several years thereafter. Soviet planners anticipate the introduction of compulsory 10-year education by 1960, and it remains to be seen what effect such a measure will have on upper-grade enrollment trends.

What is the relation of these enrollment trends to some of the characteristic features of Soviet primary and secondary education? Until about 1951 upper-grade enrollment may be spoken of as a highly select group preparing for higher education. In its optimum year (1939) it represented less than 9 percent of the total primary- and secondary-school

[68] *Pravda,* October 9, 1952 (Saburov speech at the 19th Congress of the Communist Party).

enrollment. Only after 1952 for the first time in the history of Russian education, did upper-grade enrollment surpass its 10-percent share in total enrollment.

While it is misleading to compare American high-school enrollment with enrollment in the intermediate and upper grades of the Soviet school, it must be stressed again that the enrollment trends indicated above support the contention made earlier that in the past only a small percentage of Soviet students who enter the 1st grade are eventually graduated from the 10th grade. In the United States about 55 percent of the pertinent age group graduate from the 12th grade (i. e., complete primary and secondary school). In the Soviet Union only about 5 percent in the past, and recently only about 12 percent, of those who enter the first grade graduate 10 years later. Therefore, until 1954, substantially less than 10 percent of the pertinent age group completed Soviet primary and secondary school.

Regular School Facilities

The number of schools in the Soviet Union is ascertainable by type (i. e., schools which have only 4, only 7, or all 10 grades) only for the prewar years.[64] While the total enrollment between 1928 and 1949 roughly tripled (disregarding fluctuations), the total number of schools in the period between 1928 and 1948 increased by only about one-third. Between 1931 and 1937 the total number of schools remained virtually unchanged. A fivefold to sixfold increase in the number of 7- and 10-year schools was brought about primarily by the reorganization of schools from the elementary type to those with upper grades (mostly by adding a second shift in the afternoon for intermediate and upper-grade pupils).

In spite of the lack of information on actually available floor space, it is obvious that the average enrollment per school and consequent crowding increased enormously in the decade preceding the war. Despite the decrease in enrollment in the 1950's, there are still frequent reports that school facilities are inadequate. Two shifts per day are still the usual thing.

Since the expansion in upper-grade enrollment has taken place, there have been numerous reports that almost every year since 1949 somewhere between 1,000 and 1,500 "new" 10-year schools were being added. It is impossible to ascertain how many of these constitute genuine additions of floor space, but probably again, as was the case in the 1930's, this means in most cases simply conversions of elementary schools (which in the 1950's, of course, had some idle facilities because of the enrollment drop in the primary grades) to schools having intermediate and upper grades as well.

[64] See table C–2, appendix to ch. II.

Recent Developments in Soviet Primary and Secondary Education

Since 1952 new emphasis has been placed upon polytechnical instruction, supposedly to aid Soviet youth in a freer selection of occupation. This has brought about slight modifications in the curriculum.[65] On the basis of enrollment trends, it is obvious that the expansion of intermediate and especially of upper-grade enrollment has undoubtedly created, for the first time in the history of Soviet education, a substantial surplus of graduates who are not and cannot be completely absorbed (at least at the present time) by either secondary specialized schools (technicums) or higher educational establishments. While prior to 1952 the anticipation of the situation just described received limited attention in the Soviet press, today it is openly stated that in 1954 there were several times more graduates from complete secondary schools than could be accepted after competitive entrance examinations into regular higher educational establishments. "In the future the number of secondary-school graduates will increase continuously, and many of those who complete the 10th grade will neither be accepted by higher educational establishments nor by secondary specialized semiprofessional schools and will be required to take employment." [66]

This new problem is apparently to be handled both by increasing the scope of certain extension training facilities, and also by a modification of the training program, in which polytechnical instruction is to play a significant role. Up until this time the latter method of handling this problem has not made any drastic change in Soviet secondary education. The possibility that it still may do so, however, is openly debated. In all probability this will result in a relaxation of the principle of selection.

Alternative Equivalents to Regular Schools

This chapter has devoted its major attention to Soviet regular schools. Now we shall discuss briefly the alternative equivalents to regular schools. Shortly after the Revolution, the so-called worker's faculties (*rabfak*) were established, which at the height of their activity in 1932–33 had an enrollment of about 340,000.[67] When the Soviet secondary schools began to turn out regular school graduates by the mid-1930's, the importance of the *rabfak* declined and they went out of existence shortly before the beginning of World War II.

[65] For further details, see notes and sources to table B, appendix to ch. II, and discussion in the text above.
[66] *VVSh*, No. 7, 1954, 1 (editorial article concerning the new role of extension training in higher education).
[67] *Kul't Stroi—1940*, 107.

During the war another type of school was set up to absorb those youths whose education had been interrupted for one reason or another. These were schools for working youth and for rural youth. Although they were originally conceived as a temporary wartime measure, these schools have not been closed and their enrollment has continued to expand. Shortly after the war the enrollment was about 1 million students, about equally divided between schools for working youth and schools for rural youth.[68] In 1953–54 these schools had an enrollment of about 1,700,000.[69]

Schools for rural youth have only elementary and intermediate grades, while those for working youth have intermediate and upper grades. The curriculum in schools for working youth (grades 5–10),[70] although containing all the subjects found in the regular secondary school, is cut by about one-half in the number of instruction hours involved.[71] Although Soviet authorities often advance the claim that schools for working youth give substantially the same type of training as the regular secondary schools, from the very structure of the curriculum it is apparent that they could not turn out graduates of the same quality. Various reports concerning the success of applicants to higher educational establishments on competitive entrance examinations also suggest that the quality of training in schools for working youth is considerably inferior to that of the regular secondary school.

Soviet authorities make only very vague statements concerning graduations from these schools, usually saying that there were several tens of thousands graduating from the 10th grade. In 1954 in the Russian Republic the relative share of graduates from schools for working youth was about 12 percent of the total number of 10th-grade graduates.[72] In the years prior to 1954, this share was undoubtedly smaller. Thus a relatively small fraction of all graduates come from schools for working youth.

Finally, it is worth noting that schools for working and for rural youth are regarded as facilities for adult secondary education, which in the prewar decade fluctuated between 300,000 and 750,000. It appears that adult secondary education has expanded somewhat in the postwar period.

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[68] *Gudok*, March 2, 1947.

[69] A. Shtyl'ko, *Pod'yem kul'turno-tekhnicheskogo urovnya trudyashchikhsya* (The Rise of the Cultural-Technical Level of Laborers), Moscow, 1953, 44.

[70] Medynskii, *Nar Obr*, 2d ed., 1952, 119.

[71] Schools for working youth have about 3,600 instruction hours as opposed to 6,400 instruction hours in grades 5–10 of regular schools. It is interesting to note, however, that in schools for working youth when time is limited, sciences and mathematics suffer less than the humanities, as far as instruction time is concerned. Further, these schools omit physical training and military training from the curriculum.

[72] *Izvestiya*, October 9, 1954, states that in 1954 about 60,000 graduated from schools for working youth in the R. S. F. S. R. Since anticipated graduations for that year were 470,000, this represents about 12 percent.

All this suggests that whatever glamour is assigned to other than regular secondary schools by Soviet propaganda, their role is relatively minor in the structure of the Soviet educational system. Quantitatively they provide training for up to perhaps 2 million persons by enrollment, but qualitatively this training is probably considerably inferior to that of the regular secondary school.

Since the establishment of the State Labor Reserve schools in 1940, an average of about 500,000 persons annually have been drafted into these schools.[73] It has been stated that between 1940 and 1953 these factory, trade, and railroad schools trained more than 7 million skilled laborers for various branches of Soviet industry and agriculture.[74] The highest level of enrollment in this type of training was reached in 1948, when about 1 million youths were channeled into State Labor Reserve facilities. It has been declining since then, and recently has been about 300,000 annually. This decline has been caused partly by the leveling off of the enormous demand for new skilled workers immediately after the war, and partly by the policy of expanding intermediate-grade enrollment in regular schools.

Aside from these schools which offer training on an intermediate-grade level, in recent years the facilities operated by the State Labor Reserve were added to give additional training to regular 10-year-school graduates. In 1954 about 250 technical vocational schools were set up to absorb the surplus graduates from the 10-year schools for training in skilled labor occupations.

Graduation Trends and Disposition of Graduates

Increasing upper-grade enrollment obviously results in an increasing number of graduates from the 10th grade. Table 5 summarizes the available data on graduations from the 10th grade since 1934, when the present 10-year-school system was established. In 1933 there was a negligible number of graduates from the ninth grade (at that time the last grade of the secondary school) because of the wholesale transfer of students from the upper grades into other training outlets (technicums and vocational schools. In 1934 there was still a negligible number of graduates (about 30) as a result of these transfers.

As the data in table 5 reveal, substantial gains have been made since 1934. These gains must be discussed in terms of their favorable impact upon Soviet higher education and related to the problems which they have generated in recent years. In the mid-1930's the shortage of

[73] In most years there was only one draft call. In the years 1946 and 1947 there were several calls.
[74] Shtyl'ko, op. cit., 46–47.

TABLE 5.—*Number of graduates from the 10th grade of Soviet schools*

Year:	*Graduations (thousands)*	Year:	*Graduations (thousands)*
1934	(1)	1946	127.0
1935	18.0	1947	164.0
1936	42.0	1950	220.0
1937	112.0	1952	315.0
1938	155.0	1953	440.0
1939	232.0	1954	750.0
1940	285.0		

[1] Negligible.

Source: See table A–2, appendix to ch. II.

secondary-school graduates created a great handicap to the expansion of higher education. Today the abundance of 10-year-school graduates presents another problem—what to do with the surplus if they are not accepted for further training.

Only in the last prewar years did the number of secondary-school graduates surpass the number of vacancies in higher educational establishments.[75] In 1940 there were twice as many graduations as vacancies in higher educational establishments, but in that year the surplus of graduates was absorbed by the heavy military draft. This 2-to-1 ratio was exceeded in 1954, and it may reasonably be assumed that it will increase from now on as well.

Since there are no signs so far that competitive entrance examinations into higher educational establishments are to be relaxed, it appears that today quite a favorable state of affairs, as far as selection of candidates for higher education, does indeed exist in the Soviet Union. This situation will apparently prevail in the future, a consideration which implies in turn that the expansion of professional training in higher educational establishments is not now and will not be in the future handicapped by a lack of secondary-school graduates. Whatever qualitative changes may occur, a substantially better and wider selection of candidates for higher education will be available from now on.

At the same time the surplus of secondary-school graduates in the last 2 or 3 years has brought about other developments. The Soviet press has begun to voice complaints that the Young Communist League and the school authorities "wrongly orient" the students in the 10th grade.[76] The complaint is made that students are being directed to continue their education in higher educational establishments, whereas they should be told to become skilled workers or employees. The disposition of graduates has begun to take place in new directions not previously experienced in the Soviet educational setting. Large numbers of 10-year-school graduates have begun to enter secondary semiprofessional training insti-

[75] For more details, see the section on acceptances to higher educational establishments in ch. IV.

[76] *Izvestiya*, May 19, 1954.

tutions (technicums), which now offer shorter training programs to accommodate them. In the fall of 1954 it was planned to accept into technicums about 100,000 secondary-school graduates,[77] which would account for about a quarter of all technicum acceptances. This trend of accepting 10-year-school graduates into semiprofessional schools continues, and in the fall of 1955 it is planned that about half of the students admitted to technicums will consist of 10-year-school graduates.[78] The Main Administration of the State Labor Reserve has set up vocational technical schools with 1 to 2 years of training for 10-year-school graduates, who are to become skilled laborers and craftsmen.[79]

These recent developments—the spectacular increase in upper-grade enrollment, the substantial number of 10th-grade graduates to provide for a wide selection of candidates for higher education, the channeling of the surplus of secondary school graduates into semiprofessional or certain other newly created forms of vocational training—add up to a conclusion which should be strongly emphasized. In the last year or two the Soviet educational system has reached a turning point in its evolution. This turning point is the beginning of the realization of ambitious goals set 25 years ago, when it was originally conceived that the primary and secondary schools should provide general education to such an abundantly large number of young people that there would be no difficulty in selecting available talent for specialized training on the higher steps of the educational ladder. The realization of this goal undoubtedly opens a new potential for the further expansion of specialized professional and semiprofessional education.

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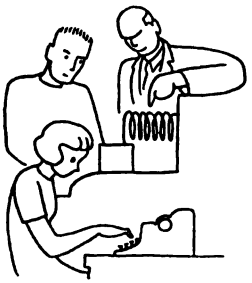
[77] Idem.
[78] Ibid., June 2, 1955.
[79] *Pravda,* August 14, 1954. See ch. III for more details concerning this development.

CHAPTER THREE



Secondary Semiprofessional Training

Functions of the Soviet Semiprofessional

In every economy a large proportion of specialized manpower consists of technicians and various specialists with secondary education only. It is extremely difficult to describe accurately this segment of trained manpower. In defining professionals on the basis of educational criteria, various reservations have already been noted, and more will follow in the next chapter. In regard to the definition of semiprofessionals, even more difficulties arise. Semiprofessional skills are often obtained through on-the-job training, and the occupational mobility of semiprofessionals is not so strongly restricted by formal education as in the case of professionals. For purposes of the present discussion, however, we shall use the term "semiprofessional" for lack of a better one to define an unhomogeneous group of Soviet specialists who have completed formal specialized secondary training.

A large number of persons in the Soviet Union receive this type of training, which is given in institutions commonly called technicums. There are a variety of names by which technicums are known.[1] It is not very revealing if we simply state that graduates of Soviet technicums and other secondary specialized schools are simply middle-grade specialists or middle-grade professionals. It may be more enlightening to discuss some of the occupational functions which these Soviet specialists are asked to perform, since educational criteria alone are not adequate.

In the United States certain occupations are held by persons who have college degrees; certain others are practiced by those who have acquired skills through on-the-job experience but who have no formal

[1] Some of them are called *shkoly*, such as medical schools (*meditsynskiye shkoly*), which prepare nurses, laboratory technicians, and medical aids, or *uchilishcha*, such as teachers' schools (*pedagogicheskiye uchilishcha*), which prepare teachers for nursery and elementary schools.

training; and still others are practiced by those who have attended vocational or industrial high schools or private technical institutes, vocational or trade schools. Soviet technicums and other secondary specialized schools give *formal* training for persons in many of these occupations. While formal training is emphasized here, it is also true that similar skills are acquired through experience both in the Soviet Union and in this country.

An American machine-shop foreman may be a person who has acquired his skill through experience, while the same occupation in the Soviet Union may be filled by a person who was graduated from an industrial technicum and who specialized, let us say, in the design, maintenance, and operation of machine tools. Our electronics technician may be a graduate of a trade school or he may have taken some apprentice courses conducted by a large manufacturer. An electronics technician in the Soviet Union is likely to be a graduate of an electrical engineering technicum. Our nurses receive a certificate from an accredited hospital or possibly a college degree, while the Soviet nurse is a secondary medical school graduate. Our veterinarian is often an agricultural college major, while in the Soviet Union he is likely to be a veterinary technicum graduate. Soviet dentists are primarily graduates of secondary specialized schools of dental medicine. Our railroad traffic dispatchers probably receive on-the-job training, while in the Soviet Union they are transportation technicum graduates. Our primary-school teacher is probably a teacher's college graduate, while the Soviet elementary-school teacher is likely to be a pedagogical-school graduate. Our technical draftsman is probably an industrial high-school graduate. In the Soviet Union the same skill is acquired in an engineering technicum.

These examples can be multiplied many times since Soviet secondary specialized schools train specialists in over 1,000 specializations for various branches of the economy. At the same time, such examples suggest that it is very difficult to find comparability of educational criteria for certain occupations in the United States with those in the Soviet Union. In many instances, occupational specialization is obtained in our own economic system by an automatic small-scale process, which, by continuously satisfying the needs of a particular unit or particular occupational category, provides a stream of specialists on the intermediate level for the economy as a whole. In the Soviet Union this process is coordinated and embodied into the system of secondary specialized educational establishments. This type of training, centralized and coordinated as it is in the Soviet Union, receives far more attention than in our educational system and, for propaganda reasons, enormous publicity is

given to it as an undertaking unparalleled and unmatched by any other country.

To some extent these claims are justifiable, since in the United States educational setting no great significance is attached to formal training of this type. Because we do not stress this type of formal training, we do not even know how many people have such training. Some of these occupations are considered in our society as being in the category of professional, technical, and kindred workers; others in clerical; others in managerial, etc. These are broad occupational employment categories where educational criteria are frequently hard to apply. Whatever the education of the several million persons in semiprofessional occupations in this country may be, the fact remains that in all probability they have less *formal* specialized training than their counterparts in the Soviet Union. This does not mean to imply that we have fewer semiprofessionals, but probably we have fewer specifically and formally trained men in occupations at the intermediate level.

Finally, it must be pointed out that Soviet semiprofessionals are called upon to perform certain minor supervisory, managerial, and supporting functions. It is also true that semiprofessionals and technicians in the United States frequently do this as well. The difference, however, lies in the fact that in the Soviet system, because of the extent of formal training and because of the emphasis upon it, semiprofessional specialization implies definite stratification criteria. Originally, formally trained semiprofessionals were singled out as a group because of their relative scarcity. Then, as training expanded and was improved, a certificate indicating completion of specialized semiprofessional education began to command prestige, pay differentials, particular status, and advantages for promotion, because of the great need for people with such training. Various regulations were issued to facilitate the singling out of trained semiprofessionals as a unique group, and their importance, in a formal sense, began to be stressed to a much greater extent than in our economic system.

Because of this, it is difficult to find an equivalent to Soviet technical secondary educational establishments in the American educational setting. There are very few technical institutes in the United States. Usually they accept high-school graduates and the training lasts about 2 years. Generally, American technical high schools do not offer a similar type of training. Probably some West European schools, especially the German Higher Technical Schools, may be a roughly corresponding equivalent, but in this case no satisfactory parallel can be drawn because Soviet technicums place such heavy stress upon practical instruction and very narrow specialization.

Coordination of Semiprofessional Training

As was already indicated, secondary specialized educational establishments in the Soviet Union are operated, financed, and maintained by the individual ministries in charge of the various branches of the Soviet economy, but their curricula, syllabi, textbooks, instruction methods, etc., are supervised by the Main Administration of Secondary Specialized Training of the Ministry of Higher Education. Subordination to the Ministry of Higher Education facilitates control over the instruction program. The aim of instruction in these establishments is to prepare specialists whose qualifications, skill, and knowledge are sufficient for their employment on the intermediate levels of professional competence. While these specialists are prepared for the intermediate levels, their curriculum often includes the same subjects as the professionals with higher education (in a given field), on the assumption that they will be closely associated in their work. In fact, the Soviet press occasionally voices complaints that in various fields, notably in engineering, the program of instruction in the technicums is not only modeled to a great extent upon the corresponding specialty of a higher educational establishment, but even duplicates in part the syllabi of higher educational establishments in a given field. These complaints are based on the argument that since technicum training has different aims from those of higher education and since technicum students lack as extensive preparation as entrants into higher educational establishments, such programs of instruction often create handicaps and are responsible for the unduly large number of failures among students. Although there is some identity of subjects taught in technicums and in higher educational establishments, it is apparent that the program of instruction in technicums is considerably more limited than that in higher educational establishments. This is obvious from the entrance requirements and from the general curriculum.

Applicants and Entrance Requirements

Until recently technicums as a rule accepted graduates of the Soviet 7-year school in the age group 14 to 30, with the majority of entering students probably younger than 18. All secondary semiprofessional schools used to fill vacancies by competitive examinations in three subjects: the Constitution of the U. S. S. R., Russian language and literature, and mathematics.[18] In March 1955 there was a slight re-

(2) Algebra: Goes as far as systems of equations of the first order with two un-
(1) Arithmetic: Goes as far as percentages.
(2) Algebra: Goes as far as systems of equations of the first order with two unknowns, with numerical and literal coefficients.

vision in the rules. Today, those who enter technicums in the fields of engineering, agriculture, and economics are required to take examinations in Russian composition and mathematics only. Those entering other fields take examinations in the history of the peoples of the U. S. S. R. (instead of the Soviet Constitution only) and in Russian composition.[2] These examinations are given by the respective institutions, but their content is prescribed uniformly throughout the Soviet Union. In addition, some schools give supplementary entrance examinations in vocational subjects; for example, draftsmanship for architectural schools, music for art schools, sports for physical culture technicums, etc. Those who have completed the 7-year school with a distinction certificate[3] are permitted to enter a technicum at any time (i. e., regardless of the year they obtained the distinction certificate) without examinations. Before the last war, those who had completed more than seven grades of regular secondary school could enter a technicum with advanced standing and thus reduce the length of required attendance. This practice has now been terminated. Today, those students who have completed the regular 10-year school may enter a technicum with reduced length of training, and those who have completed 8 or 9 years of regular secondary education are accepted by the semiprofessional school on an equal basis (i. e., by passing entrance examinations, they are accepted by quota) with first-year applicants.

Prior to 1935, the supply of applicants was limited, and thus persons with even less than 7 years of regular secondary education could be admitted. In the early 1930's the wholesale transfer of students from the upper grades (7–8–9) of regular school to technicums was a common occurrence. Since that time, however, the selection of applicants has become progressively more stringent, and a minimum 7-year school education has become an absolute requirement.

According to the plan for 1941, graduations from the 7-year schools were to be 2,400,000.[4] Assuming that about one-half of these students continued on to the eighth grade, there remained about 1,200,000 who had to take employment or enroll in technicums. Since technicum acceptances were set at about 350,000, there could have been at least three available candidates for each vacancy.

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(3) Geometry: Goes as far as triangles, polygons, trapeziums, circles, tangents, and inscribed and circumscribed circles.

For further details concerning rules and regulations in regard to admission to technicums, see M. Movshovich (compiler), *Tekhnikumy. Osnovnyye postanovleniya, prikazy i instruktsii* (Technicums. Major Decrees, Ordinances and Regulations), Moscow, 1947, esp. 26, 57, 62–64.

[2] *Trud*, March 8, 1955.

[3] So-called *otlichniki*—i. e., those students who have 75 percent of grades "excellent" (numeral 5) and 25 percent "good" (numeral 4) in all subjects taught in the 7-year school.

[4] *1941 Plan*, 612, 628. This probably reveals the optimum version of Soviet expectations in the prewar period.

This is, of course, a hypothetical situation, but another Soviet source reveals an interesting regulation.[5] It is stated that if the number of applicants for each vacancy exceeds five, acceptance of applications may be terminated prior to the usual final date. Premature closure of the application deadline indicates that there are instances when more than five applicants seek admission for each vacancy which exists.[6]

Because of the evident abundance of applicants in recent years, some semiprofessional schools (such as all dental schools, all semiprofessional jurisprudence schools, some pedagogical schools, and some engineering schools) have begun, since 1954, to accept only graduates of the regular 10-year school.[7] As was already mentioned, in 1954 about one-quarter of all acceptances in semiprofessional schools consisted of graduates of the 10-year school. This trend will probably continue, and from now on the 10-year-school graduate will constitute a substantial proportion of all applicants for semiprofessional schools. It is known that 50 percent of the acceptances into technicums in the fall of 1955 are planned to be 10-year school graduates.[7a]

Curriculum

The length of training in most secondary specialized institutions and in all engineering and technical schools is 4 years. For some specializations, however, such as the socioeconomic fields, medicine,[8] and the arts, for example, training lasts 2 or 3 years. Since 1953, for those specialized secondary training establishments which have begun to accept 10-year-school graduates only and for those with shortened training, the programs which originally required 4 years of training have been accelerated to a 2-year program.

On the basis of available information concerning curricula in technicums, it appears that the number of instruction hours per week is about 40. The academic year usually lasts 30 to 32 weeks. Thus the total number of required instruction hours is between 1,200 and 1,300

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[5] Anon., *Spravochnik dlya postupayushchikh v sredniye spetsial'nyye uchebnyye zavedeniya v 1953 godu* (Handbook for Entrants into Secondary Specialized Semiprofessional Establishments in 1953), Moscow, 1953, 13.

[6] As in this country, a student may make application to several institutions to increase his chances of being accepted by one. This, however, is less likely in the Soviet Union because the *original* certificate concerning previously completed education is required and must be surrendered by the applicant before he is permitted to take entrance examinations. Even if such conditions did not exist, the applicant-vacancy ratio for an individual institution discussed above would not be affected.

[7] Anon., *Kuda poiti uchitsa: spravochnik dlya postupayushchikh v tekhnikumy* (Where To Study: Handbook for Entrants Into Technicums), Moscow, 1954, 3, and passim.

[7a] *Izvestiya,* July 2, 1955. The number of acceptances in technicums is planned to be 450,000, of whom at least 225,000 are to be 10-year-school graduates.

[8] In regard to the recent reorganization of secondary medical training, see *BSE,* 2d ed., 1953, vol. 26, 639.

annually. In technical and engineering schools, where required class attendance is higher, the load is even heavier—exceeding 1,500 instruction hours per annum. The curriculum is divided into 3 (or sometimes 4) parts: (1) The first group consists of courses which are usually found in the upper grades of the ordinary secondary school: Russian language and literature, history, foreign language, mathematics, physics, chemistry. (2) The second group consists of technical and specialized courses, and is sometimes divided into two subgroups, singling out general technical or nonspecialized courses from courses of narrow specialization. The number of subjects in this group ranges between 15 and 20, with at least 5 devoted to nonspecialized subjects. The composition of this group of courses varies not only from one field of study to another but even within a given field, according to narrow specialization. (3) Finally, the last group is composed of industrial, clinical, or other type of practical course.

1. *Engineering Curriculum*

The curriculum for technicums in mining engineering [9] reveals that during 4 years of study, instruction takes up about 6,100 hours. About 24 percent of the time is devoted to general instruction (history, language, foreign language, physics, mathematics, chemistry); 12 percent to nonspecialized engineering courses (fundamental engineering and technical drawing); 28 percent to specialized engineering and technological subjects; 33 percent to industrial practice; and 3 percent to sports and military training. However, if laboratory work, practical work, and team assignments are considered as applied instruction along with industrial practice, the aggregate time devoted to applied training is about 72 percent, and only about 28 percent of all instruction time is devoted to lectures. Consequently practical and applied instruction is an outstanding feature of Soviet secondary specialized training.

2. *Medical Curriculum*

The stress on applied and practical pursuits is evident in other fields. In the medical field the training of *feldshers,* which is a category of assistant physicians, and is an occupation unknown in the United States, lasts 3 years. The curriculum of these secondary medical schools [10] reveals that out of about 4,500 instruction hours, about 34 percent of the time is spent in practice and laboratory work, and 66 percent is devoted to classroom instruction. The allocation of time to various sub-

[9] For details, see tables B–1A and B–1B in the appendix to ch. III.
[10] For details, see table B–2 in the appendix to ch. III.

jects is as follows. About 14 percent of the total time is devoted to general education subjects (languages, history, mathematics); about 26 percent to general medical and biological nonspecialized instruction; 53 percent to specialized clinical and military-medical subjects; and about 7 percent to various tests and final certification examinations. Again, it is possible to note that both applied and specialized instruction are dominant, although the former is not so overwhelming in this case as it is in the engineering technicum.

The two examples given above apply to training in two markedly distinct fields of occupational specialization; yet, in each curriculum, up to 60 percent of time is devoted to specialized subjects and practical instruction. In general, it is stipulated that at least 30 to 35 percent of all instruction time in technicums be devoted to practice,[11] which does not take into account laboratory or team work assignments which accompany lecture courses.

The Quality of Instruction

It is very difficult to judge the quality of instruction given in Soviet secondary specialized schools, since in only very few instances are syllabi known. In mathematics, for example, it is known that all engineering technicum students are required to learn the fundamentals of calculus and analytic geometry, which is more than the Soviet regular secondary school graduate or our own vocational technical institute graduate would be required to know. Technical mechanics include courses on strength of materials and the elements of theoretical mechanics with quite an extensive use of calculus. In courses for electrical engineering technicians, knowledge of the use of complex number and hyperbolic functions is required. In addition to general inorganic chemistry, the elements of analytical chemistry are also taught. At the same time, some specialized courses have meticulous technical details about operation, standards, design of a given type of equipment or technological process.

It is known that students in engineering fields are required to pass a general certification examination and to prepare a special thesis (diploma project [*diplomnyi proekt*]) dealing with the design, maintenance, or production of a certain type of machinery which is employed in some industrial process. These facts suggest that although the training in engineering fields appears to be more rigorous than that in our own formal or informal programs of training for the intermediate-level specialists, there is considerable stress on the application of standardized technology.

[11] Movshovich op. cit., 5.

Soviet sources often complain that technicum students are overburdened by the number of courses and by the quantity of material assigned for study, and it is said that failures of students are frequently attributable to the fact that so much material is given that they cannot master it thoroughly. There are also complaints about the textbooks. It is often claimed that they are nothing but abridged versions of texts used in higher educational establishments. In short, it appears that too much is asked of technicum students rather than too little. Of course, it may be true that, in the Soviet Union, more rigorous technological training on this level is more of a necessity than in our own society, where the acquisition of technological skills may be somewhat easier and more informal because of the wider everyday use of technical devices.

In this connection it is important to note that technicums, especially those in engineering and technology, are located in cities and industrial centers where a particular industry is prominent. Hundreds of examples were found [12] which indicate that industrial centers with large machine-building plants had technicums for mechanical engineering of various narrow specializations; mining centers had techicums for mining technologists or engineers; cities with large chemical plants had chemical technology technicums, etc. Whatever industrial specialization or manufacturing industry most frequently predominated in a given urban center, the technicum with identical specialization was also available there.

This pattern of location of secondary specialized educational establishments suggests that industrial practice is apparently carried out at nearby plants. The industrial complex provides the technicum with an essential base for carrying out applied instruction and in all probability these technicums, in return, train substantial numbers of intermediate level specialists for future use in the very same industrial complex. This localization of specialized training on the secondary level appears to be more marked than in the case of higher education.

Soviet sources occasionally state that teachers in some particular technicums are recruited or assigned temporarily from a certain large industrial plant. This occurrence is apparently closely connected with the marked localization of specialized secondary instruction. Because of this, there is probably considerable variation in the actual scope and quality of instruction. On the other hand, however, since some of the graduates of technicums associated with quite modern industrial plants are undoubtedly assigned to other localities, such a practice probably aids in spreading advanced technological know-how. In some respects, therefore, it resembles our own much more informal process of training technicians by an industrial corporation in its large modern plant. While the dissemina-

[12] Anon., *Spravochnik dlya postupayushchikh v sredniye spetsial'nyye uchebnyye zavedeniya v 1953 godu*, Moscow, 1953, passim.

tion of trained personnel in our society is effected by market demand for qualified technicians, the Soviet authoritarian state attempts to effect it by the forced placement of specialists.

Throughout the years the quality of training has not been uniform in Soviet technical secondary schools. In the early 1930's, when accelerated programs were introduced, when there was a general lack of textbooks, facilities, and qualified teachers, the training was probably of very low quality. Since the reforms of 1932 a gradual tightening of standards is evident. Standards had improved considerably by the late 1930's. Entrants into technicums began to be recruited from regular schools. Traditional grading was in effect. Standard textbooks began to appear in great numbers. Instructors and teachers were able to grade students more according to their ability than according to their proletarian origin or Communist Party or Komsomol affiliation. Tuition fees and bonuses in stipends for outstanding students caused further tightening of standards.

Tuition fees in technicums are the same as in the upper grades of the regular secondary school, and thus range between 150 and 200 rubles per annum, which is about 5 percent of the average annual income of Soviet wage earners or is equal to a successful student's stipend for 1 or 2 months. These tuition fees, however, are offset in many instances by the monthly stipend which is paid to successful students.

In 1938 about 85 percent of all technicum students received stipends.[13] Prior to the war, these stipends were paid out indiscriminately to successful and even failing students as long as they kept up attendance. For about 3 years after the introduction of tuition fees, there was also some uncertainty about who was qualified to receive a monthly stipend. In 1943, however, a monthly stipend ranging from 80 to 330 rubles was established for all students who receive passing grades in all subjects, and for those who receive honor grades there was a 25-percent bonus.[14] This measure undoubtedly provided additional incentive for learning and aided successful students in the payment of their tuition fees. In the postwar period up to three-quarters of all technicum students are believed to receive a basic stipend. The amount of the stipend is differentiated by field of specialization and is increased by course seniority. Engineering and upper course students receive larger stipends.

This discussion of the various factors affecting or stimulating the quality of training has been carried out primarily in engineering fields, but it may apply just as well to other fields. It is known that medical semiprofessional training has improved considerably over the last 20 years. Training of elementary-school teachers in normal schools has like-

[13] *Kul't Stroi—1940*, 115.
[14] Movshovich, op. cit., 217.

wise undergone change and improvement.[15] The factors motivating students to maintain standards have affected all institutions.

The success rate of students [16] is an indication that standards are being upheld, at least to some extent. In the early 1930's success rates were quite low, and there were less than 30 graduations per 100 acceptances. These were the classes which had been recruited haphazardly without selecting properly qualified candidates. In the late 1930's the success rate in engineering fields was about 40 to 45 graduations per 100 acceptances, and in other fields 50 to 55 graduations per 100 acceptances. In the postwar period less refined data suggest that the success rate of technicum students in all fields was about 60 percent.

There are two major factors which condition this rate. It is conditioned, of course, by withdrawals due to personal circumstances. Also, there is the implication that because of the enforcement of certain academic standards, only about half of the entering students succeed in graduating.

Total Enrollment

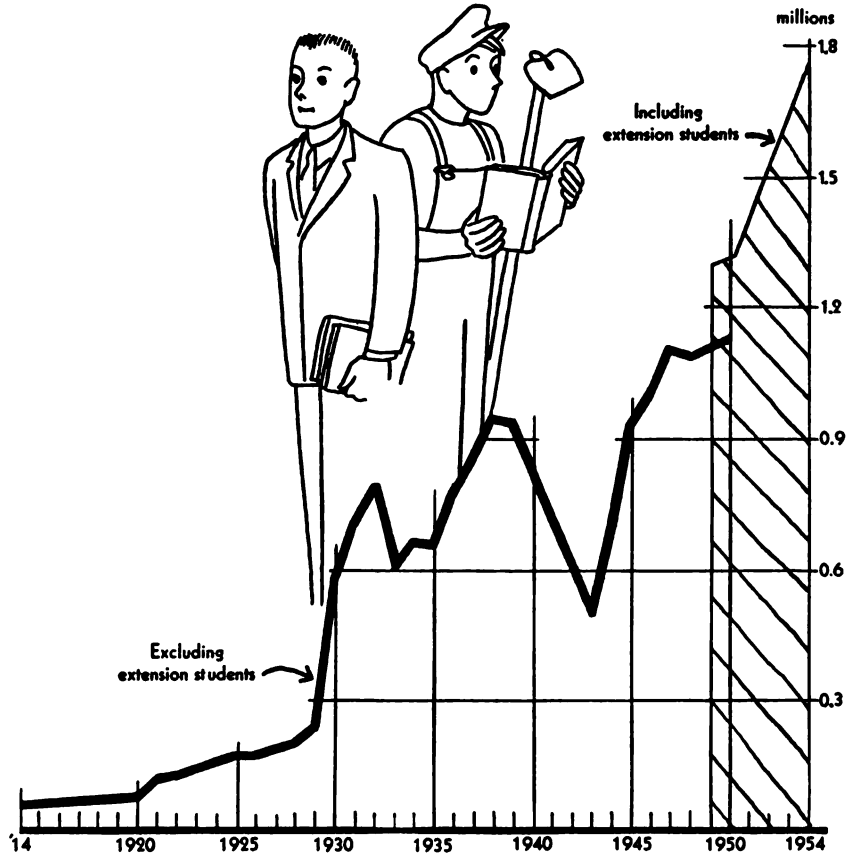
During the last 25 years enrollment in technicums has increased slightly more than 15-fold, although in this period the expansion of such training has been markedly uneven. Chart III reveals the trend in total enrollment in technicums over the last 40 years. Until 1929 the expansion of this type of training proceeded very slowly and gradually. A spectacular—though artificial—rise took place between 1929 and 1931, when the enrollment grew from about 230,000 to about 750,000. One year later the peak was reached, with about 800,000 students, and this was followed by a sharp drop in 1933 to about 600,000. This sharp upswing and decline occurred because of the training policies prevailing at that time.

The Soviet Government, having an urgent need for specialists, erroneously assumed during the First Five-Year Plan that training could be drastically accelerated without impairing its quality. Act-

[15] A curriculum is given in Medynskii, *Nar Obr,* 2d ed., 1952, 191–192. This reveals that in 1947 of about 4,600 instruction hours during the 4-year period, about half were devoted to sciences, about 20 percent to pedagogical subjects, and about 30 percent to general education. This curriculum constitutes a considerable improvement over that which existed in the 1930's for a 3-year program training elementary-grade teachers.

[16] The success rate is the number in the graduating class as compared with the number in the entering class. It can be computed directly as admissions: graduations 3 or 4 years hence. In the 1930's, Soviet authorities used to publish the rate of dropouts also, which does not account for failures at graduation or expulsions for unsatisfactory performance. In 1938 the dropout rate was 9 to 13 percent, depending upon field and length of training. This produces a hypothetical rate of success of about 55 to 65 graduations per 100 acceptances, and accounts for withdrawals by those who left "voluntarily" because of personal circumstances or unsatisfactory records.

TOTAL ENROLLMENT IN SECONDARY SPECIALIZED SEMI-PROFESSIONAL SCHOOLS, 1914–54



Source: Table A–0, table A–1, and table A–2, appendix to chapter III.

CHART III

ing according to this assumption, the Government assigned a large number of upper grade students to technicums. In fact, many regular secondary schools were simply converted into technicums, and overnight their entire upper grade contingents found themselves technicum students. Programs accelerated in some instances to less than a year were introduced. But by 1932, when it became apparent that such training was not adequate (the success rate fell to 30 graduations per 100 acceptances) and that the majority of students failed to pass such accelerated and obviously inadequate training, the expansion of enrollments was terminated. During the next 3 or 4 years (1932–34) a more moderate attitude began to prevail. The drop in enrollment which

occurred between 1932 and 1935 resulted from the excesses of the preceding years, and the adoption of moderate training policies. Enrollment was also undoubtedly affected by the chaotic conditions resulting from forced collectivization and the drastic famine which followed

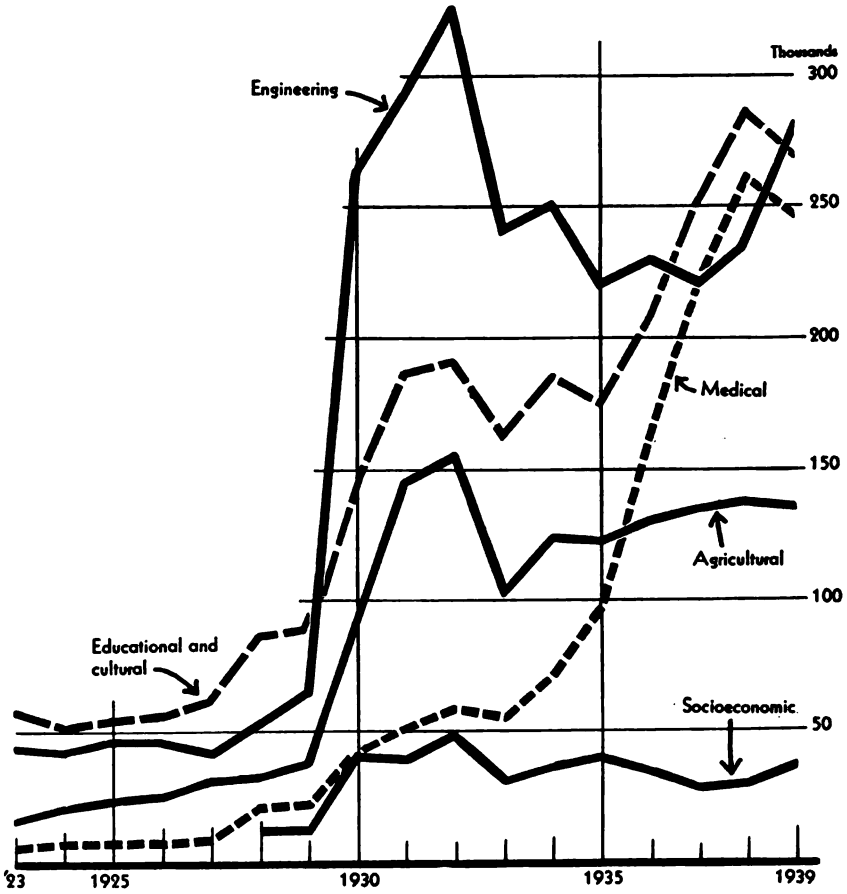
In 1935, the 1932 level was again reached, and under the general school reforms expansion proceeded gradually until about 1938. Enrollment began to decline again shortly before the war and suffered a sharp setback during the war when, in all probability, it dropped to the pre-1930 level. The postwar recovery was a very rapid one, and by 1946 a level of about 1 million, slightly above the prewar peak, had been reached. Enrollment stabilized at that level until about 1951. The rapid increase of enrollment between 1948 and 1952 was due largely to the expansion of extension training and the inclusion of these students in the overall figures on enrollment. Since extension students account for about 200,000, it appears that until 1951 there was probably a very moderate growth. After 1951 expansion of enrollment again began to take place.

Enrollment by Field

Although there are over 1,000 specializations for semiprofessionals trained in Soviet secondary specialized schools, Soviet statistical sources group them into five major categories: (1) engineering, (2) agricultural, (3) socioeconomic, (4) educational, and (5) health specialists. The notes to table A–1 in the appendix to this chapter describe in some detail the major categories included within these broad groupings. From the data presented in the appendix, enrollment trends for various fields for the prewar period are presented in chart IV.

Enrollment trends for individual fields show extremely erratic behavior. When the artificially expanded enrollment of the early 1930's was terminated, all fields were affected; but the sharpest setback occurred in the field of engineering. There were neither facilities, nor teaching staffs, nor sufficiently qualified entrants to sustain the enrollment. The quality of training was apparently poor, and cutbacks were more than justifiable. However, during the second half of the 1930's the engineering enrollment tended to stabilize around 250,000. Meanwhile, the medical-field enrollment, which had not experienced any sharp setback, increased fivefold and reached a level of about 250,000. In the educational field, where students are trained primarily as elementary-school teachers, the numbers increased. With the expansion of secondary schools there was a great shortage of teachers, and expansion of enrollment in this type of training to about 270,000 in 1939 resulted in a slight domination of this field of specialization over all others. After a setback in the mid-1930's, agricultural enrollment expanded during the decade

ENROLLMENT IN SECONDARY SPECIALIZED SEMIPROFESSIONAL SCHOOLS, BY FIELD, 1923–39



Source: Table A–0, table A–1, appendix to chapter III.

CHART IV

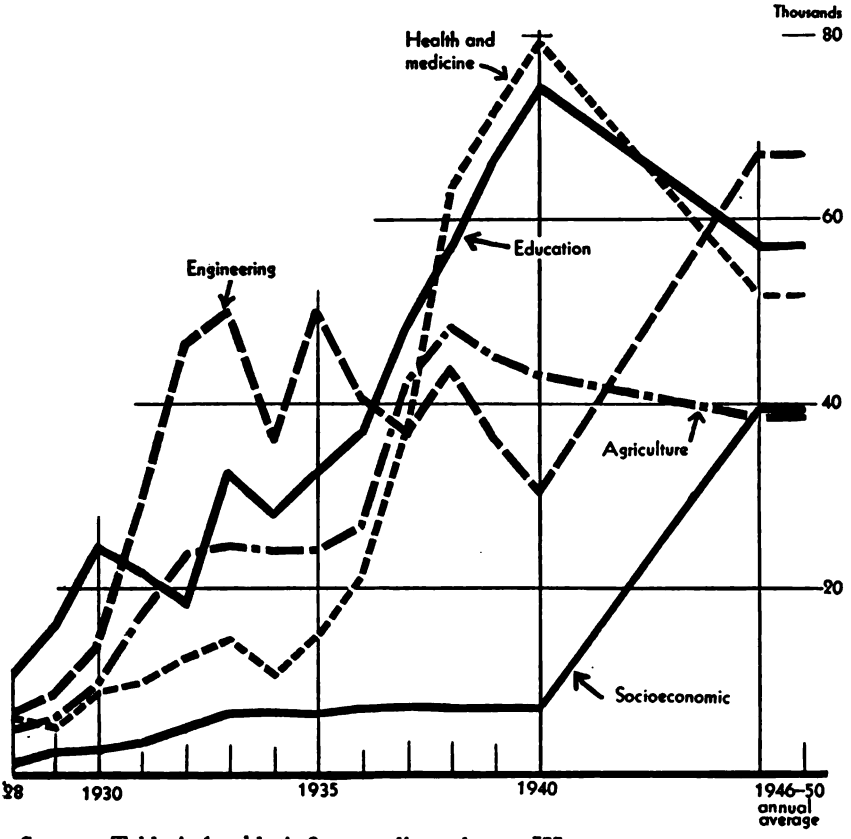
about threefold, reaching the level of about 140,000. Finally, the socioeconomic field remained at a point of stagnation, and was represented by less than 4 percent of total enrollment in 1939.

Unfortunately, sufficiently detailed data are not available to make a comprehensive analysis of enrollment trends by field for the postwar period. However, it is possible to obtain not only an adequate but perhaps even a more reliable picture of the training in individual fields by analyzing graduation trends.

Graduations by Field

Chart V shows graduation trends for the prewar period and average annual graduations in these fields for the period 1946–50, and reveals the recent trend in training. This chart shows the close parallel between graduation and enrollment trends in the prewar period, although the curve indicating ups and downs in the graduation trend must be shifted by 2 or 3 years from the curve revealing enrollment trends, depending upon the field.

GRADUATIONS FROM SECONDARY SPECIALIZED SEMI-PROFESSIONAL SCHOOLS, BY FIELD, 1928–40; AND 1946–50 AVERAGE ANNUAL GRADUATIONS



Source: Table A–1, table A–3, appendix to chapter III.

CHART V

While the educational and health fields became dominant in the late 1930's, there was renewed emphasis on engineering training at the secondary level after the war and particularly since 1952. In the postwar period (1946–50) engineering technicums prepared graduates at the rate of 70,000 per year, or about tenfold more per annum than in 1928. The decline of both educational and medical field training at the secondary level was undoubtedly the result of considerable expansion of professional higher education in these fields. Enrollment in teachers' institutes on a higher educational level, which were organized in 1935 to prepare teachers for elementary and intermediate grade teaching, was greatly expanded in the postwar period. The expansion of teacher training in higher educational establishments had its impact upon the training of teachers on the semiprofessional level. As a result, teacher training on the semiprofessional level was curtailed.

Proportionality Between Professionals and Semiprofessionals

During the first postwar plan (1946–50) about 50,000 fewer semiprofessionals in all fields were trained than was anticipated. Although by itself this cannot be considered a drastic failure, it served as a signal for a renewed drive to expand semiprofessional training. The drive began in 1952 and has been emphasized particularly in recent pronouncements concerning this type of training.[17]

During the last Party Congress in 1952, it was announced that while graduations of all types of specialists from higher educational establishments and from secondary specialized schools should increase by 1955 by about 35 percent over those of 1950,[18] reaching a level of about 600,000, graduations from technicums alone would be from 250,000 to 270,000. Actual graduations from semiprofessional schools in 1953–54 have already exceeded this target. Despite this, the drive to expand enrollment still continues.

One of the fundamental rationalizations for this drive is the contention of Soviet planners that the ratio between trained professionals and trained semiprofessionals has been violated and that this disproportionality should be eliminated. Soviet planners have been correlating graduations from higher educational establishments with graduations from technicums for the last 20 years. In the prewar period the optimum ratio between professional and semiprofessional graduations was considered to be 1 to 2 or 3, and attempts were made to approximate this ratio. In most years, however, this relationship has not prevailed, and for the last 25 years the actual ratio was about 1.7 semiprofessional graduates to 1

[17] *Izvestiya,* May 19, 1954; *Pravda,* August 14, September 17, 1954.
[18] *Pravda,* October 10, 1952 (Saburov speech at the 19th Party Congress).

professional graduate (for further details, see ch. VI). The postwar plan, 1946–50, again stipulated about two technicum graduates for each professional graduate. Actually, in most fields except education, a higher ratio was desired. However, in 1954 there were only 1.3 technicum graduates for each graduating professional. The renewed drive appears to be aimed at decreasing the discrepancy between anticipated optimum and actuality. The ratio in some fields has been raised to four technicum graduates for each professional. Strong emphasis is being placed on the training of engineering and agricultural specialists, where failure to obtain the optimum ratio seems to have caused a particular strain upon the utilization of manpower.

Technicum Facilities and Teaching Staffs

It has been stated recently that in order to satisfy the demand for specialists, new training facilities will have to be opened and extension training will have to be expanded. Many announcements concerning the actual opening of new training establishments have been made in regard to engineering and agricultural technicums. In the fall of 1954 it was contemplated that over 100 new technicums would be opened.[19]

In 1951 there were fewer technicums than in the late prewar years,[20] but it appears that their number is again being increased. While in 1940 there were about 3,770 technicums, in 1951 there were only about 3,540. Some of this decline can be attributed to the effects of the war, but the expansion of enrollment in and the facilities of the regular secondary schools also contributed to it.

The average technicum enrollment is relatively small. In 1940 an average of about 220 students were enrolled in each technicum. By 1951 there were about 380 students on the average in each technicum. A small enrollment per technicum continues to be characteristic of this type of training unit.

Soviet authorities are very reluctant to reveal the actual size of the teaching staffs employed in secondary semiprofessional establishments. A great number of technicum instructors are recruited on a part-time basis from among the ranks of teachers in other educational establishments.[21] A substantial number of instructors are recruited, also on temporary assignment, from the staff of industrial enterprises with which the technicums are associated. These factors may partly explain the

[19] *Pravda*, July 13, 1954.
[20] See table C–1 in the appendix to ch. III.
[21] *Sovmestitel'stvo*, i. e., holding a staff appointment in one institution and teaching in another at the same time, is frequently mentioned and apparently is much more extensive among technicum teachers than among those in other types of education in the U. S. S. R. *Sovmestitel'stvo* was, and to some extent still is, a general phenomenon in the Soviet Union and is not limited to teachers only. For further details, see ch. IV.

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reluctance of the authorities to reveal the actual size of the teaching staffs in technicums. From the information that is available, we know that at the beginning of 1930 there were about 63,000 technicum instructors.[22] By 1949–50 about 130,000 to 150,000 teachers were employed as full-time instructors in technicums.[23] In addition, there were undoubtedly many part-time or temporary assignees, the number of which cannot be ascertained. Although there is this great uncertainty about the number of instructors in technicums, it appears that there has probably been only a twofold or threefold increase in the full-time teaching staffs in the last two decades, and that the part-time staffs were probably greatly expanded in order to match the more than sixfold increase in technicum enrollment during the same period.

Disposition of Graduates

Most graduates of Soviet secondary specialized schools are required to take employment and are assigned to jobs for at least 3 years at a place designated by the ministry under whose direct jurisdiction the training was given. Upon completion of this job assignment, they may apply on an equal basis with other applicants to regular higher educational establishments. At the same time, while still on the job, they may apply to extension higher educational establishments, which have recently begun to enforce more rigidly the provision that the technicum graduate may continue his training in extension higher educational establishments only in the field of his original specialization. Further, as an exception, not more than the top 5 percent of a technicum graduating class may apply to a regular higher educational establishment in the same year that the graduation takes place. Again, it is stipulated, though not so rigidly enforced, that the higher education be continued in the field of former specialization.

Most technicum graduates acquire sufficient practical knowledge to perform certain specialized functions. They receive theoretical preparation in certain specialized fields, but their training remains drastically subordinate to narrow practical pursuits. Since entrance into technicums takes place usually between the ages of 14 and 16, graduates are between 18 and 20 years of age. They have had from 8 to 10 years of general education, or its equivalent, and about 2 or 3 years of specialized training of a primarily practical nature. The majority of these specialists are then assigned to jobs which, by law, they must hold for at least 3 years. After this type of training, there is only limited opportunity for a select few to continue education.

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[22] *Nar Khoz—1932*, 539.

[23] This estimate is possible on the basis of the argument presented in the notes to table C–1 of the appendix to ch. II.

CHAPTER FOUR

Higher Education and Professional Training

Montesquieu once said that the laws of education ought to be related to the principles of government. A long time has passed since these words were written, but the idea suggested by them still has force. Today Soviet educational authorities claim that the nature of the state determines the task and the aims of education. Soviet educational policy in regard to the training of professionals is a reflection of this notion. One of the tasks of education is to turn out a sufficient number of qualified persons to serve the state.

For the last few decades this has been and still remains one of the basic aims of Soviet higher education. Since the late 1920's the Soviet state, through its higher education, has tried to prepare badly needed professional personnel. The Soviet state had little use or sympathy for people who learned everything in general but knew little in particular. Soviet higher education turned primarily to the training of specialized professional personnel and sacrificed, to a great extent broad, and general educational pursuits. There were neither time nor resources to spare in its ambitious effort to build up military, political, and economic power, and higher education, together with other phases of Soviet life, was drawn into this effort.

As a result, there has been a multifold growth of training facilities, enrollment, teaching staffs, etc. This quantitative growth has been accompanied by qualitative changes. It is the task of this chapter to single out the factors which affect the qualitative aspects of Soviet professional education and to consider the quantitative gains made in Soviet higher education primarily during the period of the last 25 years.

Types of Soviet Higher Educational Establishments

Soviet higher education covers a wide range of occupational specializations, and has a large number of establishments for conducting profes-

sional training in these specialties. It is convenient to divide all Soviet higher educational establishments into two groups—universities and institutes. The U. S. S. R. today has 33 universities and well over 800 institutes. All institutions of higher education are commonly called by abbreviation—*VUZ* (*Vyssheye Uchebnoye Zavedeniye*—higher educational establishment), and individual establishments are also usually designated by abbreviations.[1] The use of the word "institute" in Russian is always associated with either higher education or with advanced research of one type or another. The latter usage of the term "institute" will be made clear in chapter V, and throughout this chapter this term will be used primarily to designate higher educational establishments.

The distinction between a university and an institute lies in the fact that universities usually offer somewhat broader training and instruction in a variety of fields, while institutes offer narrower specialization and give training primarily in related groups of fields. Furthermore, this distinction is based on the fact that while universities offer more theoretical and less applied training to those who will embark upon teaching or engage in pure science or in scientific research, institutes give primarily applied specialized training. While universities are concerned with many fields of knowledge, institutes tend to concentrate on only one. Historically, many Soviet institutes emerged from former divisions of universities during the 1920's and especially during the early 1930's, when the task of theoretical study was viewed as being distinct from the acquisition of applied knowledge. After the educational reforms of the early 1930's, although the blending of theory and practice reappeared, the functional differentiation between the two types of educational establishments remained.

1. *Universities*

The 33 Soviet universities account for a relatively small flow of graduates, and their share in the total annual number of Soviet higher education graduates has varied from 8 to 12 percent over the last 25 years. Today Soviet universities in most instances are multidivisional training establishments, offering training mainly in theory in a given field of knowledge, often supplemented by broader general education with an occasional interdisciplinary approach.

Soviet universities as a rule have about six divisions (*fakul'tety*): (1) physical-mathematical sciences, (2) philology, (3) history, (4) geography, (5) biology, and (6) chemistry. Some universities have several

[1] *MAI—Moskovskii Aviatsionnyi Institut* (Moscow Institute of Aviation Engineering); *MGU—Moskovskii Gosudarstvennyi Universitet* (Moscow State University); *KhKhT'I—Khar'kovskii Khimiko-Tekhnologicheskii Institut* (Kharkov Institute of Chemical Technology), etc.

additional divisions, such as geology, jurisprudence, etc.; but the number of divisions exceeds 9 in only 7 universities. Only as a rare exception is a division found in a university with narrow applied specializaton such as medicine or engineering. In the 33 Soviet universities there were 262 divisions (1953–54) with the following distribution:

TABLE 1.—*Distribution of divisions of Soviet universities, by field, as of 1953–54*

Specialty of a division (fakul'tet)	*Number of divisions*	*Specialty of a division (fakul'tet)*	*Number of divisions*
Physical-mathematical	29	History-philology	17
Physical	4	Philology	16
Biological	30	Jurisprudence	12
Chemical	23	Economics	8
Geological and soil mechanics	21	Eastern and Pacific cultures	4
Mechanical-mathematical	2	Other	62
Geographical	18		
History	16	Total	262

Source: *VVSh*, No. 5, 1954, 48.

About 40 percent of all divisions of Soviet universities had specialties in the fields of mathematics and physical and natural sciences. The 262 divisions were subdivided further into departments (*kafedry*), and in 1953–54 the 33 universities had about 1,900 departments. In that year Soviet universities offered training in about 62 specialties or fields of specialization, each of which had its own study plans, curriculum, and a certain number of specialized courses designed to give a specific orientation in the training of a professional with a university education.

University training as a rule lasts 5 years, but in some instances it is 5½ years. Enrollment in an average university was about 3,000 regular students (1950), but there were two universities (Moscow and Leningrad) with almost 20,000 students enrolled in each.

2. *Institutes*

The major flow of graduates comes from Soviet institutes. Today Soviet institutes are higher educational establishments which do not give any general education whatever, and which teach enough theory to make the acquisition of applied knowledge in a given field feasible. Most of these establishments are properly called institute (*institut*), but there are some which are called higher school (*vyssheye uchilische*), as for example Moscow's *VTU (B)* (*Vyssheye Tekhnicheskoye Uchilishche Baumana*—Bauman Higher Technical School), which is one of the best engineering schools in the country; or *LVMU* (*Leningradskoye Vyssheye Morekhodnoye Uchilishche*—Leningrad Higher Maritime School), which trains, among other specialists, marine engineers. Finally, in the

category of institutes belong also several art and theatrical schools and conservatories.

At the present time there are over 800 institutes which offer training in five branches of professional specialties: the engineering-industrial, agricultural, socioeconomic, educational, and health fields. Table 2 presents the number of institutes in 1954–55 and their grouping by specialty group and branch.

The grouping of Soviet institutes by branch and specialty presented in table 2 also serves a useful purpose in defining enrollment acceptances and graduations by field. This grouping by branch will be employed throughout this chapter. It is apparent from the table that the functional grouping of Soviet higher educational establishments, their students and graduates is different from the grouping by field of study commonly used in American practice in reporting this type of information.[2] Despite this, however, a numerical comparison of graduates by field for the two countries can be made, and will be presented in the latter part of this chapter.

As a rule, institutes have 3 or 4 divisions (*fakul'tety*), each of which consists, as in the universities, of several departments (*kafedry*). Occasionally there is an intermediate subdivision (*otdeleniye*), which consists of several departments. The term subdivision (*otdeleniye*), i. e., a group of departments, is also used to designate special branches of an institute, such as an evening branch (*vecherneye otdeleniye*) or an extension-correspondence branch (*zaochnoye otdeleniye*).

The largest institutes have up to eight divisions, a number which is seldom exceeded. Most institutes have only 3 or 4 divisions. In total, there are some 3,000 divisions. Medical institutes usually have only three divisions. Most of the institutes have enrollments of about 1,000 students, although there are a number of institutes, especially in the engineering field, where enrollment is anywhere from 3,000 to 8,000.

In 1940 an average Soviet higher educational establishment, if we take into consideration both universities and institutes, had an enrollment of 734 students, but by 1950 this had increased to 994. In engineering fields the average institute had about 1,130 students in 1940, and about 1,690 students by 1950. In agricultural institutes there was an average of 513 students in 1940 and an average of 960 in 1950.[3]

Today the length of training in institutes lasts usually from 4 to 6 years. Over the last three decades, however, there have been several changes in the length of training. In the early 1930's there was a

[2] In this regard, see the annual circulars of the U. S. Department of Health, Education, and Welfare, Office of Education. We distinguish about 75 fields of study, which are grouped into about 20 branches.

[3] Factual data presented above are from *VVSh*, No. 4, 1951, 7–9; Medynskii, *Nar Obr*, 2d ed., 1952, 166–167, and were supplemented and verified by analysis of data about some individual higher educational establishments.

TABLE 2.—*Soviet higher education institutes (or institute type) establishments (excluding universities), as of 1954–55*

Type of institute by branch, specialty group, and specialty	Total number of institutes in—		
	Branch	Specialty group	Specialty
I. Engineering-industrial:	177		
1. Polytechnical and industrial (multidivisional institutes for engineering training in a variety of fields)		24	
2. Electrical, electronics, engineering, and technical (engineering) physics		8	
3. Machinebuilding-engineering		30	
a. General machinebuilding			16
b. Naval engineering			2
c. Aeronautical engineering			7
d. Printing machinery and precision mechanics			3
e. Photoelectrical devices and cinema engineering			2
4. Geology, mining, and metallurgy		26	
a. Geology, mining (all types except ores), coal mining, and petroleum engineering			15
b. Mining (ores) and metallurgy			11
5. Chemical engineering and chemical technology		9	
6. Fish and food industry		13	
a. Food industry technology, machinery, and maintenance engineering			9
b. Fish industry technology, fleet operations, and maintenance engineering			4
7. Light industry		8	
a. Textile industry engineering and technology			5
b. Other branches of light industry			3
8. Civil engineering, construction engineering, and geodesy		27	
a. Civil engineering and other construction engineering (except roads)			17
b. Technology of construction materials and testing engineering			3
c. Geodesy			2
d. Road building and related surface structures engineering			5
9. Meteorology and hydrology		2	
10. Transportation and communication (maintenance, operation and construction engineering)		30	
a. Railroad			15
b. River transport			4
c. Sea transport			5
d. Air transport			1
e. Communication			5
II. Agricultural	109		
12. Agriculture		61	
13. Veterinary medicine, zootechny, animal breeding, and related studies		23	
14. Mechanization and electrification of agriculture (partly engineering)		7	

TABLE 2—Continued

Type of institute by branch, specialty group, and specialty	Total number of institutes in—		
	Branch	Specialty group	Specialty
II. Agricultural—Continued			
15. Soil conservation; water conservation and irrigation	---	6	---
16. Forestry and timber industry (latter is engineering)	---	12	---
III. Socioeconomic	35	---	---
17. Planning and managerial economics	---	9	---
18. Finance	---	9	---
19. Trade	---	5	---
20. Industrial, technical, and engineering economics	---	3	---
21. Jurisprudence	---	9	---
IV. Education (excluding 33 universities), arts and cultural services	349	---	---
22. Pedagogical institutes	---	187	---
23. Teachers institutes	---	91	---
24. Institutes of foreign languages (and Moscow Institute of Far Eastern Affairs)	---	20	---
25. Institutes for librarians and archival specialists	---	5	---
26. Arts	---	46	---
a. Architecture	---	---	3
b. Graphic and sculptural arts	---	---	9
c. Conservatories	---	---	21
d. Theatrical (stage and movie actors, producers, effects, etc.)	---	---	13
V. Health and physical education	88	---	---
27. Medicine	---	63	---
28. Stomatology	---	4	---
29. Pharmaceutical	---	8	---
30. Physical culture (teachers, coaches, and professional sportsmen)	---	13	---
Total	758	758	

Note.—In addition, there were 33 universities and 23 independent extension-correspondence institutes. The latter, being multiple branch institutes, operated about 60 local (i. e., in different cities) branches. The grand total without the multiple branches of the extension institutes is 814, if account is taken of the multiple branches it is 851. Furthermore, institutions *not included* in this list of professional training establishments are military academies (probably 18), commissioned officers military schools (number unknown), police commissioned officers' schools and probably an academy (number unknown), industrial academies (probably 7), and 2 party VUZ,y (1 Academy of Social Sciences and a Higher Party School, which has probably about 20 local branches).

Source: This table was compiled from MVO SSSR, *Spravochnik dlya postupayushchikh v VUZ'y SSSR v 1954 godu* (A Handbook for Entrants into Higher Educational Establishments in the USSR in 1954), Moscow, 1954 passim.

drastic shortening in the length of training, in some instances to 2 years. Prior to 1929 and after 1933, the minimum length of study in most institutes was 4 years. The 4-year training period is most common in the field of education, in socioeconomic studies, and in agriculture. In the engineering-industrial field, training usually lasts 5 or 5½ years. In medical fields it lasts 6 years. As an exception there are some teachers' institutes training primary-school teachers, which, although most are now being rapidly converted to 4-year schools, still do offer training lasting only 2 years.

3. *Other Types of Higher Educational Establishments*

A description of the types of Soviet higher educational establishments is not complete without mention of extension-correspondence (*zaochnyye*) training institutes and other alternative equivalent training facilities. In the first place, it may be noted that while regular universities and regular institutes trace their origins to a time long before the Revolution, these other facilities emerged only after 1917.

It is of historic interest that during the period of expediency, especially in the late 1920's and early 1930's, two types of higher educational establishments were of prominence—the Higher Party Schools (*Kom VUZ*) and the Higher Communist Agricultural Schools (*VKSKhSh*). Both were considered higher educational establishments before their ultimate abolition in the late 1930's. During the 1930's they trained some 60,000 specialists mostly for managerial jobs. As far as the professional training of these specialists is concerned, it was considerably inferior, in comparison with the standards of regular higher educational establishments of that period.

In the early 1930's a special type of substitute for higher education developed. These were the "special purpose faculties" (*FON—Fakul'tet Osobogo Naznacheniya*), which gave training to managerial and party personnel in the form of a tutorial system.[4] Around 1935, after some 6 years of existence, these special-purpose faculties were reorganized into industrial and agricultural academies (*sel'skokhozyaistvennyye i promyshlennyye akademii*), which trained specialists, again primarily for managerial positions. Many of them were closed shortly after the "great purges" of 1937–38, but some still remain, especially in the agricultural field (the Moscow Timiryazev Agricultural Academy, the Leningrad Academy of Forestry, and several industrial managerial academies).

[4] This was an interesting experiment in Soviet educational practice of which very little is known outside the Soviet Union. Some references to it can be found in Beilin, *Kadry*, 1935, 330, and passim, and in an interesting account: "Faculties of Special Purpose," unpublished manuscript, in English, New York: Research Program on the U. S. S. R.

Graduates of these academies are regarded as having higher education, and today they are reported as specialists within a given professional field of training. In the past, graduates were not very numerous (1,000–2,000 per annum) and their training appears to have been considerably lower in quality than that offered by regular higher educational establishments. However, some academies, for example, the Timiryazev Agricultural Academy in Moscow, offer training not much different from that offered in regular agricultural institutes.

In the late 1920's, extension training began to be offered by regular higher educational establishments. Some of this training was conducted by evening divisions (or subdivisions) (*vecherniye fakul'tety,* or *otdeleniya*), and some by independent institutes for extension-correspondence training (*instituty zaochnogo obrazovaniya*). Evening divisions were prominent during the period of accelerated training, and the "proletarization of cadres" policy in the early 1930's, when 8 to 10 percent of all students enrolled in higher educational establishments attended in the evening. From the mid-1930's to the present time, these evening divisions have accounted for a relatively small proportion of all students, though there are in operation about a dozen of these divisions in regular institutes as well as three institutes set up for just this purpose. Attendance of evening divisions is ordinarily aggregated in statistical sources with regular enrollment.

Enrollment in extension-correspondence programs originally was not large (see discussion below), and graduations were virtually negligible. Toward the end of the 1930's, however, the correspondence type of extension training began to expand rapidly, and in the postwar period went all out of proportion. In the past, this training was considerably inferior to that of any regular higher educational establishment. Recent reports testify that conditions have not improved and that the training is still comparatively poor.[5]

Extension-correspondence training is conducted as follows: During the academic year students must complete reading assignments according to the special study plans designed for a particular subject. Throughout the year they may use study-consultation periods (*uchebnaya konsul'tatsiya*) which, in the case of an independent extension training institute, may be provided directly through a local branch of the institute or by indirect assignment of local teaching personnel through the study-consultation guidance center (*uchebno-konsul'tativnyi tsentr*). The extension-correspondence student may do some laboratory work for credit in the regular higher educational establishment, may use library facilities there, etc. Finally, the extension student is granted several weeks of additional leave from his work (some of it with full pay, some of it with part pay) in order to take the biannual examinations, as well as several

[5] *VVSh,* No. 7, 1954, 1–4.

months' leave of absence in order to prepare for his final state accrediting examinations or for the preparation of the thesis. Although there is no formal attendance, there is frequently face-to-face contact between members of a teaching staff and individual students.

Today there are 386 divisions of regular higher educational establishments and 23 independent extension training institutes (*zaochnyye instituty*) which offer correspondence training only. It is frequently claimed that the programs of training in extension establishments are equivalent to those in regular institutions. The training, theoretically speaking, lasts 6 years, but it is often stated that students still do not finish the required courses in even 8 or 10 years. Some extension divisions have small enrollments, ranging up to 300 students. Others, like the Moscow University Extension Training Division, have enrollments of some 5,000. The largest one, the All-Union Polytechnical Extension Training Institute, had an enrollment in 1954 of some 19,000 engineering students.[6]

All extension training programs suffer from a common ill. Enrollments are very large, but graduations very low. This may be because of the outside involvement of the students, because of lack of time or energy, or, finally, because of other inefficiencies of these training undertakings. In 1953, for example, the All-Union Polytechnical Institute graduated a mere 400 students (engineers), and this was the largest graduating class in its history. During the preceding years, however, enrollment had averaged 15,000 students.[7] Thus the 1953 graduating class was about 2.6 percent of the total enrollment in that establishment.

Recent pronouncements anticipate further expansion of extension-correspondence training, and by 1960 it is planned that the 1953 extension student enrollment will about double,[8] which would mean about 900,000 to 1,200,000 students. In the past the majority (some 70 percent) of extension students were in the field of education and were comprised mostly of secondary-school teachers, who were trying to raise their professional standing. In recent years the expansion of extension higher education has brought about new regulations aimed at preventing entirely or limiting drastically the opportunity for individuals who undertake such training to change their occupational specialization. In recent years the acceptances in a given field of extension training have begun to be limited primarily to persons already employed in a given specialty. This drive is aimed primarily at former technicum graduates in order to prevent them from changing an already acquired specialty. At the same time, Soviet planners hope to remedy some of the ills of correspondence training with which they are faced today.

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[6] *Izvestiya*, September 22, 1954.
[7] *VVSh*, No. 7, 1954, 3.
[8] *Pravda*, January 6, 1955.

Another type of higher educational establishment is the military academy. In 1940 there were 18 military academies, and it is believed that their number has not increased since then. Although these academies are considered as individual units, they are, in fact, multiple-branch establishments. For instance, a certain military academy might be identified as being located in Moscow, whereas in fact it usually has 2 or 3 branches located elsewhere. In addition to military academies, there are also several institutions of a similar type operated by the police ministry. Training in military academies lasts from 5 to 6 years and, in some instances, is superior to that offered in regular higher educational establishments. There are also numerous military officers' schools which are sometimes regarded as higher educational establishments, but there is great uncertainty concerning the actual level of training in these establishments. In the prewar years annual graduations from military academies ranged between 2,000 and 3,000, but the number of graduates from other military or police schools cannot be ascertained.

This discussion has already suggested that there are many variations and great differences in the programs of training and that the meaning of the term "higher education" in the Soviet Union embraces a diversity of training effort. However, it is the regular higher educational establishments, i. e., universities and institutes, which are most significant as far as the stream of specialists is concerned, and it is these establishments which are of primary concern in the following discussion.

Entrance Requirements, Supply and Selection of Applicants in Soviet Higher Education

All Soviet higher educational establishments, institutes, and universities have standard procedures for admission of applicants. Each higher educational establishment is responsible for selecting a prescribed quota of prospective students. There are uniformly prescribed general rules on admission, but the task of selecting students rests with the individual institute or university.

Since most institutions have limited admission quotas, competition is quite keen. An applicant usually cannot apply to more than one establishment,[9] but if he has not been accepted by the 25th of August in one institution, he may apply, by transferring his entrance examination credits, to another and provided the latter has available vacancies and is willing, may be accepted. Each institution has the right to select its own students. For this purpose, in the spring of each year the institu-

[9] This is because of a technicality which requires the individual to surrender his *original* certificate of previous education. The Soviet press has occasionally denounced a violation of this requirement through "provisional acceptances" of applications.

tion sets up a temporary committee on admissions which undertakes the preliminary screening of applicants. Examinations in a given set of subjects are administered during the first 2 weeks in August. On the basis of the total score obtained by the applicant, and probably after further screening, acceptances are announced during the last 10 days of August.

All Soviet higher educational establishments accept persons of both sexes who have completed secondary education, which, as already mentioned, may be obtained through two main channels: (1) the regular 10-year school or its equivalent, or (2) technicums. Prior to the fall of 1955, the acceptance age was specified as between 17 and 35. In May 1955, the lower age limitation was abolished.[10] Entrants take competitive examinations, exemption from which is granted to persons who have completed secondary school with distinction (i. e., excellent students, formerly called *otlichniki* and today called maturity certificate holders with silver or gold medals, *medalisty*) and to a limited number (the top 5 percent) of outstanding technicum graduates who are to continue training in their previously chosen specialty.

Although the general requirements are uniform and standard procedures are employed, the actual process of selecting applicants depends on numerous factors, all of which are responsible for the emergence of differential standards on the basis of which admissions are made.

1. *Entrance Examinations and Process of Selection*

First of all, there are different sets of required subject examinations. There are institutions with an all-inclusive "hard" set of entrance examinations (five, including sciences and mathematics); there are others which require an "easier" set of subjects (geography, history, language).

There is a total of 7 subjects in which examinations may be given, 3 to 5 of which are required from the applicant, depending upon the field of future study. These subjects are: (1) Russian language and literature (required of all applicants, regardless of field of study); (2) mathematics (for applicants in engineering, technology, architecture, natural and physical science fields, and economics); (3) physics (for applicants in engineering, technology, architecture, agriculture, biology, natural and physical science fields); (4) chemistry (for all applicants listed in (3) above); (5) history of the peoples of the U. S. S. R. (for applicants in all fields of the humanities and the social sciences; pedagogy and the arts); (6) geography (for applicants listed in (5) above); (7) foreign language (1 of 3: English, German, French, for applicants in all fields except agriculture, the arts, and some fields of pedagogy).

[10] *Trud*, May 21, 1955. Also see discussion in ch. I, esp. footnote 21.

Entrance examinations in a given subject are of the oral (about 15 to 20 minutes) and written (2 hours) variety. Prior to 1955 both types were required in two subjects, Russian language and literature and mathematics. In all other subjects there were only oral examinations. In 1955 the oral examination in Russian language and literature was abolished for entrants in all fields except humanities. In addition to these seven subjects, a vocational subject is required in such fields as the arts, architecture, music, etc. Finally, those who apply to an educational establishment where the instruction is not conducted in Russian (there are a few establishments of this type, primarily in the field of pedagogy) must pass an examination in the language in which the teaching is carried on. Details concerning a given set of entrance examinations required from entrants into a particular field of study are available,[11] but for our discussion it is sufficient to sum up the pattern of these examinations.

Five subjects (mathematics, physics, chemistry, Russian language and literature, and a foreign language) are required in all engineering, technical, and natural and physical science fields of future study. In the humanities and the social sciences, the number is reduced to 3 or 4, with examinations in geography and the history of the peoples of the U. S. S. R. replacing those in mathematics, physics, and chemistry. There are some fields requiring one of these three latter subjects, but not necessarily all of them. Lastly, native language and vocational subjects are additionally required in a few instances.

The material covered for each subject in the entrance examination is based on that given in the Soviet 10-year school, particularly the material taught in grades 5–10. Thus, while the set of subjects on entrance examinations may vary from one institution or one field of future study to another, the material covered in each subject is, theoretically, uniformly determined on the basis of the secondary school curriculum. The general outline of the material required in a given subject has frequently been given in Soviet manuals.[12] On the whole, in mathematics, and particularly in physics and chemistry, the examinations appear to cover a greater area than is covered in American college board entrance examinations. Such a comparison is of course in no way proof of what the students in either case actually know, but rather of what they are *expected* to know.

In this regard, while Soviet secondary school courses provide some background for such requirements, the Soviet press often voices the

[11] Published annually in handbooks for entrants into Soviet higher educational establishments (i. e., MVO SSSR, *Spravochnik dlya postupayushchikh v VUZ'y SSSR v 1953 godu,* Moscow, 1953). A summary in English can be found in Gorokhoff, *Materials,* 77–82.

[12] For further details, see Gorokhoff, *Materials,* 83–92, where a translation of outlines of examinations in foreign language, mathematics and chemistry is given. Outlines in other subjects may be found in each edition of the handbook for entrants (MVO SSSR, op. cit.).

complaint that there is some disparity between the coverage of a given subject on the entrance examination and the material covered in the same subject in the secondary school. Whatever the case, entrants are required to pass the examinations, not on the basis of what they have actually learned but on what they *should* have learned and are expected to know. This presents an additional factor of selection.

It is obvious that those who are better prepared to take entrance examinations come from better schools, and despite the drive for uniformity on the secondary-school level, there is disparity in the training offered on this level. Soviet sources, analyzing the results of entrance examinations, occasionally report that students from rural schools with high grades often fail on the entrance examinations, while urban secondary-school graduates with poor grades make an excellent showing. It is of course difficult to say whether this is a general phenomenon or a matter of individual occurrence.

Whatever the case may be, Soviet higher educational establishments frequently give refresher courses of about 2 months' duration for those applicants who want them and who are required to take examinations for that particular establishment. In this sense, the situation is not much different from that in other European countries, where tutorial training is often taken by persons with completed secondary education before taking competitive entrance examinations for a higher educational establishment.

While the general coverage of material required in any given subject on entrance examinations is said to be uniformly prescribed, the actual examinations are prepared by the individual institution. It is thus possible for them, even within the scope of generally prescribed coverage of materials, to make up harder or easier questions. Those applicants who take refresher courses undoubtedly come better prepared or forewarned as to what to expect. Preparatory refresher courses are particularly extensive in educational establishments which place heavy demands upon applicants. Although this setup has often been criticized in Soviet sources, it is apparently still in great prominence. It permits some institutions to apply greater stringency when applicants are numerous, and is based on the simple argument that since the institution gives preparation to more applicants than can be admitted, more difficult examinations serve to simplify the process of selecting the best applicants.

There are reports in the Soviet press that the difficulty of questions varies from one institution to another. Unfortunately, sample questions are not available, but it appears that the makeup of questions tends to be more difficult in exactly those higher educational establishments where the number of applicants is large and where academic demands upon the future student are expected to be heavier, such, for example, as aviation engineering institutes as compared with institutes training me-

chanical engineers for agricultural equipment, or large universities as compared with other establishments which train teachers. Thus, because some institutions are in a position to make up examinations which are more difficult than usual, they can further considerably the process of selection.

2. *The Process of Academic Selection and Limitations Upon It*

It might be argued that the degree of difficulty of questions is one way of reserving some Soviet higher educational establishments for graduates of the better secondary schools. But whether there is discrimination or not, the fact remains that the admission of students rests primarily on the ability to pass extensive and, in many instances, highly competitive entrance examinations. This situation has been noted by other Western observers, who point out that today academic merit is one of the basic criteria for admission to Soviet higher educational establishments.[13]

These presently favorable conditions for selecting applicants did not exist from the time of the Revolution until the mid-1930's. In the 1920's and early 1930's, during the period of the "proletarization of cadres," the only criteria used were literacy and "political understanding." Only these two tests were used for entering students. However, until about 1936, a few institutions also gave intelligence tests closely resembling our Western methods of selection. These intelligence tests, under the pressure of the environmental theory, have since been abolished. The present type of examination procedure was introduced in 1934, and by 1936 all higher educational establishments were required to follow the procedures of multiple subject examinations which, with a few minor modifications, are still in effect today.

After the Revolution, various restrictions were placed upon entrance into higher education to persons of "alien social origin" (i. e., the intelligentsia, former proprietors, and the well-to-do groups of society). Special preferences were given to the toiling classes (workers and peasants) under this "proletarization of cadres" scheme, which was enforced with great severity for about 4 years after 1929. In 1927, "workers by origin" accounted for less than 25 percent of all students enrolled in Soviet higher educational establishments. By 1931 their share in total enrollment had jumped to about 58 percent. It has been on the decline ever since, and by 1938 it accounted for 34 percent.[14] It is doubtful that it has gained a larger share in the postwar period; and although Soviet statistical agencies still compile data on the social origin of students, there has been a complete taboo upon releasing any information about this situation.

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[13] E. Ashby, *Scientist in Russia*, New York: Penguin Books, 1947, 71.
[14] See table A–4 in the appendix to ch. IV, and further discussion in the text below.

This forceful drive to substitute other than academic merit criteria for the selection of candidates for higher education was admittedly a great failure. The entire scheme was motivated primarily by ideological preconceptions during the period when the regime sought political support from the workers and peasants; and distrust of the old intelligentsia led to various discriminations against them, among which was the restriction of access to higher education. While some of the restrictions gradually began to be removed around 1928,[15] the drive itself for recruiting primarily "proletarians" into higher education was just beginning to gain impetus. The height of this drive was reached in 1931 and the entire scheme backfired. Within the short period of the extensive drive to recruit primarily "proletarians," who were barely literate, there was a drastic decline in the quality of candidates selected. The situation was further aggravated by the acceleration of the training programs. In addition, the quality of instruction was drastically low because of shortages of teachers, textbooks, training facilities, etc. As a result, in December 1935, restrictions on social origin of applicants to higher educational establishments were removed and the principle of academic selection in its present form was shaped.

As the stringency of selection began to increase, other manifestations began to be felt. The Soviet press has occasionally voiced the criticism that there are manipulative occurrences when the parents' personal connections (*blat, semeistvennost'*) are used in an effort to get their offspring into some institution. While there are undoubtedly such occurrences occasionally, exaggerated significance should not be assigned to them since the practice is not widespread.

Although discrimination against applicants because of their social origin has been officially abolished, the screening of applicants still takes place. Although it is uncertain how effective Soviet screening procedures are, political screening of applicants is probably a necessary prerequisite for admission. This screening is based primarily on what the applicant says about himself in a written autobiography and "character reference" (*kharakteristika*), which he submits with his application. The latter usually states how good scholastically, how active and "politically conscious" the person is. This character reference is obtained by the applicant from the director of the 10-year school which he attended or from his employer in case he is a technicum graduate or a secondary-school graduate who has been employed for some time before applying to a higher educational establishment. Under such circumstances, there is some consideration given, in the process of screening applicants, to other

[15] Restrictions on origin were progressively removed beginning in 1928. In that year, scientific workers, literary workers, and sculptors, and their children, were put on an equal footing with workers; in 1931, engineers and technical workers were added; in 1932, bookkeepers and distribution specialists and technicians in socialized enterprises, etc.

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merit criteria (character, political loyalty, political participation, etc.). These procedures, political screening, personal circumstances, and at times personal connections, reduce the effectiveness of academic selection at least to some extent.

3. *Total Supply of Applicants, Their Distribution and Inter-institutional Differentials*

The present procedures of selecting students emerged in the mid-1930's. At about the same time, as has been pointed out in chapter II, the regular 10-year-school structure emerged. Secondary-school graduates began to replace other types of applicants, and by the late 1930's the secondary school became the primary source of supply of candidates for higher educational establishments. While in the mid-1930's only about 15 percent of entering students were accepted from regular secondary schools, by 1939 secondary-school graduates comprised about 60 percent of all students admitted. And by 1945, 10th-grade graduates of secondary schools accounted for 80 percent of all acceptances.[16] At the present time their proportion is probably close to or even over 90 percent of entering classes. In engineering fields the proportion of regular school graduates among accepted students was always higher, exceeding 70 percent even in 1938. This development undoubtedly facilitated the introduction and enforcement of the principle of academic selection.

Although the Soviet press has sometimes accused admission committees of liberalism, on the whole there is such a wide choice that admissions can be and are highly selective. In 1938, of about 166,000 acceptances, the majority were from regular secondary schools. Only 16,000, or less than 10 percent, were admitted without examinations.[17] Even in that year there were 2 to 3 candidates applying for each vacancy in many higher educational establishments.[18] A year later, in 1939, out of 300,000 applications, only about 180,000 vacancies were filled,[19] and only about 12,000 secondary-school graduates with distinction gained admittance without examinations.

In 1951 there were more than two applicants for each vacancy, and out of 355,000 admittances, only 31,000 were accepted without examinations.[20] On the whole, it appears [21] that in the late prewar years and since 1950, at least more than one, and in all probability more than two,

[16] Table AHX–1 in the appendix to ch. IV.
[17] *Pravda*, August 28, 1938.
[18] Ibid., September 1, 1938.
[19] Ibid., September 2, 1939 (Kaftanov article).
[20] *Komsomol'skaya Pravda*, September 1, 1951 (Yelyutin, present Minister of Higher Education, article).
[21] For statistical indices, compare the data in table A–2 in the appendix to ch. II, and table A–1 in the appendix to ch. IV.

10-year-school graduates have been available for each vacancy in higher educational establishments. In 1954 it was stated that many establishments received 3 to 4 applications for each vacancy.[22] Thus it is certain that today, out of two or more applicants, only one is selected, and that *less* than 10 percent of the entering class is admitted without taking examinations.

While the total supply of applicants was conditioned to a great extent by the flow of graduates from the Soviet 10-year school, and while its increase created favorable conditions for selecting entering students, in general, individual establishments were faced with the problem of selection for different reasons.

In the first place, the choice of institution is closely related to the choice of occupation. There are "prize" occupations in the Soviet Union, and they are mainly in the technical, engineering, and science fields. They command higher salaries, and offer prestige and status advantages. Professional occupations in the fields of agriculture, medicine, law, and social sciences, the humanities, etc. are far less rewarding, and in many instances because of possible political and ideological intervention, are in some respects more politically hazardous than science or engineering.

Secondly, there is the factor of the traditionally good reputation of some establishments. Most of these are located in large urban centers, and until recently, many of these "old centers" had better trained professorial staffs, better facilities, and firmer traditions in research.

Finally, there are other personal considerations such as placement policy, the attractions of a large city, the greater availability of dormitory accommodations in larger institutions, the differentials in stipends by field of study, etc.

As a result of these factors, metropolitan centers and institutions preparing specialists in prize occupations and large universities attract a greater number of applicants. In some instances, these institutions report anywhere from 5 to 12 applicants for each vacancy. Conversely, small provincial institutions have more vacancies than applicants. This situation prevailed before the war, and apparently still does today, although the deficit of applicants to match prescribed quotas in smaller institutions has been greatly reduced.

The implications of this phenomenon are worth noting. The beneficial effects of this occurrence upon the selection of candidates for larger institutions, outstanding for their reputation, are undeniable. Such institutions can enforce standards quite effectively. Smaller, provincial higher educational establishments, however, have to resort to lower standards in the selection of candidates and consequently in the general level of instruction as well. When the Moscow Institute of Aviation Engineering

[22] *VVSh*, No. 9, 1954, 1.

has 12 candidates for each vacancy and the Kharkov Institute for Librarians has only 11 applications for 300 vacancies, the standards are bound to be different. Thus, as a byproduct, the process of stringent selection has in fact benefited only certain types of Soviet higher educational establishments and has prevented many small institutions from improving their standards of instruction.

To sum up, there is in the Soviet Union (and this is not unique, of course) some discrimination among institutions by the applicant and among applicants by the institutions. Because of this situation, many Western observers have inevitably pointed up for emphasis a set of select establishments in the U. S. S. R. There is enough evidence to single out the well-publicized Moscow University as an "elite" establishment. With its new skyscraper, its 17,000 regular and 5,000 extension students, enrolled in some 12 divisions and 180 departments, manned by a teaching staff of about 2,300, among whom there are at least 100 members of the Academy of Sciences of the U. S. S. R., Moscow University looms as a formidable educational giant and a very attractive display piece.

But in singling out Moscow University and a dozen or so other educational establishments for particular prominence, one should not overlook the fact that in the last 20 years numerous institutions or departments in them have become just as important in the Soviet educational effort as the traditionally recognized old centers of learning and the "elite" establishments. The latter are important because of the uniqueness of training they offer. Establishments like the Ufa Institute of Aviation Engineering, a top-notch training center for aircraft engineers or experts on propulsion devices, or the Kiev Polytechnical Institute, with its department of automatic welding technology, which is the major center for the development of welding technology in the U. S. S. R. and the training of specialists in that field, remain in obscurity. If the uniqueness of specialization is considered, as it must be, there are many new centers whose training is just as important as that in the easily identifiable "elite" institutions.

During the last three decades Soviet educational authorities have made strenuous efforts to spread higher education into many new localities. Today, however, there are still only about 270 urban centers where some kind of higher educational establishment is found; more than half of these localities have only one teacher institute; and only 30 cities have more than five specialized higher educational establishments.[23] In 1939 only the Russian and Ukrainian Republics had more than two engineering educational establishments. In the other republics there were one or two engineering schools with enrollments of less than 1,000 students.[24] In 1947, Moscow institutions alone accommodated about one-sixth of

[23] MVO SSSR, op. cit., passim.
[24] *Kul't Stroi—1940,* 256.

the entire Soviet enrollment in higher educational establishments.[25] In 1939, 16 major urban centers accommodated about 60 percent of the entire Soviet enrollment in higher educational establishments.[26]

However, even though the unique efforts of some of the new educational establishments should not be overlooked, an extremely heavy concentration of training of professionals in the major urban centers still remains in effect. Applicants are attracted in great numbers to about two dozen major cities. Since the large universities and most of the top-notch engineering schools are located in these centers, they find themselves in a favorable position as far as the selection of students is concerned. Moscow, with about 90, and Leningrad, with about 50 higher educational establishments (with total enrollments of over 150,000 in Leningrad and about 280,000 in Moscow),[27] lead the list. Consequently, despite frequent Soviet pronouncements concerning widening the geographic spread of higher education, the fact remains that nowhere else in the world can heavier concentration of professional training in a few select urban centers be found. The selection of candidates and the pattern of concentration of available facilities appear to be closely interrelated and have a mutual effect upon the standards of instruction.

4. *Recent Debate on Selection*

The recent surplus of secondary-school graduates has brought to the fore another problem. The argument has been advanced recently that since the Soviet secondary schools give "adequate" preparation to students, there is no need for competitive entrance examinations. The question has been raised as to whether a subject set of entrance examinations adequately serves their purpose in selecting qualified students.[28] After lengthy discussion, it appears that Soviet higher educational establishments will continue to select students on the basis of a standard subject set of examinations.

The Ministry of Higher Education has stated decisively that because there is uneven quality of grading in the secondary schools, the entrance examinations given by higher educational establishments are the "most objective form of selection of qualified students." [29] At the same time, proposals to use other criteria such as average mixed grade (i. e., average grades from maturity certificate and entrance examinations), or one vocational test only, as well as other suggestions, were rejected.

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[25] MVO SSSR, *Kuda poiti uchitsa: spravochnik dlya postupayushchikh v VUZ'y Moskvy* (Where to Study: Handbook for Entrants to Higher Educational Establishments in Moscow), Moscow, 1947, 3.
[26] *BSE–SSSR,* column 1234.
[27] *VVSh,* No. 2, 1954, 5.
[28] Series of articles in *VVSh* in the spring of 1954, especially summary and official position in regard to this issue, *VVSh,* No. 6, 1954, 34–38.
[29] *VVSh,* No. 6, 1954, 37.

Thus the requirements for entrance examinations which were made compulsory in 1936 are not likely to be relinquished, at the present time at least. And although there are some signs of relaxation of standards in the upper grades of the secondary school, as was already mentioned in chapter II, so far there are no signs of the relaxation of selection procedures by higher educational establishments.

Specialization in Soviet Higher Education

The Soviet term "specialization" has a considerably narrower meaning than it has in American professional education. In the Soviet Union, "specialization" in professional education means such modification of a training program as to give an individual preparation in a certain, narrowly defined field of knowledge.

Soviet sources distinguish several levels of aggregations of professions by the field of their specialization. As of 1953–54 the pattern of specialization in Soviet professional education and the respective levels of aggregation can be described as follows: [80]

1. Soviet higher education is divided into five areas or branches (*otrasl'*). These are: (1) engineering-industrial; (2) agricultural; (3) socioeconomic; (4) educational; (5) health. These are the categories which will be dealt with extensively throughout this volume.

2. These five areas are composed of a total of 24 specialty groups or fields (*grupovaya spetsial'nost'*). To some extent, these groups resemble the demarcation lines made for American professional education by field of study. There are, for example, such specialty groups as civil engineering, chemical engineering, metallurgy, medicine, etc.

3. These 24 specialty groups or fields represent an aggregate of 295 specialties (*spetsial'nost'*). For instance, power engineering as a specialty group has eight specialties, among which, for example, are power generating, transmission networks, etc. Metallurgy as a specialty group has 10 specialties, some of which are nonferrous metals metallurgy, blast furnaces, and rolling technology. In the specialty group medicine there are seven specialties, i. e., general practice, pediatrics, hygiene, pharmacy, etc. Chemical engineering as a specialty group has 16 specialties, such as heavy chemicals technology, silicate technology, etc.

4. Some of these 295 specialties are further divided into specializations (*spetsializatsiya*). There are about 450 specializations, of

[80] I. Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR* (Training of Specialists for Industry in the U. S. S. R.), Moscow, 1954, 89. See also *VVSh*, No. 5, 1954, 48; No. 9, 1954, 6.

which institutes account for 388 and universities for 62. In the specialty nonferrous metals metallurgy, for example, there are 11 specializations, including copper and alloys metallurgy, precious metals refining and metallurgy, etc. In power generating as a specialty, there are specializations in large hydroelectric power stations, industrial plant power stations, etc. In medical general practice as a specialty, there are specializations in surgery, otology, etc.

5. Finally, about 135 of these 450 specializations are broken down further into 510 subspecializations (*drobnyye spetsializatsii*). Many of these subspecializations (about 370) are found in the engineering-industrial branch. In the specialization copper and alloys metallurgy, for instance, there are subspecializations such as refining and smelting technology, primary processing, etc.

Table 3 reveals the pattern of grouping specialties in Soviet professional education by group specialties and branches.

To sum up, there are divisions in Soviet professional education which must be clearly distinguished. They are: branch (*otrasl'*), group specialty (*grupovaya spetsial'nost'*), specialty (*spetsial'nost'*), specialization (*spetsializatsiya*), and subspecialization (*drobnaya spetsializatsiya*). While the data in table 3 present a grouping of the types of Soviet professional training by branch, specialty group, and number of specialties, it should be noted that specialty groups correspond roughly to the *type* of institutes there are in Soviet education. The number of specialties (i. e., 295) corresponds roughly to the number of *types* of divisions (*fakul'tety*) found in various institutes and universities.

It is, of course, beyond the scope of this report to present a discussion of every one of these specialties and specializations, and of necessity our discussion must be limited to the larger aggregates (primarily on the branch level). The very number of specializations in Soviet professional education is quite suggestive. These narrow specializations have resulted in what might be called a breakup and differentiation of the traditional concepts of the engineering profession. In some fields, like university programs, for example, this breakup is not so distinct as it is in engineering, where such professional training as mechanical engineering is broken up into several dozen narrow specializations (like mechanical engineering in agricultural machinery, in machine tools, in casting equipment, in automobiles, in tractors, in aircraft engines, etc.). There are metallurgical engineers in copper and alloys, in lightweight metals, in nickel and cobalt, etc. There are mining engineers in the drilling of petroleum and gas wells, in the exploration of coal deposits, etc. There are civil engineers in bridge design, in flat surface structures (roads), in large-scale hydrotechnical structures, in industrial buildings, etc. There is narrow occupational fragmentation in every field of engineering.

TABLE 3.—*Specialty groups and number of specialties in Soviet higher education (as of 1953–54)*

Branch and specialty groups	Total number of specialties in—	
	Specialty group	Branch
I. Engineering-Industrial branch		188
1. Geology and mining exploration	11	
2. Exploitation of mineral deposits, mining and primary processing	14	
3. Heat and electrical power engineering	8	
4. Metallurgy	12	
5. Machinebuilding engineering [1]	42	
of which—		
a. Heavy machinebuilding	9	
b. General machinebuilding	26	
c. Appliances and instruments	7	
6. Electrical and electronic (design-manufacturing) engineering	9	
7. Chemical engineering	16	
8. Technology of the food industry	12	
9. Wood processing, paper and related technology	6	
10. Light industry technology	12	
11. Printing and publishing	4	
12. Geodesy and cartography	4	
13. Meteorology and hydrology	4	
14. Civil (and other construction) engineering	18	
15. Transportation engineering	13	
of which—		
a. Railroad	5	
b. Water	5	
c. Automotive	2	
d. Air	1	
16. Communication engineering	3	
II. Agricultural branch		22
17. Agriculture and veterinary medicine	19	
18. Forestry	3	
III. Socioeconomic branch		24
19. Economics, planning and finance	22	
20. Jurisprudence	2	
IV. Health branch		8
21. Medicine and pharmacy	7	
22. Physical culture	1	
V. Education and arts branch		53
23. Education	48	
of which—		
a. Universities	20	
b. Pedagogy (upper)	11	
c. Pedagogy (intermediate)	5	
d. Pedagogy (lower)	7	
e. Cultural services	5	
24. Arts	5	
Total specialties		295

[1] General designation for all types of mechanical engineering primarily, as well as for other types—aeronautical, naval, etc.

Source: I. Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR* (Training of Specialists for Industry in the U. S. S. R.), Moscow, 1954, 89.

This narrow specialization came into being in the early 1930's, but since the late 1930's Soviet educational authorities have waged numerous campaigns (without much success) to put an end to it. There have been many decrees, regulations, and discussions to prevent fragmentation; but, in most instances, confronted with the argument that people trained in these fragmentary subspecializations (*drobnyye spetsializatsii*) are needed by industry for immediate employment, these pronouncements have had very little effect.

The drive in 1952–54 to put an end to fragmentation and to achieve some aggregation of narrow field specializations did not, and is not likely to, result in any drastic change in the near future. Although there has been persistent talk in the last few years concerning the broadening of general nonspecialized scientific or engineering education in order to curtail narrow specialization, so far the tendency which has prevailed over the last 25 years is still in force. As recently as this spring (1955) there was an announcement that the number of subspecializations and even specializations themselves had been "drastically curtailed." [81] But since it is not known how "drastically" it was curtailed and since there have been so many other announcements to the same effect in the past, only future developments in Soviet higher education will give us the answer.

Because of this large number of narrow specializations, because of the functional division of Soviet higher education and subordination of training to applied pursuits within each occupation, there are a great variety of training programs.

Training in Soviet Universities

Soviet universities offer sixty-odd types of training programs. Not all of them can be considered by this report. Whatever field of training is considered, it can be said that the university curriculum is based on 4,500–5,500 instruction hours, with the number of subjects of instruction ranging from 25 to 35. In most programs there is a required set of subjects which every student must take, but in some fields elective courses are offered, particularly in the humanities. The first 2 years are devoted to "general subjects of study," and usually the remaining 3 years are devoted to the major field of study.

1. *Professional Training in Scientific Fields in Soviet Universities*

In our discussion of university training programs a particular example, that is, instruction offered in scientific fields, will be considered. Training

[81] *VVSh*, No. 3, 1955, 3.

offered by Soviet universities in scientific fields is commonly called experimental sciences (*eksperimental'nyye nauki*), whether it is physics or chemistry, biology, or other science field. This type of training has already been discussed by Ashby on the basis of his firsthand observations of Soviet education.[22]

In general, it may be stated that the curriculum for science majors at Soviet universities is based on about 5,200 to 5,400 instruction hours (about 45 minutes each) over a 5-year period, with required attendance. There are, as a rule, no electives or optional courses. The subjects of instruction may be grouped into three broad categories (*tsikly*). The time allocation by group of subjects in Soviet universities is presented in table 4.

TABLE 4.—*General structure of curriculum in Soviet universities*

Group of subjects	*Time allocation in percent*
1. Political and social science	6
2. General science	27
3. Special field sciences	67
Total number of instruction hours, 5,200–5,400	100

Source: Medynskii, *Nar Obr*, 2d ed., 1952, 173.

While we shall speak of the allocation of time for a group of courses or even for individual courses, we should view this as only a useful approximation. In reality, 67 percent could obviously mean 65 or 70 percent. Further, in speaking of Soviet programs of training, it should be borne in mind that there are frequent "adjustments" in these programs. Since 1937–38 there has been relative stability as far as the general structure of the curriculum is concerned, and most of the "adjustments" have been made in syllabi for individual courses. These limitations must be remembered throughout the subsequent discussion.

Political and social science subjects consist primarily of indoctrination in the official version of Marxism and in current political and ideological orthodoxy. General science subjects include foreign language, general physics, analytical geometry and calculus, biology, general inorganic chemistry, some geology, theoretical and applied mechanics, etc. Usually there are 8 to 10 subjects within this group. Subjects in these two groups are ordinarily taken by students in the first 2 or 2½ academic years. Special field instruction consisting of some 12 to 18 subjects starts in most instances during the second half of the third academic year.

Ashby reveals the courses of instruction given by the Division of Chemistry of Moscow University, from which it is apparent that chemistry-major students spend, out of about 2,700 instruction hours devoted to chemistry subjects, about 1,800 on general chemistry (in-

[22] Ashby, op. cit., esp. 78–86, 91–93.

organic, organic, physical, analytical) and slightly less than 1,000 instruction hours on specialized chemistry subjects.[33] Thus the time spent in all chemistry subjects amounts to about one-half of the entire instruction time. Laboratory work is very prominent in general chemistry subjects and occupies some 73 percent of the total time devoted to courses in chemistry. However, the time devoted to laboratory or applied instruction in specialized chemistry courses is extremely low—virtually negligible. Extensive laboratory practice is required, particularly in basic chemistry courses. This situation of course may be true only in this particular instance of a university training program. Nevertheless, this fact is paradoxical since some subjects like spectrochemistry or biochemistry, which normally would require extensive laboratory work in our instruction setup, actually require none in the Soviet case. To some extent, then, the ills of textbook learning are also present in Soviet higher education.

If one compares the training of Soviet chemists with our own, one fact is immediately obvious. As far as instruction time is concerned, the Soviet university chemistry major spends at least one-third more time on chemistry subjects than our own chemistry major in a college with a good department of chemistry.[34] At most, our college chemistry majors during 4 years of study take 10 full courses in chemistry with a probable maximum of some 2,100 instruction hours. As far as the range of subjects goes, there is no radical difference between those which may be but often are not elected by our own chemistry majors and those which are required of the Soviet student.

It is not feasible to venture into a detailed analysis of syllabi in individual courses, but from admittedly imperfect comparisons of several textbooks, it appears that, on the whole, the content of individual courses in the U. S. S. R. is probably quite comparable to that given in our colleges. In some instances the latest theories in quantum mechanics, in molecular structure, in nuclear chemistry, and in certain other select advanced topics are not adequately discussed in Soviet texts. Some textbooks still in use are of ancient vintage, written in the 1930's, or

[33] See table B–6, appendix to ch. IV for details.

[34] Many of our colleges (Harvard, for example) operate on the basis of 24 actual instruction weeks during the academic year. Other schools (MIT, for example) operate on 28–30 instruction weeks omitting reading periods. In most instances there are 3 lectures and anywhere from 3 to 10 laboratory hours per week in a given chemistry subject. If we assume 6 laboratory hours as typical, the approximate annual number of instruction hours is 72 in lectures and 144 in laboratory periods per chemistry course. Our instruction hour lasts about 50 minutes against 45 minutes in the Soviet Union, but this is a minor difference to consider. This reconstruction of time spent per course is probably a maximum, since in some courses only 2 lectures per week are given, and in the basic courses laboratory work seldom exceeds 3 hours per week. This optimum (with Harvard the example), of about 216 instruction hours per chemistry course, is assumed, however, for purposes of comparison. Of course, if other schools are considered, the maximum time per course may reach 250 to 280 hours.

frequently translated from other languages in the early or mid-1930's. It is most difficult to make any definite statement concerning the overall content of instruction without an exhaustive and meticulous survey of individual topics, a task which would be a worthwhile undertaking but which is beyond the scope of this survey and which has not as yet, to our knowledge, been attempted.

Even when we are admittedly optimistic concerning the scope and quality of our own training of undergraduate chemists, we are faced with the probability that Soviet training is not only comparable, but somewhat more extensive than our own, although as far as the teaching of certain selected topics is concerned there are undoubtedly various reservations. The sheer size of the workload, as well as the process of enforcing certain standards in grading and the number of examinations and tests (which will be discussed in the latter parts of this chapter), exercise considerably greater pressure on the Soviet university student majoring in science than they would upon our own college student. Furthermore, aside from the requirement to learn chemistry subjects proper, the Soviet student is required to learn more about other sciences, such as analytical geometry and calculus, physics, thermodynamics, mechanics, strength of materials, etc., all of which are a part of his curriculum. Some of these subjects are undoubtedly quite useful in training a research chemist. Our chemistry majors do not venture extensively into these subjects except at the expense of chemistry courses. This may perhaps be considered an additional element of strength in the Soviet training program.

2. *Soviet University Training in a Social Science Field*

While the training of Soviet professionals in the social science fields will not be treated extensively, one example is worthy of mention. The curriculum in jurisprudence offered in Soviet universities (and also in special institutes of jurisprudence) is based on about 4,100 instruction hours for a 4-year curriculum, and about 5,300 for a 5-year curriculum.[85] The 4-year curriculum prepares specialists in Soviet law; the 5-year curriculum, specialists in international law primarily. Let us consider the 4-year curriculum. The total number of subjects is 33. The share of total time of two purely political subjects is about 12 percent, and seven general subjects (Latin, history, foreign language, logic, etc.) account for about 15 percent. The remainder of time is devoted exclusively to 23 law subjects, ranging from Roman law to contemporary international law.

[85] This discussion is based upon data presented in Bartošek, *Vysoké*, 1947, 247–278 (curriculum in tables 1–3). Bartošek as a lawyer is particularly interested in this subject, and this presentation contains many revealing details.

This example is of particular interest because it suggests that specialization is very pronounced in this field of study, as revealed by the 4-year curriculum. Also, in this program the Soviet student spends twice as much time on two purely political subjects (Marxism-Leninism and political economy) as would his counterpart in a scientific field. Furthermore, many of the law subjects are invariably treated in a political context or at least with an obviously biased interpretation. This is important because Soviet refugee accounts often stress that political instruction in technical and scientific fields has less effective penetration, and the Soviet press often complains about the state of political instruction in these fields and demands improvement.

3. *The Soviet University Diploma Certificate vs. the United States Degree*

Soviet university training culminates in state-accrediting oral examinations (*gosudarstvennyi ekzamen*) conducted before a public audience, and given by a special committee of several professors set up for this purpose. The examinations cover the entire course of study in the field of the student's specialty. Upon passing these examinations, the student receives a diploma certificate (*diplom*), which certifies to his training in a given field with a given specialty (such as "chemist," "physicist," etc.) and which states the results of the state-accrediting examinations, together with the grades he has received in some 30 to 35 subjects taken during the course of training. This procedure of requiring final examinations in public of all graduates which cover the entire program of study is unknown in our educational practice as concerns ordinary college degrees.

Although no formal degree is granted in the Soviet case, foreign observers of Soviet education have often attempted to identify Soviet higher education graduates in terms of certain academic degrees granted by a given country. Such an attempt usually leads to many difficulties because comparisons of this sort usually lack precision. Therefore it should be viewed as a rough equivalent rather than a precise one. Only with a great many reservations would it be possible to say that the Soviet university diploma certificate is equivalent to such-and-such a degree in our educational system. The training of chemists analyzed briefly above suggests that the Soviet university chemistry major has training probably comparable to, or with some reservations—somewhat more extensive than, our chemistry B. S. degree holder. The Soviet university-trained chemist may be in some instances as well trained as our

M. S. degree chemist.[36] Within these two confines, because there are both similarities and differences, this is probably as close as one can get in the evaluation of one country's training in terms of another country's. Although such imprecise equivalents create great uncertainty in the evaluation of level of training, greater refinement is hardly justifiable.

4. *Distribution of University Graduates and Placement Criteria*

It is often stressed that Soviet universities train primarily research scientists in various fields. This is true only to some extent. In the last prewar years Soviet universities graduated on the average only about 8,000 persons per annum, and in the 1950's they graduated about 18,000 per annum.[37] Soviet universities graduate about one-half of their students with a major in the humanities and social sciences, and the other half with a science major. Since 1949 at least 50 percent of the humanities and social science majors and about 20 percent of the science majors have as a rule been assigned to teaching in the upper grades of the secondary schools.[38] In 1954 Moscow University told its applicants that those who studied hard would become good research scientists and those who were just average would become school teachers upon graduation.[39]

This frank admission is quite revealing, since the compulsory placement policy of graduates of higher educational establishments is in many instances conceived by Western observers as something entirely arbitrary. But, at least as far as Soviet universities are concerned, there appears to be some correlation between academic performance and future job assignment. This has some far-reaching implications which neither analysis of textbooks nor comparisons of curricula and quality of training can reveal. If such policies are followed, however, it implies that universities can and in fact apparently do select the most promising students for scientific research careers.

Engineering Higher Education in Soviet Institutes

While engineering training in Soviet institutes is of principal interest in the following discussion, whatever field is considered, it can be said that training in a Soviet institute is modeled in the following fashion. All

[36] This is probably true in the case of graduates from large, well-established universities (such as Moscow, Leningrad, Kazan', Kiev, Khar'kov); and is less likely in the case of the new Central Asiatic and other smaller universities, where it is known for certain that the programs of training are somewhat weaker and where the facilities are not as good as in the well-established universities. Interinstitutional differences exist in the Soviet Union as well as anywhere else.

[37] *VVSh*, No. 5, 1954, 47. Total graduations 1950–53 were 53,000.

[38] *VVSh*, No. 5, 1954, 49.

[39] Idem.

institutes with over 5 years of training have anywhere from 5,000 to 6,000 total instruction hours, with required attendance. Weekly required attendance of classes ranges anywhere from 32 to 40 instruction hours. The required number of attendance hours is usually higher during the first 3 years of study. It was established in 1936 that no more than a total of 6 instruction hours in three diverse subjects may be given in 1 day. Instruction is carried on 6 days a week. The academic year, divided into two halves (*semestry*), lasts 10 months from September 1 until July 1, but the actual number of instruction weeks seldom exceeds 32 per academic year. At the present time the number of instruction hours per academic year ranges anywhere from 1,000 to 1,300, or, generally speaking, more than twice the usual number of instruction hours per academic year in American colleges.

1. *Types of Engineering Institutes and Distribution of Engineering Students by Field of Study*

Soviet higher educational establishments in the engineering fields are commonly called *VTUZ* (*Vyssheye Tekhnicheskoye Uchebnoye Zavedeniye*—Higher Technical Educational Establishment) and may be subdivided into two groups. One consists of polytechnical and industrial institutes (*politechnicheskiye i industrial'nyye instituty*), and the other of industrial branch institutes (*otraslevyye instituty*). Polytechnical and industrial institutes train engineers in various specialties, while branch institutes train them in only one. Polytechnical and industrial institutes usually have 6 to 8 divisions (*fakul'tety*), while industrial branch institutes seldom have more than three divisions. Each division usually offers training in one specialty with a score of specializations. Both types of establishments have narrow specializations. As far as training programs are concerned, the general structure of the curriculum presented below applies to both types of Soviet engineering higher educational establishments.

In the fall of 1954, as already shown in table 2 above, there were 24 industrial and polytechnical institutes. In the same year there were 153 industrial branch institutes, excluding extension training establishments. In 1950 polytechnical and industrial institutes accounted, by enrollment, for some 72,000 students, or about 26 percent of the total 280,000 students in the engineering-industrial branch.[40] Industrial branch institutes, as already indicated in table 2, are in turn grouped according to specialty into various types, such as machinebuilding, aviation, power and communication, mining and metallurgy, oil, chemical, construction, light industry, transportation, etc.

[40] *BSE* (2d ed.), 1951, vol. 9, 513. In 1950 there were 20 polytechnical and industrial institutes and about 150 industrial branch institutes.

This grouping emerged primarily as a result of the administrative setup in Soviet higher education in the early 1930's, when each institute was subsidized and controlled by a particular division of former commissariats in charge of Soviet industry. Although control of higher education—especially over instruction programs, academic appointments, financing, etc.—was consolidated in the 1930's under the All-Union Committee on Higher Education (later the Ministry of Higher Education), compartmentalization of training to suit the needs of a particular industrial or economic segment for certain types of engineers still remains.

It is known that Soviet authorities do compile detailed statistics on the actual specialties of engineering students, but since the late 1930's the data which have been made public deal with enrollment and graduations from Soviet engineering higher educational establishments, grouped according to institutional lines of jurisdiction. This institutional (or functioning) grouping make for difficulty in ascertaining the distribution of Soviet engineering students in terms of the traditional divisions by field which are commonly used in America and Western Europe. Table 5 gives the distribution of enrollment grouped by type of institutes in Soviet engineering-industrial higher educational establishments as of the fall of 1950.

It is apparent from table 5 that under the institutional grouping employed in Soviet reporting of engineering students, a similar field of study or engineering specialty (as traditionally defined—mechanical engineering, civil engineering, etc.) can be found in different groups of institutes. Although it is impossible to ascertain precisely how many students with numerous narrow specializations and in diverse groups of institutes are studying in a given field, an approximate distribution can be derived. Table 6 gives a rough approximation of the grouping of Soviet engineering students by traditional field of study. Each field, of course, includes numerous specializations and specialties.

Soviet engineering-industrial enrollment consists of about 85 to 90 percent of students with specialties which can be classified within the traditional fields of engineering. It must be particularly emphasized that mechanical engineering specialties are very prominent in Soviet engineering education. By contrast, in American engineering education, electrical engineering accounts for a considerably greater share in total engineering enrollment than in the Soviet case.[41]

[41] By way of comparison, in 1953 about 171,000 engineering students in the United States were distributed roughly as follows: aeronautical, 3 percent; chemical, 8 percent; civil, 13 percent; electrical, 20 percent; mechanical, 21 percent; mining, geological, metallurgical, 5 percent; all other, 30 percent. (U. S. Department of Health, Education, and Welfare, Office of Education, *Engineering Enrollments and Degrees, 1953*, Circular No. 387, Washington, D. C.)

TABLE 5.—*Distribution of students in Soviet engineering-industrial higher educational establishments as of 1950*

Soviet grouping of institutions with engineering-industrial specialty	*Fields of engineering training offered in these institutions*	*Enrollment as of Sept. 15, 1950*
1. Polytechnical and industrial institutes.	Metallurgical, mechanical, electrical, power, civil, engineering physics, chemical, mining, and engineering economics-management.	71, 500
2. Machine building, mechanical, aviation, and naval engineering institutes.	Primarily mechanical, materials technology (metals and alloys), aeronautical, electrical, and some chemical.	38, 700
3. Power, electrical, and communication engineering institutes.	Primarily electrical and electronics, power, engineering physics.	15, 800
4. Mining and metallurgical institutes.	Geological, mining, and metallurgical, materials technology (metals).	30, 300
5. Petroleum engineering institutes.	Primarily chemical, some mechanical	4, 600
6. Chemical technology institutes.	Primarily chemical (all types), food technology.	25, 500
7. Civil engineering, construction materials, and technology, architecture institutes.	Primarily civil, sanitary, chemical (ceramics), materials technology (rock products), architecture.	23, 200
8. Light industry institutes.	Mechanical, chemical technology (textiles primarily).	8, 300
9. Timber industry and related products institutes.	(Forestry excluded.) Primarily chemical (paper, cellulose, etc.), mechanical, materials technology (wood products).	13, 500
10. Transportation engineering and hydrology; meteorology institutes.	(Primarily railway engineering.) Mechanical, civil, electrical, operations-management, ship maintenance and navigation, hydrology, and meteorology.	30, 300
11. Engineering-economics institutes.	Primarily planning, economic and engineering management.	4, 300
12. Institutes of mechanization and electrification of agriculture.[1]	Primarily mechanical, electrical, power, and some civil engineering.	12, 300
Total		278, 300
In addition:		
Evening divisions (unspecified)		2, 400
Extension institutes (unspecified)		40, 700
Grand total		321, 400

[1] This category is singled out from the agricultural field and represents about 10 percent of agricultural branch student enrollment.

Source: *BSE* (2d ed.), vol. 9, 512. Details on fields from MVO SSSR, *Spravochnik dlya postupayushchikh v VUZ'y SSSR v 1950 godu* (Handbook for Entrants Into Higher Educational Establishments of the U. S. S. R. in 1950), Moscow, 1950, passim.

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TABLE 6.—*Approximate distribution of Soviet engineering students, by field of study, in 1950*

Fields of study	*Percent of total engineering students in the field*
Aeronautical engineering	3–5
Chemical engineering	12–14
Civil engineering	10–12
Electrical and power engineering	12–14
Engineering economics and management [1]	8–10
Mechanical engineering	28–32
Mining, geological, metallurgical engineering	12–14
Other [2]	6–8

[1] This specialty is not known in American engineering education and, strictly speaking, is only peripheral to the engineering field. (See further details in the text below.)

[2] This group contains some fields (like meteorology, navigation etc.) which are excluded from engineering in American reporting.

Source: This table was derived by distributing the enrollment for a given group of institutes (table 5 above) (*BSE*, 2d ed., vol. 9, 512) among departments by field (MVO SSSR, *Spravochnik dlya postupayushchikh v VUZ'y SSSR v 1950 godu*, Moscow, 1950, 90–136) in institutes of a given group. In addition, scattered data concerning the actual distribution of students by specialty in individual institutes were used.

2. *General Curriculum in Soviet Engineering Institutes*

According to available curricula in various fields of Soviet engineering education, the actual number of instruction hours (i. e., excluding the diploma project and industrial practice) is somewhat in excess of 5,000, and the number of subjects of instruction, depending upon specialty, ranges from 30 to 40.[42] These subjects, according to the generalized version of the curriculum frequently presented by Soviet educational authorities, may be grouped into four major areas of study with a time allocation as follows:

TABLE 7.—*General structure of the Soviet engineering curriculum*

Group of subjects	*Time allocation in percent*
Political and socioeconomic	7
General sciences	30
General nonspecialized engineering	35
Narrow specialization engineering	28
Total instruction hours, 5,000–5,200.	100

Source: Medynskii, *Nar Obr*, 2d ed., 1952, 174.

In actuality, however, this general version of time allocation to various groups of subjects can be considered as a very rough approximation only. It appears from the actual curricula examined that Soviet educational

[42] See "B" tables in the appendix to ch. IV.

authorities usually exclude from consideration physical training and military instruction, which consume from 6 to 10 percent of total instruction hours. However, if this is taken into consideration, then the generalized version of time allocation to various areas of study (*tsikly*) is roughly correct. In view of this, it is more justifiable to speak of ranges of time allocation as follows:

TABLE 8.—*Actual structure of the Soviet engineering curriculum*

Group of subjects	*Time allocation in percent*
Political and socioeconomic	6–8
General sciences	26–30
General nonspecialized engineering	25–33
Narrow specialization engineering	22–28
Physical training and military instruction	6–10
Total instruction hours, 5,200–5,500	

Source: This table is a generalization based on the actual curricula presented in the appendix to ch. IV (tables B–1, B–2, B–3, B–7).

It is within these ranges that instruction time is allocated. This allocation of instruction time excludes, however, two instruction undertakings. It excludes the time required for the preparation of a thesis (diploma project—*diplomnyi proekt*) and industrial practice (*proizvodstvennaya praktika*) which are required in all engineering programs. The time allocated for both of these is usually not accounted for when curricula of engineering training are discussed in Soviet sources and they will be discussed separately.

The general structure of the Soviet engineering curriculum presented in table 8 reveals that about one-quarter of instruction time is devoted to subjects in fields of narrow specialization, which, as has already been stressed, is an outstanding feature of Soviet higher education. While this discussion has been centered on the engineering curriculum, it must be noted that the allocation of time in other industrial and in physical science fields of training closely resembles this pattern.

Changes in curriculum were a frequent occurrence in the past. These changes were usually considered a shortcoming in Soviet professional education since, rather than being a gradual transition from one program to another, they were introduced instantaneously, often creating discontinuity in learning. A certain course of instruction might be included in the curriculum for which the student had insufficient preparation since no previous program had contained it or a similar course. Conversely, a subject of instruction not previously dealt with in other courses might suddenly be excluded from the revised curriculum. Thus, while most changes were intended as improvements in the training programs, their instantaneous introduction or sudden withdrawal often created difficulties in the learning process, particularly during the 1930's.

In recent years the flexibility in the general structure of training programs has been considerably reduced. Standardization and stability have been achieved to some degree, although there are still reports that reshuffling of subjects and changes in allocation of time do occur, though usually on a smaller scale than in the past.[43] Furthermore, the changes made recently are usually contemplated and executed gradually with less disrupting effects.

Although it was not possible to venture into a detailed, exhaustive comparison between American and Soviet engineering training programs, from a general comparison it appears that Soviet students today have on the whole no worse preparation in scientific and technical subjects than do our students. In the early 1930's their programs of training were undoubtedly inferior. Toward the late 1930's a marked improvement took place. Today, out of some 5,000 instruction hours, about half the time is devoted to lectures and the other half to laboratory and practice (excluding industrial practice).

3. *Individual Curricula in Engineering Fields*

The appendices to this chapter present three Soviet engineering curricula.[44] Two of these curricula were abstracted from Soviet sources, and the third was reconstructed from the account of a Soviet refugee. In addition, the appendices contain some data about courses in civil engineering with specialization in hydrotechnical structures. From these sources and from fragmentary information about individual courses offered in other fields of engineering, it becomes evident that although one is able to speak of a generalized pattern of curricula to a certain point, the actual programs of instruction vary markedly.

a. *The Soviet Training Program in Mechanical Engineering*

If mechanical engineering is taken as an example, out of 41 subjects of instruction, only 2 are devoted to political indoctrination, consuming about 7.7 percent of total instruction time. Two other subjects—military and physical training—consume another 10 percent of instruction time. The remaining 37 subjects are devoted to science and engineering. Generally speaking, from the number of subjects and instruction hours,

[43] For example *VVSh,* No. 3, 1955, 32–38, presents some of the highlights of the latest attempts to modify training programs. This periodical throughout the years has several hundred references to various changes either in overall programs of instruction or in individual subjects.

[44] Table B–1 gives a simplified version of the machine-building engineering curriculum. Table B–2 presents an engineering curriculum in silicate technology. Table B–3 presents a mechancial engineering curriculum for engineers in the mechanization of agriculture.

the Soviet training program requires a greater input of time in class than good engineering colleges require in the United States.

If further comparisons are undertaken, although admittedly imperfect ones, the following picture emerges. If, for example, Soviet mechanical engineering training with narrow specialization in machine tools is compared with the Massachusetts Institute of Technology's bachelor of science degree in mechanical engineering training with a broad specialization in materials and material processing, it is found that Soviet institutes require about twice as many subjects and over 2,000 more hours of instruction time.[45] In general, the scientific and engineering subjects taught at MIT are included in Soviet curricula. Most of these subjects cover nonspecialized engineering. Thus, broadly speaking, the range of general subjects in the two programs is quite comparable.

Turning to the program of instruction in individual subjects, we find that the American mechanical engineering student, for example, spends more time in general chemistry (United States, 210; U. S. S. R., 130 instruction hours) [46] and general physics (United States, 330; U. S. S. R., 200), mainly because of the lack of high-school preparation in these subjects among American students. There is no radical difference in material covered, though again, judging from Soviet textbooks, select advanced topics are not discussed adequately and perhaps there is more extensive use of calculus in physics in the Soviet case.

In higher mathematics the required time is substantially greater in the Soviet program (United States, 180; U. S. S. R., 340), but it perhaps covers the same ground as the American program. By the end of the second year, the Soviet student is expected to know analytical geometry, calculus, differential equations, elements of the theory of complex variables, and the fundamentals of vector analysis. Theoretical mechanics covers about the same ground in both programs, but again the time input is greater in Soviet training (United States, 135; U. S. S. R., 204). In theoretical and technical mechanics the Soviet programs of instruction place greater emphasis upon graphic solutions than upon advanced mathematical statistics or operational calculus.

General engineering subjects like engineering mechanics (strength of materials and materials testing laboratory, machine components and design, theory of machines and mechanisms), the fundamentals of electrical engineering, fluid mechanics, the fundamentals of heat-power en-

[45] MIT's program is based on the average of 30 instruction weeks per academic year. Required attendance at classes ranges anywhere from 2,800 to slightly over 3,000 instruction hours. The total number of subjects (consolidating related subjects such as the humanities and social sciences, all higher mathematics, statics and dynamics into theoretical mechanics, etc., as is done in Soviet curricula) is about 20.

[46] U. S. S. R. data are given in table B–1 in the appendix to ch. IV. United States data refer to the MIT curriculum, reconstructed in terms of instruction hours offered in various subjects. Information used here may be found and computed from the *MIT Bulletin*, 1951 passim.

gineering are present in both curricula and the coverage in each subject is probably about the same, although again the Soviet curriculum generally requires a greater time input.

There is a group of subjects in the Soviet Union, commonly called specialized engineering, which, by and large, are not even included in the American (i. e., MIT) curriculum. These subjects have one thing in common: their predominant stress is on technology. Some subjects are taught with substantial theoretical insight and have a close resemblance to engineering subjects, such as metal processing, mechanical behavior of metals, and metal cutting, which are often offered in the American engineering program. However, a number of them, such as machine-shop layout, design and calculation of machine tools, and fire prevention and safety, are nothing but an aggregation of norms, standards, and specifications which are in common use throughout the Soviet planned economy. These courses usually offer nothing but information concerning the application of technical norms and coefficients which put Soviet technology into a straitjacket designed by planners. Essential as they may be in Soviet practice, many of these courses contribute little to the development of creative engineering talent.

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b. *The Soviet Training Program in Chemical Engineering*

Soviet training in chemical engineering [47] is based on a curriculum of some 4,700 instruction hours, covering 30 subjects. About 15 percent of total time (5 subjects) is spent on political indoctrination, military, and physical training. The remaining time (25 subjects) is devoted to the sciences and to engineering technology. As in the case of the mechanical engineering curriculum, this program also offers no general liberal arts courses.

The range of subjects in sciences, general chemistry, and general engineering subjects offered by the Soviet institute is comparable to those offered by American engineering colleges, but again the overall required time input is substantially higher in the Soviet case.[48] The physics and general chemistry required time input is again less extensive in the Soviet case than in American practice. In higher mathematics general engineering subjects, and, this time, in advanced chemistry courses (except physical chemistry), more time is allocated in Soviet practice. In our practice we allocate more time to general chemical engineering, general industrial nonspecialized chemistry than in the Soviet program, but

[47] Table B–2, appendix to ch. IV, presents the U. S. S. R. curriculum. MIT's chemical engineering program is again considered for purposes of comparison (supplement to Table B–2, appendix to ch. IV).

[48] The MIT chemical engineering curriculum—including some 360 instruction hours for the humanities and social sciences, some 240 for military science and athletics—is based on about 3,200 instruction hours.

at the same time we do not offer any of the chemical technology courses with narrow specialization in silicate technology as in this particular example.

From these two examples of curricula in mechanical and in chemical engineering, it appears that engineering training in the Soviet Union diverges from our own when technological specialization enters the scene. General scientific and general engineering training are quite comparable, despite the differences in time inputs already noted and certain other reservations to be stated below. Foreign-language training (primarily in German and English), which is considered one of the general science subjects because such instruction concentrates on translating and readings in foreign scientific-technical literature, is stressed in the Soviet case, while it plays a relatively minor role in our engineering education. We devote from 12 to 15 percent of instruction time to general liberal arts education, while the Soviet programs devote none, and what they call social science subjects are nothing but political indoctrination. Soviet engineering training continues along formal lines of instruction into narrow technological specialization, while our B. S. engineering graduates acquire these technological skills through proper employment or through special supplementary training programs offered by various industrial corporations.

c. *The Soviet Training Program in Other Engineering Fields*

While Soviet engineering training in many fields is comparable to our general engineering training, with narrow technological specialization added in the Soviet case, in some fields Soviet engineering training is undoubtedly drastically inferior to our own. Training of Soviet mechanical engineers for agricultural machinery is an example of this inferiority. Although the curriculum describing this type of training [49] must be accepted with reservation, the training offered in such a program is considerably inferior to the other Soviet programs of engineering training discussed above.

Among other specialties, the Soviet Union trains also, for example, mechanical engineers on the maintenance of railroad-rolling equipment (*inzhenery vagonnogo i paravoznogo khozyaistva*).[50] The training

[49] Table B–3 in the appendix to ch. IV presents an abstract of a curriculum reported by a Soviet refugee. Although it is interesting to make a factual account of Soviet training of mechanical engineers on the basis of this refugee's own experience, it is admittedly imperfect and, due to some inconsistencies in reporting, must be viewed with some scepticism.

[50] V. Sologubov, "Kadry zheleznodorozhnogo transporta" (Cadres of Railroad Transport), in B. Levin (ed.), *Osnovnyye voprosy pyatiletnego plana vosstanovleniya i razvitiya zheleznodorozhnogo transporta* (Problems of Reconstruction and Development of Railroad Transport in the U. S. S. R.), Moscow, 1947, 363–381. There is a discussion of training also in *Gudok*, August 18, 1948, June 8, 1949.

of these engineers, though it also lasts 5 years, is intended primarily to prepare individuals for work in the organization and engineering supervision of repair work on rolling equipment and various maintenance problems. After 3 years of rigorous general engineering training, 2 years are devoted almost entirely to technical norms, standardization of replacement parts, inspection and test practices, etc. These practical aspects of training are more strongly pronounced in this than in other fields. Another example of professional training also reported by a refugee is in civil engineering.[51] Despite the fragmentary nature of the information in this instance, it seems that this type of training may be comparable to our B. S. in civil engineering, with broad specialization in construction and management, with narrow specialization in large hydraulic engineering structures added in the Soviet program.

4. *Evaluation of Soviet Engineering Training Programs*

These examples suggest that there is undoubtedly some variation in the quality of engineering training in the Soviet Union. A number of those in the Soviet Union who are called professional trained engineers are, even by Soviet training standards, not so extensively trained. This is true, of course, anywhere else as well. It is difficult to say which engineering training programs are of the most inferior type, but in addition to agricultural machinery engineers and maintenance mechanical engineers in railroad-rolling equipment, there are other fields [52] where the engineering training programs are quite weak. However, in spite of these variations, Soviet engineering training programs are in general substantially sound and are probably not inferior to our undergraduate engineering training.

While the present discussion has centered on the structure of Soviet engineering curricula and on the time spent by students on various groups of instruction subjects, there are other factors—such as the quality of the teaching staffs, training facilities and equipment, ability of students and the process of selection, etc.—determining the quality of training which should not be overlooked. These are emphasized in other parts of this survey, but at the present time it should be noted in summary that the teaching staffs, as well as equipment and facilities in Soviet engineering training establishments, are usually better than in other fields of Soviet professional education.

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[51] Table B–7 in the appendix to ch. IV presents a list of subjects with reported comments about their coverage. The refugee admits that his memory is not infallible and therefore does not attempt an extensive reconstruction of the curriculum, giving only a list of subjects of instruction and, in several instances, the extent of coverage of materials in the subjects.

[52] Such, for example, as "civil engineers" in the maintenance of urban dwellings, "electrical engineers" on electrification of agriculture, etc.

The reason for this is that priorities are given to engineering establishments over other fields of study. At the same time, these priorities account also for the differentiation of engineering schools as to student-teacher ratios, new buildings, equipment, and laboratory facilities, etc. If these factors are taken into consideration, together with the differences in training programs, it is obvious that the variation in quality of Soviet engineering training is a substantial one. As a rule, higher priorities are given to institutions training engineers for key industries, industries directly related to armaments production. Thus, institutes training aviation engineers, communication and electronics engineers, specialists in certain fields of mechanical, chemical and civil engineering, have not only more rigorous training programs, but also enjoy better student-teacher ratios, better facilities and equipment; and they have better opportunities for selecting candidates. These interinstitutional differences account for the fact that there are some engineers with excellent training and some with inferior training.

5. *Diploma Project (Engineering Thesis)*

Engineering training culminates in the so-called diploma project, to which 4 to 6 months are usually devoted. The student is not required to take any courses during the last term of his study, and his entire time is devoted to this project. Although in our practice we occasionally require a thesis—especially for honor students—the Soviet diploma project has a somewhat different significance from our thesis assignment. The appendix to this chapter [53] discusses the content of one of the Soviet diploma projects in some detail. It is apparent that, on the one hand, the diploma project is a much more extensive undertaking than any of our undergraduate thesis requirements, and on the other hand, it is predominantly either a technological or engineering design undertaking. The latter aspect appears to bear the stamp of meticulous technical detail rather than originality. Some of these design undertakings undoubtedly contain innovations, and in some cases they are executed with such skill that they are put into practice and adopted by industry. However, in most cases, the diploma project serves as a test of the student's ability to perform engineering calculations, to execute charts and technical drawings, and to apply existing norms and specifications, designed primarily for production engineers. Generally speaking, the Soviet engineering thesis, though consisting of engineering design and computations, is based primarily upon the use of already existing components, norms, specifications, etc. It therefore fits into one of the basic aims of Soviet engineering education which is to train production engineers.

[53] App. B–8 to ch. IV gives a brief description of one of the Soviet diploma project requirements.

After the diploma project has been prepared, it is defended before a specially appointed board, which not only determines acceptance or rejection of the thesis, but also judges its practical value and makes recommendations for its adaptation in industry. During the defense of the thesis the student is also tested orally on his knowledge of special subjects. On the basis of past grades, the merits of the diploma project, and the student's performance during the diploma defense examinations, he may be awarded a diploma certificate, with or without distinction, which states that he is a professionally trained engineer with a given specialty and a given specialization within it.

6. *Industrial Practice*

The stress upon production and technology in Soviet engineering training is carried beyond mere classroom instruction. In our engineering training, more as an exception than as a general occurrence, some cooperative training programs are in existence, which usually stipulate two terms—in some instances more—to be devoted to on-the-job assignments. In the Soviet Union, industrial practice (*industrial'naya praktika*) is required in all engineering programs and practice assignments are also given in other fields of professional training.

During the 5 years of engineering training, students usually have three industrial practice assignments (in industrial plants and enterprises allied with the field of specialization). The first assignment, usually in the summer after the second academic year, lasts about 4 weeks and is called general industrial practice (*obshcheindustrial'naya praktika*). The student is usually shown around the plant and is assigned for a few days at a time to various shops. The second assignment, called general technological practice (*obshchetekhnologicheskaya praktika*), is of about 11 weeks' duration during the summer after the end of the third academic year. During this practice the student is usually required to study one industrial process in a certain plant with detailed attention given to various machinery, norms, and technology employed in that process. Finally, the third industrial assignment, called prediploma practice (*preddiplomnaya praktika*), is also of about 11 weeks' duration and is carried out either in the summer after the end of the fourth year or the spring of the fifth academic year. This last industrial practice usually consists of an administrative assignment, as assistant shop superintendent, for example, or some other similar position where the future engineer must learn to make production or minor managerial decisions.

The above arrangement represents the most common allocation of time for industrial practice. There are variations, however, and in some instances the first practice assignment is made after the third academic year. In other instances, for example in aviation engineering, there are

four practice periods, one of which is devoted to the piloting and maintenance of aircraft. Although the time devoted to industrial practice varies anywhere from 16 to 38 weeks during the 5-year period, the most common is 25 weeks.

Over the last two decades not the principle of industrial practice but its actual execution has been criticized on numerous occasions in the Soviet press. Recent criticisms [84] do not differ from those of the past. It has been stated that during industrial practice students do not participate actively enough in learning industrial operations and techniques, but frequently are merely passive observers of the operation of machinery, of technological processes, techniques, etc. One of the reasons for this is that a large number of students descend upon the few most modern plants during the summer months, making it difficult to place them in practice. Another is the fear of industrial management that active participation by the students taking industrial practice could disrupt production processes as a result of machinery breakage because of lack of experience among the students or could result in the diversion of qualified plant personnel from their direct tasks of production.

From these criticisms it may be inferred that industrial practice in Soviet engineering training in some instances is only a superficial introduction to the problems of a given industrial process, rather than a thorough study of industrial production techniques. Therefore, engineering graduates often have additional on-the-job training, called qualification apprenticeship (*stazhirovka*), which permits them to become familiar with individual labor operations and particular techniques prior to their assignment to supervisory engineering positions. Thus, Soviet engineering graduates actually have two stages of practical training: (1) industrial practice while they are still students as an introduction to industrial techniques, (2) supplemental on-the-job training after their graduation as necessary preparation for performing specific engineering tasks.

7. *Production Engineers vs. Process or Product Design Engineers*

Since the late 1930's, when most of the engineering training programs were stabilized to some degree, it has frequently been advocated by Soviet educational authorities that there should be two profiles (*profil'*) of training in any field of narrow engineering specialization. First, there should be a program for training technology or production engineers; and secondly, a program for process or product design and development engineers.

[84] One account, among many others, may be found in *VVSh*, No. 3, 1955, 26–30. The new wave of criticism is due to party and Government decrees issued in the fall of 1954, stipulating further strengthening of applied instruction on all levels of the Soviet educational system.

Although slightly different curricula have been advocated several times over the past 15 years, up until now no such differentiation of engineering training has been achieved. Rather, from the numerous reports concerning the teaching of individual subjects, it appears that some institutes give more extensive theoretical training than others. This phenomenon was started as early as 1940, when it was revealed [55] that despite attempts at uniformity of curricula, some engineering training establishments related to the defense industries (aviation, electrical, communication, naval, and certain other branches of mechanical and civil engineering) offered more extensive training in mathematics, physics, theoretical and technical mechanics, foreign language, etc., than other engineering institutes.

Similar types of statements have been made in the postwar period about certain engineering establishments.[56] It has been stated that some of them have vast experimental and laboratory facilities, and that they offer more extensive training in theory and in experimental application of it than others. This suggests that these institutions are responsible for the training of a larger share of future process or product design and development engineers than others, which do not have at their disposal the excellent facilities and which in all probability are not so well staffed.

The problem of technological training for production engineers vs. more general and more extensive training for process or product design and development engineers is a crucial one. It is obvious that it is directly related to the existing programs of training discussed above. There are undoubtedly some institutes that are more adept in training design and development engineers, and which in fact do train them. However, the dilemma is still present as far as most of the engineering institutes are concerned. In a recent discussion,[57] it was stated that Soviet higher educational establishments by and large at the present time still cannot assume the responsibility of training design and development engineers (*inzhener-konstruktor*). It was stated that product or process design and development engineers are and should be recruited from already trained production engineers (*inzhener-proizvodstvennik*), and that the main task of engineering schools still consists in training production engineers. The latter are trained with narrow specialization. Therefore, the remedy is advocated to broaden the training, reduce the narrow

[55] *Pravda,* July 12, 1940.

[56] Such as the Bauman Higher Technical School in Moscow, which is a top-notch mechanical engineering school tied closely with Soviet tank, automotive, and firearms industries; the Moscow and certain other aviation engineering institutes; several power-electrical engineering institutes, etc. Every year *VVSh* has several articles which compare instruction in individual scientific or engineering subjects in various institutes.

[57] *VVSh,* No. 9, 1954, 7.

specialization, and add more general engineering courses. But as has already been stressed, representatives of Soviet industry are opposed to this and still demand technology and production engineers with narrow, specialized skills. There exists this merry-go-round, which in all probability will continue until there is some drastic shakeup of the training programs.

The current discussion [58] concerning changes in training programs, which started in the fall of 1954, but which has so far been limited, reveals that Soviet higher educational authorities intend to reduce narrow technological specialization somewhat and to give more theoretical and experimental engineering and scientific courses. These efforts, if executed, undoubtedly will improve the quality of engineering training and at the same time provide new opportunities for training product or process design and development engineers, whose competence depends, to a large extent, upon extensive general scientific and engineering preparation.

This dilemma of Soviet engineering training has some far-reaching implications. One is often inclined to view excessive stress on the technological, narrow specialization training of Soviet engineers as an actual hindrance to the development of creative technical and scientific knowledge. True as it may be that some talent is wasted because of the technological orientation of Soviet engineering training, this type of training on the whole is undoubtedly well suited to Soviet conditions. Soviet technological expansion in various industries has been—and to some degree still is—not so dependent on original discoveries as on the application of technology discovered and often tested elsewhere. This is not to deny the fact that in some fields of industrial technology and applied science original research has been done. On the whole, however, Soviet industry in the last 25 years has been built up not on original technological discoveries, but on adaptations, modifications, and occasional improvements of industrial techniques, models, types and practices developed elsewhere in economies with more advanced technology such as in England, Germany, and the United States.[59] Soviet engineering training is suited to these conditions of industrial development.

In addition, of course, it is important to bear in mind that in the Soviet Union as well as in the United States, original development in applied scientific research and in advanced fields of industrial technology is done primarily by research scientists rather than by engineers. It appears that Soviet engineers in many instances receive adequate preparation either after further on-the-job experience to become process or product

[58] *VVSh,* No. 9, 1954, 5–11; No. 12, 1954, 1–7; No. 2, 1955, 36–40.

[59] This, of course, is one of the major reasons for the greater stress on foreign languages in Soviet professional training and the Soviet translating activity of world scientific and technical literature, unmatched by any other country.

design and development engineers or eventually to embark upon advanced degree training in applied and technical science fields if they are selected for it. Consequently, narrow technological training is viewed as a temporary diversion for those who eventually may be engaged in more creative tasks. In the United States, early narrow specialization and extensive technological training is usually regarded as an obstacle to the development of creative engineering talent. In the Soviet Union such training is viewed as essential, since most engineers, after all, are called upon to perform primarily technological functions as production engineers. Those who eventually become product or process design and development engineers or applied scientists must learn enough about prevailing technology anyway to be successful in advanced research and development.

The pressing demand for large numbers of engineers immediately available to assume technological functions has been and still is a deciding factor in shaping the type and extent of ordinary engineering training. At the same time there is an additional objective in engineering training to give sufficient preparation to an engineer who though starting as a technologist or as a production engineer, may, at a later date, if he has this preparation and is able, also engage in advanced product or process design engineering. The majority of engineering graduates are called upon to perform the first task, while the minority are selected for the second one. Selection for the latter is done on the job. Finally, for even more creative or more advanced tasks, engineering graduates may embark upon advanced degree research training (see ch. V).

Training in Scientific Fields in Soviet Higher Education Institutes

Our attention has centered, in the preceding section, on Soviet engineering training. The training in other scientific fields (biological, medical, and agricultural sciences) has several features in common with engineering training. Training programs in other scientific fields are also characterized by narrow specialization and compartmentalization, by the lack of general education, by their emphasis upon standard practices and procedures, and by their devoting considerable attention to administrative-managerial problems.

1. *Veterinary Medicine*

The emphasis in veterinary medical training,[60] with its 4-year curriculum consisting of some 5,600 instruction hours, is also on narrow specializa-

[60] See table B–5, appendix to ch. IV.

tion. Specialized instruction accounts for about 65 percent of the instruction time (excluding military and physical training), with about 28 percent allocated to the general sciences and about 7 percent to political indoctrination.

As a result of this training, the Soviet graduate veterinarian receives a veterinarian's certificate, which is difficult to equate to any of the four different degrees given in this field in the United States. Soviet training, however, appears to be more extensive than our 4-year undergraduate training in this field. There is some temptation to equate Soviet training in this field to our D. V. M. S. degree, though the former is probably inferior to ours.

Our programs of training in veterinary medicine usually place greater emphasis on general biology in the initial stages of training than on the general science subjects stressed in the U. S. S. R. Of course this is partly due to the fact that in the Soviet Union the secondary schools devote 6 years to biology, which reduces the need for general biology courses for veterinary students.[61] Our training programs certainly exclude the administrative courses which are required of Soviet veterinarians, who are often called upon to perform administrative functions. The range of preclinical subjects in our training is probably greater. Although clinical subjects consume some 32 percent of the total instruction time in the Soviet veterinary medical curriculum, they are conducted to a great extent as theoretical rather than applied instruction, with less than a third of the time devoted to actual surgery or clinical practice in therapeutics.

Although it is claimed that up to 52 additional weeks may be spent by veterinary medical students in practice assignments, most of this time is not devoted to veterinary medicine per se, but to various animal breeding and hygiene problems faced by a certain collective or state farm and to which a student has been assigned. In short, in the training of Soviet veterinary medical specialists, there are quite a few diversions into narow, nonmedical tasks.

2. *Agronomy*

The program of training and the curriculum in agronomy have been discussed extensively by Ashby.[62] The general program of training is probably not much different from that in our own agricultural colleges. It is again more extensive than our undergraduate major receives, and it is perhaps equivalent to our first professional degree, with one very important reservation. The teaching of many subjects in this field has been ham-

[61] Primarily to surveys of morphology, comparative anatomy, development and classification of plants and species.

[62] Ashby, op. cit., 87–91. He presents the curriculum of the Timiryazev Agricultural Academy in agronomy. This curriculum is reproduced in table B–9, appendix to ch. IV.

pered, especially during the last decade, by biological controversy and official dictates in this field of Soviet science.

Again, as in other fields, agronomy students are required to take courses in agricultural management. Particular emphasis is placed on agricultural techniques, which are assumed or are proclaimed to be infallible under Soviet conditions of collective farming.

Since Stalin's death, although there have appeared some signs of relaxation of Lysenko's dictation over biology and agricultural science subjects, it is difficult to ascertain to what extent this may have improved the program of instruction. Whatever the present development, in the past the quality of agricultural training has suffered considerably from political intervention. Therefore, although the time inputs and the range of subjects in the Soviet case may be greater than those in our agricultural programs, the training itself has suffered from a lack of completely objective presentation of the basic principles of agricultural science.

3. *Medical Training*

Voluminous discussions of Soviet medical training have appeared since the last war.[63] At the present time, some 75 medical institutes train medical specialists in three main fields of specialization: (1) clinical medicine, (2) pediatrics, and (3) public health.

The appendix to this chapter presents the revised (in 1945–46) 6-year curriculum of a Soviet medical institute.[64] Without going into too much detail or repeating what has already been said concerning the program of Soviet medical training, it appears that it is less extensive than ours in those areas which coincide with our premedical training (i. e., general sciences, chemistry, biochemistry, biology). Our program of medical instruction in clinical subjects is probably based on more modern methods and is perhaps somewhat more extensive, especially if the internship requirement is considered, a requirement which does not exist in Soviet medical education. Medical practice in Soviet programs lasts only about 16 weeks during the entire 6 years of training, and is certainly quite inadequate for a physician's training.

As far as the range and coverage in special medical subjects is concerned, perhaps the training in the two countries is comparable, but in view of all the other reservations, the Soviet professional certification as physician (*vrach*) appears to be somewhat below our M. D. degree.

[63] E. g., M. B. Shimkin, "Medical Education in the Soviet Union" in *American Review of Soviet Medicine*, vol. 1, No. 5, American-Soviet Medical Society, June 1944, 465–480; Ashby, op. cit., 86–87; H. E. Sigerist, *Medicine and Health in the Soviet Union*, New York: The Citadel Press, 1947; and more than a dozen articles in periodical literature.

[64] Table B–4, appendix to ch. IV, presents the Soviet medical curriculum and some comparisons with United States medical training.

On numerous occasions other American and West European observers and visitors to the Soviet Union have pointed out that Soviet medical programs, although quite extensive, still do not match Western standards.

4. *Comparability of Soviet Scientific-Technical Training and American Professional Education*

The examples of training offered by Soviet higher educational establishments discussed above fall into the general category commonly called scientific-technical professional training. University training of chemists, engineering training in institutes, veterinary and agronomy training in agricultural institutes, medical training in medical institutes—all these programs of Soviet professional education, though they have some differences, have many elements in common with our own general professional training.

Extensive detailed comparisons of material and techniques of instruction in individual subjects are revealing, but except in a few instances they were not possible in this study because neither time nor resources were available for embarking upon such an undertaking. It is not only the paucity of Soviet data which creates a handicap for such an undertaking. The difficulty in making detailed comparisons consists in the enormous diversity of American higher education and the lack of comprehensive studies concerning various fields of American professional education and interinstitutional variations within a group of individual subjects of instruction in a given field of study. In other words, a detailed comparative study of the quality of Soviet and American higher education is handicapped by the absence of standards essential for such comparisons. Therefore, this study perforce had to resort to generalities rather than to venture into details. Despite these shortcomings in the present survey, it seems, from the examples discussed above, that the following statements are justifiable.

Although there is much diversity in the training programs, scientific-technical education in the Soviet Union today is probably quite comparable to ours as far as nonspecialized instruction is concerned. In general, Soviet training programs require a considerably greater input of time than our undergraduate and first professional degree training programs. Although no actual degrees are granted in the applied sciences and engineering fields, Soviet training is probably more extensive than that in our undergraduate programs, but either falls short of or, if various reservations are taken into account, approximates our first professional degree training programs. In addition to this, narrow technological or narrow professional specialization is added in the Soviet case, while such training is usually absent in our programs. This special-

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ization is attained at the expense of general education, and as an integral part of this specialization, emphasis is placed upon existing operational norms, standards, and procedures with some attention to administrative tasks. Finally, the quality of training suffers in those programs where political interference or political dictates are being strongly enforced.

Training of Teachers and Soviet Higher Education in Social Science Fields

1. *Teacher Training in Soviet Institutes*

The training of teachers in the Soviet Union is concentrated in several types of institutions.[64] As was already mentioned, Soviet universities train some teachers, but the largest proportion of teachers are trained in pedagogical institutes (*pedagogicheskiye instituty*) and teachers' institutes (*uchitel'skiye instituty*). Training in pedagogical institutes lasts 4 years, and the curriculum is based on about 3,500 to 3,900 instruction hours. About one-half of this instruction time is devoted to subjects of the teacher's specialty (such as mathematics, biology, history, Russian language and literature, etc.). Pedagogical institutes until recently used to train teachers primarily for the upper grades (8–10) of the Soviet secondary school. Recently, however, they have begun to train intermediate-grade teachers, and today it appears that they train teachers for both levels of the secondary school.

It is difficult to speak of the overall program of training in pedagogical institutes, since these establishments are not under centralized control; and, although a precribed structure of curriculum is in existence, there are a great many local variations. A great deal of time (perhaps as much as 20 percent of total instruction time) is devoted to political indoctrination subjects, which are stressed much more heavily here than in other types of professional training. Usually the program includes general education subjects, such as Russian language and literature, history, art, etc. A foreign language, as well as science subjects such as the elements of biology, chemistry, physics, etc., are taught regardless of the teacher's future specialty.

Within a specialty, very long courses are given. For example, for mathematics teachers a course on the principles of elementary mathematics and the teaching methods thereof embraces about 400 instruction hours, which consumes about a quarter of the entire special field instruction time and is spread over a period of 2 years. Similarly, long

[64] For details concerning regulations of the training and qualifications of teachers, see A. Danev [comp.), *Narodnoye obrazovaniye—osnovnyye postanovleniya, prikazy i instruktsii* (Popular Education—Major Decrees, Ordinances and Regulations), Moscow, 1948, esp. 375–398.

courses are given to chemistry and physics teachers. These courses discuss at length how to use textbooks, what type of home assignments should be given in a certain topic, etc. During the third year of study, students are usually given two practice periods of about 6 weeks each, teaching their respective subjects in secondary schools. At the end of the training the student is required to take the state certification examination (*gosudarstvennyi ekzamen*), which tests knowledge of special fields and teaching methods within a given specialty.

Soviet training of teachers places great emphasis upon the how and the what of teaching within the specialty, with meticulous elaboration concerning the use of textbooks, planning of classroom instruction, solutions of particular problems or instruction in particular topics. Knowledge of principles and of fundamentals in a given science is somewhat obscured by this more immediate task. The training bears some resemblance to that offered in our own state teachers' colleges, though perhaps the teacher's instrumental role in the transmission of knowledge in one specific field is emphasized more strongly in the Soviet Union than in the United States.

The training of teachers primarily for the intermediate grades has been carried on in teachers' institutes. It lasts only 2 years and appears to be an abridged, accelerated, and a less thorough replica of the pedagogical institute curriculum. The main emphasis of the training consists in developing the teacher's specialty, and in this case subjects primarily within the teacher's specialty are taught. This accelerated training perforce is at the expense of general subjects. Teachers' institutes emerged in 1935, when the shortage of teachers in secondary schools was very acute. These institutes were numerous, and enrollment was high both in the late 1930's and after the end of the war. In recent years, however, many of these institutes have either been closed or converted to 4-year pedagogical institutes.[65] Thus, teachers' institutes are apparently on their way out, and in recent years the majority of new Soviet secondary school teachers have been graduated with at least 4 years of higher education. There is also at the present time a debate about making pedagogical institutes "equivalent" to universities by increasing teachers' training from 4 to 5 years.

2. *Training in Social Science Fields*

The training of Soviet professionals in social science fields (law, geography, history, economics, etc.) is carried on both in universities and in

[65] Teachers' institutes were either independent establishments or attached to pedagogical institutes. In 1946, for example, there were 106 independent ones and 90 "attached to pedagogical institutes." The enrollment peak in teachers' institutes was reached in 1940, when there were 62,000 students. In 1954 only 16,000 students were enrolled in these 2-year teachers' institutes. (Medynskii *Nar Obr*, 2d ed., 1952, 200; *VVSh*, No. 4, 1955, 7.)

institutes. In 1954, institutes of law, institutes of economics, and universities had a total enrollment of about 150,000 regular students (in addition, there were about 95,000 extension-correspondence students),[66] which represents only about 14 percent of the total U. S. S. R. enrollment in higher educational establishments. Also, in this connection, pedagogical institutes prepare secondary-school teachers in these fields. All fields of social science training have one thing in common: many of the subjects of instruction in these fields are strongly penetrated by ideological and political dictates. The pressure for conformity to official orthodoxy in the program of instruction is very extensive and this factor undoubtedly places great limitations upon the quality of training in any field of social science.

As an example, the training program in jurisprudence has been presented earlier in this chapter. In the field of economics great stress is placed on political economy, on planning in general, and on particular procedures for various segments of the economy, and on economic institutions.[67] The program of training for Soviet geographers,[68] it is interesting to note, includes more subjects of general education than any other field of scientific-technical training discussed above. A detailed discussion of the training in various social science fields is beyond the scope of this volume and therefore only a general summary is given here.

The training lasts 4 or 5 years, the latter being more frequent. The total number of instruction hours during this period is 4,000 to 4,500. The number of courses ranges between 25 and 30. Thus, in the social science fields, both the number of instruction hours and the number of subjects of instruction is about 15 to 20 percent less than in scientific-technical fields of study in the Soviet Union. All students in social science fields are required to take introductory courses in mathematics and the physical and natural sciences, regardless of their future specialty. About half of the total instruction time is devoted to a given specialty. Narrow field specializations in these specialities are not so distinct as in other fields of study. Training in a given specialty usually starts in the third year of study. Finally, in social science fields, elective courses (*fakul'tativnyye distsipliny*) are offered more frequently than in scientific-technical fields.[69]

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[66] *VVSh*, No. 4, 1955, 6.

[67] Some interesting observations may be found in R. L. Meek, "Some Conversations With Soviet Economists," *Soviet Studies*, vol. VI, No. 3 (January 1955), 238–246, esp. 242.

[68] G. A. Taskin, *Geographic Studies in Soviet Universities and Teachers' Colleges*, mimeographed series No. 64, in Russian, New York: Research Program on the U. S. S. R., 1954.

[69] Electives are also offered in scientific-technical fields, but these are usually supplementary courses which may be taken by a student *in addition* to the required courses. In the social science fields students may, in some instances, select several courses as alternatives in his program of study.

In conclusion, it should be noted that in social science fields of study the humanities are often introduced as a required subject, while they are excluded in scientific-technical programs of training. The humanities as a separate field of study are given in universities and pedagogical institutes. In the humanities, as in the social sciences, political and ideological bias is heavily felt, and it is a great deterrent to the quality of training in these fields.

Factors Affecting the Quality of Training

Instruction programs, curricula, thesis requirements, and industrial practice suggest the extent and direction of professional training in Soviet higher education. In addition to these determinants there are, however, numerous factors which have significant effect upon the quality of Soviet professional training. These factors, both internal and external, exert considerable influence upon the quality of instruction and preparation of specialists. They are closely interrelated, and though they can be singled out, they often provide us with nonquantifiable and immeasurable indicators of the quality of Soviet professional training.

1. *Methods of Instruction*

According to the programs of training, the instruction time in Soviet higher educational establishments is about equally divided between lectures and other types of instruction. Lectures are usually given by professors to large groups ranging from one hundred to several hundred students. During the first 2 years of study, lectures are the main type of instruction. Lecture attendance is as a rule mandatory, and is checked by course monitors. During the lecture students are usually engaged in note taking (*konspektirovaniye*), a preoccupation which the Soviet press often criticizes as consuming too much of the student's attention. The material presented in a lecture usually requires outside preparation, and reading assignments are often given in advance. In addition, lecture material is used for further small group discussions or exercises (*grupovaya perera-botka materiala*), which are conducted by a teaching assistant in the course.

Section instruction (*uprazhneniya*) in such subjects as mathematics, theoretical mechanics, physics, foreign language, etc., is common during the first 2 or 3 years of study. It usually consists of exercises, computational problems, etc., and is conducted by instructors (*prepodaveteli*). This type of instruction usually requires specific homework assignments which must be passed in regularly by the students and are usually graded. Another type of section instruction is the seminar (*seminar*), conducted primarily in the humanities, socioeconomic and political

subjects, and advanced engineering-scientific subjects in the fourth or fifth year of study. Seminars are usually conducted as a discussion of a given topic under the guidance of either an instructor or a professor. It is often stated, however, that seminars tend to deteriorate, particularly those in political subjects, into formalized question-and-answer periods, where the students prepare answers in advance to anticipated questions on a given topic by the instructor.

Laboratory instruction (*laboratornyye zanyatiya*) in a variety of subjects (physics, chemistry, biology, medicine, agricultural, and engineering-technical subjects, etc.) has two phases. One phase (*kollokvium*) is designed to test the student's preparedness for laboratory exercises and consists of an assignment and oral test as to how equipment should be used, what should be done during a given laboratory exercise, etc. Then the student is allowed to perform the laboratory exercise, which is then written up and submitted in report form, for which either a grade or simply a credit is given.

Furthermore, particularly during the last 2 years of study, there are courses which require what is called an "independent study assignment" (*samostoyatel'naya rabota*). These consist usually of term assignments given by a professor on a given topic. In the humanities and the social sciences these are usually term papers (*pis'mennyye raboty*). In engineering and applied fields they are computational or drafting problems (*raschetno-graficheskiye raboty*), course projects (*kursovyye proekty*), or other special topic assignments. Assignments of this sort are usually supervised by the professor through consultation periods (*konsul'tatsiya*) with the individual student.

Finally, as was already noted, in some fields of study supplementary elective courses (*fakul'tativnyye distsipliny*) may be taken by students. These courses are primarily lecture courses, but occasionally they are conducted as seminars or other type of instruction.

Most of the instruction techniques mentioned above are also commonly used in American higher education. Soviet higher education places great stress on specific assignments, and Soviet educational authorities claim that "great weight is assigned to students' independent study and work with textbooks, equipment, and primary sources." [70] However, from the numerous references in the Soviet journal on higher education [71] and other periodicals, it is evident that what is called "independent study" consists of specifically assigned problems, study topics, sections of textbooks, etc. "Independent study" leads not to a free and voluntary inquiry by a student with a minimum of aid or direction by the

[70] Medynskii, *Nar Obr*, 2d ed., 1952, 177.

[71] During 1954 alone, for example, *VVSh* carried 7 articles devoted exclusively to the problem of independent work by students, 2 of which are of particular interest: *VVSh*, No. 10, 45–49; No. 11, 30–36. These deal with programing of home assignments for students.

professor but to regimented work on particulars and specifics. While there is some room for independent inquiry, it is limited almost from the beginning by rigidly prescribed learning procedures. Therefore, students are frequently taught what to do and how to do it. This places limitations upon the development of real independent inquiry and individual creative talent at least as far as the average student is concerned.

2. *Instruction Load*

Required attendance of classes in Soviet institutes and universities is extremely rigid by comparison to American and West European educational practices. The number of instruction hours per week with mandatory attendance ranges from 32 to 40. This includes all types of instruction, such as lectures, laboratory, classroom exercises, practice periods, etc. It places a great burden upon the student. This tendency to overburden the student is in a sense a tradition in Russian and Soviet education on various levels. If we assume that there are anywhere from 15 to 20 lecture periods each week requiring at least 2 hours of outside work per lecture, the probable load of the Soviet student is anywhere from 70 to 90 hours weekly.[72] Both the Soviet press and refugee reports indicate that students are overburdened to the point of exhaustion under such training schedules. Overburdening (*peregruzka*) has been denounced by the Soviet press over the past two decades.

It has been revealed [73] also that in some institutes (several engineering schools are cited as an example) required attendance of classes ranged upward of 42 instruction hours per week. As a consequence, recently a remedy was decreed that there should be no more than 36 instruction periods per week in all years of study except the last one, where 30 instruction hours weekly were stipulated. Even if these regulations are observed, and there is every indication that they are not, overburdening will still be very much in prominence.

The overburdening of students is said to be primarily a result of too many subjects of instruction (*mnogopredmetnost'*) in the curriculum.[74] The main result of overburdening is that the student lacks time for individual learning and additional reading. Thus, Soviet educational authorities complain that students have neither sufficient time for recreation nor for study of their own choice.

[72] *VVSh*, No. 1, 1954, 34. This source gives a specific example of the study load required of students during the third term at an engineering school. Out of 34 weekly instruction hours, from 18 to 20 lecture hours require 2 to 3 hours of preparation each. Instruction hours which do not require preparation are 14 to 16 in number. Thus: instruction periods requiring preparation, 18 to 20; student's preparation, 36 to 60 hours; total workload, 68 to 96 hours per week.

[73] *VVSh*, No. 10, 1954, 3.

[74] In addition, the extracurricular activities (*obshchestvennaya nagruzka*) (primarily of a political nature) of students who are Young Communist League members are very time consuming. This was true of the past particularly, and also to some extent in recent years.

3. *Examinations*

In order to graduate, the Soviet student must have passing grades or higher in *all* instruction subjects included in his program of study. There are four grades—excellent, good, passing, poor—the first two of which are considered honor grades and play an important role in the award of stipends. As in this country, an accumulation of honor grades (mostly "excellent") leads to graduation with distinction.

There are several types of examinations and procedures designed for verifying the student's knowledge. In some subjects students are graded during the term on the basis of home assignments, which they hand in regularly. This is the case in small group courses primarily (such as calculus and other higher mathematics courses); and a passing cumulative grade is a prerequisite for taking the final examination. The second type of procedure is used in courses where lectures and section (laboratory or seminar) type of instruction are combined. In these courses (such as physics or chemistry) the student is required, before the final examination, to take a course credit test (*zachet*), which qualifies him to take the final examination. A third type of procedure is to credit term assignments (in such courses as technical drawing, engineering computational problems, or term papers in some seminar courses), which again are a prerequisite for the final examination.

Final examinations are either oral or written. In some courses both types are given, but in most courses only oral examinations are given. Written examinations last 2 hours as a rule, and oral examinations last about 20 to 25 minutes for each student. Written examinations have 2 or 3 questions which are asked of all examinees. Oral examinations have 3 to 5 questions printed on cards, which are drawn at random by the student. Upon drawing, the student gets about half an hour to prepare his answer. Additional questions may be asked if a student fails to give answers satisfactory to the professor for determining his grade. Each subject has at least one final examination, but there may be several course credit tests. Ordinarily, final and all oral examinations are conducted by professors, while crediting, cumulative grading, and course credit tests are administered by teaching assistants.

The total number of course credit tests and final examinations runs anywhere from 70 to 90 during the 5 years of study. In some fields of study it is even higher, but rarely exceeds 100. The total number of final examinations is about equally divided between qualifying course credit tests and final examinations, which are primarily oral. More than three nonpassing grades in any given term result in automatic dismissal. With three nonpassing grades, the student is put on probation until the end of the first month of the next academic term. By that time he must have passed at least one of the subjects in which he failed earlier. During any academic

year a student may not carry more than two "debts" (*khvosty*); i. e., courses in which he has failed a course credit test or a final examination. If necessary, a student may take repeat examinations several times during the academic year to try to get a passing grade. However, if by the end of the spring term these "debts" have not been satisfied, the student is either dismissed or, under rare circumstances, is permitted to repeat the year (with all credits gained by him except for honor grades voided). By filing a special petition, a student may also be permitted to take one additional repeat examination in any subject in order to improve a grade previously received on the final oral examination.

This procedure regarding examinations prevailed from the mid-1930's until the academic year 1954–55. It has recently been decreed that the number of final examinations at the end of any term should not exceed five;[75] i. e., about 50 examinations during the 5 years of training. Despite this reduction (apparently this regulation does not affect course credit tests), examinations are still extensive and the consequences for failure are harsh. Soviet educational authorities have complained that numerous examinations in many instances lead to formalism and "grade chasing" (*pogonya za otmetkami*) among students. Despite these complaints and despite some reduction in the examination schedule, this process serves as an effective method of screening the most able students. Burdensome as these examination schedules are and aside from the fact that they test also, to some extent, the mere physical endurance of a student, they serve as an instrument of enforcing academic standards.

4. *Grading*

Little is known about the strictness in enforcing grading. Soviet sources frequently discuss how examinations are to be conducted, but nothing is said about grading. Several former Soviet professors have stated that grading is usually quite strict,[76] with the following reservation. There is some liberalism in giving a nonpassing grade (*plokho*) instead of simply a passing grade (*posredstvenno*). This sounds paradoxical, but it is actually quite realistic. Since many students receive scholarships (monthly stipends) and since repeat makeup examinations are permitted, professors may flunk a student in order to give him a second chance to take the examination a month later and to get a grade of good or excellent.

The problem of grading is also discussed occasionally in the Soviet

[75] *VVSh*, No. 10, 1954, 3.

[76] "Soviet Pedagogical Institutes," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 18. "Higher Education in the Soviet Union," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 194. "My Experiences as a Soviet School Teacher," unpublished manuscript, in English, New York: Research Program on the U. S. S. R., 27.

press.[77] One such article points out that the professors are liberal in giving grades of distinction instead of just passing grades. This is again related to the question of scholarships, which will be discussed in greater detail below.

A third factor which is stressed by refugee reports [78] is that professors have to be on guard against flunking or too strict grading of active party or active Young Communist League members, for such action could cause unnecessary trouble. It is stated that despite all instructions to the contrary, a party card usually entitles students to preferential treatment, especially if such students are active organizers of various student political or extracurricular activities. Since about the mid-1930's in the Soviet Union a professor usually can make a grade stick, but the pressure to be lenient on "activists" (*aktivisty*) is undoubtedly present. A professor who is not cautious enough usually will either face an inquiry from the party local as to why such-and-such an understanding, active, politically conscious, etc., man drew such a poor grade, or will be given the "cold shoulder" by a student clique which will try to cause him all sorts of embarrassment.

Since most examinations are oral, the personal judgment of the professor and an implicit honor code on his part are significant factors. Their impact, however, cannot be measured objectively. Although some pressures upon a professor to be liberal in grading under certain circumstances—whether formal or informal, such as the party's or the administration's interference or consideration of extenuating circumstances of an individual student—should be recognized, grading is probably on the whole commensurate with the student's knowledge and performance during the examination.

5. *Tuition Fees and Stipends*

Grading and examinations are directly related to the stipend problem. Many controversial judgments have been passed upon this subject in the postwar literature on the Soviet Union. In 1940 tuition fees which ranged from 300 to 500 rubles per academic year were introduced in all higher educational establishments.[79] Prior to this time, higher education, as well as other forms of education, was tuition free. Simultaneous with the introduction of tuition fees, the scholarship program, which

[77] *Literaturnaya Gazeta,* July 1, 1954 (article: " 'Problema troiki' i studenchestaya stipendiya" (The "Problem of the Passing Grade" and Students' Stipends).

[78] "Higher Education in the Soviet Union," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 195. This factor is also frequently referred to in the interview data in the files of the Project on the Soviet Social System of the Russian Research Center, Harvard University.

[79] M. Movshovich (comp.), *Vysshaya shkola. Osnovnyye postanovleniya, prikazy i instruktsii* (Higher Education—Major Decrees, Ordinances and Regulations), 2d ed., Moscow, 1948, 547.

theoretically provided every student (in actuality about 90 percent of all students)[80] with a monthly stipend, was drastically reduced. Between 1940 and 1943 only honor-grade students received stipends.

In 1943 this situation was changed again. Since that time students in 85 engineering institutes and in Moscow and Leningrad Universities who have all passing grades have received stipends, and those who have all excellent grades have received bonuses in the amount of 25 percent of the based stipend.[81] The amount of the stipend in these schools was set at 210 to 315 rubles per month, depending upon the year of study. Some of the other higher educational establishments [82] have begun to follow these procedures also, but the amount of the stipend is considerably lower, ranging from 140 to 210 rubles per month. Finally, there remain some higher educational establishments which continue to grant stipends to honor-grade students only.

At the present time, therefore, there are in existence different procedures in regard to the granting of stipends. Some schools grant stipends to all successful students, others to honor-grade students only. These differences in procedures and in the amount of the stipend again reflect the existing priorities for the training of specialists in engineering-technical fields. In the postwar years Soviet authorities have not released percentage figures on the total number of students enrolled in higher educational establishments who receive stipends. It has been said, for example, that about 75 percent of all students in the graduating class of 1950 received stipends.[83] Individual higher educational establishments have reported that 70 to 85 percent of their enrolled students receive stipends. Although precise figures have not been released, it is doubtful if more than 70 to 75 percent of all students enrolled received stipends.[84]

The amount of the monthly stipend is such that the stipend for 1 to 3 months covers tuition fees. The amount of tuition fees equals about a month's average salary of Soviet workers and employees. Thus, the tuition fees in themselves are not very high. The 1940 decree stipulated

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[80] *Sots Stroi—1933–38,* 127. Stipend funds to higher educational establishments were allotted in the 1930's by the commissariats in charge of the different branches of the Soviet economy, and some institutes simply did not have sufficient funds for granting stipends to all students. Furthermore, stipends were not granted to students on probation (i. e., those who had not more than 3 nonpassing grades in any 1 term).

[81] Verkhovnyi Sovet SSSR, *Sobraniye zakonov, postanovlenii i rasporyazhenii* (Collection of Laws, Decrees and Ordinances), 1943, No. 12, 218.

[82] The list specified 87 educational establishments in the first category. In the second category it was simply stated that "some other higher educational establishments in the field of industry, transportation, agriculture, medicine, pedagogy not mentioned on the preceding list" were included. (Idem.)

[83] *VVSh,* No. 4, 1951, 4.

[84] For a number of years Soviet authorities released figures on total budgetary outlays for stipends. For example, the 1953–54 outlay for stipends was anticipated as 5.8 billion rubles (*Pravda,* August 8, 1953). From this, it would appear that the annual outlay for stipends ranges from 2,000 to 3,000 rubles per student, which is about one-half or two-thirds of the average annual income of Soviet workers and salaried employees.

that needy students who received stipends were exempted from paying tuition fees. Today, there are in existence numerous exemptions from tuition fees—to veterans, to students whose parents (or parent) are in the armed forces, to war invalids, to orphans, to students having only one living parent, and to students who claim family hardship, etc. There are also some 50 institutes (pedagogical for the most part) which grant wholesale exemptions from tuition to all students of national minority groups. Consequently, although tuition fees may cause hardship to students from low-income families (peasants and unskilled urban labor), their primary effect is not that of deliberate class discrimination. The Soviet explanation that tuition fees were introduced simply as a revenue measure is also not very convincing. Most probably, tuition fees should be regarded as an instrument which introduced a rational attitude among students and their parents toward attending higher educational establishments and a measure designed to promote academic selection. The latter interpretation is imperfect, however, to the extent that there are some discriminatory effects against students from low-income families.[85]

There is a deliberate intention to use stipends as an instrument for promoting academic selection. While all entering students receive stipends during the first term, the awarding of stipends for the next term depends upon the grades received in the preceding term. Thus the struggle for honor grades implies material rewards and undoubtedly promotes the selection of the aptest students, imperfections in grading notwithstanding. Finally, it must be noted that there are about 7,000 personal stipends (*personal'nyye imennyye stipendii*), which range from 400 to 1,000 rubles per month and which are given to the most outstanding students. This system of tuition fees and stipends plays a significant role in the selection of students. It stimulates learning, as well as directing students to the most needed fields, particularly the engineering specialties.

6. *Applied Instruction and Availability of Facilities and Equipment*

Soviet programs of professional training place extensive emphasis on applied instruction. The quality of the applied instruction is dependent upon laboratory equipment, visual aids, models, equipment and machinery in machine shops and test laboratories, etc. Soviet sources often state that many, or even most, higher educational establishments have "excellent equipment" for these purposes.[86] At the same time there are

[85] *Literaturnaya Gazeta,* July 1, 1954, points out the anxiety of some students who have no family support and who are faced with the possibility of losing their stipends if they fail even one subject on the examinations.

[86] Medynskii, *Nar Obr,* 2d ed., 1952, 176.

numerous complaints about the shortages of laboratory equipment, precision instruments, machinery,[87] and even the difficulties of some institutions in obtaining funds to procure such equipment.[88]

Undoubtedly there are some institutions which have excellent facilities and equipment, but there are frequent Soviet press reports about shortages of particular items, of a certain type of laboratory equipment, and particularly of precision instruments and measuring devices. Again because of priorities, certain engineering schools and large universities are affected to a lesser extent by these shortages than smaller, less important schools. Time and again, laboratory equipment manuals and textbooks receive critical reviews because of their dependence upon foreign-manufactured equipment.

It has been noted with pride that during the last postwar plan (1946–50), Soviet higher educational establishments were equipped with "hundreds" of new laboratories, that they received about 1,200 pieces of machine tools, 8,700 microscopes, 1,000 oscilloscopes, etc.[89] This is a "drop in the bucket" as far as laboratory equipment in this country is concerned. At the same time, it was explicitly stated that the "severe lack (*otstavaniye*) of material-technical facilities" was a drawback which created "substantial difficulty in the organization of instruction with ever-increasing contingents of students." [90] There is no evidence that this "difficulty" has been overcome since then, though undoubtedly some improvements have taken place, particularly in large institutes and in some engineering schools.

There is also another practical problem involved. Because many higher educational establishments are engaged in special research or development projects for Soviet industry, there is a tendency to bar students from the use of available machinery, precision instruments and testing equipment simply because the "equipment is complex, it is highly valued, saved and protected from inexperienced handling by students." [91] This statement suggests, however, that those who are skillful and trustworthy are authorized to use such equipment regardless of how scarce it may be. There are undoubtedly interinstitutional differences as far as the actual use of various equipment is concerned. But because of these limitations the very drive for applied instruction, which constitutes the core of the Soviet training program, is somewhat handicapped.

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[87] Among other references, see *VVSh*, No. 2, 1952, 15.
[88] *Izvestiya*, February 8, 1955 (Ambartsumyan's speech).
[89] *VVSh*, No. 4, 1951, 7.
[90] Idem. This article was written by Chutkershvili, who was the head of the planning and finance section of the Ministry of Higher Education.
[91] *VVSh*, No. 3, 1955, 29.

7. *Supply and Quality of Textbooks*

The problem of textbooks for Soviet higher education students is a complicated one. This problem has been and still is being debated in the Soviet press time and time again. In the early and mid-1930's there was a very acute shortage of textbooks in every field of professional education. There was both a quantitative shortage of printed copies and a decided lack of any sort of good texts. Toward the end of the 1930's a large number of new titles with very large editions (30,000 to 50,000 copies) began to appear, and the critical shortage began to be somewhat alleviated.

Because of the acute shortages of all types of textbooks before 1938 and because of the policy of "standardizing" textbooks and formalizing the practice of "approving" a given text by the central organs of Soviet higher education, texts are frequently found in a third or fifth edition. The writing of new textbooks in many fields proceeded slowly, and a book which has been in use for as long as two decades is still common today, even though figures on the publication of new texts may look very impressive.

Between 1938 and 1948 it was reported that 2,864 titles, with a total of about 33 million copies, were printed. About 20 percent of this total number of printed copies consisted of reprints or revised editions (in some instances ranging up to the 14th edition).[92] During this decade the distribution of titles was remarkable, since well over 70 percent of all texts were in the scientific and engineering fields. Table 9 gives the distribution of titles by field.

The overwhelming emphasis on engineering and scientific textbooks continued after 1948. Between 1948 and 1950 the Soviets claim to have published about 1,000 titles with about 15 million printed copies; again, a large proportion of these were in engineering and scientific fields. Even though the overall figures on published textbooks for higher education students look very impressive, the problem still remains an acute one.

During 1954–55 the Soviet journal on higher education had lengthy discussions of this problem.[93] The problem consists not in the number of titles and size of editions but primarily in the type and quality of texts, their use by students, and their relationship to the syllabi in given subjects.

Soviet students, as a rule, do not buy their own textbooks. The large numbers of books required for course work are provided by the library of the educational establishment on a loan basis for the entire academic year. When the number of library copies is insufficient, of course, the student is forced to acquire texts of his own. Most textbooks in special-

[92] *VVSh*, No. 5, 1948, 11.
[93] *VVSh*, No. 5, 1954, 54 ff.; No. 9, 12 ff.; No. 12, 27–34; 1955, No. 3, 15–20.

TABLE 9.—*Distribution of titles of Soviet textbooks printed between 1938 and 1948*

Field	*Number of titles*
Machine building and mechanical engineering	312
Medicine	301
Mining engineering	238
Transportation engineering	222
Construction and civil engineering	176
Agriculture	173
Light industry engineering	152
Power and electrical engineering	133
Finance and economics	132
Chemistry	128
Foreign languages	113
Pedagogy	32
History	32
Geography	17
Philosophy	4
Subtotal	2, 165
Undistributed	699
Total	2, 864

Source: *VVSh*, No. 5, 1948, 11. Half of the "undistributed" category consisted of basic science texts.

ized subjects have editions of about 10,000–15,000 copies, but in general sciences there are usually editions upwards of 25,000 copies. Aside from receiving gratis from the state publishing house 2 to 5 copies of each published book, the libraries purchase substantial quantities of each book, for loan to students. The supply of textbooks in most engineering and scientific fields today is apparently substantially greater than the number of students being trained in these respective fields, but in the humanities and the social sciences the purely quantitative problem is still far from being solved.

During the recent argument over the textbook problem, it was revealed that although textbooks are available, students make little use of them and study from their lecture notes (*konspekty lektsii*) primarily because they do not have the time to read the text (see above, on "overburdening"), which for the most part are too voluminous, too detailed, and frequently the context is not in harmony with the lecture material. Type, size, and content of textbooks are responsible for these difficulties.

In terms of monetary rewards the writing of textbooks is one of the most rewarding undertakings in the Soviet Union. Despite this, many professors do not have either the time or the inclination for writing textbooks after completing the daily teaching and research duties expected of them. Those who do write textbooks frequently try to reproduce their own lecture material. Since the way in which an individual professor presents material may not necessarily be exactly the standard way of treating a given subject or the way some critic thinks it should be treated, this immediately puts the author in a precarious situation with

those who are eager to find shortcomings, lack of organization, omissions, etc. Since a written textbook is usually a mirror of one's knowledge of a given subject and his approach to the methodology of teaching that subject, and since most textbooks, despite their prepublication approval by special editorial committees, are mercilessly reviewed, denounced, and occasionally condemned by the critics, anyone who ventures into this tedious and elaborate work takes the risk of being "exposed" for one fault or another. Thus, despite the material rewards of textbook writing, many qualified persons shun this undertaking for fear of committing errors or of being arbitrarily accused of political or ideological "deviations." The latter accusations are less frequent in scientific-technical fields, but they have occurred, nevertheless.

Textbooks fall into two categories. First, there are many engineering textbooks which are exhaustive, voluminous discussions of a technological nature, with charts, drawings, diagrams of everything up to the last standardized design of bolts and rivets. Usually these textbooks are written by a group of experts rather than by one individual, which, in a sense, silences the reviewers and diminishes the risk of severe criticisms. However, since technological change is frequently rapid in an expanding economy, these books are often rendered obsolete within a few years. Meanwhile, there is reluctance to write another book to replace the original. As a consequence, the original text is revised time and again. Some of these books must be regarded as technical manuals rather than concise texts, and often are too voluminous for effective use by the student.

Second, there are general science texts. Here the problem is somewhat different. Traditional presentation of a given subject commonly prevails, and there is a tendency to shy away from discussion of controversial hypotheses or advanced topics based particularly on recent scientific discoveries. This phenomenon occurs, apparently, as it did in the postwar years particularly, for political reasons. Scientific hypotheses or theoretical truths of recent origin are often controversial, and there is great uncertainty as to their acceptable interpretation within the ideological framework at any given time. Why should a scientist commit himself in print to an interpretation of theories in quantum mechanics, relativity, nucleonics, organic compounds, or other advanced topics if his interpretations may bring him under fire, if not immediately, then perhaps 10 years hence, because of some shift in ideological orthodoxy or occasionally on scientific grounds. It is therefore easier either to reprint the old textbook or, if writing a new one, simply to avoid involvement in any adequate discussion of controversial topics, or of topics which border on the philosophy of science rather than science itself.

The latter situation applies also to advanced texts in some fields. In this instance, however, the security problem probably has its effect as

well. While in general science texts it is possible simply to avoid a controversial topic, in advanced treatises empirical data and research techniques must be presented, which have heretofore not been disclosed because of Soviet secrecy requirements. Therefore, numerous translations of advanced texts of Western writers are used. This serves a dual purpose. There can be no censure for errors or deviations, and advanced students get well acquainted with advanced topics and theories which might be the subject of considerable political or ideological controversy in the Soviet Union itself. However, despite the understandable reluctance to deal with certain controversial topics, a fair number of excellent advanced texts by Soviet scientists are published every year.

It must be very strongly emphasized that Soviet exploitation of existing literature is of great magnitude and important, not only for the advanced training programs but also for keeping Sovient scientists and technicians informed. There is a mistaken notion held by some Western observers that the Soviet Government isolates its students and scientists from Western scientific literature. On the contrary, in addition to the numerous translations of textbooks and advanced texts by foreign authors, foreign periodical literature, translations, and abstracts are circulated and used with amazing intensity and speed.

Since the early 1930's several deposit libraries of foreign scientific and technical literature have been established in half a dozen urban centers of European Russia primarily. These libraries are usually not open to the public, and only authorized students, and teaching and research personnel have free access to all the available original materials. In addition, two libraries in Moscow provide reference and translating service on a request basis. In 1953 the Institute of Scientific Information was set up at the Academy of Sciences of the U. S. S. R. for the purpose of publishing abstracts in Russian in six fields of science.[94] The publication of these abstracts and the establishment of reference, translating, and photoduplicating services at this institute are a step designed to give wider dissemination of foreign scientific and technical information within the Soviet Union.

The extensive exploitation and dissemination of foreign literature presents a paradox, in view of the postwar ideological campaigns aimed at promoting claims of the superiority of Russian and Soviet science, at denouncing foreign scientific theories, foreign scientists, and Soviet scientists who are claimed to be followers of or sympathizers with foreign scientific doctrines. This seeming contradiction is striking at first glance. It becomes apparent, however, that ideological and political dictates,

[94] At the present time there are abstracts in mathematics, mechanics, astronomy and geodesy, physics, chemistry, and biology It is contemplated that in the fall of 1955 abstracts of machine building and electrical engineering will be added. It is claimed that 6,892 foreign scientific and technical periodicals are being processed for these abstracts. (*Pravda,* March 15, 1955.)

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even at the height of the campaign in 1948–52, did not prevent Soviet students, researchers, and scientists from using factual information provided in foreign scientific and technical literature. The majority of the Soviet denunciations of Western science dealt with the philosophy of science, the acceptance and interpretation of scientific hypotheses; while factual information, empirical findings, and applied solutions were exploited without handicap in most fields of science and engineering.

8. *Teaching Personnel*

The problem of teaching personnel is another complicated and involved issue, which will be discussed in more detail later on in this and in the following chapter. At the present time it is important only to note the difference between the present situation and that prevailing in the early 1930's. In the past there was undoubtedly a great shortage of qualified teachers. Although the problem is far from being solved in some fields as yet, it can be said that on the whole there appears to be no shortage of qualified academic personnel in higher education.

9. *Military Training and Physical Education in Soviet Higher Education*

The preferential treatment of Soviet higher education students in regard to military obligation has already been noted in Ch. I. In higher educational establishments all male students are required to take several hours per week of military training. This training includes military drill, the use of small arms, tactics, mapreading, etc. Physical training, with its stress upon gymnastics rather than on organized sports, supplements military training to a great extent. In addition, a paramilitary organization called *DOSAAF* (formerly called *Osoaviakhim*) provides additional military training in the form of extracurricular activity, which, although proclaimed voluntary, is in effect compulsory. Formal military training, supplemented by physical education and extracurricular participation in a paramilitary organization, affects all male students in Soviet higher education. Thus, despite exemption or deferment from active military duty, most students nevertheless receive a certain amount of basic military training in the higher educational establishments themselves.

While all male students are affected by these military training requirements, it must be noted that within the scope of Soviet higher education, some direct training of military officers takes place. Since the early 1930's some higher educational establishments have begun to operate special departments (*spetsial'nyye fakul'tety*), as well as groups

of higher nonregular army training.[95] The former are still in existence, while the latter are defunct. The latter used to train commissioned company-grade officers, and the program of training consisted of the ordinary curriculum, supplemented by 1 year of extensive military training. The former train military specialists, who are commissioned as officers (usually a captain's rank) for specialized branches of the armed forces rather than as ordinary-grade officers. It is believed that their training is based on the usual curriculum with a given specialization, supplemented by several special military courses. These special departments are found most frequently in engineering and medical institutes. Thus, at the present time, some military specialists are trained in regular higher educational establishments, but their number is small in comparison to the overall enrollment, and the majority of students are not affected by these special training programs.

10. *Political Indoctrination in Soviet Higher Education*

Two other aspects of training are of major significance for evaluating the quality of Soviet higher education. Political indoctrination and extracurricular activities are closely tied together. Until about the mid-1930's what might be called extracurricular activities—which in the Soviet sense of this term implies political activity primarily—were closely related to the instruction program. Until that time student organizations, the party local, trade-union locals, etc., had a great deal to say about the program of instruction. In many instances extracurricular activities, political gatherings and meetings had priority over academic pursuits. In the last two decades the reign of extracurricular over curricular pursuits has been drastically curtailed. Today the Young Communist League is mobilized more to enforce discipline and standards of learning than to divert the student's attention to political campaigns or to interfere with teaching. Political meetings may take place only after school hours (abuses notwithstanding), and their frequency is seldom more than once a month. Of course, communist youth organizations and the party mobilize, organize, and conduct the indoctrination of all students, but the result of such undertakings often bears the stamp of superficiality and formality.

In the first place, it must be remembered that the "elitist" nature of the Young Communist League is on the way out.[96] While in 1931

[95] Known as GVP, GVVP, or VVP—*Vysshaya Vnevoiskovaya Podgotovka.* Some refugee reports discuss certain aspects of training in detail: N. Ivanov, *Higher Technical Training in the U. S. S. R.*, mimeographed series No. 42, in Russian, New York: Research Program on the U. S. S. R., 1953, esp. 24–26. Also, "Soviet Pedagogical Institutes," unpublished manuscript, in Russian, New York: Research Program in the U. S. S. R., 30 ff.

[96] Cf., M. Fainsod, *How Russia Is Ruled,* Cambridge: Harvard University Press, 1954, 248–249.

this organization had only about 3 million members, by 1952 its membership totaled over 16 million. While in 1929 only 24 percent of all students in higher educational establishments were members of the Young Communist League,[97] by 1954, 88 percent of all students were in its ranks.[98] As a result of this growth, the Young Communist League has been transformed into a mass organization.

In the second place, we may note that frequent press reports about the need for strengthening curricular instruction in political indoctrination subjects (Marxism-Leninism, materialism, political economy—which are required of all students) suggests that after many years of communist rule, a foolproof formula for successfully accomplishing this task has not been devised. Of course, Soviet students, for the sake of the record, assign great significance to the actual grades received in the political subjects which they are required to take. However, as has been noted by other Western observers, this indoctrination frequently results in outward conformity only.[99] This is confirmed also by most of the refugee accounts.

Soviet refugees note that these indoctrination programs are received "passively and mechanically." [1] Soviet students accept this "philosophy [Marxism-Leninism and Communist ideology] quite passively and indifferently. They study, repeat, and adopt readymade answers from it because this is required of them (*tak nuzhno*)." [2] There are many other reports which reveal the same situation.[3] The convincing force of such indoctrination effort is quite weak and, faced with the realities of life, loses its strength. The extracurricular activity of the party and its subsidiary, the Young Communist League organization, is designed to supplement formal instruction effort. Most of its activities, however, according to refugee reports, were considered as a mere "waste of time" by students,[4] and various political campaigns to promote or to strengthen certain aspects of the propaganda line as boring and tedious, an onerous and unpleasant duty. Despite this, some residual effects of the propaganda effort are undoubtedly felt, simply because of the fact that no matter how flagrantly untrue and repulsive the propaganda messages may be, some of them become subconsciously accepted when heard and repeated often enough.

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[97] *Podgotovka*, 152.
[98] *VVSh*, No. 3, 1955, 8.
[99] See B. Moore, *Terror and Progress, U. S. S. R.*, Cambridge: Harvard University Press, 1954, passim.
[1] "Social and Political Aspects of Student Life in a Soviet University," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 42.
[2] "Higher Education in the Soviet Union," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 36.
[3] The interview files of the Project on the Soviet Social System of the Russian Research Center, Harvard University, contain several dozen statements made by former Soviet citizens to the same effect.
[4] "Soviet Pedagogical Institutes," unpublished manuscript, in Russian, New York: Research Program on the U. S. S. R., 12.

It appears that most students just drift along with the tide of the totalitarian state. They go through the outward motions of learning ideological dictates; they participate in political activities, because it is a common standard of performance, because one is expected to know quotations from Lenin, and because one is expected to march in the May Day parade. What effect does such outward conformity have upon the training of Soviet specialists?

Refugee comments in this regard are revealing. It is stated, for example, that under such conditions the pursuit of knowledge tends to overshadow political indoctrination,[5] that students tend to be concerned with science and bury themselves in it to hide from Soviet reality. Lack of genuine enthusiasm for official doctrines, and escape from reality by greater devotion to academic pursuits, are reported to be very common among Soviet students. This would, in turn, imply that many accounts in the Soviet press concerning universal acceptance of the Communist faith by the army of specialists trained during the last decades must be viewed with great skepticism and with many reservations. To sum up, Communist thought control appears not to be so all-embracing or so effective as Soviet propaganda claims it to be or as some Western observers describe it. The detrimental effects of it upon the training of Soviet specialists and scientists cannot be qualified or measured in any reliable way, but it seems that there is some tendency for scientific truth to overshadow political doctrine even in the Soviet totalitarian state.

11. *Factors in the Choice of Study Field Affecting the Quality of Training*

It is well recognized that there are various factors which exercise an indirect impact upon the quality of training. One of these factors is the placement policy of graduates. According to law, since 1933 all specialists graduating from Soviet higher educational establishments are assigned to jobs.[6] This decree has been reinforced by other regulations (in 1936, 1937, 1940), all restricting the occupational mobility of graduates, and limiting the choice of occupation outside the specialty of their formal training. Job assignment takes place within 5 days after the issuance of the graduation certificate, and the minimum term of assignment is 3 years. In 1940, when labor legislation acts were reinforced through the introduction of labor books (without which an individual cannot be hired anywhere), the opportunity for specialists to change jobs at will was even further reduced. In view of these restrictions, the individual is likely

[5] "My Experience as a Soviet School Teacher," unpublished manuscript, in English, New York: Research Program on the U. S. S. R., 19–20, 37.
[6] Movshovich, op. cit., 208–212.

to seek occupational training which offers a good chance of satisfying his career expectations.

Since there is a high value placed on certain kinds of professional training, and since some occupations offer higher incomes and material comforts than others, many students choose their fields of training on the basis of these differential rewards. Administrative-managerial positions, scientific research, engineering, university teaching, medicine, agricultural occupations, secondary-school teaching, other social service occupations—these represent a sequential chain of diminishing monetary rewards. Administrative positions are filled not only from the various ranks of professionals, especially engineers, but also from other groups. These individuals, however, are selected primarily for good party standing and for noted past performance of one sort or another. On the whole, professionals of all types fare much better than any other group of wage earners, a consideration which makes higher education in any field quite attractive. Still, there are differential rewards for various occupations within the group of professionals.

Because occupations can be changed only with great difficulty, there is greater pressure toward the "prize" occupations. Engineers and scientists top the list, and therefore establishments offering this training have the greatest number of applicants. Institutes offering training in these fields place greater demands upon the student, and the standards of instruction can be enforced far more rigidly than in certain other fields of training. Thus, it may be easily seen that placement policy and the attraction of certain occupations exercise an impact upon the quality of training.

Another factor, related to the one described above, is that there are undoubtedly fields of science or occupations where the impact of the ever-changing political and ideological orthodoxy is heavily felt. Such fields as biology, agriculture, history, economics, humanities, and the social sciences in general, aside from offering smaller financial rewards, are politically hazardous as well. The party line, though it may be clearly defined at a given moment, may change in the foreseeable future. This may not only cause career handicaps but, in extreme cases, even threaten the individual's very existence. Training in these fields therefore is less attractive than in other professional fields, where the probability of political intervention—which is undoubtedly felt by each individual—is small. Engineering, applied sciences, medicine, and even secondary-school teaching, in the sciences particularly, are therefore more attractive than certain other fields of professional training. This explains to a large extent why there are stagnant fields with only a trickle of graduates each year and why other training establishments must refuse admission to the flocks of aspiring applicants.

These are some of the factors to be considered when one speaks of Soviet professional training in general. There are undoubtedly many other aspects of the student's life which influence his training. Dormitory accommodations (it is reported that up to 70 percent of students are provided with these at one time or another), dining halls, attractions of the large cities, recreation opportunities, and a score of other factors enter into the consideration of choice of field of training and the institution in which it is undertaken. Interesting as all these factors may be, however, they are outside the scope of this survey. Keeping in mind some of the most important factors influencing the qualitative aspect of Soviet professional training, let us turn now to its quantitative aspects.

Quantitative Trends in Soviet Higher Education

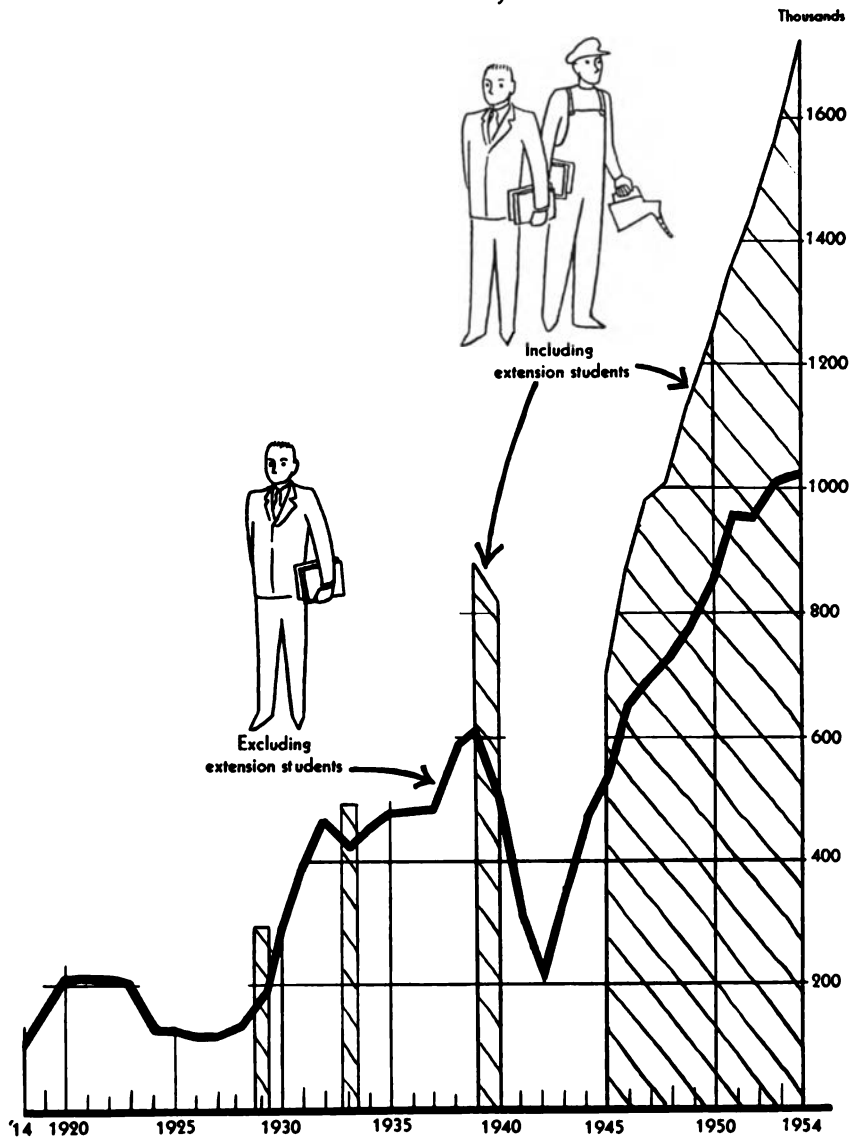
1. *Total Enrollment in Soviet Higher Educational Establishments*

Chart VI presents the enrollment in all fields of Soviet higher educational establishments for the last four decades.[1] Although some expansion in enrollment occurred shortly after the Revolution, enrollment remained at the level of about 160,000 during most of the 1920's, thus only some 20,000 over that of the pre-Revolutionary period. This was a period of stagnation when official policy toward higher education was based on a deliberate attempt to hold it down. It was a time when the intelligentsia and professionals were looked upon with contempt and suspicion as socially alien elements in a proletarian state. The stagnant economy had very little need for trained manpower, and the Soviet state had no earnest desire to expand such training.

The year 1929 marks the beginning of a new era. The Soviet economy embarked upon a path of rapid industrialization, which began to demand more and more trained specialists. Hundreds of proclamations, dozens of directives, and a multitude of speeches by party leaders proclaimed the need for the expansion of education in general and for the training of specialists in particular. Stalin coined a new slogan: "Cadres decide everything." The availability of specialists was to decide the outcome of industrialization. Feverish expansion of enrollment began at a time when there was lack of facilities and qualified teachers and of decent training programs. Between 1929 and 1932 enrollment jumped two and a half times, reaching the peak of about 500,000 in 1932. During

[1] Enrollment figures throughout this discussion are presented as of the end of the year, i. e., 1932 enrollment means the year-end enrollment in 1932 and consequently refers to the academic year 1932–33. For factual data in the subsequent discussion and for sources from which they were compiled, see tables A and A–1, appendix to ch. IV.

TOTAL ENROLLMENT IN SOVIET HIGHER EDUCATIONAL ESTABLISHMENTS, 1914–54



Source: Table A–0, table A–1, appendix to chapter IV.

CHART VI

this same period, however, enrollment of extension students was not significant, there being some 40,000 in 1929, dwindling down to nothing by 1932, and then expanding again. Thus, in 1932, enrollment in all Soviet higher educational establishments was somewhat less than half of the resident college enrollment in the United States in 1930 (about 1,100,000).

The overexpansion of the preceding period accounted for the drop in 1933. This drop is usually explained by Soviet sources as having resulted from the "reorganization" of higher education. True as this may be, there were also other causes which were responsible. Drastic collectivization measures, the famine resulting therefrom, and other disrupting effects which affected Soviet society as a whole were significant factors. The reorganization of higher education, the lengthening of training programs, the introduction of traditional methods of instruction, the strengthening of discipline, the introduction of individual grading (as opposed to group grading), and a score of other measures which came into existence between 1931 and 1934 actually provided a substantially sound foundation for Soviet higher education and were the original and fundamental factors in shaping its present character. In 1934 enrollment had increased to a level of some 520,000, and for the next 4 years was stabilized between 520,000 and 540,000. From 1937 to 1939, it increased by some 100,000, reaching a level of 620,000 in 1939, a figure again well less than one-half the enrollment in United States higher education in 1940 (about 1,500,000).

The initial impact of the new military draft law caused a drain on the supply of applicants for higher educational establishments in 1939 and 1940. The sudden introduction of tuition fees in 1940 was another disturbing factor. These two factors, combined with the mobilization of some students because of the Soviet-Polish and Soviet-Finnish conflicts, were responsible for the drop in enrollment in 1940, down about 50,000 from the 1939 figure.

The war with Germany caused further setbacks in Soviet higher education. At the beginning of the academic year 1940–41, enrollment was only 313,000, and during the course of that academic year, because of the rapid advance of the German armies and the occupation of a large number of urban centers, it probably went even below this figure. A large number of higher educational establishments, particularly engineering schools, were evacuated; and the academic year 1941–42 was probably the worst, in terms of the havoc created in higher education by German invasion of Soviet territory. Enrollment by the spring of 1942 was, in all probability, below the 200,000 mark, or about three times less than before the outbreak of the war. In the fall of 1942, when the military situation had become somewhat more stable, enrollment was at a level of about 227,000 and has been on the increase

ever since. The new law in the fall of 1943 stipulating exemption or deferment from military service for students in higher educational establishments was an additionally favorable factor for increasing enrollment. By the fall of 1945, about the same level as existed in the period 1934–37 (circa 540,000) was reached. Although the war-inflicted damage was great, the recovery in higher education enrollment was a rapid one.

In the early 1930's extension students accounted for less than 10 percent of the total enrollment. During the late prewar years, from about 1936, there began a rapid expansion of extension training. In 1939 there were some 250,000 extension students in Soviet higher education, which represented about 28 percent of total enrollment. In 1945 there were about 160,000, and in subsequent years extension students began to account for a large proportion of total enrollment. From 1945 on, a steady and rapid growth in enrollment is noticeable. While the regular higher education enrollment increased from about 540,000 in 1945 to about 1,100,000 in 1954, the number of extension students increased from about 160,000 to about 645,000 in these respective years. In 1954 extension students represented about 37 percent of the total enrollment. In 1954 the number of *regular* students in Soviet higher education was still less than one-half the number of resident students in colleges in the United States in 1950 (about 2,600,000); however, if Soviet extension students are included, the Soviet higher education enrollment lagged by about one-third in comparison with United States enrollment. The inclusion of extension students with regular students in Soviet official pronouncements on enrollment is obviously made for propaganda purposes in an attempt to present a more favorable picture of the expansion that took place in Soviet higher education. For purposes of objective evaluation, however, because of the qualitative differences, a sharp distinction between these two forms of training must be maintained. Regular enrollment still accounts for the major flow of graduates. Although the extension program enrollment is quite large in itself, it still provides a proportionately small flow of graduates.

During the last 25 years (1929–54) *regular* student enrollment in Soviet higher education has increased by leaps and bounds, about sixfold, reaching the figure of 1,100,000 by 1954. Total enrollment in regular training establishments during this period was supplemented by extension enrollment, which in 1954 accounted for about 645,000, or 15 times the 1929 figure. During the entire period regular enrollment in Soviet higher education has remained less than half the resident student enrollment in colleges in the United States. Furthermore, if higher education enrollment per capita population, or if a given age group of those attending higher education in the two countries are compared, it is obvious that the Soviet Union lags behind the United States to a considerable degree.

2. *Enrollment by Field in Soviet Higher Education*

Turning to enrollment trends by field, we note that during the last decades some marked shifts have occurred although the engineering enrollment has remained a major component of the student body. Table 10 shows the distribution of Soviet higher education enrollment by field for selected years. This table reveals the percentage distribution of the Soviet student body, while chart VII summarizes enrollment trends by field over two decades (1929–49).

From the table and the chart, it is evident that engineering enrollment was dominant from the late 1920's until about 1937–38. At the peak of the expansion of engineering training in 1932, it accounted for some 50 percent of student enrollment. Towards the late 1930's the training of teachers began to predominate, and this trend continued into the postwar period, pushing engineering enrollment into second place. Despite this, engineering enrollment in most years accounted for more than 30 percent of the total enrollment. Just as enrollment for the socioeconomic segment remained at a stagnant level and showed only a twofold increase between 1929 and 1949, so the agricultural enrollment roughly doubled in this period. The relative proportion in total enrollment of both these segments declined. Engineering and medical field enrollment increased about fourfold each, but the relative proportion of each remained about the same. At the same time, the training of teachers increased more than sixfold, with a gain in relative proportion of about 15 percent.

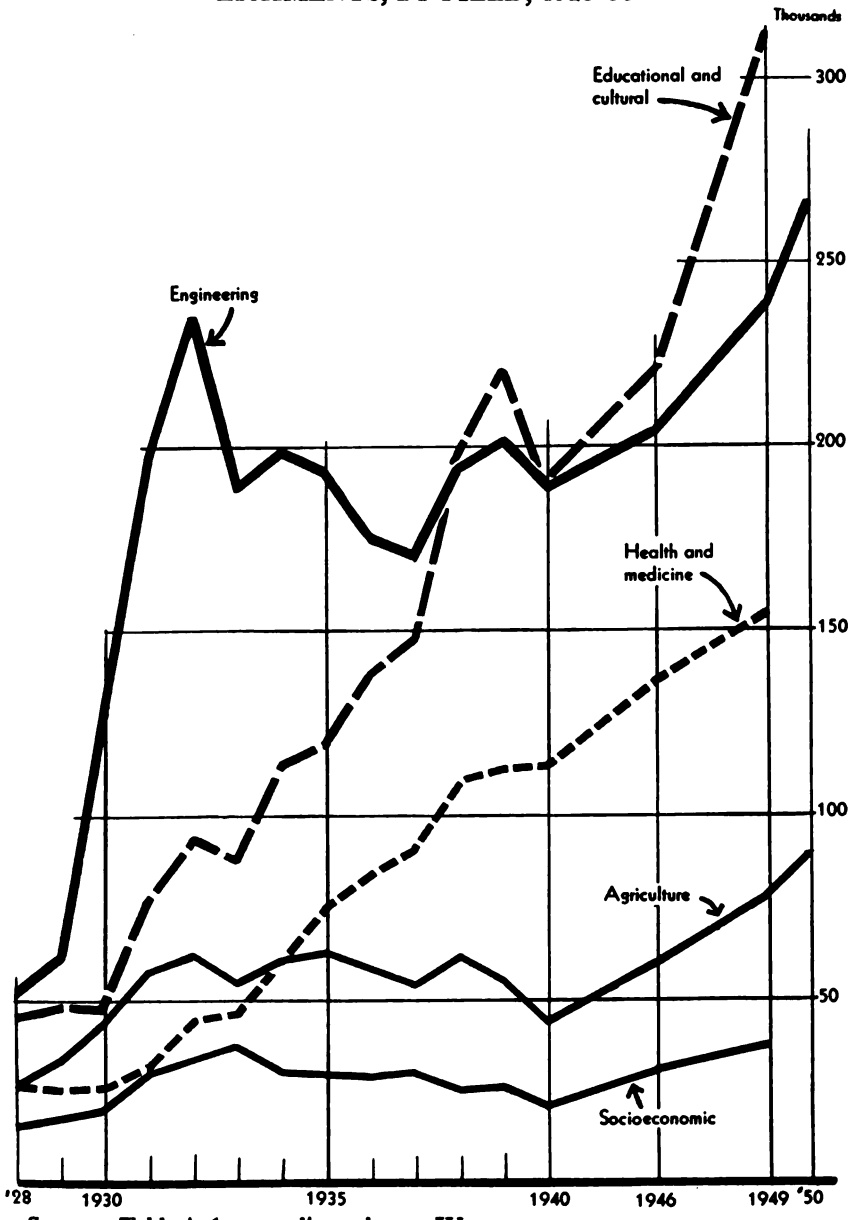
TABLE 10.—*Soviet higher education enrollment, by field, 1929–49*

	1929		1932		1939		1946		1949	
	Thousands	Percent	Thousands	Percent	Thousands	Percent	Thousands	Percent	Thousands	Percent
Total regular training enrollment	191.1	100.0	469.8	100.0	619.9	100.0	653.3	100.0	774.5	100.0
Of which, by field:										
Engineering	62.8	32.9	233.4	49.7	201.5	32.5	204.4	31.4	239.3	30.9
Agricultural	34.0	17.8	62.2	13.2	56.6	9.1	60.3	9.2	78.7	10.2
Socioeconomic	18.3	9.6	34.3	7.3	27.7	4.5	31.5	4.8	38.0	4.9
Educational	49.9	26.1	93.5	19.9	221.1	35.7	220.4	33.7	312.9	40.4
Health	26.1	13.6	46.4	9.9	113.0	18.2	136.7	20.9	105.6	13.6
Additional enrollment:										
Party schools	13.1	--------	38.9	--------	None	--------	None	--------	None	--------
Extension training	42.9	--------	(1)	--------	250.0	--------	212.0	--------	346.0	--------
Grand total	247.1	--------	508.7	--------	869.9	--------	865.3	--------	1,120.5	--------

[1] Negligible.

Source: See Table A–1 in the appendix to ch. IV, where additional data may be found for other years.

ENROLLMENT IN SOVIET HIGHER EDUCATIONAL ESTABLISHMENTS, BY FIELD, 1928–50



Source: Table A–1, appendix to chapter IV.

CHART VII

Chart VII does not reveal the training given in the Higher Party Schools, which (in the mid-1930's during the peak of their operation) accounted for an additional enrollment of about 50,000. Nor does the chart reveal the distribution of extension students by field. The majority of extension students (and also graduations) are attributable to the field of education. In 1949–50, for example, all engineering schools had 40,000 extension students, which is about 15 percent of all students in engineering.[8] In the academic year 1950–51 there were about 400,000 extension students, which were distributed as follows:

TABLE 11.—*Distribution of extension students, by field, in 1950–51*

Field	*Percent*
Engineering	13.1
Agricultural	3.8
Socioeconomic	9.5
Educational	70.0
Health	None
Unaccounted	3.6
Total	100

Source: *BSE*, 2d ed., vol. 16, 1953, 422.

The 3.6 percent which remains unaccounted for probably belong also to the educational sector because extension students in universities were not included in the breakdown for education by the source.

In the late postwar period (1949–52) there was an average of about 125,000 acceptances per year in extension training, and graduations of extension students were about 35,000 per year. Thus, if graduations were distributed roughly in the same way as enrollment of students,[9] then less than 5,000 per year could graduate in the field of engineering, while the influx of graduates in the field of education would be over 25,000 per annum. Therefore, it must be kept in mind that although Soviet authorities are reluctant to release exact figures on the distribution of extension graduates, on the basis of the distribution of extension students by field, it is evident that extension training is less prominent in certain fields. In all fields except education, extension training graduates account for a proportionately small number of total graduates in a given field.

The expansion of extension training is attributable to the following factors. The particular prominence of extension training among educational field professionals is explainable on the basis of several decrees issued by the Soviet Government in 1936 and especially between 1942

[8] *BSE*, vol. 9, 1951, 512.

[9] Under such an assumption we tend to favor the fields of engineering and agriculture where programs of study are undoubtedly more demanding and difficult. See also the discussion above concerning the quality of extension education and the extremely low number of graduations as compared with enrollment.

and 1944. These decrees established wage differentials for primary- and secondary-school teachers based on their education and legitimized the practice of appointing teachers only to those positions which coincided with their level of education. Intermediate and upper grade (5–10) teachers of secondary schools were requested to have higher education, and those who had not completed it were compelled to do so through extension training. Thus, the enormous expansion of extension training, which occurred predominantly in the education field, is partly explainable on these grounds.

The extremely rapid expansion of extension training which is currently going on is also a result of another factor. Regular higher educational establishments apparently are not able to accommodate the growing numbers of those who aspire to receive professional training. As a result, extension training is expanding because of Soviet efforts to enroll the growing numbers of secondary-school graduates going directly to work in industry and agriculture upon the completion of the 10-year-school but who wish to continue their education and cannot be absorbed by the regular facilities.

3. *Graduation Trends in Soviet Higher Education*

Table 12 and chart VIII reveal graduation trends in Soviet higher education over the last 25 years.[10] Table 12 presents the distribution of graduates by field in selected years. Chart VIII reveals overall graduation trends over the last two and a half decades. The available data reveal that graduating classes increased from 30,000 in the late 1920's to about 100,000 by the late 1930's. In the immediate postwar years annual graduations were about 130,000, and in 1954 they were upwards of 170,000. Today, in addition, almost 60,000, the majority of whom are teachers, are being graduated from extension training programs. Thus, during the last 25 years graduating classes from regular training programs have increased about sixfold and have reached a level of about 170,000, which is somewhat less than half the annual graduations in the United States (bachelor and first professional degree, taking the 1949–53 average of about 360,000 graduations per annum).

According to the data in table 12 and chart VIII, it is apparent that during the First Five-Year Plan (1928–32) the training of professionals was oriented primarily towards the needs of industry. Engineering graduates were the dominant component and constituted up to 40 percent of the graduating classes. During the Second Five-Year Plan (1933–37), after the setback of 1933 when graduations fell drastically due to the

[10] Data concerning the size of graduating as well as entering classes are presented in table A–1 in the appendix to ch. IV.

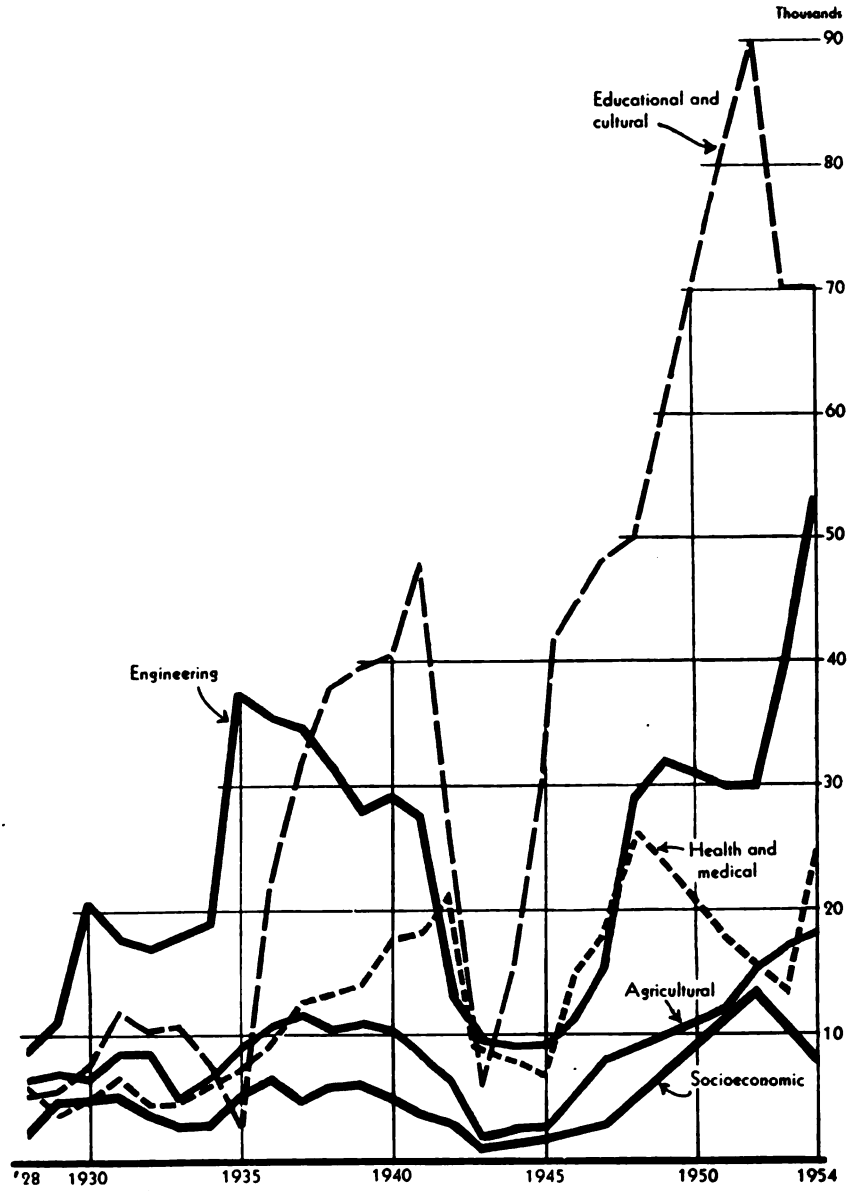
TABLE 12.—*Distribution of graduations from Soviet higher educational establishments, by field, 1928–54*

	1928		1935		1940		1946–50 average annual		1954	
	Thousands	Percent	Thousands	Percent	Thousands	Percent	Thousands	Percent	Thousands	Percent
Total graduations	28.7	100.0	71.0	100.0	102.2	100.0	130.3	100.0	173.0	100.0
Engineering	8.9	31.0	37.2	52.4	29.3	28.6	32.0	24.6	53.0	30.6
Agricultural	6.4	22.3	8.8	12.4	10.1	9.9	10.1	7.8	18.0	10.4
Socioeconomic	2.0	7.0	5.0	7.0	4.8	4.7	6.9	5.3	8.0	4.6
Educational	5.2	18.1	12.5	17.6	40.6	39.8	59.6	45.7	70.0	40.5
Health	6.2	21.6	7.5	10.6	17.4	17.0	21.7	16.6	24.0	13.9
Additional:										
Party schools	None	----	12.7	----	None	----	----	----	None	----
Extension training	None	----	(1)	----	(1)	----	----	----	57.0	----
Grand total	28.7	----	83.7	----	102.2	----	----	----	230.0	----

[1] Negligible.

Source: Tables A–1 and A–2 in appendix to chapter IV.

GRADUATIONS FROM SOVIET HIGHER EDUCATIONAL ESTABLISHMENTS, BY FIELD, 1928–54



Source: Table A–1, table A–2, appendix to chapter IV.

CHART VIII

351459—55——13

lengthening of the training, the reorganization of higher education, and the political difficulties caused by collectivization and the famine, the field of engineering still continued to dominate. However, during the first 4 years of the Third Five-Year Plan (1938–42), before the outbreak of the war, the relative proportion of engineers fell and specialists in education (teachers) began to emerge as the dominant component among graduates. This trend is explainable in terms of the expansion of secondary education in the U. S. S. R. after the mid-1930's (see ch. II). At the same time we notice a decline in the relative proportion of graduations of agricultural and socioeconomic specialists, and a significant increase in graduations of medical professional personnel. In fact, the expansion of medical training continued throughout the years without any sharp setback, as there was, for example, in the engineering and agricultural fields.

Of course it must be noted that the low numerical rate of training of the socioeconomic professional group, with graduations in most years around 5,000—and the agricultural specialists group with graduations around 10,000 since the mid-1930's—was supplemented by graduates of Higher Party Schools.[11] The relative importance of these schools, especially during the Second Five-Year Plan, in supplying specialists classified as professionals, must be noted. During that period the Higher Party Schools trained about 18 percent of the total number of professionals.[12] It is worth noting that some of these party-school graduates obtained high administrative positions, especially in industrial and agricultural management.

The war caused a sharp setback, with the lowest point reached in 1943, when the total number of graduates was about 28,000, or somewhat below the 1928 level. The sharpest setback was suffered in the field of education, but recovery was rapid in this field; and in the postwar years the dominance of graduates in the field of education is obvious. In 1952, when the peak of graduating teachers was reached, graduates were about 90,000, or more than twice as high as in the late prewar years. If comparison between the field of education and the field of engineering is made, the difference in graduations is considerably greater than the difference in enrollments in the two fields. This is due partly to the shorter program of training in pedagogical and teachers' institutes than in engineering schools, and also undoubtedly because the success

[11] For annual graduations from the Higher Party Schools, see table A–1 in the appendix to ch. IV.

[12] In order to clarify the definition "Higher Party School," the following statement will be sufficient. The term is used to designate only *Vysshyye Partiinyye Shkoly* (Higher Party Schools)—agricultural, managerial, industrial and propaganda schools which train party organizers only on a high level. Party "day schools" (*dnevnyye*) and lower level party and Government schools (*sovpartshkoly*) are excluded. By Soviet concepts, graduates of "Higher Party Schools" are considered to have a higher education, i. e., to be professionals; while graduates of other party schools are viewed merely as semiprofessionals. See discussion of this in ch. I.

rate of students in engineering is not so high as in teacher training. Therefore, the graduation trend presents a sharper contrast than the enrollment trend discussed earlier.

After the rapid postwar recovery and for several years thereafter (1947–52) annual graduations of engineers stabilized in the neighborhood of 30,000, or at about the same level as in the late prewar years. However, in 1953 engineering graduates already accounted for 40,000; and by 1954 their number had increased to some 53,000, which is about a 75-percent increase over the late prewar years. While graduations in the socioeconomic segment increased only modestly (a gain of about 35 percent between 1939 and 1954), the training of agricultural specialists expanded greatly, and by 1954 there were about 80 percent more graduates than in 1939. In the medical field, after the shift from the 5- to the 6-year curriculum, graduations by 1954 had stabilized at the level of about 25,000, or some 70 percent over those of 1939.[18]

4. *Comparison of Soviet and American Graduating Classes*

The foregoing discussion has stressed trends in graduations by field in Soviet higher education. This discussion of graduation trends does not reveal, however, the radical structural differences between Soviet professional training and higher education (college and first professional degree training) in the United States. Graduating classes in the Soviet Union are today still substantially smaller than those in the United States. The Soviet graduating class of 1954 was about 40 percent smaller than the number of bachelor and first professional degrees awarded in 1953 by American colleges and universities. There is, however, a radical difference in the composition of these graduating classes in the two countries. This difference in the graduating classes represents a reflection of the emphasis placed upon the training in specific fields in the two countries.

Table 13 reveals these differences. Before venturing into such a comparison, it should be remembered that any task of this sort is only partially satisfactory. There are many difficulties which cannot be solved because of certain differences in the grouping of graduates and because of the qualitative differences which are hard to define in the case of either country. Nevertheless, such a comparison is valid as an approximation.

From this table we see that in the Soviet Union over 60 percent of the graduating classes were composed of engineering and other natural and

[18] Although the 1952 increase in medical field graduates is not shown on the chart, in 1952 these graduates accounted for over 30,000. This figure was not included on the chart because of some uncertainty about its derivation. For further details, see table A–1 in the appendix to ch. IV.

TABLE 13.—*Structure of graduating classes in the U. S. S. R. and the United States*

U. S. S. R., 1954 [1] Graduations by field of study			United States, 1953 [2] Bachelor's and first professional degree by field of study		
Field	Thousands	Percent	Percent	Thousands	Field
Total	173	100. 0	100. 0	305	Total.
Engineering of all types	53	30. 6	7. 8	24	Engineering of all types.
Agriculture, including agronomy, forestry, animal husbandry, veterinary medicine.	18	10. 4	3. 3	10	Agriculture, including veterinary medicine, agronomy, forestry, animal husbandry.
Health and medical sciences	24	13. 9	7. 5	23	Health and medical sciences.
of which— physicians only	(20)			(6)	(excluding veterinary medicine), of which: M. D.'s only.
All other fields	78	45. 1	81. 4	248	All other fields.
(of which *university* physical and biological sciences, mathematics).	(12)			(24)	(of which mathematics, physical and biological science majors).
Additional: Extension training (predominantly in all other fields).	57			n. a.	

n. a.—Figure not available.

Sources:

[1] Table A–1, appendix to ch. IV. For university graduates in sciences, see discussion in text above.

[2] U. S. Dept. of Health, Education, and Welfare, *Earned Degrees Conferred by Higher Educational Institutions, 1952–53*, Circular No. 380, Washington, D. C., 1954, 141–15.

physical science majors. If science majors in Soviet pedagogical institutes are added, this percentage is even larger. In the United States, less than 25 percent of the graduating classes were in the fields of engineering and other natural and physical sciences. Although, as we have already mentioned, the Soviet engineering classification contains some categories which in American practice would be classified elsewhere, this distribution is valid as a rough approximation. United States engineering graduates accounted for less than 8 percent of the total graduating classes, while in the Soviet Union their share was somewhat above 30 percent. All agricultural field majors in the Soviet case account for about 10 percent of the total, while in the United States they represent slightly more than 3 percent of all graduates. Soviet health field graduates, consisting primarily of physicians, accounted for about 14 percent, while in the United States they accounted for less than 8 percent. In this same category, of course, the Soviet Union had far fewer "healing arts" specialists (pharmacists, dentists, etc.), than did the United States, and excluded particularly medical technicians and nurses, which are included in the United States total. Finally, Soviet majors in the physical and biological sciences and mathematics include only those who were graduates of universities, while secondary-school teachers in the respective fields were not taken into account. In the United States, however, some of the majors in these fields are trained as prospective teachers.

Therefore, except for the physical and biological sciences and mathematics, the Soviet Union, with substantially smaller total graduating classes, produced more professionals in the various technical and scientific fields than the United States. The Soviet Union graduated twice as many engineers, about 80 percent more agricultural specialists, and about three times as many physicians as the United States did. At the same time, of course, the Soviet Union had a drastically small number of "other field" graduates—in the humanities, the social sciences, and the liberal arts—which represent 65 to 70 percent of all United States graduates.

5. *Graduation Rates in Soviet Higher Education*

From available data concerning entering and graduating classes, it is possible to ascertain graduation rates of Soviet students in higher education.[14] During the 1930's, graduation rates fluctuated considerably in the Soviet Union. For some classes entering training in the early 1930's, they were as low as 30 graduations per 100 acceptances. Toward the

[14] Graduation rate is the ratio of graduating to entering classes expressed in percent. There is some difficulty in ascertaining graduation rates because of the differences in the length of training in various fields. The data presented here are derived from table A–1, appendix to ch. IV.

end of the 1930's, starting with the entering class of 1933, the graduation rate tended to stabilize at about 60 graduations per 100 acceptances for all fields, being slightly above this figure for nonengineering fields and about 55 percent for engineering fields. In the immediate postwar years, until about 1950, graduation rates are not ascertainable due to the influx of students whose study was interrupted by the war.[15] In the early 1950's, to judge from the engineering field, for example, the graduation rate is about 70 graduations per 100 entering students. These success rates suggest that grading and the process of selection are being enforced at least to some extent. In this connection, it is worth noting that the long-run graduation rate (i. e., an average of annual graduation rates for all fields over the 20-year period) used by Soviet planners in their projections and hypothetical computations, is only about 45 graduations per 100 acceptances in the engineering and scientific fields, with over 5 years of study, and about 60 graduations per 100 acceptances in other fields of study.[16] Actual rates in recent years have apparently been higher than those stipulated by the norms.

6. *The Role of Women in Soviet Higher Education*

During the prewar decade the relative proportion of women among Soviet higher education students, and consequently among graduates, increased considerably. The data presented in table 14 indicate that while in 1927 women accounted for only about 31 percent of the students enrolled, by 1938 their relative proportion among students in all fields had increased to 43 percent. Table 14 reveals the following changes in the relative proportion of women by field:

TABLE 14.—*Relative proportion of women among students in Soviet higher educational establishments, by field (in percent)*

Field	Year end	
	1927	*1938*
Engineering	7. 2	28. 0
Agricultural	16. 3	30. 2
Socioeconomic	16. 5	41. 0
Educational	48. 0	48. 2
Health	32. 0	67. 5
All fields	30. 9	43. 1

Source: Table A–3, appendix to ch. IV, which gives data available for all years in the period from 1927 to 1938 concerning the relative proportion of women in Soviet higher educational establishments.

[15] In many instances graduating classes are larger than entering classes 4 or 5 years earlier.
[16] Sinetskii, *PP Kadry*, 201.

In 1938 about half of all students in the field of education were women. Also in that year women accounted for almost 70 percent of all medical field students. In engineering, the proportion of women students was about 28 percent, a substantially lower rate than in other fields.

During the war the relative proportion of women in higher educational establishments rose considerably, but leveled off somewhat thereafter. Data concerning the relative proportion of women in individual fields are not available for the postwar years, but the overall proportion for all fields in the fall of 1954 was about 50 percent.[17] Although there is a lack of precise data to substantiate the postwar trends in regard to the relative proportion of women among students in various fields, it seems that the 1946–49 graduating classes in the fields of education and medicine were composed almost exclusively of women. While in the United States the relative proportion of women in all fields in colleges ranged anywhere from 25 to 35 percent over the last two decades, their respective numbers among students in engineering, agriculture, and medicine (save medical nursing, of course) was and still is virtually insignificant. On the other hand, the proportion of women in education in the United States is as high (up to 70 percent) as in the Soviet Union. But in the Soviet case a substantial number of women receive formal training in highly specialized professional fields (engineering, medicine, agricultural specialization, etc.). The implication which follows, and which will be explored further (see ch. VI), is, of course, that a substantial number of professionals in the Soviet Union are women.

7. *Composition of Students by Social Origin*

A further item of great interest is the composition of Soviet higher education students by social origin.[18] The mythology fostered by Soviet propaganda that professionals trained during the Soviet period are predominately of "proletarian origin" can be rejected by statistical evidence. Prior to the introduction of strong restrictive provisions (1927–28) in regard to the access of "socially alien elements" to higher education and prior to an extensive campaign to recruit "proletarians" by origin (primarily workers), workers by origin accounted for some 25 percent of all students enrolled in Soviet higher educational establishments. During the peak of operation of these restrictive provisions and recruitment campaign (1932–33), the relative proportion of workers by origin increased to some 58 percent of all students. But by the end of the prewar decade and after the abolition of the restrictions (1935), the relative proportion of workers by origin had declined by 1938 to

[17] *Partiinaya Zhizn'*, No. 4, February 1955, 48; *Pravda*, March 5, 1955.
[18] For further details, see table A–4, appendix to ch. IV.

34 percent of all students enrolled. Despite manipulation with the definition of "social origin" which tended to favor "workers" an the mid-1930's, and despite extensive falsifications of social origin by persons claiming to be of "worker" origin but who actually were not, the "proletarization" drive was an obvious failure, as indicated by statistical evidence. After 1938 references to the social origin of higher education students were suppressed, and since the late 1930's any discussion of this topic has been completely silenced in the Soviet press.

By 1938 over one-half of the students were from the "other" groups by social origin, and even during the height of the drive their proportion never fell below one-third. "Other" groups include the intelligentsia, white-collar workers, handicraftsmen (and their children)—all of which account for less than 7 percent of the Soviet population. Thus, by the end of the 1930's less than 7 percent of the population accounted for over one-half of the students in higher education; workers and their children barely held the same proportion among students as their proportion in the population. Peasants, accounting for almost 60 percent of the population, had the smallest number among students in higher education. This is particularly significant since more than half of the Soviet professionals employed in the Soviet Union in 1940 came from nonworker and nonpeasant classes. In this fashion the groups which were originally denounced as "socially alien elements" in a proletarian society reasserted themselves as the major component of Soviet professional manpower.

Teaching Personnel in Soviet Higher Educational Establishments

The preceding section has centered upon enrollment, graduations, and other quantitative aspects of the student body in Soviet higher education. Another quantitative factor in every educational setting is the supply and availability of teachers. At the same time, as already indicated, the supply and particularly the qualifications of teachers are important determinants of the quality of higher education. The availability and the qualifications of teaching personnel are also major factors which permit favorable conditions for an expanded enrollment in a given field of training. These are some of the important reasons which call for an extensive discussion of the problem of teaching personnel in Soviet higher education.

1. *Total Supply of Teaching Personnel in Soviet Higher Education*

The problem of ascertaining the actual number of teachers in Soviet higher education is extremely complicated. The difficulty stems from the

fact that Soviet authorities often report the total number of "scientific-teaching personnel" (*nauchno-prepodavatel'skiye kadry*), which includes, on the one hand, "staff personnel" (*shtatnyye*) and, on the other, multiple-jobholders or "plurality appointment" personnel (*sovmestiteli*). The latter are persons holding two or even more jobs or academic appointments. Various decrees specify that persons may have only one staff appointment, while at the same time they may hold several plurality teaching posts.[19] This practice was particularly prominent in the late 1920's and early 1930's when teachers in higher educational establishments (as well as specialists in various professional fields) were in short supply. It has continued up to the present time, though on a diminishing scale. In short, staff members of one institution may hold several teaching appointments in other higher educational establishments or other jobs in research or industry. Similarly, holders of research or industry jobs may hold nonstaff (plurality) teaching appointments. This phenomenon is not peculiar to the Soviet Union alone, but in other countries it exists on a more limited scale. The presence of a substantial number of multiple-job holders makes for great difficulty in determining the actual number of teachers employed in Soviet higher education.

In order to clarify this somewhat further, let us consider the situation in 1 year. The following data refer to the census of teaching personnel as of January 1, 1947.[20] In that year there were about 67,300 staff appointees. In addition, there were 7,100 teachers with plurality appointments, 2,400 of whom held jobs in research establishments and 4,700 of whom worked in industry and public administration. Thus the total number of persons employed as teachers was 74,400. Out of the total number of 67,300 staff appointees, there were in turn 7,800 persons who had jobs in more than one higher educational establishment and 13,400 persons who held additional jobs in research establishments, industrial enterprises, or government. Thus, 21,200 of the staff appointees in higher educational establishments were also employed elsewhere. To sum up, there were 67,300 staff teachers, 7,800 of whom had two or more teaching appointments. In addition, 7,100 teachers were assigned from outside. Therefore, 74,400 *actual* persons were teaching in more than 82,200 teaching positions. Furthermore, out of the total 74,400 actual persons, 28,300, or well over a third of all those employed as teachers in higher educational establishments, held more than one job.

Plurality teaching appointees are often called part-time teachers. This is somewhat ambiguous. The instruction load of a teacher who has one job and a teacher who has several jobs may be identical in a given higher educational establishment, while the total workload in the case of the

[19] Movshovich, op. cit., 471 ff.
[20] See Sinetskii, *PP Kadry*, 105–106.

latter is obviously greater. Consequently, as far as the teaching load alone of one individual in one given institution is concerned, both single-job and multiple-job holders are in the same category. A staff appointee gets his full salary in one place, and in addition 50 percent of it from every other job. Except for this salary arrangement, there is often no way of telling, from the point of view of time input, who is a full- or part-time teacher, or whether a person is employed in a higher educational establishment, in industrial enterprise, in government, or in a combination of these.

One fact emerges clearly, however, from this multiple-job holding arrangement. A professor can get involved in his multiple jobs to such an extent that his value as an effective teacher diminishes drastically. In fact, this is the major target of criticism against plurality appointments (*sovmestitel'stvo*). The Soviet press condemns plurality appointments because professors may not be able to devote the individual attention desired to their students because of their other duties. At the same time, however, plurality appointments are commended because of the more effective and more extensive utilization of the best teaching or more experienced scientific talent. (In this connection, upper academic rank holders show increasing proportions of multiple-job appointments.) Although the latter argument is weakened by the former, the latter still carries some weight.

Contrary to one's expectations, however, plurality appointments are far more frequent in nonscientific fields. The fields of art and jurisprudence have the highest proportion of plurality appointments (up to 60 percent of all teachers), while in engineering only about 30 percent of staff appointees are engaged in multiple-job holdings. Large urban centers with a greater number of educational and research establishments have a larger proportion of multiple-job appointees.

2. *Teaching Load*

The practice of multiple-job holding is closely related to the workload of Soviet teachers in higher education. Since 1937 it has been established that staff members must have a *minimum* of 36 work hours per week (6-hour workday, 6 workdays per week).[21] At the same time, the *maximum instruction load* was specified as 18 hours per week. This latter provision refers to both single-job and multiple-job holders. The Soviet definition of "instruction load," however, includes all sorts of instructional activities and is not limited to actual classroom instruction. Besides lectures, it covers seminars, individual consultations with stu-

[21] For various decrees and regulations concerning workload, teaching load, etc., see Movshovich, op. cit., passim.

dents, etc. The definition of instruction load is thus broad enough to cover all sorts of instruction activities which require face-to-face contact between teacher and student on an individual or group basis. Thus, the teaching load as commonly defined in American educational practice is substantially less than the specified maximum 18 hours per week in the Soviet Union, overloading notwithstanding in the case of multiple-job holders.

The remaining time (36 hours minus not more than 18 hours of instruction activities per week) is to be spent on other duties, such as preparation for lectures, research, grading, preparation and correction of examinations, staff seminars, etc. Some of these activities, such as research, are planned in advance for the entire academic year, while others, such as preparation for lectures or time spent on correcting and grading a student's work, are dictated by prevailing needs. These latter activities are not planned and are left to the teacher's discretion. Often multiple-job holdings, especially among upper-rank appointees, are carried at the expense of these latter activities. This situation suggests that the Soviet professor has less time to devote to other pursuits of his own choice than his colleagues elsewhere, and that Soviet teachers in higher educational establishments are often overburdened by the load of required activities alone.

3. *The Growth of Teaching Staffs in All Fields*

Table 15 shows the growth of Soviet higher education teaching staffs, including and excluding plurality appointees from the outside.

TABLE 15.—*Teaching staffs of Soviet higher educational establishments*

Year end	*Staff faculty*	*Staff plus plurality appointees to faculty from outside*
1929	13, 758	22, 876
1931	26, 200	58, 220
1940	50, 089	60, 000
1943	24, 749	---
1947	67, 280	74, 341
1950	80, 000	87, 000
1954	86, 000	---

Source: Table C–2, appendix to ch. IV.

It is evident that during the two decades between 1929 and 1950, the teaching staffs in Soviet higher educational establishments increased about fivefold and that the *relative* share of plurality appointees greatly diminished. During the early 1930's there was undoubtedly a great lack of teachers, and plurality appointees accounted for some 55 percent

of the total teaching faculty (i. e., staff and plurality appointees from the outside combined). Although the Soviet press frequently voices complaints that there is a lack of teachers, the fact must nevertheless be recognized that the situation has improved a great deal. In the postwar period plurality appointees apparently accounted for less than 10 percent of the overall teaching faculty.

4. *Student-Teacher Ratio*

The growth of teaching staffs and the reduction in multiple-job holdings over the last 25 years has had a favorable impact upon the student-teacher ratio. In 1931, during the height of the teacher shortage, there were about 19 students per faculty staff member, but by 1940 there were only 12. The lowest ratio—less than 10 students per faculty staff member—was reached in 1947. The ratio has been increasing since then, and by 1950 was 10.5 and by 1954, 12.6 students per faculty staff member. Of course, if the total faculty (i. e., including plurality appointees from the outside) is considered, these student-teacher ratios will be lower.

It appears, therefore, that the average number of students per faculty member in the Soviet Union today is somewhat lower than that in the United States (in 1950 about 14 students per faculty member), although we have about twice as many teachers on our faculties (in 1950 about 190,000). In this connection, it should be noted that while the student-teacher ratio in the United States has been increasing, especially since 1936, the Soviets have been able to lower it considerably. In the early 1950's the Soviet student-teacher ratio began to increase again. This increase suggests a reemergence of the shortage of teachers, which in higher education, is an additional factor limiting the expansion of *regular* student enrollment and fostering greater reliance upon extension training in higher educational establishments.

5. *The Growth of Teaching Staffs by Field in Relation to Enrollment*

Data concerning the growth of teaching staffs by field in Soviet higher education are summarized in table 16.

It is obvious that increases in teaching staffs in different fields were very uneven during the period between 1929 and 1946. This disproportionality becomes particularly striking if the increments in enrollment are compared with increases in teaching staffs. Table 17 was compiled to illustrate this disproportionality.

TABLE 16.—*Distribution of teaching staffs, by field (excluding plurality appointees, from the outside)*

Field	Number of staff appointees, year end— 1929	1940	1946
Engineering	3, 200	12, 400	18, 800
Agriculture	2, 200	5, 500	6, 700
Socioeconomic	300	1, 500	2, 600
Education (and art)	6, 500	19, 400	24, 700
Health	1, 300	10, 300	14, 100
Total	13, 500	49, 300	66, 900
Unaccounted	200	800	800

Source: Sinetskii, *PP Kadry*, 108.

TABLE 17.—*Comparison of rate of growth of students and teaching staffs, 1929–46*

Field	Increase in enrollment (ratio 1946 to 1929 enrollment)	Increase in teaching staffs (ratio of 1946 to 1929 faculty)
Engineering	3. 2	5. 9
Agriculture	1. 8	3. 0
Socioeconomic	1. 7	8. 7
Education	4. 4	3. 8
Health	5. 2	10. 8
All fields	3. 4	5. 0

Source: Ratio of growth of students computed from table A–1, appendix to ch. IV. Ratio of growth of teachers from Sinetskii, *PP Kadry*, 108.

From 1929 to 1946, teaching staffs in all fields increased more rapidly than enrollment. In the field of education, however, the reverse trend is true. While in the health fields the teaching staff increased more than twice as much as enrollment, in engineering and agriculture the increment in teaching staff over the increment in enrollment was only 1.8 and 1.6, respectively. Thus, it is obvious that in certain fields—education, for example—the situation must be less favorable and this field of higher education experiences a great lack of teachers. Apparently the fields of agriculture and engineering were not as well off as the health field in solving their teacher problems, although the rate of increase in teaching staffs was substantially greater than the increment in enrollment. Despite the large number of students in fields like education, for example, less priority is assigned to these fields and as a consequence fewer qualified academic appointees are assigned to them.

The expansion in enrollment which took place after 1947, as was already pointed out in a comparison of student-teacher ratios, resulted in less favorable differential rates of growth of teaching staffs to enroll-

ment. During the last 25 years (1929–54) regular enrollment has increased by a ratio of 5.6, while teaching staffs (excluding plurality appointees from the outside) increased about 6.3-fold. Unfortunately, data are lacking to make detailed comparisons by field after 1947.

6. *Composition, Social Characteristics, and Formal Preparation of Staff Appointees*

The 1947 census of teaching personnel also reveals the composition of teaching staffs in Soviet higher educational establishments by rank, age, and experience. Table 18 presents data concerning the composition of teaching staffs by academic rank.

TABLE 18.—*Composition of Soviet teaching staffs by academic rank in 1947*

Rank holders:	*Total number*	*Distribution in percent*
Professors[1]	5,527	8.2
Assistant professors (*dotsents*)	13,863	20.6
Nonrank holders: All other teachers and instructors	47,890	71.2
Total	67,280	100.0

[1] Included in this category are 157 members of the Academy of Sciences and republic academies of science.

Source: Sinetskii, *PP Kadry*, 116, 122. Data as of Jan. 1, 1947.

This table reveals a remarkably low proportion of upper rank holders among Soviet teaching staffs. Apparently there is a marked conservatism in appointing persons to upper academic ranks. This conservatism is reflected in the age composition of Soviet academic rank holders.

Table 19 reveals the age composition of all staff appointees in Soviet higher educational establishments. It is apparent from the data presented in this table that in 1947 over 60 percent of all professors and teachers in Soviet higher education were over the age of 40, and only less than 10 percent were younger than 30 years of age.

TABLE 19.—*Age distribution of Soviet teachers in higher education in 1947*

Age group	*Percent of total staff appointees in the age group*
66 and over	3.2
60 to 65	5.0
50 to 59	17.7
40 to 49	36.3
30 to 39	28.0
29 and younger	9.8
	100.0

This distribution applies to a total of 67,280 professors and teachers.

Source: Sinetskii, *PP Kadry*, 116. Data as of Jan. 1, 1947.

Furthermore, if median age is considered, among professors it was 53.3 years; among assistant professors (*dotsents*), 45.5; and among all other nonranking instructors, 39.7 years. This confirms the supposition that extreme conservatism prevails in appointments to teaching staffs. Apparently it is only after long years of experience that one gets appointment to a ranking teaching position.

This policy is evident if teaching experience (*stazh*) is considered. Among professors, 15 percent had more than 30 years', and 82 percent had from 10 to 30 years' teaching experience. If all staff teachers are considered, there were 1.6 percent with more than 30 years, and 44.2 percent with 10 to 30 years of teaching experience. If median age and experience are considered jointly, it is evident that many of those with 10 to 30 years of experience had probably over 20 years of teaching experience. This in turn suggests that many teachers in 1947, especially with the rank of professor or assistant professor, had completed their education even before the Revolution. Furthermore, such a breakdown (10 to 30 years) is a reflection of a certain amount of stagnation in Soviet higher education during the period of the 1920's, when no significant additions were made to teaching staffs.

The 1947 census of teaching staffs also reveals that Soviet professors and assistant professors had among their ranks some 79 percent advanced degree holders of doctor and candidate of science, while among nonranking instructors less than 10 percent had advanced degrees.[32] Well over one-half of all advanced degree holders of the country were employed as teachers in higher educational establishments.

In 1947 about 35 percent of the teaching staff was composed of women. Also in that year 34.4 percent of all teachers were Communist Party members, and 1.3 percent were Young Communist League members; but among professors (about 5,500), only 25.4 percent were Communist Party members. There was enormous variation in the proportion of women and the proportion of party members in individual fields. The proportion of women teachers in engineering higher educational establishments was about 24 percent, while among teachers in the health fields some 48 percent were women. While the proportion of party members among professors in engineering technical fields was as low as 17 percent, it was as high as 58 percent in the sociopolitical and philosophy fields. Even more revealing is the fact that out of those 23,100 who were party members, only 10 percent entered party ranks before 1925, 19 percent entered between 1925 and 1935, 16 percent between 1935 and 1940, and an overwhelming 55 percent after the outbreak of World War II.[33]

[32] Sinetskii, *PP Kadry*, 122. See ch. V for details concerning advanced degrees, especially Table 6.
[33] Sinetskii, *PP Kadry*, 130–140.

7. *Summary Conclusions in Regard to the Problem of Teaching Staffs*

These facts suggest a number of conclusions. Soviet press reports of teacher shortages should not be discarded, although it is apparent that today there is no acute overall shortage, save perhaps in the field of education, which, as mentioned, may be a factor in the overwhelming dominance of extension training in this field. Except for this instance, there is a sharp contrast with the situation in the early 1930's when there was an enormous shortage of qualified teaching personnel.

The improvement in the supply of teaching personnel is responsible for the substantial decrease in the number of multiple-job holders from over 50 percent in 1930 to about 10 percent in 1947. Nevertheless, the continuation of the policy of assigning teaching personnel to several jobs at once suggests that there is still a shortage of teachers, particularly in the upper academic ranks (i. e., professors). At the same time, one wonders if the plurality system is not artificially upheld as a tool for larger incomes, as a prestige item, and as a measure for the personal coordination of research and teaching activity. Some name checking confirms these assumptions.[24]

It is erroneous to speak of Soviet academic rank holders as inexperienced teachers. The majority of them are over 40, and a large proportion of them have advanced degrees. Even among nonranking instructors, there are few (less than 10 percent) who are younger than 30, although very few of these (again 10 percent) have advanced academic degrees. While women account for a large proportion of instructors in certain fields (medicine, education), their proportion among teachers in applied, technical, engineering, and physical science fields is very low (less than 20 percent). Party membership appears to be strong only in those fields where political intervention is most feasible (social sciences, history, economics, philosophy, etc.); and it is substantially below one-third among teachers in the science fields, being less than 20 percent in the physical-mathematical and engineering-technical sciences. This implies that perhaps the quality of instruction which these academic

[24] In the fields of philology, anthropology, and ethnography, out of some 400 ranking scientists, one-half had more than 2 research and teaching appointments (D. Shimkin and N. DeWitt, "U. S. S. R." section in *International Directory of Anthropological Research;* New York: Wenner-Gren Foundation for Anthropological Research Incorporated, 1953, 253–266. Such prominent names as Lysenko; Tolstov (anthropologist); Khachaturov (transportation economist); Kapitsa, Yoffe (physicists); Nesmeyanov (chemist); Chudakov (theoretical mechanics); Yakovlev (aircraft designer); and many others are directors, chairmen, or professors in more than half a dozen research and teaching establishments. Most of these plurality appointees coordinate research and teaching in their respective fields. *Sovmestitel'stvo,* in their case at least, may be a device for making themselves "indispensable" and a tool for power and prestige.

rank holders are able to offer suffers less from political bias, which undoubtedly creates a big handicap in certain other fields. Finally, it seems that most of the teaching staff carries a heavy load, their teaching perhaps suffering either from holding several jobs or from the multiple chores which they are called upon to perform.

Facilities of Soviet Higher Education

The availability of training facilities has been mentioned before in connection with the qualitative aspects of higher education. The question of existing facilities is extremely interesting, but is difficult to analyze since in most instances we do not have information about the actual availability of building space, classrooms, etc. Therefore, any attempt to venture into a detailed analysis of physical plant in Soviet higher education proves to be disappointing.

The Soviet Union today operates about 850 higher educational establishments. The word "about" must be stressed because by using different sources one arrives at different figures for the total number of establishments in operation. Table 20 gives information concerning the number of higher educational establishments for selected years between 1929 and 1954.

TABLE 20.—*Number of higher educational establishments in the U. S. S. R., 1929–54*

Field	Number of institutions				
	1929	1930	1939	1949	1954
Regular training establishments:					
Engineering	32	248	165	166	177
Agricultural	38	96	85	90	109
Socioeconomic	11	50	47	32	35
Educational	60	105	375	462	382
(of which universities)	(20)	N	(22)	(32)	(33)
Health	11	38	78	86	88
Total	152	537	750	836	791
Extension training establishments:					
Independent establishments	----	----	----	16	23
Divisions of regular higher educational establishments	----	----	----	410	----

N=None. In 1930 all universities were divided into institutes; by 1931, however, 19 universities were again in operation.
Source: Table C–1 in appendix to ch. IV.

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Over the last 25 years the number of Soviet higher educational establishments has increased about sevenfold. Yet today the total number of Soviet higher educational institutions is less than half of the total number in the United States (U. S. S. R., 1949—about 850 including extension; United States, 1950—about 1,850). It must be noted that by an amebalike process of splitting individual establishments in the U. S. S. R. between 1929 and 1930, the number of higher educational establishments more than tripled within 1 year. This artificial growth did not result in any appreciable increase of actual facilities (floor space, laboratory, dormitory quarters, etc.). Only the number of institutional titles increased. Some large engineering schools were divided into a dozen specialized institutes, or in other instances departments of universities were singled out and called institutes. Soviet refugee accounts even reveal instances when several of these "new" institutes were housed in the same building, but on different floors. This artificial growth continued until 1934, though some genuinely new facilities were added meanwhile. In 1934 the consolidation of many establishments took place, and since that year additions of new units in most instances represent true additions of new facilities, buildings, laboratories, etc.

From about 1935 until 1949 the number of engineering higher educational establishments remained about the same, fluctuating between 160 and 170. In the last few years several new engineering schools have been added. In the agricultural field during this period, the number of institutes remained stationary at around 90, and in the early 1950's about 20 more schools were added. While by 1949 there were fewer institutions in the socioeconomic segment than in the 1940's, the medical field and the field of education, particularly, experienced the largest increase in the number of existing institutions. In both the latter fields, there was a genuine growth in the number of actual physical units in a multitude of new localities. However, after 1949 a decrease in the number of institutions in the field of education is noticeable. This resulted largely from the fact that a substantial number of teachers' institutes were closed or were merged with pedagogical institutes.

It is impossible to ascertain what additions have been made to physical plants in the last few decades. While some institutions report additions of new buildings, new laboratory facilities, new dormitories, etc., many others reveal that the same old buildings, often those erected before the Revolution, are still in use. World War II undoubtedly wiped out many of the existing physical plants in occupied areas, and it has often been stated that during the war about 1,200,000 square meters of instruction space and 800,000 square meters of dormitory space were destroyed. How much of the prewar actual physical plant has been rebuilt is unknown, but most institutes in existence in the prewar period are at least reported as "operating" in the postwar years. Soviet sources report

that about 1,500,000,000 rubles were spent from 1946 to 1950 on repair and on new construction of higher educational establishments,[25] which is a small fractional percentage of the total capital construction outlay during this period. Reports concerning shortages of facilities are much more frequent than reports of additions of new physical facilities, and one is not much wiser after trying to piece together the bits of information about reported gains. It appears, however, that in the 1930's the addition of new facilities certainly did not keep pace with enrollment increases, and also that the postwar expansion of enrollment has resulted in substantial crowding of available facilities.

Average enrollment per institution has increased considerably over the last decade. In 1940 there were about 732 students per educational establishment; in 1950 there were 994. While in 1940 there were 1,130 students per engineering institute, by 1950 there were 1,690 students. It appears most improbable that the corresponding 35- and 50-percent increases in available space have been achieved during this period. Since 1950, an additional 15-percent increase in enrollment has taken place, and again it is very doubtful if a proportional increase in facilities has occurred. All this seems to add up to the tentative conclusion that Soviet higher educational establishments are crowded, and that the physical plants of Soviet higher educational institutions are in the same sad shape as the urban dwellings of the U. S. S. R. in general.

Summary

This chapter has attempted to present various aspects of the training of Soviet professionals. An attempt was made to single out the most significant factors highlighting the training of Soviet professional personnel in higher educational establishments. These factors are closely interrelated, difficult to separate, and even harder to interpret. Despite this, some summary impressions and observations may be made.

The Soviet state imposes its norms of conformity and uniformity upon the individual who undertakes professional education. The totalitarian state places its demands upon the individual and compels him to serve the state. At the same time the state has to rely upon developing individual talent, which is quite carefully selected and utilized. The contradictory nature of these two pursuits highlights Soviet higher education. Although there are some obvious contradictions between these two objectives, the interest of the state and self-interest of the individual often converge, and an individual by following state-oriented goals in

[25] *VVSh*, No. 4 ,1951, 7. While the cost of construction of 1 unit is well over 5 million rubles, even if the whole amount was spent on new construction, far less than 300 new buildings could have been erected.

higher education succeeds to some extent in developing his intellectual capacity and professional skill.

In order to fulfill its tasks, the Soviet Union maintains numerous training facilities and uses a variety of devices to foster these objectives. The extensive indoctrination effort on the part of the party and state is often counteracted by passive acceptance or outward conformity only on the part of the individual. The selection of applicants, the structure of training programs, the organization of instruction, grading and examinations, the preferential treatment in regard to military draft, the system of stipends—all these factors serve to promote the recruitment, selection, and development of individual talent, and at the same time to aid the state in securing the supply of specialized professional personnel needed to achieve its ambitious goals.

There is significant variation in the quality of training and standards of instruction. Despite this, the quality of Soviet professional training in scientific, technical, and applied fields is quite comparable to ours. In some fields it is better, but in others, especially those in which political intervention is heavily felt, it is inferior. Technological specialization and applied professional pursuits are the major objectives of training, which at the same time often provides the individual with sufficent knowledge to pursue more creative tasks.

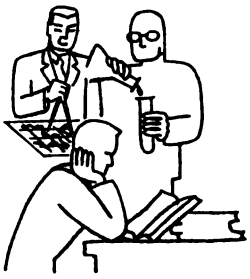
The shortage of teachers, the limited physical facilities and other factors which have made for difficulty in improving the quality of training and in expanding enrollment in the early 1930's, are gradually being overcome. The qualitative differences in the training imposed by these conditions have diminished and will diminish further as the conditions themselves improve. The programs of training show much adaptability to temporary conditions, and as conditions of expediency and scarcity become less pressing, further improvements will result.

Many of these qualitative reservations become less significant in view of the quantitative gains made over the last two decades. While higher education in the Soviet Union is still accessible to a substantially smaller number of persons per capita than in the United States, it is available to a substantially higher number per capita than in other countries of the world. Despite various setbacks and fluctuations in enrollment and graduations, Soviet planners have succeeded in increasing spectacularly the numerical rate of training specialists. As a result, in recent years the number of graduates of Soviet higher educational establishments in various applied fields such as engineering, agriculture, and medicine has substantially exceeded the rate of training of these specialists in the United States and in other countries of the world.

These gains have been made at the expense of general education, liberal arts, and social sciences. While the utility of a specialist to a society

at large is undeniable, the preparation of the Soviet specialist with his lack of general education, disregard for other cultural, ethical, and social values, though leading to technical competence and skill, limits individual creative participation in the solution of the important social and political problems which face the Soviet Union and the world today.

CHAPTER FIVE



Research Training Programs and Advanced Degrees

Soviet universities and institutes offer professional training which may be compared with our undergraduate education. However, as already mentioned, this training is in some instances more extensive than ours. Often it approaches our training programs for the first professional degree, though narrow specialization prevails. No actual academic degrees are granted to those who complete this training, and therefore what is often termed graduate or postgraduate study in the Soviet Union is *not* "graduate" or "post-graduate" study, as we use these terms in our educational setting.

As there is no standardized meaning to advanced degrees in American practice, so there are even less standardized and uniform criteria to apply to Soviet advanced degrees. Therefore, although many attempts have been made simply to equate Soviet advanced degrees with our Ph. D.'s, masters and doctorates in science, etc., such attempts serve only one useful purpose—convenience in comparisons between numerical rates in advanced degree training in the two countries. Aside from this convenience, the use of equivalents not only contributes little to the understanding of Soviet advanced degree training programs but may actually create further confusion in understanding them.

It is important, first, to realize that Soviet advanced degrees may be earned not only in regular higher educational establishments but also in research institutes as well. Advanced training is offered by some Soviet higher educational establishments, in addition to the ordinary professional training programs discussed in the preceding chapter. Advanced degree training is also offered by *research* institutes and laboratories which do not engage in ordinary professional training.[1] Finally, though

[1] These institutes and laboratories are under the jurisdiction of the Academy of Sciences of the U. S. S. R., the republic academies of science, academies of a particular branch of science, and industrial ministries. Approximate distribution of

advanced training is offered by both types of institutions, the actual *confirmation* of degrees is made by a certification office, the Supreme Attestation commission (VAK—*Vysshaya Attestatsionnaya Komissiya*), which is set up for this purpose as well as for the supervision of appointments to academic and research positions.

The complexity of the interrelationships among Soviet research, industry, and higher education is unique, and therefore discussion of advanced degree training programs in the Soviet Union presents great difficulty. In fact, the discussion of many interesting but complex aspects of this problem transcends the broadest conceivable scope of this volume. Soviet advanced degree training represents an integral part of day-to-day scientific research, and in an individual instance may represent only a small fraction of an extensive research program. This provides both for individual endeavor, and at the same time for close conformity to the research requirements of the Soviet state.

Types of Degrees and Procedures for Awarding Them

The Soviet Union today offers two advanced degrees: "doctor" and "candidate" in a given field of "science," which is designated by the word *nauka,* a term which has a much broader connotation than our contemporary general term "science." To be more precise, these degrees should be called advanced degrees in a certain "field of knowledge" rather than in "science."

There are 18 fields of "science" which are recognized as fields of study for both advanced degrees:

1. physics and mathematics
2. chemistry
3. engineering (technical)
4. geological-mineralogical sciences
5. biological sciences
6. agricultural sciences
7. medical sciences
8. pharmacy
9. veterinary medicine
10. geography
11. history
12. economics
13. philosophy (and general political science)
14. philology
15. jurisprudence
16. pedagogy
17. arts
18. architecture

In addition, on the "candidate" level only, the fields of military, naval, and physical culture "sciences" are singled out.

Prior to the Revolution of 1917, there was a system of advanced degrees patterned upon and having close resemblance to German

advanced training among these institutions appears to be as follows: During 1934–46 the Academy of Sciences of the U. S. S. R. accounted for about 20 percent; the republic academies, about 10 percent; industrial research institutes and branch academies, about 10 percent; and higher educational establishments, about 60 percent of all advanced degrees granted in the U. S. S. R.

procedures in granting university degrees. In 1917 the system of advanced degrees was abolished and degrees were not again recognized in the Soviet Union until 1934. During this period, however, some advanced training programs were in operation which had some resemblance to prerevolutionary practice. Prior to 1925, advanced training was conducted in the form of "professorial scholarships" (*professorskiye stipendiaty*), which meant in effect that promising students, upon completion of their professional training, were selected to stay on for further study and research in a given department of a university. These students were considered to be preparing for academic careers.

After 1925 this training on a personal-selection basis was formalized into what is now known as *aspirantura* training, which actually designated the status of those students who were selected on the basis of past performance as promising candidates for teaching or research careers. In the literal sense of the word, they are the candidates for or, even better, "seekers" of teaching or research careers. During these years of training the "aspirant" has not necessarily completed his higher professional education.

Faced with enormous shortages of scientific and teaching manpower when professional training began to expand after the forces of rapid industrialization were set in motion in 1929, Soviet higher educational authorities began expanding aspirantura training very rapidly through the wholesale assignments of industrial research personnel to this training. In 1932 (September 19 decree) it was decided that these wholesale assignment practices should be terminated, and that only persons with completed higher education should be selected for aspirantura training. Selection was to be made on the basis of personal merit primarily by the departments of higher educational establishments. Advanced students thus selected were to be trained according to an individual program and were to produce a thesis after 2 or 3 years of study. There were no advanced degrees granted.

Finally, in 1934 (decree of January 13),[2] a most significant regulation was issued, which specified several academic ranks and two advanced academic degrees, the procedure of appointment to the former and the awarding of the latter. This decree also specified the recognition of some prerevolutionary degrees. This law of 1934 was supplemented by two decrees in 1937 and 1938; and finally in 1939 rules for academic training under the auspices of aspirantura training were defined in their

[2] This is one of the most significant decrees concerning appointment to academic rank and the awarding of advanced academic degrees, and can be found in *Svod zakonov SSSR* (Collection of Laws of the U. S. S. R.), Moscow, No. 3, 1934, 30; also the supplement which interprets this law, in ibid., No. 34, 270. Additional details in regard to the award of degrees, appointment to academic rank, etc., can be found in M. Movshovich (comp.) *Vysshaya shkola. Osnovnyye postanovleniya, prikazy i instruktsii* (Higher Education. Major Decrees, Ordinances and Regulations], 2d ed., Moscow, 1948, passim.

present form. Since then, although there have been numerous regulations clarifying, formalizing and amending this or that particular aspect of advanced training, they have not changed the basic aspects of this type of training as it emerged between 1934 and 1939. Consequently for about 17 years after the Revolution there were no advanced degrees awarded in the Soviet Union. The year 1934 may be marked as the turning point.

The 1934 decree and the subsequent amendments thereto set forth a policy of close correlation between academic degrees and academic rank. This policy has a unique significance, since it places Soviet advanced degree training in a category somewhat distinct from that anywhere else in the Western world. After the appearance of decrees specifying advanced academic ranks and degrees in 1938, the Supreme Attestation Commission, the VAK, was set up, and it became the organ which granted and confirmed advanced degrees, as well as academic and research appointments.[8] The functions of the VAK consist not only in accrediting institutions which offer advanced training and issuing certificates but also in revoking degrees both for scientific or political inadequacy.

After the issuance of a series of decrees between 1934 and 1938, the two distinct advanced academic degrees mentioned above were established. These advanced degrees (*uchenaya stepen'*) have a close correlation with academic rank (*uchenoye zvaniye*). The latter are defined as follows:

Soviet Academic Ranks

In higher educational establishments	*In scientific research establishments (which offer only advanced degree training)*
Professor (*professor*)	Professor.
Assistant professor (*dotsent*)	Senior scientific associate (*starshyi nauchnyi sotrudnik*).
Instructor-lecturer (*asistent-prepodavatel'*).	Junior scientific associate (*mladshyi nauchnyi soudnik*).

The VAK certifies professors, assistant professors, and senior scientific associates in all Soviet higher educational establishments and in all research establishments, and confirms appointments to these ranks made by the Academy of Sciences of the U. S. S. R. and by the various academies of the union republics. It also grants all doctors degrees and confirms all candidate degrees approved by individual higher educational

[8] The VAK replaced a score of "qualification commissions," abbreviated as KK's (*Kvalifikatsionnyye Komissii*), which had jurisdiction over appointments to academic rank and research positions prior to that time. Most of these commissions were temporary and had jurisdiction over a given field of science or a given set of research or academic institutions. The establishment of the VAK brought about centralization, and today the VAK is probably the most powerful division of the Ministry of Higher Education.

and research establishments. It has no jurisdiction over nonranking academic and research appointments (i. e., instructor-lecturer and junior scientific associate), but it receives records of their appointment from individual establishments. This centralization of advanced degree awards and academic rank appointments, while it shows the correlation between the two, is also a reflection of strong bureaucratic control over Soviet academic and research personnel.

The situation in the mid-1930's may be described as follows. There were many persons actually engaged as professors, assistant professors, and senior scientific associates who obviously did not have any advanced degrees since there were none awarded. These persons were considerd to possess high scientific qualifications. Since advanced degrees could not be awarded overnight, an easy solution was found to the effect that those who were full professors had the "qualification" (whatever this might be) of a "doctor," though in order to acquire this degree they had to prepare and publicly defend a thesis. Similarly, assistant professors and senior scientific associates were considered to possess the "qualification" of a "candidate," though in order to acquire such an academic degree they had to prepare and defend a dissertation.

In addition, a procedure was established by which both doctor and candidate degrees could be awarded without writing or defending a dissertation, solely on the basis of merit (that is, for inventions, discoveries or simply for "outstanding work" or "outstanding scientific research"). This was done frequently in the past, but in recent years the practice of awarding degrees on the basis of merit has apparently decreased somewhat. Once these assertions about an individual's "qualification" or merit were made, there was no single body to integrate the award of advanced degrees and appointment to academic rank. The VAK was therefore established as the central and sole authority for making decisions on who was qualified for what degree or position, and how academic appointments and the awarding degrees should be made. Such close correlation was essential in order to justify the existing differentiation by rank of scientific and academic personnel, who already had their appointments. It was also essential for making new academic appointments of those who did not have advanced degrees. Finally, aside from this convenience the VAK was endowed with great bureaucratic power which it has exercised at times with moderation and rationale, but often with ruthless arbitrariness to suit the political and ideological goals of the Soviet regime.

However, the problem of training new academic and research personnel and their appointment to rank had to be solved. Therefore, it was decided to continue the aspirantura training, which would be a formal way of training new personnel. Consequently, the advanced degree training and the award of advanced degrees today has four distinct phases:

1. *Aspirantura training,* which must be taken by those who start careers in the fields of teaching in higher education or in scientific research.

2. *The candidate degree,* which is awarded either to persons who complete aspirantura training, subsequently pass oral examinations and defend a thesis, or to assistant professors and senior research associates without going through formal aspirantura training. In the latter case the candidate degree is more frequently awarded upon the public defense of a dissertation, and occasionally on the basis of the merit provision without writing or defending a thesis.

3. *Doktorantura training,* which may be taken by those holding a candidate degree and who would like to engage in research and study in preparation for the doctor's degree in a higher educational or scientific research establishment.

4. *The doctor degree* may be awarded to those who have a candidate degree or to those who have the rank of professor but who do not have a candidate degree; and which is either awarded upon writing and defending in public a dissertation, or granted on the basis of past performance and individual merit of its recipient without producing an actual thesis. Outstanding publications or unpublished research reports of the recipient of the degree may be regarded as equivalent substitutes.

These procedures incorporate the provisions which were originally considered emergency measures. These measures survived the period of transition from the nonrecognition of advanced degrees to the enormous prestige and significance attached to them today. This development, as well as many other aspects of the Soviet social system, came about as a result of the abandonment of the principles of utopian egalitarianism and the degrading "proletarization" of everything, including science and research, which took place in the U. S. S. R. prior to the 1930's.

"Aspirantura" Training and First Advanced Degree

Aspirantura training is considered today the basic form of training of new academic and scientific personnel for higher educational establishments and research institutions of the U. S. S. R. Persons not over 40 years of age with completed higher education may be accepted for aspirantura training. In order to be accepted, the student must pass oral examinations in (1) the subject in which the applicant intends to do his work (field of science and a specific topic within it); (2) one foreign language (reading and translating proficiency); and (3) ideology (principles of Marxism-Leninism).

Aspirantura training is specified to last 3 years. During the first 1½ or 2 years of training, aspirantura students are required to do read-

ing and preparation in (1) one socioeconomic (political) subject; (2) two foreign languages; (3) special subjects in the field of study. Training is organized on the basis of an individual study plan. A ranking professor is assigned to supervise the work of 2 to 5 aspirantura students for whom individual programs of study are set up. The student must attend special seminars, participate in research work and the discussion periods of a department. Twice a year he must submit a progress report on his studies. During the second year he may be assigned as a half-time instructor (assisting the professor either in a course or in research). After the end of the first year, students in applied fields are assigned to industrial practice during the summer if they have had no previous employment in industry. By the end of the first year the dissertation subject should be selected.

During the course of the first 2 years, the student must pass examinations, called candidate degree qualification minimum (*kandidatskii minimum*), which, broadly speaking, demonstrate the specialized knowledge sufficient for an advanced student to do the necessary research for his dissertation. There are oral examinations in four subjects: (1) ideology (dialectical and historical materialism); (2) the field of science in which the aspirantura training is taken; (3) a special subject in which the applicant intends to work and prepare his dissertation; and (4) two foreign languages. The examination in ideology is designed to test the student's adaptability to the philosophical implications of the prevailing orthodoxy for the given field of science. The other examinations test, respectively, his general knowledge in the field of science, his special knowledge in his particular field, and his reading and translating ability of foreign scientific and technical literature. Examinations in general and special subjects in a given field of science are given by a committee consisting of the chairman of the department (or division in the case of a research institution) and two ranking professors.

After these requirements have been fulfilled,[4] the entire third year is usually devoted to work on the dissertation. Research for the dissertation may already have started during the second year. The latter part of the third year is devoted to preparing the public defense of the dissertation. After the department is satisfied with the thesis as written, it sets the date for its public defense.

After the student's adviser approves the thesis, two official opponents are selected generally from outside of the institution in which the aspirantura training was taken by the student. They give a first opinion on the

[4] As was already mentioned, academic rank appointees are excused from these requirements. In addition, persons who attended the Institute of Red Professors (now defunct, but which had an annual enrollment of about 2,000 in the mid-1930's), the Military Academy of the General Staff of the U. S. S. R., or the Voroshilov Military Academy (chemical warfare academy) are also excused. For further details, see Movshovich, op. cit., passim.

thesis. If it meets requirements, copies of the summary of the dissertation are sent out to other establishments and several copies of the thesis itself are deposited in the library. This is done about 1 month in advance of the scheduled date for public defense of the thesis. At about the same time the thesis copy is submitted to two specially appointed official opponents.

The defense of the dissertation itself takes place at a public meeting of the academic council (*uchenyi sovet*) of the university or institute,[5] during which the student presents a résumé of his research and thesis findings, and then either faces questions of the official opponents or has to debate their comments and criticisms. In addition, anyone present, either members of the academic council or members of the audience, may ask questions. After the conclusion of the defense, approval of the dissertation is decided by simple majority of a secret ballot cast by members of the council. Subsequently, although the candidate degree is granted by the given institution, this degree is subject to confirmation by the VAK.

"Doktorantura" Training and Second Advanced Degree

While there are entrance examinations and formal requirements on the basis of which the applicant is accepted for aspirantura training for the candidate degree, there are no formal entrance examinations for the doctor degree. Persons wishing to embark on "doktorantura" training who have a candidate degree (which is less frequent than one might expect, see below) or the rank of professor, submit, along with the application, various certificates of their previous education and employment, as well as copies of all of their published or unpublished completed works, accompanied by reviews, and a proposed outline of research for their dissertation. Their records, publications, and particularly the proposed plan of study and research outlines, are examined and reviewed by a special board set up for this purpose in the educational or research establishment. If the decision of the board is favorable, the person is accepted for "doktorantura" training.

Persons applying for "doktorantura" training ordinarily should not be more than 45 years old; people older than this, however, may make a special petition, the outcome of which is based on the merits of the individual case. It is specified that "doktorantura" training is not to exceed 4 years, but, again, its length may be extended upon special petition. Persons enrolled in this advanced training program must do independent research, submitting a progress report once a month. This

[5] The academic council consists of: the director, two assistant directors, deans of faculties, chairmen-professors of the departments, several ranking professors, representatives from the party and trade union and also from "interested ministries," i. e., those closely connected with the student's field of study or interested in his research topic.

research is supervised by the chairman of the department (or of the division in the case of a research establishment) in which the research is undertaken. In addition, 1 adviser and 2 additional consultants are appointed from the top academic rank to guide this training research.

A person in this advanced training program must demonstrate complete competence in the use of scientific literature in three foreign languages. Upon completion, the dissertation is recommended for the doctor's degree and defense is permitted. The public defense takes place in a setting similar to the one described above for the candidate degree, except that there are 3 official opponents, 2 of whom must have a doctor's degree. After the public defense, a successful person is not immediately awarded the degree, but is "proposed" or recommended to the VAK as meeting the requirements for the doctor's degree. The VAK sets up a special committee of experts to review the dissertation itself and to pass judgment upon its merits. After such scrutiny the doctor's degree is awarded to successful persons by the VAK rather than by the training establishment itself. This procedure of "proposing" and "granting" a doctor's degree differs from the practice of "granting" and "confirming" a candidate degree by the fact that the VAK as a rule makes a further review of doctoral dissertations on scientific grounds and at the same time apparently considers other factors (such as past performance, record, ideological conformity, etc.), while these considerations are less common in the case of candidate degrees.

Finally, these procedures are also employed for awarding degrees to persons who are considered "worthy" of either a doctor or a candidate degree. Persons considered to have some special merit are "proposed" by various establishments to the VAK. This proposal is accompanied by a statement about the person's past performance, his research and its originality, and by copies of his published works together with their reviews, etc. In short, an academic institution or research establishment which proposes an advanced-degree award without dissertation must present a strong case for the individual's academic or scientific merit. It should be noted that the work considered in such cases is often an outstanding piece of research, an advanced treatise or a text, and is viewed as equivalent to a doctoral dissertation. Again, the entire proposal is submitted to a special committee of experts, who pass judgment upon it, and then the VAK may grant the degree. There is only one exception to this rule. The Academy of Sciences of the U. S. S. R. can, by simple majority vote of its general assembly, grant a doctor's degree to anyone it pleases. This apparently happens quite seldom, and when it does occur it really amounts to an award of an honorary degree.

The consideration of the types of degrees and procedures for their award may be summarized as follows. During the last 20 years the Soviet Union established highly centralized control and supervision of ap-

pointments to academic rank and award of advanced degrees. During this period advanced degrees became a symbol of prestige, and great formal significance was attached to them. In contrast to American practice, Soviet advanced degrees are not regarded as indispensable prerequisites for academic appointment. Academic rank appointments do not necessarily depend upon the holding of an advanced degree, and often the advanced degree is received after the appointment to academic rank or to a research position. Soviet advanced degrees are often awarded as a sign of recognition for certain research accomplishments.

The lack of course requirements and the individual plan of study account for the radical differences in the award of Soviet advanced degrees, as compared with procedures for obtaining advanced degrees in our educational setting. This, however, is not radically different as compared with the rest of Europe where an informal setting and individual plan of study also prevail. Despite these differences, there are two elements which bear some resemblance to our award of advanced degrees—special examinations which are required for the candidate degree and the fact that some kind of a thesis-dissertation (or some research or written work as a substitute for it) has to be produced before obtaining either degree.

Qualitative Aspects of Advanced Training

It is very difficult to pass judgment on the quality of Soviet advanced-degree training and of the dissertations themselves. It is obvious that individual study plans cannot be ascertained. Even if they were known, there would be no precise way of assessing their significance. Consequently, in order to conceive the nature of advanced training in the Soviet Union, one must rely primarily on dissertations or accounts of them. Furthermore, it is obvious that very substantial diversification in scope and quality of advanced training research exists. Personal relations between the advanced student and his academic supervisors are very prominent in such a setting, although there are in existence important checks (opponents, public defense of the thesis, the VAK's review power) upon abuses of these personal ties.

As in this country, Soviet advanced-degree dissertations bear the stamp of individuality. The individuality of each advanced degree undertaking is undeniable, and the quality of it is related to a set of factors or cirumstances under which it was obtained, such as the general caliber of research work in a given institution, the qualifications of the adviser who supervised the study, the research topic and its execution, its relation to the existing body of knowledge, published literature, etc. At the same time the research for an advanced degree is an integral part of a larger program, which is to a great degree centrally super-

vised and coordinated. This overall research program can be judged only in terms of the quality of Soviet work in a given field of science. Because of this dual orientation, there are marked excellencies along with pitiful inefficiencies. In a sense, it is a dichotomy in which individual excellence of advanced work at times overshadows the indifferent quality of research as a whole. At the same time, there are fields of study in which, because of political dictates, practicality or other external factors, "the grand average" prevails. Because of such circumstances there is a wide variation in quality, which makes a general description or definition of Soviet advanced-degree dissertations quite difficult.

It is stated by Soviet sources that a candidate degree dissertation should reveal general theoretical knowledge in a given field of learning and special knowledge of the topic on which it is written. It should demonstrate the ability to perform independent research, and should reveal new scientific findings. The doctor's degree dissertation should consist of independent scientific research, on the basis of which a specific solution or theoretical generalization of scientific problems can be obtained. Specific solutions or theoretical generalizations must be of considerable significance for a given field of science.

For either degree, the dissertation may be a published or unpublished work, a published textbook of outstanding quality, independently obtained findings of empirical or applied research, a contribution to the methodology of a given science, or theoretical treatment of a specific topic in its relation to an existing body of knowledge.

Such are the general requirements for advanced degrees. These requirements for an advanced-degree thesis are both as ambitious and as equivocal as one wants to interpret them. This is not merely a supposition; there are numerous examples to substantiate it. While neither time nor resources were available for undertaking a qualitative evaluation of Soviet advanced-degree dissertations on scientific grounds, there are some data for such an evaluation.[6]

Admittedly, there are interinstitutional, interdisciplinary, and intradisciplinary variation in advanced-degree dissertations (such as our Ph. D.'s, doctorates, M. S.'s, etc.) in every educational setting. The

[6] *Vestnik Vysshei Shkoly* (Journal of Higher Education) carries frequent stories about the general quality of advanced-degree dissertations and discusses problems connected with advanced training. It gives frequent summaries of dissertations particularly in the social science fields. *Vestnik Akademii Nauk SSSR* (Journal of the Academy of Sciences of the U. S. S. R.) often reveals dissertation topics and brief summaries of dissertations. The summaries of, or abstracts from, these dissertations appear in other publications of the Academy of Sciences of the U. S. S. R. in article form. Similar practice is employed by union republic academies. Articles based on original dissertations appear also in various trade magazines (such as *Ugol'* (Coal), *Elektrichestvo* (Electricity), *Tsement* (Cement), etc.). Finally, Soviet newspapers (for example, *Pravda*, March 26, 1954, *Komsomol'skaya Pravda*, July 11, 1954) carry stories of individual cases or some malpractices in the award of degrees or deficiencies in advanced research. Some of the local Soviet newspapers also carry advertisements about the forthcoming public defense of dissertations.

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Soviet Union is no exception, but the variation in the quality of advanced-degree dissertations is apparently enormous. These variations range not only from one field of science to another but within a given field as well. One may be highly impressed by a doctor's dissertation in engineering on the problems of the theory of elasticity in anisotropic bodies. A dissertation concerning the structure of polycrystal layers of copper oxide elements related to the photoelectric theory, or one on problems of instrumental seismology, may be considered rewarding dissertation topics for the doctor's degree. However, a dissertation for the doctor of science degree on the design of depth pumps for oil wells is of questionable scientific value, and the mediocrity of a candidate degree dissertation on mobile machine repair shops in agriculture is astounding.

While one can easily appreciate an attempt to explore the Pavlovian theory in a dissertation for doctor of medical science on psychic disturbances from noncerebral wounds, one is bewildered to find that a candidate in a medical science field tried, by the Pavlovian theory, to prove in his dissertation the inverse relationship between air temperature and the speed of rigor mortis. Although the VAK was quite indignant about the latter "application" of the Pavlovian theory and the "experimental findings" (on 45 dogs) presented in the thesis, and which actually disproved this alleged relationship, the fact remains that a dissertation of this sort was approved by an institute, worked on, "successfully" defended, and only much later did it create turmoil and subsequently receive condemnation.[7] These two examples vividly reveal the qualitative variation in Soviet advanced degree theses and primarily how a scientific theory can be put to use or abuse by advanced students.

The quality of Soviet advanced degree theses apparently also suffers occasionally from external pressure. Soviet authorities time and again stress the need for "practicality" in advanced degree research. In this connection, a cartoon in a Soviet satirical magazine is delightfully revealing. One advanced student in biology asked another, who had written his candidate dissertation on the fertility and economic use of the African boa constrictor, "What practical significance does your dissertation have?" The other replied, "Enormous. I will receive a candidate degree from it!" [8]

Examples of the uneven quality of advanced-degree dissertations can be multiplied. Those cited above are perhaps extreme cases of the variations which occur. While in our educational setting we observe many variations in standards in the awarding of advanced degrees, in the Soviet Union the variation in quality of advanced-degree dissertations is furthered by external factors among which ideological dictates, the compulsion to follow them and the continuing drive for "practical results" in research are most significant.

[7] *VVSh*, No. 1, 1951, 24.
[8] *Krokodil*, July 30, 1953, 13.

Without going into individual cases, it is apparent that three major factors must be taken into account when an evaluation of Soviet advanced degrees is made. First, there is pressure exercised via ideological dictates, which undoubtedly affects the quality of advanced training. The fields of biological and agricultural sciences and a large segment of the social sciences are thus affected. In this connection, it must be noted that this ideological interference in the physical sciences often concerns the philosophy of science and the acceptance of hypotheses, and therefore causes fewer handicaps in dissertations which deal with specific problems of applied research. Second, there is pressure to obtain applied technical results, which is significant in the physical sciences and in engineering dissertations. This factor is closely related to the first. Finally, there is a third factor which is often the outgrowth of the second and which may be termed "unknown dimension." It is apparent that though some probably quite significant dissertations are occasionally mentioned in Soviet literature, their content is not discussed simply because of prevailing secrecy. There are probably good dissertations in the fields of aerodynamics, some branches of mathematics, nuclear physics, electronics, and the like. The impact upon advanced training of the first two factors can be ascertained, but the significance of the latter in the overall assessment of the quality can be only a matter of speculation.

Despite the uncertainty in evaluating Soviet advanced-degree training, Ashby has made a valid observation. Speaking of Soviet scientists in general, he observed that the Soviet Union probably has as fair a number of first-class scientists per head of population as any other civilized country, but that the research ranks are filled by a large number of people of indifferent quality.[9] The same holds true for advanced-degree students. While there are undoubtedly many excellent dissertations produced, there are also numerous degrees awarded for dissertations which are quite inferior, both by Western standards or by comparison to Soviet dissertations which can be recognized as substantially sound undertakings on purely scientific grounds.

Quantitative Aspects of Advanced Training and Award of Degrees

While there is great uncertainty about the actual quality of advanced-degree dissertations, the quantitative aspects of training can be ascertained with sufficient accuracy. As was indicated above, several distinct components of advanced-degree training have to be singled out and the quantitative aspects related to these components.

[9] E. Ashby, *Scientist in Russia,* New York: Penguin Books, 1947, 204–205.

1. *Aspirantura Enrollment*

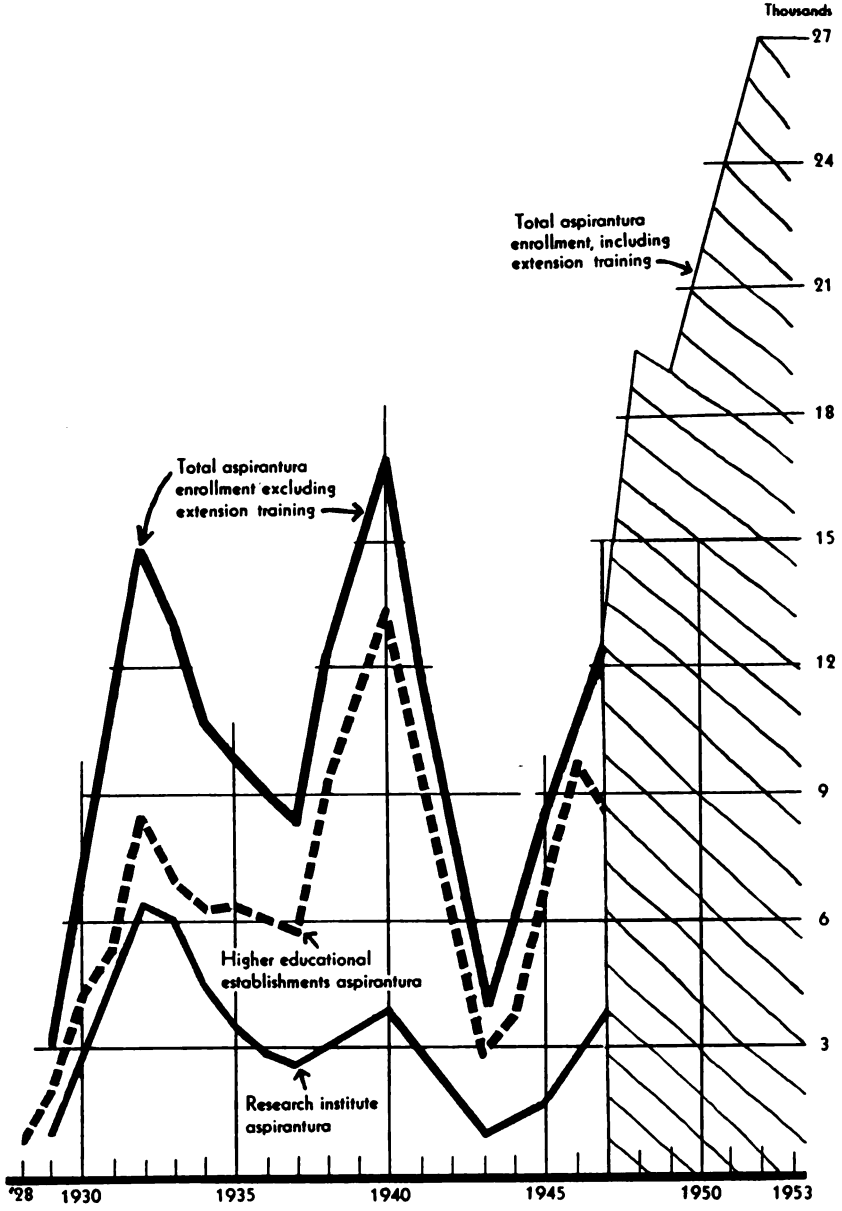
The discussion of quantitative aspects of Soviet advanced-degree programs should properly start with a discussion of aspirantura training. While it would be revealing to follow the number of acceptances for aspirantura training, data concerning these acceptances are available for only a very few years. Acceptances in 1934 were in the neighborhood of 3,000 per annum,[10] and had more than doubled by 1951–52, when they were about 7,000 per annum.[11] However, an attempt to follow aspirantura acceptances and to trace the number of those who successfully completed this type of training proved to be a very complicated task, since, as explained earlier, the awarding of the advanced degree of candidate in a given field of science was unrelated, particularly in the past, and to a lesser extent in recent years, to the completion of aspirantura training. Furthermore, a large proportion of aspirantura students drop out before the completion of their training, and those who do complete their training take a considerably longer period of time than the maximum 3 years specified. Of course, this extension of the required time to complete training is not peculiar to the U. S. S. R. alone. While considerable attention is given to these complicated factors below, it was impossible to relate them satisfactorily to the original acceptances in aspirantura training.

Chart IX summarizes enrollment trends in aspirantura training over the last 25 years. Starting from nonexistence in 1925, the level of enrollment by 1930 had reached about 3,000. It then shot up rapidly, reaching a peak of some 15,000 in 1932, and was on the decline throughout the rest of the 1930's. It should be borne in mind, of course, that aspirantura training did not lead to a candidate degree until 1934. Advanced students who had "completed" aspirantura training were simply assigned as research scientists or appointed to teaching ranks in higher educational establishments. The decrees issued between 1934 and 1937 (see discussion above) helped to boost aspirantura enrollment again, and the prewar peak of about 17,000 advanced students was reached in 1940.

In the postwar period this level of 17,000 was probably not reached again until 1950. Postwar enrollment series (since 1948) are biased by the inclusion of extension advanced students, who probably account for 3,000 to 5,000. Even without making allowance for such bias, it is apparent that during the last 15 years (1940–54) advanced training enrollment has expanded at a slower rate than enrollment in professional higher education. While enrollment in higher educational establishments about doubled during this period (see ch. IV), advanced-degree enrollment increased by about 60 percent (without allowance for bias upward due to the inclusion of extension students).

[10] *Kul't Stroi—1935,* 96–97.
[11] *Izvestiya,* October 16, 1951; *Pravda,* June 14, 1952.

ADVANCED-DEGREE TRAINING ENROLLMENT, ASPIRANTURA STUDENTS, 1928–53



Source: Table A–1, appendix to ch. V.

CHART IX

Another development in aspirantura training should be noted. While in the early 1930's aspirantura enrollment in research establishments was relatively high and accounted for over 45 percent of all aspirantura

students, by the late 1930's, and especially in the postwar period (1946), research establishments in the U. S. S. R. accounted for less than one-fifth of Soviet advanced-degree students by enrollment. Regular higher educational establishments became increasingly important in the training of advanced-degree students, because advanced-degree training had become so closely correlated with teaching appointments. A large proportion of advanced-degree students enter teaching, and the tendency to train more of them in regular higher educational establishments rather than in research institutes is another manifestation of the close tie between a teaching career and advanced training. In this connection it must be noted that a large proportion of all advanced-degree holders are employed by higher educational establishments, a fact which will be discussed in quantitative terms below.

In Soviet reporting, aspirantura enrollment is usually distributed by the type of institution in which the training takes place. The functional grouping extensively discussed in the previous chapter is employed also in reporting aspirantura enrollment. Table 1 presents the average distribution of aspirantura students by branch during the period 1934–46.

TABLE 1.—*Distribution of aspirantura enrollment, by branch, 1934–46*

Branch	*Average distribution of aspirantura students in percent (rounded)*
All engineering	39
Agricultural	7
Socioeconomic	6
Educational	35
Medical	13
Total	100

Source: Table A–3 in the appendix to Ch. V.

The distribution of aspirantura enrollment by type of institution presented in table 1 refers to higher educational establishments only. Data on the distribution for research institutes of the Academy of Sciences of the U. S. S. R. and economic commissariats are available for 1938 and 1939, and in these years it did not differ radically from the distribution of aspirantura students by branch in higher educational establishments.[12]

It is evident from the data presented in table 1 that the engineering-industrial branch higher educational establishments accounted on the average during the period 1934–46 for the largest share, or about 39 per-

[12] The distribution of aspirantura enrollment by *type* of institution in higher educational establishments and in research institutes can be compared for only 2 prewar years (1938, 1939) (*Kul't Stroi—1940*, 242, and Sinetskii, *PP Kadry*, 91). Such a comparison reveals that although there is no *radical* difference in distribution, the relative share of the educational, medical, and agricultural segments is *somewhat* larger among aspirantura students in *research* institutes than among aspirantura students in higher educational establishments. This observation is interesting because it suggests that despite some minor differences, the distribution of aspirantura students by field in higher educational establishments can be assumed to be representative of all aspirantura students.

cent, of all aspirantura students, which indicates the high priority given to advanced training in this field. All science fields together (i. e., engineering-industrial, agricultural, and medical) accounted by enrollment for about 60 percent of total aspirantura students during this period. This distribution of aspirantura students by type of educational establishment does not reveal the distribution by field of science, which will be discussed below.

2. *Completion of Aspirantura Training and Its Relationship to the Award of Candidate Degrees*

A sharp distinction must be made between the number of persons who have actually "completed" aspirantura training and those who have successfully defended a dissertation and been awarded a candidate degree. Between 1925 and 1947, about 25,000 persons "completed" aspirantura training in regular higher educational establishments (i. e., excluding research institutes, which probably accounted for about 11,000 during the same period).[13] Of these 25,000 who "completed" aspirantura training during these years, only about 60 percent defended a dissertation for the candidate or doctor degree at some time hence, but the number of those who defended such a dissertation within a specified time (*v srok*), i. e., 3 years of study, was "considerably less." [14] Between 1935 and 1938 only 39.8 percent (1,738) of all who "completed" aspirantura training (4,366) defended a dissertation, in 1939 only about 37 percent (902 out of 2,447), and in 1946 about 24 percent of all who "completed" aspirantura training defended a dissertation.[15] The situation is about the same today. In 1951 only 25 percent of those who "completed" aspirantura training defended a dissertation on time.[16] In 1952 the percentage was 25.3, and in 1953 it was 35.3.[17] During the 3-year period from 1951 to 1953, about 13,000 persons "completed" aspirantura training.[18] Thus two significant points must be stressed. First, aspirantura training may be "completed" (i. e., a person terminates his study usually in 3 years or 1 year upon completion of the candidate minimum examinations) without defense of a dissertation. Secondly, probably only about one-third of advanced students defend a dissertation in the specified time.

[13] The first part of this statement is based on Sinetskii, *PP Kadry*, 176. The second part is an estimate based on the following rationalization: that it may be assumed that the unweighted average of the proportion of aspirantura students in research institutes was about 30 percent of all aspirantura students during this period. Under the assumption of uniformity of "completion" of training, therefore, research institutes probably accounted also for about 30 percent (or 10,700), in addition to VUZ "completed" aspirantura training.
[14] Sinetskii, *PP Kadry*, 184.
[15] Ibid, 184–186.
[16] *VVSh*, No. 10, 1952, 38.
[17] Ibid., No. 5, 1954, 31.
[18] Idem.

In order to clarify further the success rate of advanced students, the following discussion is important. On November 15, 1946, the total number of aspirantura students in higher educational establishments was about 9,500. Table 2 indicates their distribution by year of study.

TABLE 2.—*Distribution of aspirantura students in Soviet higher educational establishments, by year of study, in 1946–47*

Year of study	*Total number, approximate*	*Distribution in percent*
First	3,590	37.4
Second	2,800	30.0
Third	2,700	28.1
Fourth or over	430	4.5
	9,520	100.0

Source: Sinetskii, *PP Kadry*, 183, 187. These data refer to higher educational establishment aspirantura students and exclude aspirantura students in research institutes.

During the academic year 1946–47, about 17 percent of this total (9,500) either left before the completion of study (1,100) or "completed" study without defending a dissertation (500). Consequently the attrition rate in that year was about 17 percent of the total enrollment, most of which took place during the second and third year of study. On the basis of this information, for 1946–47 the rate of success, i. e., those advanced-degree students who complete aspirantura training with defense of a dissertation, can be determined as somewhere between 20 and 30 per 100 entering aspirantura students. A similar situation prevails today as well. In 1953 it was stated that about 70 percent of aspirantura students "complete" aspirantura training without writing or defending dissertations.[19]

Such a low success rate (less than 30 per 100 entering students) is subject to many interpretations. On the one hand, it may be stated that aspirantura students are not well enough prepared or that they do not realize before entering such training what is expected of them.[20] On the other hand, however, it appears that the training is quite stringent, and the effective principle of selection is enforced even on this level. Both of these interpretations are valid and, to some extent, complement each other. Both are also confirmed by frequent Soviet press reports complaining about poor preparation, lack of interest in a subject of study, the student's desire to attain the degree without a sincere interest in a scientific career, etc. At the same time there are other reports which state that aspirantura training is too difficult and too demanding for even good students to follow.

[19] Ibid., No. 2, 1953, 23.
[20] There are occasional stories in Soviet newspapers that testify to this effect (see, for example, *Pravda*, December 7, 1953; January 9, 1954).

The selection process begins with admission to aspirantura training. For example, in 1948 (total acceptances about 3,500) higher educational establishments accepted only 50 percent of the applicants, and research establishments accepted only about 43 percent.[21] In other words, there were two or more applicants for each available vacancy. This process of selection continues during the course of training as the success rate tends to suggest.

Aspirantura training is the formal way of preparing advanced students for the candidate degree. However, in order to receive the candidate degree persons do not necessarily have to have completed this formal training. On the basis of the available data, it appears that about one-half of all candidate degrees awarded by higher educational establishments prior to 1947 were awarded to persons who did not have formal aspirantura training.

Among those who received a candidate degree from higher educational establishments prior to January 1947, there were anywhere from 23 to 61 percent, depending upon the field, who had completed aspirantura training. The highest proportion of aspirantura-trained persons among candidate degree holders, as might be expected, was in the fields of philosophy and philology (61 percent) and history (58 percent); and the lowest was in the field of medicine (23 percent).[22] In engineering, about 36 percent of candidate degree holders had formal aspirantura training. The proportion is lower in applied fields because research performed elsewhere may be considered an equivalent substitute and because the teaching experience of academic rank holders serves also as a substitute for formal aspirantura residence requirements. This trend apparently has continued since there are reports of candidate degrees in various instances (particularly in the case of industrial research scientists) awarded to persons who do not have aspirantura training. Unfortunately, overall quantitative indices of this occurrence have not been released in recent years.

To complicate matters further, it must be stressed again that the candidate degree has been and may still be awarded to persons without the actual writing and defense of a dissertation. This was especially true in the late prewar years (1937–41), when degrees were first granted on a large scale. In 1941, for example,[23] out of about 3,000 "awarded" candidate degrees, only about 1,700, or 56 percent, were obtained as a result of the defense of a dissertation. The rest were "awarded" without such a dissertation on individual merit. Also, from individual reports, it is known that this practice is still being followed, but again the overall

[21] *VVSh*, No. 6, 1949, 41.
[22] Sinetskii, *PP Kadry*, 180.
[23] *VVSh*, No. 10, 1946, 47, and S. Kaftanov, *Zadachi vysshei shkoly* (The Task of Higher Education), Moscow, 1944, 22.

quantitative aspect of such a process is not ascertainable for recent years. It seems that it is not so widely practiced today as in the 1930's after the decree of January 1934 concerning advanced degrees and academic rank went into effect.

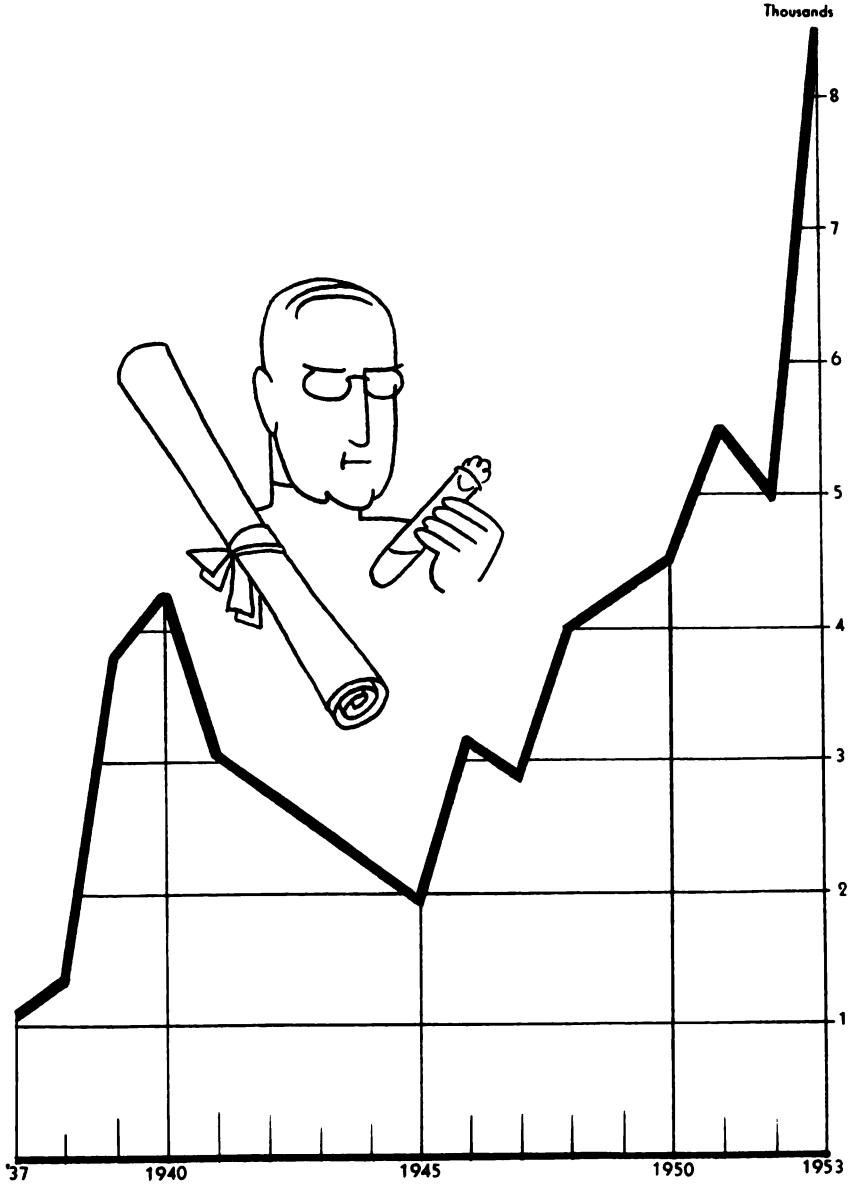
Any statement regarding the award of candidate degrees must carry with it the qualifications inherent in the preceding remarks. With the help of these observations, we hope to show how radically different the situation is in regard to the awarding of advanced degrees in the Soviet Union from that prevailing anywhere else. To sum up, it appears that only about one-third of those who take and complete aspirantura training write and defend a dissertation in a specified time. The proportion of those who take aspirantura training and then at some later date receive a candidate degree increases to about 60 percent. About one-half of the candidate degrees in all fields were, in the past, awarded to persons who did not have formal aspirantura training. In the past about one-third of all candidate degrees were awarded without the defense of a thesis but on the basis of the individual merit provision. Finally, over a period of years, there is a noticeable trend that an increasing proportion of those receiving candidate degrees have taken formal aspirantura training and have made formal defense of a thesis.

In conclusion, it is necessary to mention the problem of rejection of a dissertation. A dissertation, which has been allowed to be defended and which has been "successfully" defended, may be rejected by the VAK (see discussion above). This, however, is a very infrequent occurrence. In the academic year 1949–50, for example, out of 4,660 candidate degree dissertations, only 124, or about 2.7 percent, were considered "unworthy" of a degree by the VAK,[24] and the degree was denied.

According to Soviet press reports, the rejection of a degree by the VAK often takes place for quite justified reasons (inadequate research, plagiarism, use of classified materials, faults in evaluation of empirical data, etc.).[25] Of course, degrees can also be withheld on political and ideological grounds. In this connection one refugee account [26] states that, in general, if a dissertation is allowed to be presented in the first place, it means the awarding of the degree, unless something unforeseeable happens (such as denunciation for personal rivalry reasons, "political deviations," etc.). Only occasionally may either the advisers or the opponents "slip up" by not thoroughly reviewing the dissertation. The VAK apparently catches some of these "slip ups," and at the same time sees to it that political vigilance and ideological conformity are observed in preparing theses.

[24] *VVSh*, No. 6, 1951, 24.
[25] Ibid., No. 4, 1951, 21; *Pravda*, August 4, 1952, January 31, 1953; *Bol'shevik*, No. 10, 1952, 2; *Izvestiya*, January 11, 1949.
[26] Research Program on the U. S. S. R., "Soviet Education," Manuscript No. 188 (in Russian), 27.

AWARD OF FIRST ADVANCED DEGREE, CANDIDATE IN SCIENCE, 1937–53



Source: Table A–2, appendix to ch. V.

CHART X

3. *Candidate Degrees*

Keeping in mind all of these factors which explain the significance of "awarded" candidate degrees, let us analyze briefly the trend in

awarding these degrees. Chart X shows the trend in awarding degrees during the last 17 years.

Since candidate degrees were instituted in 1934, the number of degrees awarded annually has increased from 2,300 to 8,500, or about 3.7-fold, which represents about the same rate of growth as for Soviet professional graduations (see ch. IV) over the same period of time. It is probable that prior to 1937 one can hardly speak of "earned" (i. e., by defense of a dissertation) degrees, while the relative share of actually earned degrees among all awarded degrees has continued to increase throughout the years.

One of the most interesting and most important questions concerns the distribution of candidate degree holders by field. Only one component of degree awards by field can be ascertained with a sufficient degree of certainty, but even in this case we are justified in speaking only in terms of rough approximations. It has already been shown (table 2) in the distribution of aspirantura enrollment by field that a large proportion of advanced-degree students in higher educational establishments are in scientific fields. The subsequent discussion refers to the distribution of candidate degrees by field, and the data refer to the award of candidate degrees by higher educational establishments only (i. e., research institutes excluded).

Aspirantura training in higher educational establishments is conducted under the auspices of a given department. Therefore, an engineering institute, for example, offers aspirantura training in physical-mathematical sciences or in chemistry. Medical institutes offer training in departments of chemistry or biology, etc. Consequently, it is more significant to ascertain the awarding of degrees by *field of science* rather than by field of specialization of the institutions in which the advanced training is conducted (as was done in table 2).

Data on the awarding of the candidate degree and completion of aspirantura training by field of science are presented in table 3. These data were revealed in 1951 and were compiled during the census of teaching staffs of Soviet higher educational establishments conducted in January 1947.

The data presented in table 3 are most revealing. In the first place, it is important to note that although aspirantura "completion" refers to about 25,000 persons during the period between 1925 and 1946, the "defended candidate dissertations" refer to the period between 1934 and 1946. Thus, we may ascertain in aggregate terms the same point which was made earlier: *of those who completed aspirantura training, only about 60 percent defended a dissertation for the candidate degree.* Of course, in this connection, it should be pointed out that some of those who had completed aspirantura training between 1925 and 1934 received candidate degrees on individual merit, i. e., without defense of a dissertation, *after* these degrees were established in 1934.

TABLE 3.—*Distribution by field of science of persons who have completed aspirantura training (1925–46) and who defended dissertation for candidate degrees (1934–46) in higher educational establishments*

Field of science	Completed aspirantura training (1925–46)		Defended candidate dissertation (1934–46)		
	Total number	Distribution in percent	Total number	Distribution in percent	Recomputed distribution in percent
Philology	4,850	19.4	1,650	6.6	11.4
Medicine	4,120	16.5	2,375	9.5	16.5
Engineering	3,750	15.0	3,000	12.0	20.8
Physical-mathematical sciences	2,550	10.2	1,750	7.0	12.1
Chemical sciences	1,750	7.0	1,275	5.1	8.8
Biological sciences	1,400	5.6	925	3.7	6.4
Political sciences and philosophy	1,270	5.1	425	1.7	2.9
Agricultural sciences	1,250	5.0	825	3.3	5.7
Economics	750	3.0	425	1.7	2.9
Arts	720	2.9	225	0.9	1.6
History	670	2.7	350	1.4	2.5
Veterinary medicine	620	2.5	425	1.7	2.9
Geology-mineralogy	550	2.2	400	1.6	2.8
Pedagogy	275	1.1	125	0.5	0.9
Geography	275	1.1	150	0.6	1.1
Jurisprudence	150	0.6	75	0.3	0.5
Physical culture	50	0.2	25	0.1	0.2
Subtotal	25,000	100.1	14,425	57.7	100.0
Did *not* defend dissertation	----------	----------	10,575	42.3	----------
Total	----------	----------	25,000	100.0	----------

Source: Sinetskii, *PP Kadry*, 176, and chart on 179. This source presents percentages and total number of persons with completed aspirantura training on the basis of which the numerical magnitudes for each field of science were reconstructed. Two additional fields, pharmaceutical science and architecture, in which degrees may be awarded, are omitted by the Soviet source and apparently accounted for substantially *less* than 0.1 percent (i. e., *less* than 25 people) of the candidate degrees awarded.

Second, it must be noted that there is no time element involved in these data as far as the period between 1934 and 1946 is concerned. The data on defended dissertations simply refer to what was earlier termed the "eventual" defense of the candidate dissertation whether it was done within the specified length of aspirantura residence or several years later. Of course, these data do not take into consideration the period after 1946 when some who had completed aspirantura training prior to that date may have since that time defended their dissertation.

Third, the data in table 3 account for about 14,425 candidate degree dissertations, a number representing one-half of all candidate degrees awarded in all fields and by all institutions (i. e., including both the higher educational establishments and the research institutions of the U. S. S. R.) during the period between 1934 and 1946.[27] Although there is no way of knowing exactly what the distribution by field of science was of persons who completed aspirantura training and who defended candidate dissertations in research establishments, as was already suggested, this distribution (i. e., on the basis of higher educational establishments only) can be viewed as a representative sample for all candidate degrees.

Finally, regardless of whether the data on distribution of candidate dissertations by field of science presented in table 3 are representative of all candidate degrees awarded from this sample of about one-half of all degrees, the following statement appears to be justified. During the period between 1934 and 1946, candidate degrees in engineering science accounted for about 21 percent of all candidate degrees awarded, physics and mathematics about 12 percent, and chemistry about 9 percent. If all scientific fields are considered, we obtain the following:

Field of science	*Percent of all defended candidate dissertations*
Medicine	16. 5
Engineering	20. 8
Physics and mathematics	12. 1
Chemistry	8. 8
Biology	6. 4
Agricultural sciences	5. 9
Veterinary medicine	2. 9
Geology-mineralogy	2. 8
Total	76. 2

Thus, at least as far as *defense of the dissertations in Soviet higher educational establishments during the period between 1934 and 1946 is concerned, over 75 percent of all dissertations were in the field of sciences.* The remainder, less than 25 percent, were in the fields of the humani-

[27] Prior to January 1947 about 28,000 candidate degrees were awarded (*VVSh*, No. 5, 1948, 1).

ties, arts, and social sciences. Such a distribution of first advanced degrees is quite unique and is unparalleled in any other educational setting.

We do not have overall factual data to ascertain the trend in awarding candidate degrees in recent years, but from fragmentary reports it would seem that the trend which prevailed in the past has not been substantially altered. It is most likely that preponderant stress upon sciences and engineering in awarding candidate degrees has continued in the postwar period.

4. *Doctor Degrees*

Turning to the award of the doctor degrees, we find that the situation described above concerning the disparity between "awarded" degrees and those actually *earned* as the result of defending a dissertation is even more marked. Chart XI summarizes the trend over the last two decades in the "award" of doctor's degrees, both as a result of defending a dissertation and on the basis of the merit provision. The chart reveals that, except for the years 1939–41, the number of doctor degrees awarded was between 450 and 550 per annum. This level was exceeded between 1939 and 1941, when many awards were made to academic rank holders on the basis of the merit provision.

It should be particularly noted that the trend in the award of doctor degrees without defense of a dissertation was very widespread in the 1930's. Table 4 summarizes this trend.

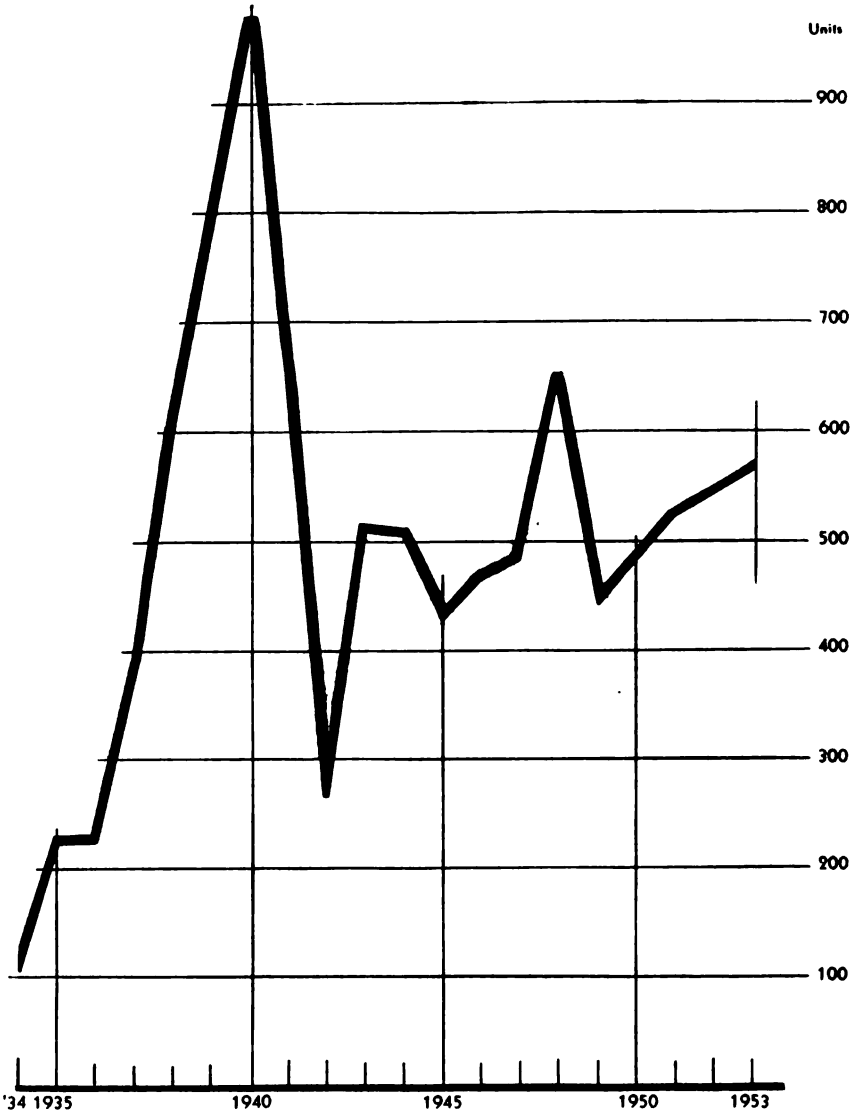
TABLE 4.—*Relative proportion of doctor degrees awarded without defense of dissertation (in percent of all doctor degrees awarded)*

Period	*Doctor degree awards without dissertation in percent of all degrees awarded*
1934–36	81. 5
1937–39	30. 0
1940–45	10. 3

Source: Sinetskii, *PP Kadry*, 152.

This table illustrates that awarding advanced degrees on the basis of the merit provision was very extensive as an expediency measure after the establishment of advanced degrees in the mid-1930's. During the period from 1934 to 1946, about 20 percent of all doctor degrees awarded were granted on the basis of the merit provision. Though such awards were very extensive at the beginning of the period and though they diminished significantly in the early postwar years, it appears that even today anywhere from 5 to 10 percent of all doctor degrees are still granted without defense of a dissertation.

AWARD OF SECOND ADVANCED DEGREE, DOCTOR OF SCIENCE, 1934–53



Source: Table A–4, appendix to ch. V.

CHART XI

Throughout the years two fields of "science" have been most significant in the awarding of doctor degrees. These are engineering (technical science) and medicine, each of which accounted for from 20 to 25 percent of doctor degrees awarded in any given year.[23] It is characteristic of doctor degree awards that they are examined by the VAK much

[23] *VVSh,* No. 9, 1948, 27; No. 6, 1951, 21; Sinetskii, *PP Kadry,* 151.

more meticulously than candidate degrees. The rate of rejection of doctor degrees both on scientific and political grounds in the postwar years has been about 10 percent as against 2 to 3 percent for candidate dissertations.

It is significant to note that very few holders of the doctor degree hold the previous degree of candidate. Out of the total number of doctor degrees awarded between 1938 and 1946 (about 5,200), only 14 percent, or about 740, were granted to persons already holding the candidate degree. Therefore, although theoretically these two degrees are sequential, in reality only a very small fraction of the holders of the second advanced degree have acquired the first advanced degree.[29] This situation appears to have been true up to 1947. We do not have detailed data to demonstrate numerically that this trend in awarding doctor degrees without the previous degree of candidate has continued in recent years, but it is probable that it has continued, but on a diminishing scale.

The Relationship of Advanced Degrees to Other Educational and Social Factors

The most significant question after a consideration of the trends in aspirantura training and the awarding of the two advanced degrees is their relationship to professional higher education. Of fundamental importance is the question of the length of time it takes to become an advanced-degree holder upon the completion of higher education. In 1947 about one-third of advanced students continued their training without interruption between their professional higher education and advanced degree training.[30] The proportion of those who continue advanced training immediately upon graduation from Soviet universities and institutes has probably increased in recent years.

It has already been pointed out that a relatively small proportion (about one-third) of aspirantura students obtain the candidate degree in the specified time (3 years). However, the time which *actually* elapses between the completion of higher education and the awarding of advanced degrees is extremely long. It was stated earlier in this volume that under normal circumstances a successful student completes his higher education at the age of 22 or 23. From information concerning acceptances for aspirantura training (for example, in 1947), it is obvious that the majority, i. e., some 70 percent, enter aspirantura training before the age of 30.[31] However, some 60 percent of these

[29] *VVSh*, No. 11, 1947, 32–33.
[30] Sinetskii, *PP Kadry*, 154–157.
[31] Entering aspirantura students in 1947 were distributed as follows: Younger than 25, 28.4 percent; 25–29, 41.6 percent; 30–35, 19.2 percent; over 35, 10.8 percent (Sinetskii, *PP Kadry*, 184).

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entering aspirantura students have had three or more years of employment elsewhere. Thus Soviet students embark on advanced-degree training at a later age than in the United States, and frequently after some employment experience.

According to data revealed in 1947, those who had advanced degrees received them many years after the completion of their work in a higher educational establishment. In 1947, among those who had both advanced degrees, 65.6 percent received the candidate degree 10 or more years after graduation from a higher educational establishment, and 72.8 percent received the doctor's degree 15 or more years after graduation from a higher educational establishment.[32] How much longer than 10 or 15 years it took these individuals to earn an advanced degree is not known. This great delay in years between the completion of higher education and the award of an advanced degree, though unusual in American education, is not uncommon in other European countries.

It seems quite certain that much of the delay in acquiring advanced degrees as evidenced by 1947 data is attributable to the simple fact that no such degrees were awarded before 1934. Thus a person completing higher education before 1934 could not have earned an advanced degree anyhow. This however does not explain it fully. To some extent the delay is caused by an individual's difficulty in escaping the work requirement upon the completion of a higher educational institution and once, having begun work, by the difficulty in getting a release to return to academic work. Finally, the factor of "accomplishment" is also important. While aspirantura training may be undertaken by many, the actual award of degrees is made in recognition of certain research achievement, which in many instances can be accomplished only after many years of study and research. This latter factor is particularly significant in the case of doctor degrees.

Table 5 shows the age distribution of persons at the time when the doctor degree was awarded to them.

TABLE 5.—*Age distribution of the recipients of doctor degrees at the time of the degree award*

Age at the time of degree award	*Distribution by age in percent*
Younger than 29	0.1
30–39	6.0
40–49	36.0
50–59	33.6
60–65	11.1
Over 66	13.2
Total	100.0

This distribution refers to 5,200 doctor degrees awarded during the period 1937–46.

Source: Sinetskii, *PP Kadry*, 157.

[32] Sinetskii, *PP Kadry*, 155–156.

Although corresponding data for candidate degree awards could not be found, it is revealing that as of January 1947 the median age of living doctor degree holders was 53.3 years and for candidate degree holders, 45.2 years.[33]

This relationship of age to the holding of an advanced degree gives new significance to the award of advanced degrees in the Soviet Union. The meaning assigned to advanced degrees in the Soviet Union is radically different from the meaning assigned to them in the United States. The Soviet advanced degree in a sense becomes a criterion of accomplishment rather than an indication of formal preparation. Under these circumstances it becomes obvious that, aside from the dissertation, an all-important, though almost immeasurable factor, the "experience" of an advanced-degree holder, must be taken into consideration in the assessment of Soviet advanced degrees. This, however, is a matter of evaluating the actual scientific research or teaching in the various fields, the discussion of which is beyond the scope of this volume. Another obvious conclusion is that all Soviet advanced-degree holders are "overaged" in comparison with American or with West European advanced-degree holders, and that there is an undeniable conservatism involved in the award of these degrees.

In relation to the latter, it is important to note that women play a considerably smaller role in Soviet advanced-degree training than in any other phase of professional education (see chs. IV and VI). The relative share of women among those who "completed" aspirantura training was only 20.3 percent,[34] and consequently the proportion of women who actually have the candidate degree is undoubtedly smaller. Among Soviet doctor-degree holders, women accounted for only 4.9 percent in 1947.[35] This is far below the relative share of women among professionals with completed higher education (about 50 percent), or among teachers in higher educational establishments (about 35 percent).

Facilities for Advanced Training

It is important to note that advanced-degree training is concentrated in a relatively limited number of establishments. Not all Soviet educational and research institutions are accredited to conduct aspirantura training, to award the candidate degree, or to recommend persons for

[33] Sinetskii, *PP Kadry*, 121, 124. This refers to 3,985, or roughly 75 percent, of all living doctor-degree holders, and to 15,800, consisting of roughly 65 percent of all living candidate degree holders employed in 1947 in Soviet higher educational establishments, as academic rank appointees.

[34] Sinetskii, *PP Kadry*, 140. This refers to higher educational establishment aspirantura, i. e., about 25,000 for the period 1925–46.

[35] This refers to those employed in higher educational establishments, or about 4,000. See footnote 33.

the doctor degree. In 1934 some 300 institutions were engaged in advanced-degree training programs.[86] In 1939, out of about 700 research institutions of significance, only about 280 offered advanced training;[87] and out of some 750 higher educational establishments in that year, only 312 offered advanced-degree training.[88] Thus, only about 40 percent of all research institutes and higher educational establishments were authorized to engage in advanced training. The number of institutions permitted to supervise doctor-degree research was considerably smaller (about one-tenth of all establishments).

By 1953 the number of institutions authorized to conduct advanced-degree training had declined, both in absolute numbers and proportionately. Soviet authorities explain this as a trend in improving the quality of advanced training by concentrating it in institutions which can offer the best quality of training in terms of facilities and advisory teaching personnel. In that year there were 278 higher educational establishments and 211 research institutions which were certified to conduct aspirantura training and to award candidate degrees. Since the number of higher educational establishments and the number of research institutes increased during this period, the relative proportion of institutions authorized to engage in advanced training is at the present time about one-quarter of all institutions. Most of the institutions authorized to participate in advanced training are located in about 10 major urban centers.

Relationship of Advanced Degrees to Academic Rank

On several occasions throughout this chapter the close correlation between appointment to academic rank and the awarding of advanced degrees has been emphasized. This assertion can now be made more explicit in numerical terms. Prior to January 1947, there were about 26,000 candidate and about 5,200 doctor degrees awarded in the Soviet Union. About 65 percent of candidate degree holders and about 75 percent of doctor-degree holders were employed in Soviet higher educational establishments as academic-rank appointees.[89] The correlation of academic degree to academic rank may be exemplified by table 6.

Similarly, there is a very strong correlation by age of advanced-degree holders and advanced-rank teaching appointees. A professor's median age was 55.4 years; a doctor of science degree holder had a median age of 53.3 years. An assistant professor had a median age of 46.5 years, and a candidate degree holder had a median age of 45.2 years.

[86] Sinetskii, *PP Kadry*, 82.
[87] *Kul't Stroi—1940*, 238, 242.
[88] Ibid., 242.
[89] Sinetskii, *PP Kadry*, 121–124.

TABLE 6.—*Correlation of academic degrees and academic rank in Soviet higher educational establishments in 1947*

Academic rank	Total number (thousands)	Of which—				With either advanced degree	
		With degree of doctor		With degree of candidate			
		Thousands	Percent	Thousands	Percent	Thousands	Percent
Professor	5. 37	3. 64	67. 8	0. 59	11. 0	4. 23	78. 8
Assistant professor (*dotsent*)	13. 86	. 21	1. 5	10. 69	77. 1	10. 90	78. 6
All nonranking instructors	47. 89	. 13	. 3	4. 52	9. 4	4. 65	9. 7

Source: Sinetskii, *PP Kadry*, 122.

Summary

In this chapter an attempt has been made to describe some of the features of Soviet advanced-degree training. Although these features were singled out for discussion in this chapter, the material must be viewed as a continuation of the preceding chapter, where the teaching staffs of Soviet higher educational establishments were discussed. Advanced-degree training programs are designed mainly to prepare or to give recognition to individuals engaged in teaching or research. The latter particularly accounts for the fact that up to 70 percent of all advanced degrees awarded in the Soviet Union are granted in scientific fields.

While in the United States it is true that a large proportion of persons with advanced degrees remain in the academic field, this trend is much more marked in the Soviet Union. Furthermore, while in our educational setting, advanced training and degrees are considered as prerequisites to teaching and research careers, in the Soviet Union they do not serve as such. Academic-rank appointment and advanced-degree awards are supplemental indicators of an achieved status differential.

Past experience and performance are significant determinants of both advanced academic rank and advanced degrees; while the former could be more easily obtained if the latter is attained, the latter is but a formal indicator of achieved prestige, performance, and accomplishment of the former. The existence of this mutual relationship penetrates deeply into the actual scope of day-to-day scientific research activity in the U. S. S. R., and the impact of this dependence is felt and can be fully assessed only if the performance of Soviet scientists is put under further examination.

CHAPTER SIX

Soviet Professional and Specialized Manpower

It should be recalled that in the Soviet Union specialized personnel are grouped into three distinct categories: professionals with higher education; semiprofessionals with specialized secondary education; and those employed as specialists but who have not received formal specialized training. The previous discussion of the training of the first two groups has shown that this training is aimed primarily at preparing an individual for a definite professional occupation which he is expected to assume upon graduation.

The preceding chapters have concerned themselves with the education and training of Soviet professionals and semiprofessionals. This chapter will deal primarily with the allocation of specialized manpower obtained through these training systems and with the employment of Soviet specialists. Some of the problems of the utilization of trained manpower in the U. S. S. R. will also be explored.

It should be remembered that the prevailing policy of involuntary placement of specialists forces the majority of graduates of Soviet semiprofessional secondary schools and Soviet higher educational establishments into jobs which coincide with the field of their formal training. These policies restrict the individual's mobility from one occupational field to another, foster geographic mobility to some extent by the involuntary dispersion of trained personnel, and, finally, have only a slight effect upon the vertical mobility of trained specialists. The first effect is of particular interest for this study since it suggests that once a certain specialty has been acquired by an individual through formal training, there is an institutional device of involuntary placement which compels him to remain within the formally acquired occupational field. This device operates in addition to such personal factors as career expectation, personal motivation, prestige, benefits, etc., which in any industrial society force the individual to retain the occupation originally attained through formal training. In this chapter the extent to which these propositions hold true will be explored further.

Finally, it should be recalled that aside from education there are two other criteria which can be used for defining Soviet specialists—employment and census enumeration. Therefore, another task in the discussion which follows will be a comparison of the information on employment and the census enumeration of specialists with available data about the training of specialists in various fields. The relationship of trained manpower to the Soviet population and labor force will also be discussed.

A number of statistical procedures have been employed. Most of the technical details, estimates, and various checks, as well as a discussion of the sources, are presented in the appendix to this chapter. The text itself will deal primarily with an analysis of the statistical data presented in the appendix.

Overall Supply of Graduates With Specialized Education

While the training of Soviet semiprofessionals and of technicians who have completed secondary specialized education was discussed in chapter III, and graduation trends from Soviet higher educational establishments were considered in chapter IV, discussion of the total flow of graduates has been reserved for this chapter. As already revealed in the text and in the appendices to chapters III and IV, the total number of graduates in the U. S. S. R. can be ascertained for most years. There are, however, some gaps in Soviet reporting of the distribution of graduates by field, a deficiency which can be remedied by using information on graduations by field for longer periods (usually the Soviet planning period of 5 years) and by employing estimates.[1] Since we are concerned in the present chapter with ascertaining gross trends in Soviet training and the supply of specialized manpower, the errors which may arise by making use of admittedly imperfect data should be overlooked for all practical purposes. It is obvious that we will be dealing with sufficiently reliable approximations only, and no claim is made that the figures presented are absolutely precise magnitudes.

The data in table 1 summarize statistics on graduations of Soviet professionals and semiprofessionals during the period 1928–54. During this 26-year period, which is the era of the Soviet Five-Year Plans, Soviet higher educational establishments trained about 2,660,000 professionals, and about 4,510,000 semiprofessionals were graduated from secondary specialized schools for a total of about 7,170,000 specialists in all fields and on both levels of training. These figures represent totals, which

[1] See details in the appendix to this chapter. Most of the estimates are made on the assumption of continuity which in most cases is a valid one. The estimating techniques are primarily interpolations, projection of distribution of entering classes in order to arrive at the distribution of graduating classes, projection of a distribution of graduates by period upon graduating class in a given year.

TABLE 1.—*Summary of graduations of professionals and semiprofessionals by period, 1928–54*

Graduations by field	1928	1st FYP, 1929–32	2d FYP, 1933–37	3d FYP, 1938–40	War, 1941–45	4th FYP, 1946–50	5th FYP, 1951–54	Total, 1928–54
Graduations of professionals (with completed higher education):								
1. Engineering-industrial	8,900	67,700	134,400	89,000	69,100	(160,300)	(153,000)	(682,400)
2. Agricultural	6,400	30,600	41,600	31,000	21,100	(50,800)	(62,000)	(243,500)
3. Socioeconomic	2,000	17,900	21,400	16,600	10,100	(34,600)	(44,000)	(146,600)
4. Educational	5,200	34,600	84,200	118,100	124,200	(298,000)	(310,000)	(974,300)
5. Health	6,200	19,200	36,100	44,000	62,800	(108,300)	(97,000)	(373,600)
6. Total (1–5)	28,700	170,000	317,700	298,700	287,300	(652,000)	(666,000)	(2,420,400)
7. Higher Party Schools	—	—	52,200	5,600	N	N	N	57,800
8. Correspondence	N	—	N	—	—	—	(186,000)	(186,000)
9. Total (6–8)	28,700	170,000	369,900	304,300	287,300	(652,000)	(852,000)	(2,664,200)
Graduations of semiprofessionals (with completed secondary specialized education):								
10. Engineering-industrial	6,800	98,600	213,200	112,000	—	(337,000)	—	[1,218,400]
11. Agricultural	4,400	58,000	94,400	78,000	—	(193,000)	—	[682,000]
12. Socioeconomic	1,200	14,500	35,700	21,500	—	(198,000)	—	[428,000]
13. Educational	11,300	82,500	179,500	198,700	—	(289,000)	—	[1,204,000]
14. Health	4,800	37,600	100,200	215,500	—	(261,000)	—	[979,000]
15. Total (10–14)	28,500	291,200	623,000	625,700	(533,000)	(1,278,000)	—	[4,511,400]
16. Correspondence	N	—	N	N	—	—	—	—
17. Total (15–16)	28,500	291,200	623,000	625,700	(533,000)	(1,278,000)	(1,132,000)	(4,511,400)
Professional and semiprofessional combined:								
18. Grand total (9, 17)	57,200	461,200	992,900	930,000	(820,300)	(1,930,000)	(1,984,000)	(7,175,600)

( ) All figures in parentheses are derived by addition. Both reported figures and estimates were used.

[ ] Figures for technicum graduates for the period 1928–54 were derived on the basis of the projected distribution of graduates during 1928–40 and 1946–50.

N—None or negligible. (—) Figures not available.

Source: Table B–1, appendix to ch. VI; table A–1 and table A–3, appendix to ch. III; and table A–1 and table A–2, appendix to ch. IV. All estimated figures are rounded.

FYP designates 5-Year Plan periods.

account for graduates of educational establishments operated by Soviet civilian authorities and exclude specialists trained in military or police higher educational establishments or semiprofessional schools, which, if considered, would obviously increase the total number of trained specialists and particularly the number of those trained in the engineering-industrial and health fields.

At the same time, of course, it is obvious that the total number of trained specialists (i. e., 7,170,000) is biased upward because of some double counting. Some semiprofessionals continue their training in higher educational establishments and subsequently are counted as professionals. The extent of this bias cannot be ascertained with precision, but it is probably from 5 to 10 percent of the total number of professional graduates.

During the period 1928–54 the Soviet Union trained about 17 semiprofessionals per 10 professionals, a ratio which according to the Soviet planning norms should have been higher. This ratio of trained semiprofessional personnel and technicians to professional personnel and engineers varied from field to field, being about 28 to 10 in agricultural fields, 25 to 10 in medical fields, 29 to 10 in socioeconomic fields, 18 to 10 in engineering-industrial fields, and only about 12 to 10 in educational and cultural services fields. Thus, the reliance upon the supply of specialized semiprofessional graduates was substantially greater in agricultural, socioeconomic, and medical fields than in engineering or education.

During the last two and one-half decades Soviet efforts in training specialists have centered on engineering-technical and educational fields. About 32 percent of the professional and semiprofessional graduates were trained for the field of education. Engineers and technicians and other specialists on both levels for industry, manufacturing, mining, transportation, and communication accounted for about 27 percent of graduates on both levels. About 20 percent of the specialists were trained for medical and public health fields. Agricultural field specialists accounted for only 13 percent, and all graduates in socioeconomic fields accounted for only 8 percent of specialists trained on both levels during this period.

Supply of Graduates With Higher Education

While a large number of semiprofessionals with completed secondary specialized education who were trained in the period 1928–54 provided additions to the supply of technical, supporting and minor supervisory personnel for the Soviet economy, the flow of graduates from Soviet higher educational establishments was the main source of addi-

tions to Soviet professional, engineering, and managerial manpower. It is this supply of graduates with completed higher education which merits further attention.

A summary of the available data covering the supply of graduates with completed higher education over the last 26 years (1928–54) is presented in the appendix (table B–1) to this chapter. From the available data on annual graduations, table 2 has been compiled. Again it must be stressed that the figures presented in table 2 were derived by addition, using actual figures or available estimates. Consequently, they should be viewed as good approximations only.

From 1928, the beginning of Soviet efforts to train large numbers of professionals, until 1954 the higher educational establishments of the U. S. S. R. graduated about 2,660,000 specialists. This represents approximately one-half of about 5,275,000 degrees awarded in all fields by higher educational establishments in the United States during a comparable period (1926–53).

While it is not possible to make numerical comparisons of Soviet semiprofessional graduates with those in the United States, simply because this type of formal training receives less attention in American education and, consequently, data are not readily available, however these comparisons can be made and are justifiable on the level of professional higher education because of the qualitative comparability of the training in the two countries.

While Soviet higher educational establishments graduated only half as many persons in all fields as were graduated from colleges and universities in the United States during the last 26 years, there are other numerical differences which should be emphasized. Because of the radical difference in emphasis in higher education in the two countries, the Soviet Union graduated about 42 percent more engineering field professionals than were graduated in this field in the United States (United States (1926–53), about 480,000; U. S. S. R. (1928–54), about 682,000). There were almost twice as many agricultural field graduates in the Soviet Union as in the United States (U. S. S. R. (1928–54), about 244,000; United States (1926–53), about 133,000). While in all health fields the number of Soviet and American graduates was about the same, in medicine alone, the Soviet Union graduated more than twice as many specialists as there were graduates in the United States (medical, primarily physicians): U. S. S. R. (1928–54), about 320,000; United States (1926–53), about 148,000.[2]

The Soviet emphasis on training specialists in engineering, medical, and agricultural occupations was carried out at the expense of other

[2] All American figures were derived by addition from data reported by periods in D. Wolfle, *America's Resources of Specialized Talent*, New York: Harper & Bros., 1954, 294–295. All Soviet figures are the same as in table 2.

TABLE 2.—*Professional graduates of Soviet higher educational establishments, 1928–54*

Soviet graduates with completed higher education by field of training	Approximate total number of graduates	Distribution of graduates in percent	Notes on Soviet categories of reporting graduates by field
Engineers of all types in industry, construction, manufacturing, mining, transportation, communication, and other industrial field professionals.	682,000	25.6	Contains about 85–90 percent engineers by American definition. Includes about 10–15 percent, or about 70,000 to 100,000, graduates which are not commonly reported as engineers in American practice. These are primarily specialists in engineering-economics (i. e., engineering management), as well as some other categories (geology, engineering physics, geodetics, meteorology, etc.).
Agricultural specialists: agronomists, veterinarians, specialists in: conservation, electrification, and mechanization of agriculture, forestry.	244,000	9.2	Includes about 10 percent, or about 25,000, engineers on electrification and mechanization of agriculture. The remainder are primarily agricultural field specialists.
Socioeconomic professionals in: economics, trade, accounting, banking, planning, statistics, jurisprudence, social and communal services.	147,000	5.5	About ⅓ of all graduates in this category are planning, accounting and economic managerial personnel.
Educational professionals: teachers for all levels of schools and professors—foreign-language specialists, other cultural service professionals, art and music instructors and performers.	974,000	36.5	Contains about 180,000–200,000 Soviet university graduates, of whom about 40–45 percent, or 75,000–90,000, are natural and physical science and mathematics majors. Contains about 470,000–490,000 Soviet pedagogical institute graduates, of whom about ½, or about 230,000–250,000, are mathematics, natural, and physical science majors.
Health professionals in: medicine—therapeutic and preventive; dentistry, pharmacy, hygiene, professional coaching, and physical culture instructing.	374,000	14.0	Contains predominantly medical field specialists (physicians primarily, who represent about 85 percent, or about 320,000).
Total distributed	2,421,000		
Other undistributed	244,000	9.2	
Of which: Higher Party School graduates	58,000		Primarily managerial personnel for industry and agriculture.
Extension training graduates	186,000		About 70 percent, or about 120,000, are education field professionals.
Grand total	2,665,000	100.0	

Source: Table B–1, appendix to ch. VI. Totals are derived by adding annual graduations. This distribution and total do not take into account professionals graduated from military or police higher educational establishments.

fields. In social science fields the Soviet Union trained only about one-tenth as many persons as were trained in these fields in the United States. In the field of education both countries graduated about the same number of persons (close to 1,000,000). However, among Soviet graduates in the field of education, about one-third majored in mathematics and in the natural and physical sciences (about 320,000), the majority of whom became science teachers. This represents about one-half of the total number of graduates as there were in the respective fields in the United States (about 645,000), but in the United States only a portion of these science graduates became science teachers. Finally in the humanities, liberal arts, and other nonspecialized fields, Soviet higher education trained but a small fraction of the number of persons as were trained in American colleges and universities in these fields.

These comparisons of the supply of graduates of higher educational establishments by field in the two countries during the last two and one-half decades clearly suggest that while the United States made a greater effort to provide higher education for a larger number of people in various nonspecialized fields and thus to promote the aims of general education, the Soviet Union proceeded primarily with the buildup of specialized professional manpower resources largely at the expense of general education.

Problems in Estimating Employment of Soviet Specialized Personnel

The problem of ascertaining the number of living and employed specialists who have graduated from Soviet professional and semiprofessional educational establishments is a complicated one. Estimates of the number of Soviet professional and semiprofessional graduates employed in the national economy of the U. S. S. R. can be obtained in several ways, all of which have one element in common. These estimates are extrapolations from the detailed prewar data on the number of specialists employed and living, to which are added the numbers who have graduated annually since that time and from which total have been subtracted losses based on assumed rates of mortality or attrition. The differences between various estimating techniques result primarily from different methods of derivation of these mortality or attrition rates and from differing evaluations of the reliability of the estimates obtained once these loss rates have been applied.

The first approach consists in ascertaining the total number of living graduates and is as follows:

An overall death rate for Soviet higher education graduates can be estimated by the application of plausible age specific mortality rates to the age distribution of graduates in 1939.[3] For 1939 this estimated overall death rate of Soviet higher education graduates was about 1.0–1.2 percent. Assuming that changing age distribution due to the annual additions of new graduates has little effect upon this overall death rate and making allowance for additional (hypothetical) war losses[4] of about 10 percent of the 1941 total number of living graduates, we may estimate the total number of living Soviet higher education graduates for any given postwar year. Employing these techniques, we estimate that as of January 1955 the Soviet Union had about 2,550,000 (estimates range from 2,470,000 to 2,640,000) living higher education graduates.[5]

This method of estimating is relatively simple to apply and provides an easy solution as to the probable maximal estimate of the total number of living higher education graduates in the U. S. S. R.[6] However, because it rests primarily on hypothetical assumptions, it is not subject to verification and check. It does not provide us with information of particular interest in regard to the actual developments in the process of the formation of Soviet trained manpower resources. In addition, it is applicable only to graduates of Soviet higher educational establishments, and valid assumptions for extending this estimating technique to graduates of Soviet semiprofessional schools cannot be made.

The second technique which can be used in estimating the number of employed graduates, both by total and by occupational field, applies only to those who complete Soviet higher education. It consists first in estimating actual annual attrition rates for one profession and then in making the assumption that these attrition rates are valid for other professional occupations. Then, actual attrition rates are estimated on the basis of

[3] Age distribution is given in *Kul't Stroi*—1940, 21. "Hypothetical mortality rates" for the U. S. S. R. for 1938–40 can be obtained from F. Lorimer, *The Population of the Soviet Union*, Geneva: League of Nations, 1947, 124.

[4] Hypothetical war losses for the U. S. S. R.'s population as a whole can be assumed as ranging between 8 and 12 percent according to various estimates (Lorimer, Eason, Kulisher). See, for example, E. Kulisher, "Russian Manpower," *Foreign Affairs*, vol. 31, No. 1 (October 1953), 71; Lorimer, op. cit., 181–184; W. Eason, "Population and Labor Force" in A. Bergson (editor), *Soviet Economic Growth*, Evanston, Ill.: 1953, 101–105; and W. Eason, *Population and Labor Force*, Appendix, copyright manuscript for private circulation, 1953.

[5] Employing this technique and assuming: (1) the total number of persons with completed higher education reported in the Soviet census of population of January 1939 as 1,080,000; (2) the overall mortality rate as 1.1 percent; (3) annual graduations as given in table B–1, appendix to ch. VI; (4) additional hypothetical war losses (deaths and migration) as 10 percent of 1941 total, we obtain for January 1950 a total number of living graduates of 1,890,000; for January 1955, 2,470,000 (excluding extension training graduates) and 2,640,000 (including extension training graduates).

[6] In this connection it must be pointed out that in Soviet vital statistics calculations the use of occupational life-expectancy tables derived for the United States or other countries is unjustified and erroneous. For obvious reasons it is difficult to make comparisons between Soviet attrition rates and attrition rates which can be obtained on the basis of American occupational life-expectancy tables.

actual employment and annual additions of graduates,[7] and such rates can be derived for Soviet physicians, for example, for a number of years. Although these attrition rates can be derived for many years, they cannot be ascertained for all years,[8] and therefore the consistent use of this estimating technique becomes difficult without making additional assumptions. Again this technique can be applied to Soviet professionals only.

Finally, there is another way of obtaining estimates for the total number of professional and semiprofessional graduates employed in the Soviet economy and for their distribution by occupation. This method in a sense is an extension of the second type of procedure, except that it deals with aggregates and instead of dealing with 1 year deals with periods. It consists first in adopting information about the employment of trained professionals or semiprofessionals, or both combined, in a certain year. Second, an assumption is made about minimum and maximum rates of attrition, which in this case are assumed to be an average annual attrition rate for a given period. Third, an actual set of estimates is produced by using annual graduations. Finally, these estimates are verified on the basis of actual employment reported several years later.

Although these estimating procedures are lengthy and laborious,[9] they make optimum use of the available checks on the actual number of specialists employed, provide additional information about the development of specialized manpower within a given period, and finally help to ascertain the validity of certain hypothetical assumptions. This technique of estimating was used for ascertaining the total number and occupational distribution of Soviet specialists who have been graduated from higher educational establishments and semiprofessional schools, and employed in the national economy of the U. S. S. R.

Total Number of Trained Specialists Employed in the National Economy of the U. S. S. R.

In order to ascertain the total number of professionals and semiprofessionals, two types of information can be used. One type, as already indicated, consists of information about the actual employment of trained

[7] The attrition rate in this case is defined as the ratio in percent of the number employed at the beginning of a given year, plus graduates in the summer of that year minus the number actually employed at the beginning of the next year to the number employed at the beginning of a given year. These actual attrition rates among Soviet physicians varied from 1.2 to 8.0 percent during the period 1937–52.

[8] There are discontinuities in reporting the number of physicians employed in the U. S. S. R. Furthermore, due to the temporary withdrawals of physicians from civilian employment before and during the war, there are several postwar years (1946–48) for which the attrition rate becomes positive. Although a similar occurrence is observable in regard to other occupations, the use of actual annual attrition rates among physicians for other occupations leads to some uncertainty as to the reliability of estimates.

[9] For further details, see app. C and the set of "C" tables in the appendix to ch. VI.

specialists in the national economy of the U. S. S. R. Table 3 presents a summary of this type of information derived from Soviet official pronouncements (primarily those reported by the State Planning Commission of the U. S. S. R.). For some years the number of trained specialists employed in the Soviet economy was stated explicitly, while for other years figures on employed specialists can be derived from reported percentage relationships which interrelate the number of trained specialists employed in different years. In either case this information gives gross approximations of the actual number of specialists employed for the years since 1940.

By the end of 1953 the Soviet Union employed about 5,850,000 formally trained specialists. In 1953 the national economy of the U. S. S. R. employed about 2 million professionals with completed higher education and about 3,850,000 semiprofessionals with completed secondary specialized education. During the two decades 1932–53 the number of trained specialists employed in the U. S. S. R. increased about 4.2-fold, from about 1,366,000 to about 5,850,000.

TABLE 3.—*Soviet reporting of the actual number of trained professionals and semiprofessionals employed in the national economy of the U. S. S. R., 1928–54*

[All figures rounded in thousands]

Year end	Professionals in all fields	Semiprofessionals in all fields	All trained specialists
1928	[1] 283. 5	----------	----------
1932	[1] 462. 4	[1] 903. 7	1,366.1.[1]
1937	[1] 748. 8	[1] 1, 440. 0	2,188.8.[1]
1940	850. 0–900. 0	1, 650. 0–1, 700. 0	About 2,550.0.
1946	----------	----------	About 3,000.0.[1]
1948	----------	----------	About 3,920.0.
1949	----------	----------	About 4,270.0.
1950	1, 573. 0–1, 665. 0	3, 015. 0–3, 107. 0	About 4,680.0.
1951	----------	----------	About 5,000.0.[1]
1952	----------	----------	About 5,500.0.[1]
1953	1, 870. 0–1, 980. 0	3, 870. 0–3, 980. 0	About 5,850.0.
1954	----------	----------	About 6,350.0.

[1] Figures explicitly stated. All other figures were derived on the basis of reported percentage relationships.

Sources and notes: Data from tables A–1, A–2, A–3, A–4, A–6, A–7, appendix to ch. VI. Details on derivation of figures and alternatives are presented in the appendix. For several sets of alternative figures for 1940, see table A–4, appendix to ch. VI.

It should be stressed, however, that figures on the employment of trained specialists in the national economy of the U. S. S. R. do not take into account trained manpower in military fields. The numerical rate of transfer of trained specialists between the civilian economy and the military segment cannot be verified. It is apparent, however, that because

military specialists, or those who were originally trained for civilian occupations but later withdrew in favor of military occupations, are not accounted for by the data, the estimates of specialists employed in the national economy are biased downward.

The data presented in table 3 provide an independent check when a second type of available information is used for making estimates. This information deals with estimates based upon the annual influx of graduates who provide additions to the known employment in a certain base year and upon application of assumed rates of attrition. This information is of considerably greater interest since it can be subjected to analysis and interpretation.

Table 4 summarizes numerous estimates based on this technique and explained in more detail in the appendices to this chapter. The data presented in table 4 are most revealing. It is quite significant that despite minor numerical differences, there is a close approximation between the estimates derived on the basis of different assumptions from graduation data and those verified on the basis of the actual reporting by Soviet sources of employed specialists. In most instances, estimates differ by substantially less than 5 percent, a variation which is to be expected and which is quite acceptable. Thus, these findings about the numerical growth of trained specialists employed in the U. S. S. R. are sufficiently reliable and can be accepted with reasonable confidence.

Losses and Attrition Rates Among Soviet Specialists Employed in the National Economy

From the data summarized in table 4, it is ascertainable that over the last two and a half decades the trained specialized manpower employed in the national economy of the U. S. S. R. was subject to an average annual rate of attrition of about 3 percent. This attrition rate was due to natural causes, retirements, withdrawals, war losses, and purges. The average annual attrition rate among professionals over the period between 1932 and 1953 was slightly over 3 percent, while the average annual attrition rate for semiprofessionals was slightly above 2 percent. These actually verifiable rates of attrition are substantiated further by various statements of Soviet planners in the field of specialized manpower.

As early as 1929 it was stated by the Soviet State Planning Commission that average annual losses among professionals and semiprofessionals were anticipated at about 2 to 4 percent. These losses would include attrition due to natural causes, retirement, and "political incompatibility." [10] In 1948 it was indicated that there had been in the past 2- to 4-percent average annual losses among Soviet trained manpower

[10] *Plan Kadrov—1930,* 24, 103.

TABLE 4.—*Estimated number of trained specialists employed in the national economy of U. S. S. R. and verification of estimates 1932–53*

[All figures rounded in thousands]

Year end	Professionals in all fields	Semiprofessionals in all fields	All trained specialists	Notes and comments on derivation of estimates
1932 given	[1] 462. 4	[1] 903. 7	[1] 1, 336. 1	Given employment.
1937 estimate	750. 4	1, 417. 2	2, 167. 6	1932 base: Professional, 3 percent; semiprofessional, 2 percent attrition rate.
1937 given	[1] 748. 8	[1] 1, 440. 0	[1] 2, 188. 8	Given employment.
1940 estimate 1	864. 0	1, 699. 0	2, 563. 0	1937 base: Professional and semiprofessional, 8 percent attrition rate.
1940 estimate 2	848. 2	1, 769. 6	2, 618. 8	1937 base: Professional and semiprofessional, 2 percent attrition rate. Adjusted for purge losses and prewar withdrawals.
1940 given	[1] 850. 0	[1] 1, 700. 0	[1] 2, 550. 0	Given employment.
1950 estimate 1	1, 564. 0	3, 048. 0	4, 612. 0	1937 base: Professional and semiprofessional, 3 percent attrition rate. No adjustments.
1950 estimate 2	1, 567. 0	3, 077. 0	4, 644. 0	1940 base: Professional and semiprofessional, 2 percent attrition rate. No adjustments.
1950 estimate 3	1, 512. 6	3, 018. 7	4, 531. 0	1937 base: Professional and semiprofessional, 2 percent attrition rate. Adjusted for purge losses and prewar withdrawals. Adjusted for 8 percent hypothetical war losses.
1950 given	[1] 1, 573. 0	[1] 3, 107. 0	[1] 4, 680. 0	Given employment.
1953 estimate 1	2, 027. 0	3, 638. 0	5, 665. 0	1937: base: Professional and semiprofessional, 2 percent attrition rate. Adjusted for purge losses and prewar withdrawals. Adjusted for 8 percent hypothetical war losses.
1953 estimate 2	2, 026. 0	3, 571. 0	5, 597. 0	1937 base: Professional and semiprofessional, 3 percent attrition rate. No adjustments.
1953 estimate 3	2, 026. 0	3, 819. 0	5, 845. 0	1937 base: Professional, 3 percent; semiprofessional, 2 percent attrition rate. No adjustments.
1953 given	[1] 1, 980. 0	[1] 3, 870. 0	[1] 5, 850. 0	Given employment.

[1] Figures indicated represent approximate employment actually reported for these years.

Source: "A" and "C" Tables, appendix to ch. VI. These tables also present estimates for some intermediate years. See text and appendices for further details.

employed in the national economy.[11] Finally, in 1954 it was revealed that depending upon occupational field, the average annual rate of attrition of trained specialists varied from 2.0 to 3.5 percent. In the past and for all specialists this average annual rate of attrition due to natural causes and withdrawals (including losses due to political causes) has been about 3 percent per annum.[12] Thus, if a long period (the last 22 years) is considered, the average annual rate of attrition appears to have been about 3 percent.

While this finding is important for long-run projections and estimates of Soviet trained manpower, the consideration of losses and attrition rates for shorter periods is also important for understanding the process of the growth of Soviet trained manpower resources.

During the period 1928–32, the process of upgrading specialists in terms of their classification by training took place on a wide scale.[13] This upgrading was practiced particularly in regard to semiprofessionals. Some of this upgrading probably continued during the Second 5-Year Plan (1933–37), but it was undoubtedly on a considerably smaller scale. During this period (1933–37) the addition of graduates with completed specialized education on both levels was about 993,000. The net gain in the number of trained specialists employed in the national economy was about 833,000. Consequently, losses were about 160,000. The average annual attrition rate for professionals was about 3 percent, and for semiprofessionals about 2 percent. For all trained specialists the average annual attrition rate was about 2.5 percent during the period 1932–37.[14]

During the period 1938–40 the additions of graduates amounted to about 930,000; however, the net gain in the total number of trained specialists employed in the national economy was only about 361,000. Thus, if the attrition rates which prevailed in 1932–37 are adopted for the period 1938–40, between 1938 and 1940 there were excessive losses of 300,000 to 400,000.[15]

These excessive losses were undoubtedly caused to some extent by temporary withdrawals of trained personnel from civilian employment on the eve of World War II. However, they were primarily caused by the impact of the "great purges" in 1937–38, when an unprecedented and unparalleled reign of terror led to the incarceration or physical elimination of a large number of trained specialists. Because of these excessive losses, the average annual rate of attrition increased to about 8 percent during 1938–40.

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[11] *VVSh*, No. 4, 1948, 12–17. [Lyasnikov article).

[12] I. Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR* (Training of Specialists for Industry in the U. S. S. R.), Moscow, 1954, 67.

[13] Table C–1, table C–2, and notes to these tables in the appendix to ch. VI give further details.

[14] Further details may be found in table C–2 in the appendix to ch. VI.

[15] Data from table C–4, appendix to ch. VI.

During the war period (1941–46), about 1,080,000 specialists were trained; however, between 1940 and 1946 the number of specialists employed in the national economy increased by only about 450,000. Particularly during the war, as well as in the immediate prewar years, there were extensive withdrawals of trained specialists from civilian employment. Because of these withdrawals the average annual rate of attrition appears to have been slightly over 4 percent. However, in the postwar years, particularly during 1946–48, additions to the number of trained specialists employed in the national economy of the U. S. S. R. were substantially higher than the number of new graduates from specialized training establishments, which implies that transfers from military occupations into civilian economy were taking place on a large scale. Because of these developments it is more fruitful to consider the growth of Soviet specialized manpower over the entire decade of the 1940's.

During the period 1941–50 additions of graduates were about 2,750,000, and the net gain in the number of trained specialists employed in the national economy was about 2,130,000.[16] Total losses were about 600,000. Hypothetical war losses (1941–45) are assumed to have been about 8 percent of the original 1940 trained professional and semiprofessional labor force, in addition to the average annual attrition rate during the entire decade of about 2 percent per annum.[17] The average annual attrition rate during the war was probably close to 4 percent, but it fell substantially below 2 percent per annum in the postwar years particularly because of the compensating effect of transfers of trained specialists from military to civilian occupations. During 1946–48, in fact, there were large net gains and the attrition rate was positive.

Finally, it appears that from 1950 to 1954 the average annual rate of attrition was below 2 percent (probably close to 1.6 percent), although in most estimates of trained manpower in the early 1950's the assumed attrition rate of 2 percent per annum was used.[18]

To sum up these trends, in 1932 the Soviet Union employed about 1,366,000 trained professionals and semiprofessionals, some of whom were classified as such because of extensive upgrading during 1928–32. After that period, additions to the specialized labor force were primarily the result of a flow of new graduates. During the period 1933–54, Soviet higher educational establishments and secondary specialized schools graduated about 6,685,000 specialists. In 1954 there were about 6 million trained specialists employed in the national economy. Thus, net losses of trained specialists during this period (1932–54) were about 2 million. These losses were heavy not only during the war itself but particularly during the political purges in 1937–38. While the attrition rates varied

[16] Table C–8 in the appendix to ch. VI.
[17] For additional details, see tables C–10 and C–14 in the appendix to ch. VI.
[18] For further details, see tables C–12 and C–15 in the appendix to ch. VI.

from one period to another, for the entire period (1932–54) the average annual rate af attrition can be assumed to have been about 3 percent, being slightly over 3 percent among trained professionals and close to 2.5 percent for trained semiprofessionals.

Soviet Labor Force and Specialized Personnel

The data presented in table 3 and table 4 show the number of specialists employed in the national economy of the U. S. S. R. in various years during the last two and one-half decades. The specialists employed in the national economy of the U. S. S. R. represent a part of the Soviet labor force of "salaried workers and employees." This concept of labor force excludes collective farmers and most agricultural labor, military personnel, forced labor, some artisans, and certain other smaller components. The concept includes employment in all industries, manufacturing, mining, construction, transportation, communication, trade and distribution of supply, banking, accounting, planning, insurance and credit institutions, some state agricultural farms and machine tractor stations, education and health services.[19] Most trained specialists are employed in one of the subdivisions of this labor force of salaried workers and employees.

During the period 1928–53 the Soviet labor force of salaried workers and employees increased about fourfold from about 10 million to slightly over 40 million persons. While in 1926 the labor force of salaried workers and employees represented about 10 percent of the total labor force, by 1950 it accounted for over a third of the total labor force. In 1928 the Soviet labor force of salaried workers and employees accounted for about 7 percent of the U. S. S. R.'s total population. By 1953 about one-fifth of the Soviet population was in this labor force.[20]

In 1928 the industrial component of this labor force of Soviet salaried workers and employees was only about 3.8 million, which was slightly above the industrial employment in the United States in 1880. By 1953, however, the industrial component of the Soviet labor force of salaried workers and employees was about 16 million, which was only slightly below (about 10 percent) the industrial employment in the United States in 1952 (about 17,600,000).

[19] See more precise definition in W. Eason "Population and Labor Force," in A. Bergson (editor), *Soviet Economic Growth;* A. D. Redding, "Volume and Distribution of Nonagricultural Employment in the U. S. S. R., 1928–55," *The American Slavic and East European Review,* vol. XIII, No. 3 (October 1954), 365–367; or in a number of texts on Soviet economy.

[20] For a more extensive discussion of these trends, see A. D. Redding, "Comparison of Volume and Distribution of Nonagricultural Employment in the U. S. S. R., 1928–55, with the United States, 1870–1952." *The Review of Economics and Statistics,* vol. XXXIV, No. 4 (November 1954), 444–450.

These figures indicate that the formation of a Soviet nonagricultural and industrial labor force proceeded rapidly. Under the conditions of this short formative period of industrial labor, formal training of one sort or another and on all levels—from skilled labor to engineer, from technician to research scientist—was an urgent and indispensable requirement. This formal training was not only a function of rapid growth but also a function of the higher degree of specialization and bureaucratization of skills and occupations in an industrial society. This is true of any industrial society. However, in a rapidly expanding industrial order, formal training becomes more significant since there is a scarcity of the skills and experience acquired informally in two or even more generations in the industrial society which has developed gradually. Thus, there is much more reliance upon formal training for the development of such skills and experience.

Under these conditions, formal training of various types and on different levels became the major source for additions to the expanding industrial labor force and to the professional and semiprofessional component within it. In order to satisfy the demands of industry, of social services needed for the expanding industrial order, of the growing bureaucracy of a totalitarian state, which with open ruthlessness began to carry out its long-run objectives of transforming an agricultural state into an industrial power, the Soviet educational system at large and the training of professionals and specialists on various levels were shaped in the form they are today—and as they have been described in earlier parts of this volume. It was under such circumstances—aside from various political and ideological rationalizations—that formal training acquired such a prominent place in the Soviet Union and that formal educational criteria began to play such a significant part in the determination of one's occupational and social status.

Table 5 shows the growth of specialized personnel employed in the national economy of the U. S. S. R. in its relationship to the labor force of salaried workers and employees. At the end of 1953 the number of specialists with completed secondary semiprofessional and higher professional education, which—except for a few agricultural specialists—represents a part of this labor force, was 5,850,000, and represented a 4.3-fold increase over the number of trained specialists employed in 1932. At the end of 1953 the number of professionals with completed higher specialized education was about 2,027,000, and the number of semiprofessionals with completed specialized secondary education was about 3,813,000. The semiprofessional component among all trained specialists increased during this period (1932–53) at a slightly higher rate (about a 4.4-fold increase) than the professional personnel (about a 4.1-fold increase).

TABLE 5.—*Comparison of the growth of the Soviet labor force of salaried workers and employees and trained manpower, 1928–53*

Year end	(A) Number of workers and employees	(B) Total number of professionals and semiprofessionals with completed specialized education	(C) All trained specialists per 1,000 workers and employees	(D) Number of professionals in all fields	(E) Professionals per 1,000 workers and employees
	Millions	*Thousands*		*Thousands*	
1928	11. 6			283. 5	24. 4
1932	22. 9	1, 366. 1	59. 6	462. 4	20. 2
1937	27. 0	2, 188. 8	81. 1	748. 8	27. 7
1940	31. 2	2, 550. 0	81. 7	848. 2	27. 2
1946	30. 7	3, 000. 0	97. 7		
1950	38. 4	4, 680. 0	122. 5	1, 513. 0	39. 6
1953	43. 2	5, 850. 0	135. 4	2, 027. 0	46. 9

Sources and notes

Column (A)—A. D. Redding, "Volume and Distribution of Nonagricultural Employment in the U. S. S. R., 1928–55," *The American Slavic and East European Review*, vol. XIII, No. 3 (October 1954), 360–361. About the same series are presented in W. Eason, "Population and Labor Force" in A. Bergson (editor), *Soviet Economic Growth*, 110.

Columns (B) and (D)—All figures are the same as derived in appendix to chapter VI (tables A–1, A–2, A–3; C–9, C–10, C–12) or those presented in tables 3 and 4 in the text above. Among several alternative estimates of professionals for 1940, 1950, 1953, those figures were selected which refer to the distribution by field (which are slightly lower than estimates which were derived by using totals only).

Columns (C) and (E)—Derived by division of column (B) or column (D) by column (A).

During this period (1932–53) the growth of trained specialized personnel, both professional and semiprofessional, proceeded at a rate more than twice as high as the rate of growth of the Soviet labor force of salaried workers and employees. The number of all trained specialists per 1,000 salaried workers and employees increased during this period about 2.3-fold, from about 60 trained specialists in 1932 to about 135 trained specialists in 1953 per 1,000 workers and employees.

While from 1928 to 1932 there was a sharp drop in the number of professionals per 1,000 workers and employees (from 25 to 20 per 1,000), which caused severe shortages of professional manpower in the early stages of the Soviet industrialization drive, the situation improved toward the mid-1930's. Despite some gain from 1937 to 1940 in the total number of trained specialists employed in the national economy, the number of trained specialists per 1,000 workers and employees remained

virtually unchanged. Consequently, due to temporary withdrawals from civilian employment and political purges, the rate of growth of specialized manpower was about the same (even slightly lower among professionals) as that of the labor force of salaried workers and employees in the late 1930's. In the postwar period due partly to the rapid expansion of professional education and due to transfers from military to civilian occupations, the rate of growth of trained manpower has been substantially higher than the rate of growth of the labor force of workers and employees. As a result, by 1953 there were about 47 trained professionals per 1,000 workers and employees, which is more than a two-fold increase over the low ratio of trained professionals to workers and employees which existed in 1932.

Soviet Professionals With Higher Education and Soviet Population

The census of the Soviet population in 1939 revealed that in that year out of a Soviet population of about 183 million, there were about 13 million persons who had secondary education and about 1,080,000 persons with higher education.[21]

It must be noted that the census of population as of January 17, 1939, included all persons with completed higher education living in the U. S. S. R. The actual number of persons with completed higher education employed in the national economy in that year can be estimated as about 830,000, or about 76 percent of all reported persons with higher education. Thus, in that year there were about 250,000 persons reported with higher education not employed in the national economy. There are two possible explanations for this occurrence. First, it is quite probable that the census figure included some persons who actually had only partial higher education.[22] Second, there were undoubtedly persons with completed higher education outside the civilian nonagricultural labor force of salaried workers and employees. There were the military, the retired, or incarcerated persons, all of whom were excluded from reported employment series, but included in the census of population count.

If all persons with higher education reported by the census in 1939 are considered, the Soviet Union had about 64 persons with higher education per 10,000 population. However, if only persons with completed

[21] *Kul't Stroi—1940,* 8.

[22] In this connection it should be stressed that throughout this volume and in the discussion in this chapter, only persons with completed higher education were considered as professionals. This is consistent with the definition used by the Soviet State Planning Commission (*Gosplan*) since 1932, when specialists with completed higher education rather than partial higher education were singled out as a distinct category within an aggregate category of all specialists employed in the Soviet economy.

higher education employed in the national economy are taken into account, there were about 45 professionals per 10,000 population.

In 1950 the estimated number of persons with completed higher education employed in the national economy was about 1,513,000. Since Soviet authorities have been reluctant to release figures on the actual population of the Soviet Union in the postwar years, Western observers have had to rely upon various estimates. If we assume the estimated population of the Soviet Union for 1950 as ranging from about 193 million to about 205 million,[23] the number of professionals with completed higher education employed in the national economy ranges from 73 to 78 per 10,000 population. If all living persons with higher education (i. e., military, retired, incarcerated, etc.) are considered, this proportion might increase to as high as 95 to 105 persons with higher education per 10,000 population.[24]

Despite the lack of precision, it is apparent that by 1950 the proportion of persons in the Soviet Union with completed higher education to population was substantially smaller than that in the United States (in 1953 the United States had about 320 persons with higher education per 10,000 population), but slightly higher than that in most West European countries. At the same time it should be stressed that the proportion of persons with higher education in the Soviet population has made enormous gains over the last three decades when the number of persons with completed higher education increased from about 12 in 1926 to at least 80 in 1950 per 10,000 population.

Occupational Composition of Trained Professional Labor Force in the U. S. S. R.

The preceding discussion has dealt with the total supply of graduates and the estimates of the total number of trained specialists employed in the national economy of the U. S. S. R. It is of particular interest to consider now the occupational composition of Soviet professionals employed in the national economy of the U. S. S. R. Table 6 presents a summary of the estimates of trained professionals in different occupations on the basis of which the distribution and the rates of growth for

[23] Eason, "Population and Labor Force" in A. Bergson, *Soviet Economic Growth*, 102; or other population studies (Kulisher, Lorimer, Redding).

[24] This statement is based on two possible methods of estimating the total number of living graduates. One estimate for 1950 is about 1,890,000 living higher education graduates, which can be derived by using techniques already discussed in the earlier part of this chapter (see footnote 5 above). The second estimate for 1950 is about 1,940,000, which can be obtained if the assumption made that the 1939 relationship of all reportedly living persons with higher education to the actual number of persons with completed higher education employed in the national economy remained true for 1950. Both estimates, of course, should be regarded as useful approximations only.

different fields were verified. Before turning to a discussion of the data presented in table 6, several reservations must be made.

The data presented in table 6 refer to persons with completed higher education employed in the national economy only. The definitions of occupational fields which are used in table 6 are the same as those generally employed in Soviet official sources for grouping specialists by branch of employment and graduates by field of training. These categories are broad and designate entire segments of the economy and services rather than narrowly defined occupational fields commonly employed in American practice in reporting this type of information. Consequently, an analysis of these data lacks the desired refinement of occupational categories, which are more narrowly defined and, as a result, more precise.

The figures presented in table 6 for 1929 and 1937 are based on Soviet official reporting of the actual employment of professionals with completed higher education in the respective occupational fields. The 1937 composition of professionals by occupation can also be estimated on the basis of the 1932 actual employment of professionals by branch and annual additions of higher education graduates in the respective fields. This suggests that already by the mid-1930's it is verifiable, in gross terms, that most higher education graduates were employed in occupational fields coinciding with the field of their formal training.

Figures for 1940, 1950, and 1954 were estimated by using average annual rates of attrition (see discussion above) and on the basis of the actual employment of professionals by occupational field in 1937 and the annual influx of graduates in the respective fields.[25] After the estimates were made by using various Soviet pronouncements it was possible to ascertain that actual employment in a number of occupational fields (engineering, agriculture, health) was consistent with and closely approximated the estimates thus derived. Consequently, on the basis of available checks for a number of years and several fields, it was possible to verify the fundamental implication of these estimating procedures. It appears that there is only a limited transfer of graduates formally trained in one field into some other occupational field in the course of their employment.

Although the fundamental assumption of limited transfer is actually verifiable and consequently the data presented in table 6 do reveal the occupational composition of Soviet professionals with completed higher education, the problem of the utilization of professionals within any given occupational category is not solved by these findings. This is particularly true if a narrower definition of occupation is used, or if within a given occupation the vertical mobility of professionals into such positions as

[25] For further details, see appendix to ch. VI, particularly general note to "C" tables, notes to tables C–9, C–10, C–12, and app. C–11.

TABLE 6.—*Distribution of Soviet trained professionals with completed higher education, by occupational field, and growth of professional fields, 1929–54*

[Year-end employment in the national economy of the U. S. S. R.]

Professionals with completed higher education by occupational training	1929		1937		1940		1950		1954		Ratio of growth from 1929 to 1954
	Thousands	*Percent*	*Thousands*	*Percent*	*Thousands*	*Percent*	*Thousands*	*Percent*	*Thousands*	*Percent*	
Engineers of all types in industry, construction, manufacturing, mining, transportation, communication, and other industrial field professionals	40.7	14.1	262.2	35.1	283.5	33.5	428.0	28.4	541.0	26.6	13.3
Agricultural specialists (agronomists, veterinarians; specialists in conservation, electrification and mechanization of agriculture, forestry)	12.5	4.4	89.5	11.9	97.3	11.4	140.0	9.2	189.0	9.2	15.2
Socioeconomic professionals in: (economics, trade, accounting, banking, planning, statistics, jurisprudence, social and communal services)	41.0	14.2	60.2	8.1	61.7	7.3	88.0	5.8	125.0	6.1	3.0
Educational professionals (teachers for all levels of school and professors—foreign language specialists, other cultural service professionals, art and music instructors and performers)	130.0	45.2	231.0	30.8	284.1	33.5	607.0	40.2	857.0	42.1	6.6
Health professionals in: (medicine—therapeutic and preventive; dentistry, pharmacy, hygiene, professional coaching, and physical culture instructing)	63.5	22.1	105.9	14.1	121.6	14.3	249.0	16.4	324.0	16.0	5.1
Total distributed	287.7	100.0	748.8	100.0	848.2	100.0	1,513.0	100.0	[1]2,036.0	100.0	7.1

[1] In addition, in 1954 there were about 182,000 professionals undistributed by occupational field (a large proportion of whom belong to the educational field). 1954 estimated grand total is 2,218,000.

Source: Tables A–1, A–3, C–9, C–10, C–12 in the appendix to ch. VI. Data for 1929 consist of 1928 and 1929 employment figures. Totals for educational and health field professionals same as in table A–1 in the appendix to ch. VI. Engineering, agricultural, and socioeconomic field professionals from *Nar Khoz—1932*, 488–493. See notes to table 2 in the text above for further comments about Soviet definitions of occupational fields.

administration or management is considered. Furthermore, the limited interoccupational transfer does not preclude (as the Soviet press occasionally reveals in stories about the utilization of professionals) a person from assuming employment in an occupation distinctly different from that which coincides with the field of his formal training. This, however, takes place on a very limited scale only. In view of all this, it must be kept in mind that the problem of utilization of Soviet professionals within a given occupational field constitutes an additional issue, which must be singled out and which will be discussed briefly in subsequent parts of this chapter.

The data in table 6 reveal the growth of occupational fields and changes in distribution of Soviet professionals. During the 25-year period from 1929 to 1954, the Soviet trained professional labor force increased more than sevenfold. However, during this same period two fields of occupational specialization—engineering and agriculture—experienced growth at a rate twice as high as that for all professional personnel. Growth in other fields was disproportionately lower than increases in the professional labor force as a whole.

There were marked changes in the distribution of professionals by occupational field during this period. The engineering-industrial professionals emerged as the dominant component (about 35 percent) of the total professional labor force by the end of the Second 5-Year Plan (1937). Since then, though the number of engineering-industrial professionals more than doubled from 1937 to 1954 (1937, 260,000; 1954, 540,000), their relative proportion among all professionals has been declining. Despite this, however, in 1954 trained engineering-industrial professionals accounted for about 27 percent of all professionals employed in the national economy of the U. S. S. R., or almost twice their relative share in 1929.

Educational field professionals accounted in 1929 for about 45 percent, and in 1954 for about 42 percent of all professionals. Thus, educational field professionals, after the decline of their relative share to about 30 percent in the mid-1930's, at the end of the 25-year period had almost regained their original proportion and again accounted for the largest segment of all trained professionals. As a result of the 15-fold increase in the number of agricultural field professionals (1929, about 12,000; 1954, about 190,000), their relative proportion more than doubled during the last 25 years, and in 1954 represented about 9 percent of all professionals. Finally, the relative proportion of trained professionals in the health fields and particularly in the socioeconomic segment has declined markedly over the last 25 years.

In 1954 there were over 2 million persons with completed higher education employed in the national economy of the U. S. S. R. In 1954 about 42 percent of these were trained for and employed in the field of

education, about 27 percent were trained in engineering and related fields and employed in industry, manufacturing, mining, transportation, and communication. In that year about 16 percent were health field professionals, about 9 percent were in agricultural fields, and only 6 percent were in all socioeconomic service fields.

Some Social Aspects of Soviet Professional Labor Force

1. *Place of Women Among Soviet Professionals*

During the last 25 years, the participation of women in professional occupations in the Soviet Union has increased considerably. These changes in the relative proportion of women among professionals in individual fields are summarized in table 7.

The enormous increase in the relative proportion of women in the postwar period came about as a result of the war, and also because there were large numerical increases of professionals in the medical and eductional fields where the relative proportion of women continued to be extremely high. The relative proportion of women among professionals in 1950 was only slightly higher than the relative proportion of women among all workers and employees. In 1950 women accounted for 45.7 percent of all Soviet salaried persons employed in the nonagricultural labor force of salaried workers and employees.[26]

TABLE 7.—*Relative proportion of women among Soviet professionals (Year end)*

Occupational fields	*Percent of women among all professionals*		
	1939	*1940*	*1951*
Engineering	14.7	19.4	----
Agricultural	9.2	24.4	----
Socioeconomic	8.2	26.1	----
Educational	21.0	37.0	----
Health	47.2	56.9	----
All fields	23.5	32.6	50.5
Total number, women professionals	68,000	277,000	830,000

Sources: The original 1930 distribution was obtained from *Nar Khoz—1932*, 488–540, and *Itogi Pervogo FYP*, 217. Data for 1940 were obtained as a projection of enrollment trends for women during the period 1930–40 upon data for graduations (see table A–3 in the appendix to ch. IV). The 1939 census serves as a check point (it also gives about 32 percent for women). The 1951 total number of women professionals (830,000) was reported in *Bol'shevik*, No. 12, 1952, p. 4. The percentage was derived on the basis of this total number of women professionals and the estimate of all professionals employed in the national economy in that year (table C–12 in the appendix to ch. VI). The percentage of women professionals in different occupational fields is not available.

[26] As estimated from Eason "Population and Labor Force" in A. Bergson, *Soviet Economic Growth*, 110.

2. *Social Origins of Soviet Professional Personnel*

After the October Revolution, Soviet leaders envisaged a rapid transformation of the managerial, technical, and cultural leadership in the U. S. S. R. Lenin saw a cultural revolution which would change the face of the intellectual elite in Russia. He felt that the old intelligentsia and professionals would be used only temporarily until the new proletarian cadres of specialists could be trained. Stalin, in the late 1920's and early 1930's, made many pronouncements which called for an increased tempo in the training of specialists from the working class. Both Soviet leaders tended to view the success of the Revolution and the construction of a socialist society as greatly dependent upon newly trained Soviet professionals who would be proletarian by origin. This ideologically and politically dictated orientation was incorporated in voluminous legislation and even in early planning—for example the First 5-Year Plan, which stressed the need for the "proletarization" of specialists (*orabocheniye kadrov*).[27]

The opportunity to accomplish these aims presented itself during the 1930's, when about a threefold increase in the size of the professional labor force was achieved. As was already indicated earlier in this volume (ch. IV), this policy of the proletarization of Soviet professional personnel had to be relaxed in the mid-1930's. The net result of this policy, however, is summarized in table 8.

TABLE 8.—*Composition of Soviet professional personnel by social origin*

Social groups	*Composition of Soviet professionals in percent (year end)*	
	1929	*1940*
Workers and their descendants	9. 7	30. 1
Peasants and their descendants	18. 9	19. 5
"Other": Artisans, intelligentsia, white-collar, and former proprietor classes and their descendants	71. 4	50. 4
Total professionals	287, 700	848, 200

Sources: Original 1929 distribution from *Nar Khoz—1932*, 488–493. Data for 1940 derived by projection of VUZ enrollment by social origin (table A–4, appendix to ch. IV) upon graduation data.

Thus, although the restrictive policies of the Soviet Government succeeded in raising about threefold the proportion of workers and their descendants by origin among Soviet professionals, on the whole during this crucial decade it was the "other" groups (i. e., nonworkers, intelligentsia, white collar, etc.) who were still largely responsible for additions to professional personnel.

The particular significance of this development can be appreciated when it is understood that "other" groups (intelligentsia, white collar,

[27] *Plan Kadrov—1930,* 115–129. Beilin, *Kadry,* discusses this problem on almost every page.

and other minor categories), who in 1939 accounted for only about 7 percent of the U. S. S. R.'s total population, were responsible for about 40 percent of the additions to the professional labor force. While workers and their descendants, despite the forceful policy, were responsible for additions to professional personnel only slightly higher than their relative share in the total population, peasants, who represented about 60 percent of the Soviet population, were responsible for less than 20 percent of the additions to Soviet professional personnel.

It can be argued that because of the expansion of all educational facilities (particularly secondary education in urban centers) in recent years, the relative share of workers and their descendants by origin among Soviet professionals increased somewhat in the postwar period. There is an equally strong argument, however, that in all probability the trend of the increasing proportion of "other" (nonproletarian and nonpeasant) groups among graduates of Soviet higher educational establishments continued in the postwar period. The second argument seems more plausible particularly in view of the fact that the Soviet Government has suppressed the release of any statistical data (though they are still compiled) dealing with the distribution by social origin of students in Soviet higher educational establishments. This complete taboo on discussing the social origin of Soviet professionals suggests the presence of unfavorable trends, which unfortunately cannot be assessed in quantitative terms.

3. *Soviet Professionals and Communist Party Membership*

It is particularly revealing to note that from 1929 to 1947 many Soviet professionals were recruited into the ranks of the Communist Party of the Soviet Union. In 1929 only about 7 percent of all professionals were members of the Communist Party.[28] In 1947 about one-third of all Soviet professionals were Communist Party members. In 1947 about 38 percent of all engineers employed in the national economy, about 19 percent of medical doctors, about 19 percent of agricultural field professionals, and about 16 percent of professionals in the field of education were members of the Communist Party.[29]

This increase of Communist Party membership among professionals was brought about by the radical shift in policy on admissions and recruitment for party membership which took place in the mid- and late-1930's.[30] During that period various restrictions and discriminations against accepting intellectuals, white-collar workers, and other nonprole-

[28] *Nar Khoz—1932,* 492.

[29] These percentages were ascertained on the basis of data on Communist Party membership presented in *Partiinaya Zhizn',* No. 20, October 1947, 73–83, and the estimated number of professionals by field for 1947.

[30] For further details, see M. Fainsod, *How Russia is Ruled,* Cambridge: Harvard University Press, 1954, esp. 225–232.

tarian social groups into the ranks of the party were lifted, and extensive campaigns recruiting professionals and other specialists into the party were conducted. Despite this drive to mobilize the support of professionals which started shortly before the war and despite the substantial gain in the relative proportion of party members among professionals, it is surprising that in 1947, after 30 years of Communist rule in Russia, only about one-third of all professionals had been recruited into the party.

Soviet Semiprofessional Personnel and Its Occupational Composition

Thus far, this discussion has centered on the total number of specialists, as well as on Soviet professionals with completed higher education. Various statements made above were possible because estimates were verifiable with a sufficient degree of accuracy and reliability. Unfortunately, except for the discussion of the overall supply of semiprofessionals with completed secondary specialized education made earlier, a discussion of occupational composition and various related aspects of the semiprofessional labor force is hampered by the lack of precise data on graduations, which are essential for obtaining estimates with the desired degree of reliability. Therefore, although data on the occupational distribution of trained semiprofessionals were derived for the postwar years, they must be viewed as very rough approximations only.

Table 9 summarizes actually reported employment and estimates in regard to the composition of semiprofessionals by field.

From 1932 to 1950 the size of the Soviet semiprofessional labor force increased about 3.3-fold. Again, as in the case of professionals, the growth of semiprofessionals in the fields of industry and agriculture was disproportionately higher, and in the fields of socioeconomic services and education disproportionately lower than the rate of growth of the total semiprofessional labor force. In the health field, however, the rate of growth of semiprofessional supporting personnel (medical nursing primarily) increased almost fivefold during this period.

The 1950 composition of semiprofessionals was about as follows: Engineering technicians and other semiprofessionals in industry accounted for about one-quarter of all semiprofessionals, and their proportion was only slightly below that of semiprofessionals in the education field (some 29 percent). Semiprofessionals in health fields accounted for about 22 percent, and those in agriculture and socioeconomic services for 13 and 11 percent, respectively, of all trained semiprofessionals employed in the national economy.

TABLE 9.—*Approximate composition of the Soviet semiprofessional labor force, 1932–50*

[Year-end employment in thousands]

Field	1932	1937	1940	1950
Semiprofessionals and technicians in industry, manufacturing, mining, transportation, and communication	132. 5	372. 3	413. 5	749. 4
Semiprofessionals in agricultural fields	58. 5	145. 5	191. 7	385. 4
Semiprofessionals in socioeconomic services and branches	195. 6	184. 6	174. 9	349. 3
Semiprofessionals in the field of education and cultural services	382. 1	524. 3	618. 9	862. 0
Semiprofessionals in health fields	135. 0	213. 3	370. 6	672. 6
Total	903. 7	1, 440. 0	1, 769. 6	3, 018. 7

Source: Actual employment reported for 1932 and 1937 from tables A–2 and A–3 in the appendix to ch. VI. 1940 and 1950 estimated employment from tables C–13 and C–14 in the appendix to ch. VI. See notes in the appendix for further details.

Finally, it should be noted that while in 1950 the ratio of all trained semiprofessionals to all professionals employed in the national economy was about 2 to 1, there was wide divergence from this ratio in individual fields.[81] In the socioeconomic service fields far greater reliance upon trained semiprofessionals was reflected in the ratio of 39 semiprofessionals to 10 professionals. In agricultural and health fields there were about 27 semiprofessionals per 10 professionals employed. The ratio of technicians and industrial semiprofessionals to engineers with higher education was only 17 to 10, and in education it was only 14 to 10. The examination of these ratios suggests that if Soviet planning norms are taken into consideration, there is a substantial deviation from the planned optimum of the utilization of semiprofessional personnel in industry in particular.

Trained Specialists and Soviet Managerial, Administrative, Technical, and Supervisory Personnel

Soviet professional and semiprofessional personnel with formal higher education and secondary specialized training represent an integral part of the bureaucratic, managerial, and administrative personnel, intellectuals, white-collar workers, technical and supervisory personnel. This large group is usually singled out and is commonly called in Soviet pronouncements by the broad and ambiguous term—"intelligentsia." Table 10 shows the composition of this group as a whole and various

[81] In order to make these statements, a comparison of the data for the estimated number of professionals (table 6 above) and semiprofessionals (table 9) was made.

segments within it as revealed for a number of years in Soviet official pronouncements. The data presented in this table reveal the total size of fields by function or by occupation.

Although the overall size of this group can be ascertained for 1936 only, from the fragmentary information available for 1926 and 1952 it is possible to obtain valuable information about the growth of various segments within it during the last three decades. Furthermore, on the basis of the available data it is possible to consider the role which is assigned to trained manpower in the bureaucracy of the Soviet state.

The data presented in table 10 refer to various groups defined by status and occupation. For the years 1926, 1936, and 1938 the figures reported have apparently been obtained from the census of population in these years. There are several occupations (engineers and architects, agronomists, scientists, physicians) for which it can be safely assumed that the majority of persons are professionals with higher education. In 1938 the figures for engineers, agronomists, and physicians closely approximate

TABLE 10.—*Composition of Soviet managerial, administrative, technical, specialized, and supervisory personnel*

[Year-end figures in thousands]

	(a) 1926	(b) 1936	(c) 1938	(d) 1952
Administrative personnel	(2)	1,751.0	(2)	(2)
Engineers and architects [1]	32.0	250.0	305.0	2,000.0
Intermediate technical personnel	175.0	810.0	896.0	
Agronomists [1]	18.0	80.0	90.0	400.0
Other technical agricultural personnel	13.0	96.0	114.0	
Scientists [1]	14.0	80.0	93.0	(2)
Teachers (of all ranks)	348.0	969.0	1,201.0	2,000.0
Cultural and educational workers	59.0	297.0	495.0	(2)
Arts	54.0	159.0	174.0	(2)
Physicians [1]	70.0	132.0	155.0	300.0
Intermediate medical personnel	130.0	382.0	607.0	900.0
Economists and statisticians	(2)	822.0	(2)	(2)
Bookkeepers and accountants	375.0	1,617.0	1,769.0	(2)
Legal workers	(2)	46.0	(2)	(2)
Students in higher education establishments	160.0	550.0	603.0	1,400.0
Other types (including military)	(2)	1,550.0	(2)	(2)
Total	(2)	9,591.0	(2)	(2)

[1] Categories thus indicated can be assumed to be composed mainly of professionals with higher education.
[2] Figures not available.

Sources: (a), (c) *Bol'shevik*, No. 10, 1940, 22; also see *American Quarterly on the Soviet Union*, Nos. 2–3, Nov. 1940, 95. (b) *Bol'shevik*, Nos. 5–6, 1939, 102–104. (d) L. Gruilow (ed.), *Current Soviet Policies*, Ann Arbor, Mich.: 1953, 163 (Beriya speech at 19th Party Congress). In subsequent years (after fall 1952) these original figures were repeated by several dozen other Soviet sources.

the estimated number of professionals employed in the respective fields in the national economy. If it is assumed that the majority of persons in these segments were trained professionals, it is possible to account for about 643,000 specialists, or about 80 percent of the trained professionals employed in the national economy of the U. S. S. R. in that year.

It appears that in 1936 trained professionals and semiprofessionals accounted for about one-fifth of a group which is officially defined as "Soviet intelligentsia." Unfortunately the total size of this group cannot be obtained for 1952, but on the basis of the growth in fields for which data are obtainable it appears that by 1952 the "Soviet intelligentsia" numbered about 12 to 14 million persons. If this figure is assumed to be correct, in that year trained professionals and semiprofessionals accounted probably for about one-third of this group.

From 1926 to 1952 engineers, architects, and technical personnel increased about tenfold. Agricultural field personnel experienced a 13-fold growth. The number of teachers of all ranks increased about fivefold. The number of physicians grew slightly more than fourfold. These differential rates of growth greatly resemble those which were already discussed in regard to the pattern of increases of trained professional and semiprofessional personnel.

Supply, Employment, and the Problem of Utilization of Engineers and Technicians in Soviet Industry

In the preceding parts of this chapter an attempt was made to deal with aggregates and to ascertain the growth and the size of specialized fields, primarily with reference to these aggregates. In conclusion, it is useful to bring together and to reconcile the different types of data discussed earlier and to supplement them with additional information which will be helpful in understanding the problems of employment and utilization of trained personnel in the U. S. S. R. This is particularly important in regard to the employment of engineers and technicians in Soviet industry.

It has earlier been stated that Soviet authorities distinguish, in addition to *trained* specialists, another category of professionals and semiprofessionals. This category consists of persons actually employed in the capacity of specialists although they have not had formal specialized training. Personnel of this type in Soviet industry are commonly called practicals (*praktiki*). Formally trained professionals and semiprofessionals who are employed in production, in supervisory or in managerial positions, and all "practicals" who are employed in a similar capacity in Soviet industry, manufacturing, mining, construction, transportation,

communication, etc., are commonly designated in Soviet practice as one group, which is called engineering-technical personnel (*ITR—Inzhenerno-Tekhnicheskiye Rabotniki*).

It was indicated earlier, in table 10 above, that in 1952 the Soviet Union had about 2 million engineers, architects and intermediate technical personnel. This aggregate figure represents roughly the total number of persons in the category "engineering-technical personnel" and includes by definition trained professionals and semiprofessionals and all "practicals" who are employed as specialists in all branches of Soviet industry, manufacturing, mining, construction, transportation, and communication. According to estimates of trained manpower, in 1952 the Soviet Union had about 470,000 engineers and industrial field professionals with completed higher education, and about 850,000 trained technicians with completed secondary specialized education.[32] Consequently, trained specialists, professionals and semiprofessionals accounted in that year for about 1,320,000 persons, which is about two-thirds of all "engineering-technical personnel" (about 2 million) in all branches of Soviet industry, manufacturing, mining, construction, transportation, and communication.

In the Soviet Union (as well as in the United States in many instances) the supply of engineers and technicians in industry is related to the number of production workers. Table 5 above has shown the relationship of trained manpower to the Soviet labor force of salaried workers and employees. It is revealing to consider now the relationship between trained engineers, trained technicians, all engineering-technical personnel (i. e., including "practicals"), and production workers in Soviet industry. This relationship is usually expressed in terms of the number of specialists per 1,000 production workers. This ratio obviously varies from one branch of industry to another, which to some extent is a reflection of the numerous technological and economic factors affecting the demand for engineers and technicians by different branches of industry.

During the last 25 years there has been a considerable increase in the supply of engineering and technical personnel in relation to the number of production workers employed in Soviet industry.[33] Table 11 summarizes the data which reveal the change in the ratio of engineering-technical personnel per 1,000 production workers from 1930 to 1950.

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[32] Tables C–12 and C–15 in the appendix to ch. VI. The figures on trained engineers and technicians in the text are rounded estimates of figures presented in the appendix.

[33] The concept "Soviet industry" includes all mining, extracting, and processing industries, all types of manufacturing. It excludes construction, transportation, and communication.

TABLE 11.—*The relationship of engineering-technical personnel to production workers in all branches of Soviet industry, 1930–50*

	Ratio per 1,000 production workers			
Year end	*Trained engineers with completed higher education*	*Trained technicians with secondary specialized education*	*Practicals*	*Total engineering-technical personnel*
1930 actual	7.0	8.0	20.5	35.5
1936 actual	13.0	17.0	40.5	70.5
1940 actual	19.7	23.3	67.0	110.0
1950 plan	28.0	60.0	30.0	118.0
1950 actual	28.0	37.0	65.0	130.0

Source: All years, except 1950 Plan, from I. Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR* (Training of Specialists for Industry in the U. S. S. R.), Moscow, 1954, 79–80. 1950 Plan from *VVSh*, No. 4, 1948, 16.

It should be noted first that, on the basis of the data presented in table 11, additional verification of the number of trained engineers and technicians employed in Soviet industry can be made. In 1950 there were about 28 trained engineers and about 37 trained technicians per 1,000 production workers in Soviet industry. Although the actual number of production workers alone in Soviet industry in 1950 cannot be obtained, if total employment in Soviet industry (i. e., about 14,500,000) is considered, it appears that the upper limit estimate of the actual number of trained engineers employed in Soviet industry (i. e., excluding transportation, communication, and construction) in 1950 was about 400,000 and of trained technicians was about 540,000. Consequently, Soviet industry in that year accounted for about 80 percent of all trained engineers employed in the Soviet Union and for about 65 percent of trained technicians. These percentages are not radically different from those which prevailed on the eve of the Second World War (1940), when Soviet industry accounted also for about 80 percent of all trained engineers employed in the Soviet Union. Construction, transportation, and communication engineers apparently accounted for the residual number of trained engineers and technicians.

From the data presented in table 11, it is evident that for Soviet industry as a whole the number of trained engineers and trained technicians per 1,000 production workers over the 20-year period 1930 to 1950 increased more than fourfold. Thus over these two decades the rate of growth of engineering and technical personnel was considerably greater than the expansion in the force of production workers.

The data also reveal that by 1950 trained engineers and technicians accounted for about one-half of all engineering-technical personnel, which, as we already mentioned, also includes by definition those persons performing supervisory and managerial functions. It should be noted, however, that in 1950 "practicals" still continued to account for

about one-half of all engineering-technical personnel. If planned and actually attained ratios for 1950 are compared, it becomes evident that although the planned ratio of trained engineers per 1,000 production workers was realized, the utilization of "practicals" continued to be extensive, particularly because of the deficient supply of trained technicians. The utilization of "practicals" in place of trained technicians, particularly in production, appears to be quite frequent.[34]

It was revealed in 1948 that, according to the plan for 1950, the variation of the number of engineers and technicians per 1,000 production workers in industry was considerable. Table 12 presents these data.

TABLE 12.—*Planned relationship of engineering-technical personnel to production workers in different industries in 1950*

Branch of Soviet industry	*Ratio per 1,000 production workers*			
	Trained engineers with completed higher education	*Trained technicians with secondary specialized education*	*Practicals*	*Total engineering technical personnel*
Electric power stations	50	115	20	185
All types of machine building	45	90	20	155
Petroleum industry	40	85	25	150
Chemical industry	35	80	25	140
Metallurgical industry	25	55	35	115
Food industry	20	55	35	110
Coal and peat industry	20	40	45	105
Construction materials industry	15	40	35	90
Textile and light industry	15	35	30	80
In all branches	28	60	30	118

Source: *VVSh*, No. 4, 1948, 15 (Lyasnikov's article).

The data presented in table 12 reveal that there is a considerably greater reliance placed upon engineers and technicians with formal training in those branches of Soviet industry which deal with machine building and other branches of heavy industry than in light industry. The existence of this pattern in the utilization of trained engineers and technicians is confirmed further by a statement that in 1950 "in certain branches of machine building the number of all engineering-technical personnel per 1,000 production workers exceeded 200, of whom more than one-half were trained engineers." [35]

[34] In this connection, it should be recalled (see ch. III for details) that in recent years Soviet authorities have begun to emphasize strongly the need for increasing secondary semiprofessional training. That there is extensive substitution of "practicals" for trained technicians, as revealed by employment data, is responsible to a great extent for this drive to expand the training of technicians.

[35] I. Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR* (Training of Specialists for Industry in the U. S. S. R.), Moscow, 1954, 17.

It is apparent, therefore, that in 1950 the variation of the ratio of engineering-technical personnel per 1,000 production workers in different branches of Soviet industry was quite substantial. There was, furthermore, in Soviet industry a wide variation in the proportion of trained engineers and technicians among all engineering-technical personnel employed in a given branch. While there are some branches of Soviet industry where the ratio of engineering-technical personnel, and particularly of trained engineers to production workers, is quite low (light industry), there are other branches (probably the armaments-producing branches of machine building, aircraft manufacturing, and the like) where there is enormous concentration of engineering personnel. This pattern of wide differentials in the utilization of engineering-technical personnel throughout industry is, to a large extent, a reflection of the priorities given to certain branches of heavy industry in the Soviet economy.

For 1940 the actual distribution of trained engineers employed in Soviet industry can be ascertained. Table 13 presents these data.

TABLE 13.—*Approximate distribution, by specialty, of engineers with completed higher education employed in Soviet industry in 1940*

Engineering specialty	*Distribution in percent*
Mechanical	34
Power and electrical	9
Mining	8
Metallurgical	6
Chemical technology	11
Food processing	4
Textile and light industry	4
Engineering economics	11
Other undistributed	13
Total	100

Source: Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR*, 65. This distribution refers to about 215,000 engineers.

The data in table 13 reveal that in 1940 the largest proportion of trained engineers were employed as mechanical engineers (i. e., primarily in machine building). Unfortunately the distribution of trained engineers by specialty employed in Soviet industry is not available for recent years. However, judging from the distribution of engineering students by specialty in recent years (see ch. IV), we note that there has not been any significant change in the trend of training by specialty, and consequently the distribution of trained engineers by specialty may not have altered markedly from that presented in table 13.

It is important to note that a substantial proportion of engineering-technical personnel employed in Soviet industry are called upon to perform managerial functions. The latest year for which a comprehensive

distribution of trained specialists employed in Soviet industry and construction was found is 1940. Table 14 presents these data.

TABLE 14.—*Distribution of specialists with completed higher education, by type of employment, in Soviet industry and construction in 1940*

Type of employment	*Distribution in percent*
Administration and management of commissariats (ministries) and chief administrations	7. 4
Administration and management of industrial trusts	9. 1
Regional and local administrations of industrial and construction enterprises	5. 2
Industrial enterprises	48. 1
Construction enterprises	13. 0
Scientific, industrial research and development	7. 5
Educational establishments training specialists and industrial labor	9. 7
Total	100. 0

Source: Lyasnikov, *Podgotovka spetsialistov promyshlennosti SSSR*, 65. This distribution refers to about 240,000 specialists, primarily engineers as well as some other specialists with completed higher education employed in industry (about 215,000) and construction (about 25,000) in 1940.

The data in table 14 reveal that about 22 percent of trained specialists in 1940 were employed in organizations directly concerned with management, technical and economic planning in industry and construction. About 61 percent were employed in industrial and construction enterprises, and about 17 percent were engaged in industrial research and development and training establishments.

The data presented in table 14 indicate the tendency for Soviet engineers to be employed in the upper levels of industrial organization. Many engineers employed in these positions are undoubtedly called upon to perform administrative or managerial functions. However, it is erroneous to assume that *all* those who are employed on a ministry or a trust level do not perform any engineering functions. Industrial research and development, design of new products, and a large amount of engineering and technological planning are concentrated in offices and bureaus of Soviet economic ministries and trusts. This setup is responsible in part for the employment of a substantial proportion of engineers in the upper levels of industrial organization.

Although the data in table 14 reveal that some 60 percent of professionals (primarily engineers) in Soviet industry and construction are employed in plants and enterprises, it is evident from numerous Soviet press reports and pronouncements, both in the past and in recent years, that the proportion of trained engineers employed in production directly is quite low. In 1940 in Soviet industry only 31 percent of all engineers were employed directly in production.[86] This fact is consistent with the previous observation that on the lower levels of industrial organi-

[86] Ibid., 15.

zation it is common for engineering and technical functions to be performed by "practicals." Although it has recently (i. e., 1954) been stated that a further increase in the number of engineers employed in managerial positions is unlikely[87] and that most new engineering graduates will be assigned to jobs in industrial research or in production directly, in the past the trend prevailed of using engineers extensively for technical and economic management.

In this section an attempt has been made in a very brief and cursory fashion to discuss the problem of the utilization of engineering-technical manpower in Soviet industry. It is apparent that in addition to trained engineers and technicians the Soviet Union makes extensive use of personnel without formal specialized education ("practicals"). In the past a trend prevailed by which a large number of "practicals" were used in production because a considerable proportion of trained engineers were engaged in industrial management and the supply of trained technicians was insufficient to replace all "practicals." Furthermore, the distribution of trained engineering manpower in relation to production workers throughout industry is very uneven. There are some branches of industry where an enormous concentration of engineering manpower was achieved because of the deliberate intent of Soviet planners to promote technological development of certain branches of industry.

In conclusion, it should be noted that the total number of trained engineers in the Soviet Union and the ratio of trained engineers to the number of production workers employed in industry in the Soviet Union appear in recent years to have been about the same or even slightly higher than in the United States. A consideration of various reservations regarding the effective utilization of engineers in the Soviet Union is superseded, however, by the fact that in recent years the annual rate of training engineers in the Soviet Union has been substantially higher than that in the United States.

Finally, it should always be kept in mind that the radical differences between an allocation economy and a free-enterprise economy are significant factors which exercise influence upon the differences in demand for engineers in the two countries. These differences, however, cannot be ascertained without a detailed and exhaustive investigation into the state of industrial technology and scientific development in any given branch of industry or in any given field of science in the two countries.

The Number of Advanced-Degree Holders and the Supply of Scientists in the U. S. S. R.

The estimates of trained manpower in the Soviet Union presented in the preceding parts of this chapter have dealt with professionals and semi-

[87] Ibid., 68.

professionals. It is important now to ascertain the number of advanced-degree holders in the Soviet Union.

An elaborate procedure may be used to make postwar estimates on the number of advanced degree holders in the U. S. S. R. However, since there is a radical distinction in the significance of advanced degrees in the U. S. S. R. from those granted elsewhere,[38] a somewhat more simplified approach can be adopted. At the end of 1946 there were about 26,000 candidate-degree holders and 6,000 doctor-degree holders in the Soviet Union.[39] Using this as a base, we may estimate that by the end of 1953 there were about 57,000 advanced-degree holders in all fields. There were some 47,000 with candidate degrees and some 10,000 with doctor degrees.[40] The composition of these advanced-degree holders by field of science can be ascertained only on the basis of a projection of past trends, as was already done in chapter V. It may be recalled that these trends reveal that the great proportion (almost 75 percent) of all advanced degrees were awarded in the field of the natural and physical sciences.

The majority of these advanced-degree holders among Soviet professionals were engaged either in teaching in Soviet higher educational establishments or in scientific research. In 1952 the teaching staffs of Soviet higher educational establishments numbered about 90,000. A large proportion of these teachers were engaged also in pure or applied research. In 1952 the Soviet Union also had about 68,000 research scientists employed in institutions other than higher educational establishments.[41] Consequently, assuming that the majority of academic rank appointees in the U. S. S. R. can be regarded also as scientists, we may say that the Soviet Union in 1952 had about 160,000 scientists. This number of research scientists and academic rank appointees represents approximately a four-fold increase over the number in 1930. Finally, it is apparent that by 1952 more than one-third of all Soviet scientists held advanced degrees.

Summary: A Brief Comparison of the Supply of Professional Manpower in the U. S. S. R. and the United States

On various occasions throughout this volume we have made reference to professional education in the United States, and it therefore seems fitting now to make some concluding comparisons, in summary fashion,

[38] Concerning this distinction, see ch. V.
[39] *VVSh*, No. 11, 1947, 30.
[40] Figures for 1953 are obtained as estimates at 3 percent average annual losses and data on the award of advanced degrees presented in tables A–2 and A–4 in the appendix to ch. V.
[41] This estimate was made on the basis of the pronouncements in *Bol'shevik*, No. 6, 1941, 17; *Pravda*, October 6, 1952.

concerning the availability of trained professional manpower in the two countries.[42] Higher education is undoubtedly more accessible in the United States than in the Soviet Union. In 1953 the United States had about 5,800,000 persons with completed higher education (college or first professional degree). The Soviet Union had roughly 2 million persons with completed higher education. However, *in applied scientific fields—such as engineering, agriculture, medicine—the number of Soviet professionals with completed higher education was about equal to or somewhat above the number of trained persons in these occupations in the United States.* In 1953 the Soviet Union had about 500,000 trained professional engineers, while in the United States there were about 530,000 trained engineers. The Soviet Union had about 280,000 physicians (and only 20,000 dentists), while in the United States there were about 195,000 physicians (and about 90,000 dentists). The United States had about 150,000 trained agricultural specialists, while the U. S. S. R. had about 170,000.

Of course, in order to assign meaning to these magnitudes, they must be viewed in relation to the size of the population and the nonagricultural labor force. While the Soviet population is about one-quarter larger than that of the United States, the Soviet nonagricultural labor force is still about one-third smaller than that of the United States. Thus, the proportionate share of trained professionals employed in the Soviet Union is lower with respect to the population at large, but obviously somewhat higher in relation to the nonagricultural labor force.

To sum up the other fields of occupational composition of the Soviet professional labor force, although the number of teachers of all ranks and at all levels of the educational system is larger in the Soviet Union than in the United States, the relative share of persons with completed higher education among all teachers is substantially smaller in the U. S. S. R. While the Soviet Union in 1952 employed about 2 million teachers, the relative share of those with completed higher education was only about 37 percent (750,000); in the United States in 1953 there were some 1,400,000 teachers, among whom about 70 percent had higher education. The number of teachers in Soviet higher educational establishments was about one-half of that in the United States. In 1952 the Soviet Union had about 90,000 teachers in higher educational establishments, while the United States, in 1953, had about 210,000.

Finally, while in the United States there was a large supply of trained professionals in various fields of business, law, commerce, the humanities, and various social sciences, etc., in the U. S. S. R. there were very few indeed. The few Soviet professionals who did have training in the humanities or the social sciences were employed in teaching fields. There were, for example, less than 100,000 professionals in the U. S. S. R. with

[42] United States data which follow are taken from Wolfle, op cit., passim.

training in the socioeconomic sciences, as compared with over 1 million in the United States.

Analysis of the Soviet professional labor force by occupational field, as well as certain comparisons just made with professional personnel in the United States, suggest that Soviet higher education is still oriented primarily towards the training of specialists in scientific-technical and applied fields (engineering, agriculture, medicine), and has succeeded over the past two and a half decades in reaching a level of close equivalence, and occasionally of numerical supremacy, to that in the United States. Furthermore, Soviet secondary semiprofessional education has provided a large supply of trained supporting personnel, which in the United States is obtained mainly through the automatic process of on-the-job training or through the underutilization of trained college graduates.

As far as the supply and utilization of trained professional manpower is concerned, the Soviet Union over the last 25 years has made these substantial gains, despite the disrupting effects caused by forced collectivization, purges, and war, as well as the radical experimentation which took place in the field of education in the late 1920's. The growth of professional manpower has been facilitated by the extensive utilization of women (50 percent of all professionals). The expansion of this manpower, despite all ideological and political preconceptions advanced by the Communist dictatorship, has proceeded from among the ranks of descendants of the intelligentsia classes. Despite severe pressures for conformity and despite continuous campaigns to recruit professionals into the ranks of the Communist Party, especially since 1935, only about one-third of Soviet professionals have formally embraced this allegiance.

Increases in the Soviet professional labor force were sustained not only by the ability of Soviet higher educational establishments to turn out graduates, but also through the preferential treatment of specialists. However, in spite of such treatment, the net losses among Soviet trained professionals during the last 25 years have been substantially greater than in the United States. Nevertheless, at the present time, the annual losses are substantially smaller than in this country. While annual additions to trained personnel in all fields in the Soviet Union are still smaller than those in the United States, additions to specialized personnel in scientific-technical and applied fields are greater than in the United States and will, in all probability, continue to be. While Soviet official sources continue to complain of shortages of trained professional personnel, the drive to increase Soviet professional manpower at a rate greater than that for the labor force itself still continues to be the long-run objective of Soviet planners in their desire to improve already existing and to master new industrial technology. The success of this undertaking is still regarded as

being largely dependent upon the future additions of formally trained specialists.

Throughout this volume many reservations have been made concerning the training, supply, and utilization of professional personnel in the U. S. S. R. Despite these reservations, we must bear in mind that during the last two and a half decades the Soviet Union has made enormous strides towards building up its specialized manpower resources. As a result of its efforts, it has reached a position of close equivalence with or even slight numerical supremacy over the United States as far as the supply of trained manpower in specialized professional fields is concerned. The Soviet effort continues. Our own policies in the field of education and in regard to specialized manpower resources will decide whether within the next decade or so the scales will be tipped off balance.

Appendix to Introduction

A Note on the Difficulties Encountered in Working With Soviet Educational Statistics

The problem of the reliability of Soviet educational statistics seems to be a major one, and it requires some general discussion. There is no evidence that data published in official Soviet sources are outright fraudulent. In the long run, Soviet statistics seem to be fairly consistent, but at times they appear ambiguous and some juggling can be observed. This juggling takes place when a certain unfavorable trend becomes apparent. For example, when enrollment began to fall off in higher educational establishments in the mid-1930's, Soviet statistical sources began to include enrollment in the Higher Communist Party Schools in the totals. The same was done to bolster the totals of graduations. Once enrollment was again on the upgrade, toward the end of the 1930's, there was no need to smooth the curve and cover up the real drop in enrollment, and so the party schools were again excluded from the totals and carried separately.

While in the prewar period, enrollment and graduation series were biased by the inclusion of party schools in the category of higher educational establishments, in the postwar period Soviet statistical series are biased by the enormous expansion of extension training (*zaochnoye obucheniye*). It is worth noting, however, that the "lumping" of extension students with regular students in official pronouncements became standard procedure in the years after 1949 only. The inclusion of extension students in statistical series is, of course, quite a handy device, for it creates, at least on the surface, an extremely favorable impression of the enormous expansion of Soviet higher education in the postwar period. Furthermore, such inclusion helps to conceal the ups and downs in graduating classes from regular training establishments.

Juggling with primary- and secondary-school enrollment data is another example. After 1949, when enrollment began to fall off in the elementary grades, primary- and secondary-school enrollment began to be "lumped" together with technicum enrollment and with enrollment of students in other than regular secondary schools (extension, schools for working and for rural youth).

There is frequently also some ambiguity concerning the date of the survey for which statistics are given. Some censuses of students in higher educational establishments refer to "October 15," some to "December 1," and some to "January 1" within a given academic year. Some sources simply state the year "1937," and one must do some investigating to find out whether this means average yearly, year-end, or year-entry figures. There are ambiguities as to distribution of students by field. For example, for the year 1934 one can

find eight different sets of figures which add up to approximately the same total but are different in breakdown. This is apparently because of the reorganization of institutes which took place in that year. In the postwar period it becomes a formidable task to cope with figures on graduates by field because of ambiguity concerning what is or is not included in "residual" after specific categories of graduates have been singled out.

There is a problem of inclusion or exclusion of certain categories in graduations by field. For example, prior to 1931, mechanical engineers on the maintenance of agricultural equipment were included in the industrial (i. e., engineering) category, but later on they appear together with agricultural specialists. "Engineer-economists" prior to 1932 were also lumped together with engineers, and thereafter with "economists" (i. e., socio-economic). In the postwar years again some engineering economists were aggregated with engineering-industrial professionals.

A further complication in working with Soviet statistics arises in regard to professionals graduating from universities. Until 1931 the various faculties of universities were allied with the fields of their respective specializations. Thus medical students appear under the health category, and certain engineers under the industrial category, etc. After 1931, however, graduates of universities are lumped under the heading "education."

There is also the problem of approximations, which for the prewar period is not particularly grave, but which becomes quite serious for the postwar years. Directly related to this is the problem of using "preliminary reporting" figures. Often only one set of figures is available, and the use of "preliminary reporting" figures becomes unavoidable as the closest possible approximation of the actual situation.

In addition, there is the problem of professionals who are censored out of statistics. Those who are definitely censored out are military (both army and NKVD) specialists. The concept of "professionals in the national economy" prior to 1932 was constructed in such a way that it censored out education and health specialists. Afterwards professionals in these two occupational groups were embodied in the concept of "professionals in the national economy." But throughout the years, professionals with higher education in military affairs are excluded. This fact was revealed by the 1939 census figure for professionals. There is some uncertainty also as to whether graduates of "special departments" (faculties which train military professionals in civilian higher educational establishments) appear in the totals by field or whether they also are censored out.

Again, there is the problem of the outright suppression of statistics. This problem seems to crop up in cases where a certain trend is in reverse. For example, it is obvious that the 1932 figure for the social and sex composition of students in higher educational establishments was such as to reveal an extremely large proportion of workers by origin and women respectively. In subsequent years, we observe a downward trend, and apparently the publication of the 1932 figures began to look unfavorable propaganda-wise. In order to save embarrassment, these statistics were simply suppressed in all later publications.

A somewhat similar situation is evident in statistics on students by root nationality. The trend was such that national minorities could not gain their relative share in professional education by enrollment in higher educational establishments, a share that would be equal to their relative population. The trend, by 1935, had become so apparent that publication of data on the distribution of students by root nationality was suppressed

from that year on, and "geographic" distribution, often quite ambiguous, began to be used.

Sometimes trends are concealed due to a change of concepts. Sometime in 1934 Soviet statisticians decided to change the concept of the social category "workers by origin" to "workers or their descendants by origin." This change again can be explained on the basis of a desire to bias the picture in the sense that the share of workers by origin among professionals and among students had begun to decline, and in order to bolster the trend the concept was modified.

Regardless of these and many other minor considerations, it is still possible to abstract quite meaningful and consistent data, at least as far as aggregates are concerned. Where discrepancies are minor (such as December 1 or January 1 figures), they may simply be overlooked. In many cases, since no other data are available anyway, there is very little that can be done to adjust certain discrepancies (for example, the problem of "engineer-economists" or the change in concept of "workers by origin"). During the preparation of this report, careful checks of Soviet official sources were made and a large number of ambiguities were resolved. Of statistics which offered some choice, only those which appeared to be most reliable were selected (such as consistency on date of census, exclusion of party schools, attempts to total the breakdowns, etc.).

It should be noted, in conclusion, that any set of social statistics cannot reflect the precision which is expected from data in, say, physics or engineering. The dynamics of social change are so complex that one has to be satisfied when a certain trend can be established or confirmed with reliability and consistency, rather than when a finding is made which states that a few thousand trained engineers are economists who are engaged not in production but in management.

Throughout the report, when a certain bias in a statistical series, when some shift in definition, etc., was observed, every attempt was made to clarify the implication behind it. Most of these observations are made in the appendices.

Finally, a word of caution must be added in regard to "estimates." Some estimates had to be made; they were simply unavoidable. Some estimates do not require any particular assumptions and are based on an elaboration of data gathered explicitly for this purpose. Others require a set of assumptions which are based essentially on one fundamental assumption of continuity. This basis assumption, though often justifiable, may give results which occasionally leave much to be desired.

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Appendix to Chapter II

TABLE A–1.—*Primary- and secondary-school enrollment in the U. S. S. R., 1914, 1920–28*

Year:	Enrollment (in the fall) in thousands	Year:	Enrollment (in the fall) in thousand
1914	7, 800	1924	9, 139
1920	9, 781	1925	10, 194
1921	8, 439	1926	10, 727
1922	7, 394	1927	11, 356
1923	7, 828	1928	12, 075

SOURCES AND NOTES TO TABLE A–1

All figures are rounded. They are reproduced as reported by *Nar Khoz—1932*, p. 507. The year 1928 provides a link with table A which follows where the total enrollment in that year is reported as 12,068,000 against 12,075,000 in this table.

Differentiation by grade was not considered for this period, and only total enrollment figures in regular secondary schools are given below. Enrollment in the *upper* grades (i. e., equivalent to postreform grades 8–10), which at that time were called third-level concentration (*kontsentrat tretei stupeni*), was somewhere between 150,000 and 200,000 in any of the years (there are some fluctuations, but their discussion is irrelevant for our purposes).

TABLE A.—*Primary and secondary school enrollment in the U. S. S. R., 1928–54* [1]

[All figures in thousands]

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	Year end—	Aggregate enrollment in primary and secondary education	Technicum enrollment	Aggregate enrollment without technicums	Total enrollment in regular primary and secondary schools	Primary and secondary school enrollment distributed by grades	Distribution by grade—		
							1–4	5–7	8–10
1	1928		207. 8		12, 068. 2	11, 951. 8	10, 349. 7	1, 437. 5	164. 6
2	1929		235. 6		13, 515. 7	13, 387. 8	11, 583. 4	1, 614. 6	189. 8
3	1930		593. 7		17, 614. 5	17, 427. 4	15, 385. 4	1, 976. 3	65. 7
4	1931		754. 1		20, 933. 0	20, 547. 0	17, 732. 5	2, 813. 6	. 9
5	1932		797. 0		21, 397. 2	21, 257. 0	17, 674. 6	3, 515. 2	67. 2
6	1933		601. 6		22, 095. 7	21, 971. 7	17, 749. 5	4, 083. 6	138. 7
7	1934		668. 5		23, 539. 0	23, 414. 4	18, 279. 7	4, 848. 3	286. 3
8	1935		692. 2		25, 555. 0	25, 420. 3	19, 077. 4	5, 852. 1	490. 8
9	1936		818. 7		27, 611. 1	27, 517. 3	20, 077. 9	6, 716. 7	722. 7
10	1937		862. 5		29, 562. 0	29, 446. 0	20, 755. 4	7, 677. 4	1, 013. 2
11	1938		951. 9		31, 517. 4	31, 386. 2	21, 202. 4	8, 780. 0	1, 403. 8
12	1939		945. 0			32, 056. 0	20, 471. 0	9, 715. 0	1, 870. 0
13	1940		820. 0		32, 900. 0				
14	[1941 Plan]					[36, 262. 6]	[20, 903. 3]	[12, 551. 1]	[2, 808. 2]
15	1941 Actual				(19, 617. 0)				
16	1942				(15, 667. 0)		(10, 467. 0)	(4, 435. 0)	(765. 0)
17	1943				(19, 934. 0)				
18	1944				(22, 625. 0)				
19	1945		940. 0		25, 800. 0				
20	1946	29, 000. 0	1, 077. 0	27, 933. 0	28, 200. 0				
21	1947		1, 113. 0	29, 500. 0	29, 060. 0				
22	1948	34, 000. 0	1, 094. 0	32, 906. 0	31, 000. 0				
23	1949	36, 000. 0	*1, 308. 0	34, 692. 0	32, 000. 0		(30, 866. 0)		(1, 144. 0)
24	1950	37, 000. 0	*1, 298. 0	35, 702. 0	33, 000. 0		(21, 920. 0)	(9, 808. 0)	(1, 272. 0)
25	1951		*1, 369. 0		(31, 500. 0)		(17, 020. 0)	(12, 210. 0)	(2, 270. 0)
26	1952		*1, 475. 0		(28, 000. 0)		(13, 020. 0)	(12, 710. 0)	(3, 270. 0)
27	1953	37, 000. 0	*1, 644. 0	35, 356. 0	(29, 000. 0)		(24, 423. 0)		(4, 577. 0)
28	1954		*1, 744. 0	32, 000. 0	(29, 000. 0)		(23, 620. 0)		(5, 380. 0)

*Including extension students. [ ] Planned figures. ( ) Estimated figures.

[1] For detailed description of columns, see notes and sources to this table. Cols. (*b*), (*c*), (*d*) are included in this table in order to make clear the techniques of estimates: cols. (*e*)–(*i*) relate to primary and secondary-school enrollment as such. All figures refer to the year end; i. e., 1928 means year end 1928 or fall enrollment in the academic year 1928–29.

SOURCES AND NOTES TO TABLE A

Primary- and Secondary-School Enrollment in the USSR, 1928–54

Information presented in table A was compiled from a large number of sources and therefore the use of primary sources and estimating techniques are discussed in detail.

The explanation of columnar designation is as follows:

Column (a).—Years of reference. For example, 1938 means either the academic year 1938–39, or reported date as "fall 1938" in primary sources. It also refers to the usual official procedure of reporting data "at the end of the year" (with actual statistics compiled as of either September 15 or October 20 of that year).

Column (b).—Aggregate enrollment in educational establishments including all forms of primary and secondary education. Since 1949 it has become common practice for Soviet official sources to report the aggregate enrollment in all kinds of primary and secondary educational establishments. Contrary to the supposition which is commonly held, these aggregates contain not only enrollment in secondary semiprofessional schools (*tekhnikumy*) joined with regular primary- and secondary-school enrollment, but also some residual categories, the explanation of which is found in the notes to this table.

Column (c).—Enrollment in secondary semiprofessional schools (*tekhnikumy*). Technicum enrollment, excluding correspondence students, is given for the years prior to 1949. Since 1949, figures on technicum enrollment include correspondence students and no attempt has been made to adjust them. It is believed that correspondence students accounted for at least 250,000 in 1949, and probably as high as 400,000 in 1953. Technicum enrollment has to be considered in the postwar period for the derivation of primary- and secondary-school enrollment.

Column (d).—Aggregate enrollment *without* technicums. It is derived as the difference between column (b) and column (c). More details are found below in the appendix for particular years. Figures in this column were not rounded in order to show clearly their derivation in the table.

Column (e).—Total enrollment in regular primary and secondary schools. It includes, according to Soviet practice, schools for physically handicapped children and mentally retarded children, as well as boarding schools for orphans (*detdoma*).

Column (f).—Regular primary- and secondary-school enrollment distributed by grade. It excludes special schools on the primary and secondary level for physically handicapped and mentally retarded children, enrollment in which, according to Soviet practice, is not reported by grade. In the prewar period the difference between column (e) and column (f) ranged between 80,000 and 380,000. For the postwar period the enrollment in these special schools for physically handicapped and mentally retarded children, and orphanages (*detdoma*) is not ascertainable, but in all probability it ranges somewhere between 300,000 and 500,000. Adjustment of column (f) was not made, and for the post-war period column (e) was regarded as equivalent to column (f). Since adjustment was not made, the result is a slightly higher enrollment for grades 1–4 (column (g)) and grades 1–7 (column (g) and column (h) combined) in the postwar period.

Column (g).—Elementary-school enrollment, grades 1–4. For years prior to 1934 (decree of May 15, 1934) elementary schools were called schools of the first level (*shkoly pervoi stupeni*). Since 1934, enrollment in the first four grades of the 7-year school (*semiletka*) and the 10-year school (*srednyaya shkola*) is included in this category.

Column (h).—Upper grades of the 7-year school, grades 5–7. Prior to 1934 includes first three grades of second-level schools (*shkoly vtoroi stupeni*). Since 1934 includes also grades 5–7 of 10-year schools and 7-year schools.

Column (i).—Upper grades of 10-year school, grades 8–10. Prior to 1934 includes two upper grades of second-level schools (*shkoly vtoroi stupeni*). Since 1934 includes, obviously, only grades 8–10 of the 10-year school.

All figures in table A were presented in thousands and rounded to the first decimal place.

Number and small-letter code refer to the appropriate places in table A. Rows are designated by numbers and columns by small letters. Only abridged titles of primary sources are presented here; for full titles see bibliography.

Code in Table — *Sources and Discussion*

1–11, e–i—*Kul't Stroi—1940*, pp. 27, 51–52, for all years 1928–38.

1–13, c—Data on technicum enrollment are from table A–1, appendix to chapter III.

19–28, c—Data from table A–2, appendix to chapter III.

12, f–i—*BSE-SSSR*, 1947, column 1225. *Kul't Stroi—1940*, p. 246.

13e—There are several figures available for this year:

(1) The figure which was adopted for this table is 32,900,000 from *Pravda*, Feb. 21, 1947 (Zverev, 1947 budget). It is explicitly stated that this is the enrollment in elementary, 7-year and complete secondary schools.

(2) This figure (32,900,000 above) is supported by an independent estimate. *Nar Obr RR—1943*, p. 101, states that the 1940 enrollment in the R. S. F. S. R. was 19,464,200. Since in the years 1937–39 the R. S. F. S. R. comprised by enrollment about 60 percent of the U S. S. R. total, the U. S. S. R. total within old boundaries would have been 32,440,000 in 1940. The 1941 *planned* enrollment for the Baltic provinces (*1941 Plan*, pp. 709, 714, 729) was about 800,000. Thus the figure of about 33,200,000 for 1940 can be obtained by independent estimate.

(3) *Plan Khoz*, No. 3, 1941, p. 47 (Voznesensky's speech at 18th Party Conference), states the planned enrollment in 1941 as being 103.4 percent of the planned enrollment in 1940. The 1941 planned enrollment was to be 36,200,000; therefore the 1940 planned enrollment was set at 35,000,000. It is worth noting that *1941 Plan*, p. 612, gives the figure of 35,467,400, which excludes the newly annexed Baltic provinces; and if these are added (*1941 Plan*, pp. 709, 714, 729), it gives the same figure of about 36,200,000, as reported by Voznesensky. Since these are planned figures, they were not used in this table directly. However, the 1940 planned figure of 35 million provides us with an additional check. The 1940 R. S. F. S. R. planned enrollment was fulfilled by 91 percent (*Nar Obr RR—1943*, p. 101); consequently if this percentage of plan fulfillment is assumed for the U. S. S. R., we obtain the figure of 31,850,000.

(4) *Nar Khoz SSSR*, No. 3, 1950, p. 402 (Zverev's article concerning the 1949 budget), states that the 1949 anticipated enrollment would be 33,928,000, which is 266,000 more than in 1940. Therefore 1940 would have been 33,620,000. It must be noted that Zverev makes it explicit that this enrollment is to be at the *beginning* of the school year, and apparently compares it with the beginning of the school year in 1940. There is a difference of 720,000 between this figure and the one which was adopted for this table (also from Zverev's speech but in 1947). It is known from various sources that the Labor Reserve School draft of October 1940 resulted in a 700,000–800,000 draft of school children in that month alone. This might be an explanation of the discrepancy.

An alternative explanation is also possible. It might be that the figure of 33,600,000 refers to enrollment including new territories, which accounted, according to the *1941 Plan*, for about 800,000, and therefore the figure adopted for this table from (1) above refers to old boundaries only. This explanation seems to be less likely, however, since the U. S. S. R.'s enrollment, as indicated by R. S. F. S. R. figures, was probably either falling or remained stationary between 1939 and 1940; and the Baltic provinces could not account for a difference of 1,600,000 (i. e., if the above figure of 33,600,000 is assumed for 1940 and the 1939 actual figure of about 32,000,000). Consequently, although we have a range of estimates varying between 32,000,000 and 33,600,000 for 1940, it was assumed that the figure adopted for this table (i. e., 32,900,000) appears to be the most probable for *U. S. S. R. total enrollment, including the Baltic provinces annexed during the summer of 1940.*

14, f–i—*1941 Plan*, pp. 612, 709, 714, 729. Enrollment in the Baltic provinces is added in each category of enrollment. The 1941 planned figures are introduced only in order to illustrate the possible highest anticipated enrollment in the prewar period. The plan was not realized.

15–18, e.—The wartime enrollment was derived on the basis of the assumption that R. S. F. S. R. enrollment represents 60 percent of U. S. S. R. total enrollment. *Nar Obr RR—1945*, p. 101; *Nar Obr RR—1944*, p. 166, give the R. S. F. S. R. enrollment which was used as a base.

		R. S. F. S. R. (thousands)	*U. S. S. R.-derived (thousands)*
13e	1940	19,464	32,440
15e	1941	11,770	19,617
16e	1942	9,400	15,667
17e	1943	11,960	19,934
18e	1944	13,575	22,625

These estimates are without doubt maximum estimates for U. S. S. R. enrollment, especially for 1941–43, since the assumption of 60 percent of the R. S. F. S. R.'s share in total enrollment does not take into account the fact that some western regions were occupied by the Germans and instruction there was discontinued entirely.

16, g–i.—Although enrollment by grade could have been derived from the same sources as in 15–18, e, above, it was not done since such an estimate would be based on much greater uncertainty than those presented above. Only for orientation purposes was enrollment by grade for 1942 derived as follows (from *Nar Obr RR—1945*, p. 101):

	Grades:	*R. S. F. S. R.*	*U. S. S. R.*
16g	1–4	6,280	10,467
16h	5–7	2,660	4,435
16i	8–10	459	765
		9,399	15,667

This is undoubtedly a maximum estimate.

18e (additional check).—A different procedure may be employed in order to obtain the 1944 enrollment. *Pravda*, Apr. 25, 1945 (Zverev, 1945 budget), states that the 1945 planned enrollment should increase by 2,800,000, or 11.1 percent over the planned enrollment in 1944. Consequently the planned enrollment for 1945 was about 28,000,000 and planned enrollment for 1944 was 25,220,000. *Nar Obr RR—1944*, p. 166, reports that the R. S. F. S. R. planned enrollment for 1944 was fulfilled by 91 percent. Consequently, assuming 25,220,000 as the planned enrollment for the U. S. S. R. and assuming that the reported fulfillment of plan for the R. S. F. S. R. holds also for the U. S. S. R., we obtain the *actual 1944 enrollment* as 22,950,000, which closely checks with the previous estimate (i. e., 22,600,000).

19e.—*Gudok*, Oct. 16, 1945 (Zverev, 1944–46 budgets), states that the anticipated enrollment in 1946–47 would be 29,339,000, which is 13.9 percent over the actual enrollment in primary and secondary schools in 1945. Therefore the 1945 enrollment was about 25,768,000. It is explicitly stated that enrollment figures refer only to elementary, 7-year and complete secondary schools. Rounded figure of 25,800,000 was adopted in this table.

Another statement tends to confirm the figure assumed for 1945. Zhirnov, *Kul'turnoye*, p. 26, states that enrollment in the spring of 1947 (i. e., it is neither 1946 nor 1947 as table A is set up) was 28,500,000 and that during the last 2 (postwar) years (i. e., 1945, 1946) it increased by 17 percent. Consequently the enrollment sometime in the spring of 1945 was 24,360,000. To sum up, it appears that the enrollment in regular primary and secondary schools in 1944 was about 23,000,000, by the spring of 1945 was about 24,500,000, and by the fall of 1945 was about 25,800,000. This appears to be an entirely reasonable expansion if the actual course of events (i. e., progress of war, reoccupation of Western territories, and reconstruction of these areas) is taken into consideration.

20e.—*Gudok*, Jan. 21, 1946 (Gosplan, Itogi 1946), states that actual 1946 fall enrollment was 2,400,000 above 1945. If we assume the figure of 25,800,000 for 1945 to be correct, the 1946 enrollment was therefore 28,200,000. Note that anticipated 1946 enrollment (see Zverev, 19e, above) was 29,300,000.

19–20, e combined (additional check).—An explicit statement about actual enrollment in April 1946 tends to confirm the figures on enrollment assumed for 1945 and 1946. *Uchitel'skaya Gazeta*, May 1, 1946, reveals both enrollment data by republic which is termed "enrollment at the present time" (*seichas*), and the 1950 planned enrollment (same as given in *Pravda*, March 21, 1946 (1946–50 Plan)). Therefore April 1946 enrollment can be ascertained as follows:

Enrollment in thousands

Republic	1946 (spring)	1950 (plan)
Russian	16,000	18,229
Ukrainian	4,800	6,300
Byelorussian	1,325	1,500
Kazakh	774	1,130
Georgian	585	642
Latvian	227	275
Lithuanian	360	390
Kirgiz	221	278
Tadzhik	238	301
Armenian	225	295
Turkmen	171	203
Estonian	125	136
Subtotal	25,051	29,679
Uzbek	[a](742)	1,085
Azerbaidzhan	[b](517)	569
Moldav	[c](322)	422
Karelo-Finnish	[d](80)	95
Subtotal	1,662	2,171
U. S. S. R. grand total	26,713	31,850

Figures in parentheses are estimated.

The figures for four republics are not revealed, and therefore an estimate is necessary to obtain the 1946 U. S. S. R. total. The least error in obtaining such estimates will probably result if the 1946 to 1950 percentage increases are used for regions under similar conditions (i. e., probably similar effects of war upon planned expansion of enrollment). Therefore:

[a] For the Uzbek S. S. R. it was assumed that conditions prevailing in the Kirgiz, Tadzhik and Kazakh Republics were similar (though in the Kazakh Republic they were probably less favorable). Since a 1946 to 1950 increase in enrollment for these areas of 146 percent was planned, the 1946 enrollment in the Uzbek S. S. R. is estimated as 742,000.

[b] For the Azerbaidzhan S. S. R. it was assumed that conditions prevailing in the Georgian and Armenian Republics were similar (though in the Azerbaidzhan Republic conditions were probably less favorable). Since the 1950 planned enrollment was to be 110 percent of that of 1946, therefore the Azerbaidzhan estimate for 1946 is 517,000.

[c] For the Moldav Republic it was assumed that conditions prevailing in the Ukraine were typical. Since the 1946 to 1950 increase was planned as 131 percent, the 1946 estimated enrollment in the Moldav Republic was 322,000.

[d] The 1940 enrollment in the Karelo-Finnish Republic was 80,000. It is stated that in 1946 it was about the same as in 1940; therefore for 1946 an enrollment of 80,000 was assumed to be true also.

It appears, on the basis of the data presented above, that enrollment in the U. S. S. R. in the spring of 1946 was about 26,700,000. This figure tends to confirm the general magnitude of estimates assumed to be true for 1945 and 1946. The 1946 (fall) enrollment was above this figure (28,100,000) and the 1945 (fall), just after the end of the war), enrollment was estimated as about 25,800,000.

20b.—An alternative derivation of the 1946 figure is possible. *Pravda*, April 17, 1951 (Gosplan, Itogi 1946–50), states that in 1950 there were 37 million pupils *in primary and secondary schools and students in technicums and other secondary educational establishments*, which represents an increase of over 8 million during the period of the Fourth 5-year Plan (i. e., over 1946). Therefore the 1946 technicum, primary and secondary school enrollment was about 29 million or slightly above.

20d.—Consequently, since the technicum enrollment was 1,077,000, the *primary and secondary school enrollment alone* would have been 27,933,000. Note that it is irrelevant at this point what is included in the 37 million in 1950 as an aggregate figure (see discussion under 24b, d, e). Note that 20d and 20e coincide closely, especially if the term "over" 8 million is taken into account.

20–21, e combined (additional check).—Zhirnov, *Kul'turnoye*, p. 26, states that the 1947 spring enrollment was about 28,500,000. Table A presents enrollments at the end of a given year, and therefore this explicit statement is used only to confirm the fact that estimates for 1946 and 1947 seem to be of the right order of magnitude. It appears also (see 19e, 20e) that in the immediate postwar period the enrollment was expanding *not only from one academic year to another, but also within any given school year, which, considering the existing state of affairs at that time, was apparently quite a conceivable occurrence.*

21c.—*Nar Khoz SBX*, No. 2, 1948, p. 494 (Gosplan, Itogi 1947), states that the 1947 enrollment in primary and secondary schools increased by 860,000

as compared with 1946. If the 1946 figure is assumed as 28,200,000, the 1947 enrollment in primary and secondary schools would have been 29,060,000.

The anticipated (planned) figure of 31,300,000 for 1947, the enrollment reported by *Pravda*, February 21, 1947 (Zverev, 1947 budget), and *Gudok*, March 2, 1947 (Gosplan, 1947 Annual Plan), must be rejected without hesitation (see 23e and 24e below), since it was stated only in 1949 that the planned enrollment for 1950 (i. e., 31,900,000) was obtained.

21d.—*Trud*, July 16, 1948, reveals that the enrollment *in all types of primary and secondary schools, excluding technicums*, in 1947–48 was 29,500,000. It gives "last year" (i. e., year end 1947) enrollment in all types of primary and secondary schools.

22c.—*Nar Khoz SBX*, No. 3, 1950, p. 413 (Gosplan, Itogi 1948), states that in 1948 the primary- and secondary-school enrollment increased by about 2 million over that of 1947. Therefore, the 1948 enrollment was about 31 million. Note that this is the last year for which primary- and secondary-school enrollment can be derived by straight addition of reported increases over the preceding year.

Trud, Sept. 4, 1948 (editorial article), states that "*almost*" 32 million pupils in primary and secondary schools are about to start the school year (1948–49). This is obviously only an anticipated figure. "Almost" (*pochti*) means certainly less than 32 million. This direct statement must be taken into account when the 1948 discrepancy is discussed (see 22d below).

Note on change in definitions.—It is important to stress at this point that in all Gosplan and other reports prior to 1948, primary, incomplete, and complete secondary schools (*nachal'nyye, semiletniye i polnyye sredniye shkoly*) are differentiated from technicums (*tekhnikumy i drugiye sredniye spetsial'nyye uchebnyye zavedeniya*). In the years after 1949 (first quarter 1949 Gosplan report and other sources) this distinction disappears and both categories are "lumped" together. Furthermore, the wording of the reports has changed. In view of this, it can be assumed that the definition has also been changed. Instead of technicums (*tekhnikumy i drugiye sredniye spetsial'nyye uchebnyye zavedeniya*, i. e., only semiprofessional training establishments), a category of "other specialized training establishments" (*drugikh spetsial'nyk uchebnykh zavedeniyakh*, i. e., other specialized training establishments, like the labor reserve schools) is introduced. Furthermore, from 1949 on it has been often stated: "and other secondary educational establishments" (*i drugikh srednikh uchebnykh zavedeniyakh*, i. e., other secondary schools, like schools for rural and for working youth). This change in wording of definition of enrollment appears to be significant. See subsequent discussion for further details.

22b.—*Nar Khoz SBX*, No. 3, 1950, p. 445 (Gosplan, Itogi 1949), states that the 1949 enrollment (*note wording*) in elementary, 7-year schools, 10-year schools, technicums, and other specialized training establishments (*i drugikh spetsial'nykh uchebnykh zavedeniyakh*) was 36 million or almost 2 million more than in 1948. Therefore, the 1948 "aggregate" enrollment was about 34 million.

22d.—Since technicum enrollment is precisely defined, it appears that enrollment in the "lumped" category was about 32,900,000. This figure is confirmed by a statement (*Trud*, Dec. 29, 1948) which reveals that enrollment in all types of primary and secondary schools excluding technicums in 1948–49 was about 33 million.

22d (additional check)—NOTE.—For checking purposes at this point, it is possible to work backward in years if the assumption is made that the 1948 "lumped" figure is a correct one. Here is the procedure (all sources the same as indicated above):

1948 (assumed to be correct) 32,900,000
1947 (1948 figure minus 2,000,000) 30,900,000
1946 (1947 figure minus 860,000) 30,040,000

Now we introduce the checkpoint of 8 million increase between 1946 and 1950, and 1950 should be 38 million. This is obviously wrong and is not in agreement with either the statement for 1950, or the explicit statement for 1947 of 29,500,000 (as against the one which was used in table of 29 million). The conclusion which can be derived from this is an ob-

vious one. While the wording of official pronouncements (Gosplan) has changed only slightly (two words either omitted or changed in various post-1949 pronouncements), the category of enrollment has changed drastically. A discrepancy of almost 2 million is introduced into the series on enrollment in 1949. Therefore, especially if it is taken into consideration (see 22e above) that the anticipated 1948 figure was 32 million, it appears that *the change in definition resulted in a biased upward series for the years after 1949.*

23b.—*Nar Khoz SBX*, No. 3 1950, p. 445 (Gosplan, Itogi 1949), gives the figure adopted in the table (36 million).

23d.—Figure 23d was derived as the difference between 23b and 23c without adjustment for correspondence students in technicums. Rounded figure of 34,700,000 is preferable.

23e.—*Nar Khoz SBX*, No. 3, 1950, p. 445, states that while the aggregate enrollment (i. e., regular primary and secondary schools, technicums, and the newly added "other" specialized training establishments) was 36 million, the enrollment in elementary, 7-year, and 10-year schools surpassed somewhat (*privysilo*) in 1949 the enrollment planned in those schools (i. e., regular primary and secondary schools only) for 1950. Since the 1950 planned enrollment was 31,900,000, it appears that the 1949 figure was somewhat higher. Note that this statement explicitly singles out regular primary and secondary schools. Therefore, the 1949 regular and secondary-school enrollment can be assumed to have been about 32 million or somewhat above.

24b.—*Pravda*, Apr. 17, 1951 (Gosplan, Itogi 1946–50), gives the aggregate enrollment in primary and secondary schools, technicums and "other secondary educational establishments" (*drugiye sredniye uchebnyye zavedeniya*) as 37 million.

NOTE.—It is important to stress that in the same report when the Gosplan discusses technicum enrollment (including correspondence students) it states explicitly that these are secondary specialized educational establishments.

24d.—Figure 24d was derived as the difference between 24b and 24c. Rounded figure 35,700,000 is preferable.

24e.—An assumption may be made that the technicum enrollment remained unchanged between 1949 and 1950. The further assumption should be made that enrollment in "other secondary establishments" which causes an upward bias in the series remained unaltered between 1949 and 1950. Then, it would appear that the increment between 1949 and 1950 is caused only by the increase in primary- and secondary-school enrollment and is about 1 million. While the first assumption is a valid one and is substantiated by statistical evidence, the second one is extremely shaky. There is no way of getting around this problem. The one available clue is the *anticipated 1950 enrollment* in the form of a statement from *Uchitel'skaya Gazeta*, September 6, 1950 (feature story), which indicates that about 34 million pupils were *about to start the school year* (i. e., 1950–51). The second clue is a speech made by Fadeyev (*Uchitel'skaya Gazeta*, July 5, 1950), which stated that R. S. F. S. R.'s primary- and secondary-school enrollment in the fall of 1950 was to be 18,626,000, against the planned enrollment for R. S. F. S. R. for 1950 of 18,229,000 (*Pravda*, March 21, 1946 (Gosplan, Plan 1946–50). Thus, if it is assumed that the U. S. S. R. was ahead of the plan in anticipated enrollment by about 2.8 percent as the R. S. F. S. R. was, then the enrollment in 1950 should have been about 32,100,000 (which is about the same as in the preceding year, 1949). In view of this, it appears that the enrollment in 1950 was certainly not more than 34 million; it was probably also not less than 32,100,000. If on the basis of the stated assumptions the 1 million increase between 1949 and 1950 is attributable to primary and secondary schools only, then the 1950 enrollment should have been about 33 million. This figure was adopted for the table.

25–27, b, d, e.—Soviet authorities *failed to report any primary and secondary school or aggregate enrollment for any of the years 1951–53.* Only in 1953 (*Pravda*, Aug. 6, 1953 (Zverev, 1953 budget)) was it stated that the 1953 anticipated enrollment in primary and secondary schools would be 900,000 over 1952. This complete silence is more than suggestive. Apparently after

1950 the enrollment dropped drastically. The R. S. F. S. R. enrollment figures suggest that such a drop occurred. The following data illustrate this:

Primary- and secondary-school enrollment in the R. S. F. S. R.

[In millions, all figures rounded]

Year end		Year end	
1938	19.5	1946	16.0
1939	19.8	1949 (actual)	19.0
1940	19.5	1950 (plan)	18.2
1941	11.7	1950 (anticipated)	18.6
1942	9.4	1950 (actual)	18.0
1943	11.9	1953 (actual)	16.4
1944	13.6		

Sources:
1938–1944: *Nar Obr RR—1943*, p. 101; *Nar Obr RR—1944*, p. 166.
1949: *Uchitel'skaya Gazeta*, April 1, 1950 (feature article).
1946: *BSE–SSSR*, col. 1808.
1950 (plan): *Pravda*, March 21, 1946.
1950 (anticipated): *Uchitel'skaya Gazeta*, July 5, 1950.
1950: (actual): Ibid., Apr. 4, 1951.
1953 (actual): *Pravda*, May 30, 1954 (Puzanov—chairman of the R. S. F. S. R.'s Council of Ministers).

Using the 1953 *actual* R. S. F. S. R. enrollment from these data, we obtain the 1953 U. S. S. R. enrollment as 28,770,000. In this instance we assume the R. S. F. S. R. component in the U. S. S. R. total enrollment as 57 percent (from 1950 planned enrollment, see 19e and 20e combined, above). On the basis of the R. S. F. S. R.'s figures, it appears to be almost certain that in *none of the postwar years was the maximum prewar level surpassed considerably.* The 1953 enrollment in the R. S. F. S. R. was on about the same level as in 1946. Since the R. S. F. S. R. can be considered as a representative section of the U. S. S. R. as far as war decrement in births and excess deaths among children are concerned, and since the drop in primary- and secondary-school enrollment is primarily related to this, it appears that the U. S. S. R.'s primary- and secondary-school enrollment is probably correlated with the R. S. F. S. R.'s enrollment. The two other largest components of Soviet primary- and secondary-school population—the Ukrainian S. S. R. and the Byelorussian S. S. R.—were probably even more affected by war disturbances. Therefore the use of R. S. F. S. R. figures to adjust the U. S. S. R. enrollment will probably result in maximal rather than minimal estimates.

27e.—In view of the above, the 1953 enrollment in the U. S. S. R. was probably of the 1946–47 magnitude, or roughly 29 million. This would represent a *maximal estimate.*

26e.—Consequently (see statement above), the 1952 enrollment in the U. S. S. R.'s primary and secondary schools was probably about 28 million.

25e.—The 1951 figure may be derived by straight interpolation between 1950 and 1952. There is no other way of deriving this figure, and apparently the estimate is a *maximal* one.

25h, i combined.—*Bol'shevik*, No. 19, 1952, p. 42 (Malenkov's speech at the 19th Party Congress), states that the number of pupils in grades 5–10 between 1940 and 1951 had increased by 25 percent. If it is assumed that the 1940 figures are those of 1939–40 (i. e., 1939 in the table), it is possible to estimate the 1951 enrollment in grades 5–10. Various primary sources after Malenkov's speech compare enrollment in 1939 with that in 1951. Since 1939 (i. e., 1940) enrollment was 11,585,000 (12h and 12i combined), the 1951 enrollment in grades 5–10 would be (rounded) 14,480,000.

The problem of territorial changes enters here again. The Baltic provinces, according to *1941 Plan* (pp. 709, 714, 729) could have accounted for only about 184,000 (by addition), 25 percent of which is 46,000, representing the maximum possible discrepancy for the 1951 estimate. There is a strong argument against making any adjustment to include this 46,000 in

the 1951 estimate. It is known from R. S. F. S. R. data that the enrollment in the U. S. S. R. in 1940 either dropped or remained stationary, as compared with 1939. This is particularly true about upper grade enrollment where the labor reserve draft was certainly felt heavily. Therefore the 1939 enrollment probably leads to a maximal estimate for the postwar period and the 1951 estimate is probably biased upwards somewhat.

24, h, i combined.—*Voprosy Ekonomiki*, No. 2, 1952, p. 11 (Gosplan, Itogi 1951), and *Pravda*, Aug. 4, 1952 (feature article), state that in 1951 there were 2,500,000 more pupils in grades 5–10 than in 1950. Therefore, if we assume the 1951 figure derived above, the 1950 grade 5–10 enrollment was 11,080,000.

24i.—*Pravda*, June 1, 1954 (R. S. F. S. R. budget), states that the 1954 anticipated enrollment in grades 8–10 in the R. S. F. S. R. was to be 2,800,000, which is four times higher than in 1950. Thus the R. S. F. S. R. 1950 enrollment in grades 8–10 was about 700,000. Assuming the R. S. F. S. R.'s share in the U. S. S. R.'s total enrollment as 55 percent, we get an enrollment for grades 8–10 in the U. S. S. R. of 1,272,000.

24h.—Assuming 24h and 24i combined as 11,080,000, we obtain for 24h (as a residual) 9,808,000.

26, h, i combined.—*Pravda*, January 23, 1953 (Gosplan, Itogi 1952), states that the 1952 enrollment in grades 5–10 was "more than about 1,500,000" over 1951. Thus, if we assume the 1950 figure derived above, the 1952 enrollment, grades 5–10, was 15,980,000, or, rounded, 16,000,000.

25–27, i.—In order to derive estimates of enrollment in grades 8–10, an assumption must be made that urban and rural areas experienced the same rate of annual increases in enrollment. This assumption undoubtedly biases the estimate of upper grade enrollment (8–10) somewhat upward, but so far no other clues have been discovered which would suggest any better procedure for this estimate. The sources on the basis of which the estimates were obtained are as follows: *Pravda*, January 23, 1953 (Gosplan, Itogi 1952), states that between 1951 and 1952 the enrollment in grades 8–10 increased by about 1,000,000, and that in major industrial and urban centers it increased by about 44 percent. *Pravda*, January 31, 1954 (Gosplan, Itogi 1953), states that between 1952 and 1953 enrollment in grades 8–10 increased by 1,307,000 (518,000 in rural areas and 789,000 in urban areas), and that in urban areas there was an increase of 34 percent. In view of these statements and on the assumption that rural and urban enrollment increased at the same rate (at this point it is worth pointing out that the R. S. F. S. R. report (*Pravda*, January 29, 1953) also states a 45 percent increase in upper grade 8–10 enrollment between 1951 and 1952), it appears that, using the 1951 5–10 grade enrollment as a base, we obtain $(14{,}480{,}000-x)$, where x is the 5–7 grade enrollment, and which represents the 1951 8–10 grade enrollment. Since 44 percent of $(14{,}480{,}000-x)$ is a reported increase of 1,000,000, we find that x is 12,210,000 and the 8–10 grade enrollment is 2,270,000. Consequently the 1952 enrollment in grades 8–10 is 3,270,000, and for 1953 is 4,577,000. The figures thus derived are introduced in the table.

25–26, h.—Figure 25–26, h was derived as a residual between 25h–i, 26h–i combined and 25i, 26i, respectively.

23i.—*Pravda*, March 13, 1954 (Saburov's speech), states that the 1953 enrollment in grades 8–10 increased fourfold as compared with 1949. Assuming the 1953 figure of 4,577,000, we obtain the 1949 enrollment for grades 8–10 as 1,144,000.

23, 27, g–h combined.—Obtained by subtraction of available estimates from figures in col. (e). No adjustment was made for figures in col. (e), since they are estimates only and they could be assumed to be true for col. (f) for the years after 1948.

27b.—*BSE* (2d ed.), 1954, vol. 29, p. 140. It is important to note that the aggregate enrollment in primary and secondary education reported for 1950 and for 1953, paradoxically enough, is identical (37 million).

27d.—Figure 27d was derived by subtracting col. (c) from col. (b).

28d.—*Sovetskaya Kul'tura*, Nov. 4, 1954. This figure refers to all primary and secondary education. It may possibly include technicums, but this is uncertain. It definitely includes schools for rural and for working youth.

28e.—The figure adopted in the table is 29 million and represents a maximum estimate. The R. S. F. S. R. total enrollment in 1954 was about 16 million (*Izvestiya*, Sept. 1, 1954). Assuming the R. S. F. S. R. as 55 percent or 60 percent of the U. S. S. R.'s total, we obtain 29,090,000 and 26,666,000, respectively, for the U. S. S. R.'s enrollment. There is no doubt that the total U. S. S. R. enrollment was below 29 million.

28i.—*Pravda*, Jan. 21, 1955 (Itogi 1954), states that in grades 8–10 in 1954 there were 4,110,000 students more than in 1950 and 756,000 more than in 1953. Assuming estimated enrollments of 1,272,000 for 1950 and 4,577,000 for 1953, we obtain for 1954, 5,382,000 and 5,333,000, respectively. A check on these estimates is available. *Pravda*, June 1, 1954, states that the planned R. S. F. S. R. enrollment was 2,800,000. *Izvestiya*, Sept. 1, 1954, states that enrollment was about 3,000,000. Assuming the R. S. F. S. R.'s share in the U. S. S. R. total as 55 or 60 percent, we obtain 4,454,000 and 5 million respectively for U. S. S. R. enrollment in grades 8–10. The estimate of 5,380,000 was accepted for the table.

28, g–h.—Figure 28g, h was derived as a residual between 28e and 28i.

Concluding note: In conclusion, the question arises as to what is included in the "lumped" category derived from Soviet reports about aggregate enrollment in primary and secondary education after 1949. It almost certainly includes schools for working and for rural youth. It probably includes at least some of the schools operated by the labor reserve school system. There are some schools within this system (such as mining and agricultural with 4- to 7-year training) which already by 1946 were considered in some instances as establishments equivalent to technicums. Military schools of the Suvorov and Nakhimov type are probably also included here. As to the magnitude of these components, there were at least 1 million to 1,500,000 students in schools for working and for rural youth in 1950. Labor reserve schools, which had an enrollment of several hundred thousand in 1949–1950, probably are not included as a whole, but some part of them is included in the "lumped" series on enrollment. Labor reserve schools of the *uchilishche* type (with over 2 years of training) are probably included in the series. The estimates presented in the table are more likely to be maximal.

TABLE A–2.—*Graduations from the 10th grade of the complete secondary school, 1934–54*

Year	Estimated number of graduates (thous.)	Year	Estimated number of graduates (thous.)
1934	(1)	(1941 Plan)	(422.4)
1935	18.0	1946	127.0
1936	42.0	1947	164.0
1937	112.0	1950	220.0
1938	155.0	1952	315.0
1939	232.0	1953	440.0
1940	285.0	1954	750.0

[1] Negligible.

SOURCES AND NOTES TO TABLE A–2

Years of reference — *Sources and Discussion*

1934–38.—Graduations for the respective years are estimated as follows. *Kul't Stroi—1935*, page 17, gives the following figures:

Year end	Grade	Enrollment	Graduating class
1933	10	32	1934
1934	10	22,647	1935
1935	10	51,492	1936
1935	9	137,022	1937
1935	8	302,641	1938

Applying the annual success rates of students (given in *Kul't Stroi—1940*, page 78; see also text, ch. II), to these classes, we obtain estimates as follows:

Year:	Graduations (rounded)	Year:	Graduations (rounded)
1934	(1)	1937	112,000
1935	18,000	1938	155,000
1936	42,000		

[1] Negligible.

1939.—*Actual figure, Pravda*, June 25, 1940, states that the anticipated graduations (317,000) in 1940 would be 85,000 over actual graduations in 1939. Therefore graduations in 1939 were 232,000. This is consistent with the figure of anticipated graduations for 1939 of 262,000 reported in *Pravda*, July 7, 1939, since the success rate in 1938 (*Kul't Stroi—1940*, p. 78) was about 90 percent in grade 10.

1940.—*Pravda*, June 25, 1940, states that anticipated graduations in 1940 would be 317,000. Assuming the success rate of students in the last (10th) grade as 90 percent, we obtain the estimate of actual graduations as about 285,000.

1941.—*1941 Plan*, p. 612. The figure on planned graduations is introduced here only to illustrate the highest prewar target, which apparently was not reached until 1953.

1946, 1947.—Estimated as follows: *Pravda*, May 16, 1947, states that actual graduations in 1946 in the R. S. F. S. R. were "more than 70,000" and that anticipated graduations in 1947 were "about 90,000." Assuming the R. S. F. S. R.'s share as 55 percent of the U. S. S. R.'s total graduations, we obtain for 1946 and 1947 estimates of 127,000 and 164,000, respectively.

1950.—Estimated as follows: *Pravda*, Aug. 6, 1953 (Zverev, 1953 budget), reports that graduations in 1953 were twice those of 1950. Assuming the figure of 440,000 for 1953 (see derivation below), we obtain the figure (220,000) stated in the table.

1952.—Estimated as follows: *Pravda*, Jan. 31, 1954 (Gosplan, Itogi 1953), states that actual graduations in 1953 were 40 percent over those of 1952. Assuming 1953 graduations as 440,000 (see below), we obtain the figure of 315,000 (rounded) for 1952.

1953.—Estimated as follows: *Pravda*, Apr. 22, 1954 (Zverev, 1954 budget), states that anticipated graduations in 1954 were twofold higher than actual graduations in 1953. *Pravda*, June 19, 1954, reports that about 880,000 students were preparing to take examinations in the 10th grade. This was assumed to represent the anticipated graduations in 1954. Consequently the actual graduations in 1953 were about 440,000.

An additional check for this figure is available. *Izvestiya*, May 20, 1954, states that anticipated graduations for the R. S. F. S. R. in 1954 were about 470,000. Since we know also the anticipated graduations for the U. S. S. R., the R. S. F. S. R. share is about 53.4 percent of the U. S. S. R.'s total anticipated graduations. The same source also states that between 1953 and 1954 graduations were to increase also about twofold. Consequently 1953 R. S. F. S. R. graduations were about 235,000, and the U. S. S. R.'s total graduations were about 435,000.

1954.—Anticipated graduations in 1954 were about 880,000 (see 1953 above). *Pravda*, July 23, 1954 (Gosplan, first half of 1954 report), states that the actual graduations from the 10th grade in 1954 increased in comparison to 1953 in urban areas by 69 percent and in rural areas by 82 percent. Assuming that actual 1953 graduations were about 440,000, and assuming that both urban and rural increases were about the same, or about 70 percent (there is no other way of solving this equation except by making this simple assumption), we may estimate that actual 1954 graduations were about 750,000 (rounded from 748,000). The simplifying assumption of a 70-percent increase in graduations in both urban and rural areas between 1953 and 1954 probably introduces an upward bias to this estimate since urban graduations are usually considerably larger than rural. If we assume that in 1954 about 750,000 graduated out of these 880,000 who took examinations (i. e., anticipated graduations), then we note that about 85 percent graduated. This appears to be within the expected limits of the verifiable success rates of students.

TABLE B.—*General curriculum of Soviet primary and secondary schools*[1]

Subjects of instruction	10-Year school				
	7-Year school				
	Elementary school, grades 1–4	Grades 5–7	Grades 1–7	Grades 8–10	Grades 1–10
	Total number of instruction hours				
Group I—General	1,897	1,700	3,597	1,617	5,214
1. Russian language and literature	1,716	792	2,508	--	2,508
2. Other literature	--	--	--	545	545
3. Foreign language	--	363	363	363	726
4. History	99	214	313	396	709
5. Geography	82	265	347	181	528
6. Constitution of U. S. S. R.	--	66	66	--	66
7. Psychology	--	--	--	66	66
8. Logic	--	--	--	66	66
Group II—Mathematics and science	941	1,138	2,079	1,320	3,399
9. Arithmetic	858	297	1,155	--	1,155
10. Algebra, geometry, trigonometry	--	363	363	594	957
11. General science[2]	83	231	314	132	446
12. Chemistry	--	82	82	247	329
13. Physics	--	165	165	314	479
14. Astronomy	--	--	--	33	33
Group III—Other	462	297	759	267	1,056
15. Singing	132	--	132	--	132
16. Drawing	132	66	198	--	198
17. Drafting	--	33	33	99	132
18. Physical culture and sport	198	198	396	198	594
Total	3,300	3,135	6,435	3,234	9,669
Additional:					
19. Military training	--	132	132	198	330

[1] This curriculum refers to schools conducting instruction in the Russian language. Data as of 1945–53.
[2] General introductory biology, botany, zoology, anatomy, physiology, Darwinism.

NOTES AND SOURCES TO TABLE B

General Curriculum of Primary and Secondary Schools Conducting Instruction in Russian Language

The curriculum presented above was compiled from data presented in Medynskii, *Nar Obr*, 2d edition, 1952, pp. 59, 74, 86. An addition to this curriculum was made

in accordance with a 1939 law which required introductory military training of 1 to 2 hours per week in grades 5–7, and predraft military training of 2 hours per week in grades 8–10. This training is not considered part of the regular curriculum by Soviet educational authorities.

The curriculum presented in table B is based on 33 weeks of instruction. The school year is divided into 2 half years and 4 quarters. The first half year has 16 instruction weeks with quarters from September 1 to November 5 and from November 9 to December 29. The second half year has 17 instruction weeks with the third quarter from January 11 to March 23, the fourth quarter from April 1 to May 20, with an examination period from May 20 to June 5. One instruction hour lasts 45 minutes. There are not more than five instruction periods per day in the elementary grades and not more than six instruction hours per day in the intermediate and upper grades. Many city schools operate on a two-shifts-a-day basis, with the elementary grades scheduled in the morning (8 a. m. to 1 p. m.), and the intermediate and upper grades in the afternoon (1–7 p. m.).

The curriculum presented in table B refers to schools conducting instruction in the Russian language. The basic structure of the curriculum for schools conducting instruction in the native language (such, for example, as that given for Georgian schools in *Sovetskaya Pedagogika*, No. 11, 1950) is somewhat modified. Schools conducting instruction in the native language cut to some extent the time allocated to Russian language and literature and at the same time slightly reduce the time allocated to science and mathematics courses. All subjects of instruction, of course, are conducted in the native language. In mixed language schools there is hardly any modification in the curriculum presented above.

The following is a brief description of coverage of the subjects indicated in the curriculum:

1. *Russian language and literature.*—Grammar: spelling, morphology, syntax Composition (grades 1–7); Literature: selected reading (grades 5–7 and selected survey by periods, systematic survey by periods and formal analytic techniques of folklore, 10th century to romanticisim (first quarter of 10th century) in grade 8, 19th-century literature in 9th grade, 20th-century literature in 10th grade.
2. *Other literature.*—Selected readings in translation of world literature and analysis by periods, pre-19th century in grade 8, 19th century in grade 9, 20th century in grade 10.
3. *Foreign language.*—Prior to 1940 predominately German; after 1940, German, English, French (in sequence of frequency taught), One foreign language is required, but all three are taught in some schools. Stress primarily on grammar and reading.
4. *History.*—Ancient history (grade 5); Rome to the Middle Ages (grade 6); Middle Ages to French Revolution (grade 7); modern (since 19th century) (grade 8); history of Russia and peoples of the U. S. S. R. (grades 9–10).
5. *Geography.*—Introductory physical geography (grade 5); world geography (physical) except U. S. S. R. (grade 6); U. S. S. R. physical geography (grade 7); economic geography of the U. S. S. R. (grade 8); world economic geography (grade 9).
6. *Constitution of the U. S. S. R.*—Political structure and 1936 Constitution (grade 7).
7 and 8. *Psychology* and *logic* were introduced in 1946–47 in a limited number of schools (primarily capitals of republics).
9. *Arithmetic.*—Instruction covers arithmetic, fractions, decimals, percentages and proportions, with increasing complexity througout the grades (1–6).
10. *Algebra, geometry, trigonometry.*—Time allocated to class instruction in these subjects (6 hours per week) is usually split in each year. Algebra is taught in all grades (6–10), 5 hours per week in grades 6–7, 2 hours in grades 8–10. Geometry is introduced in the 7th grade (1 hour), stressed in the 8th grade (4 hours) and continued in grades 9–10 (2 hours). Trigonometry (2 hours) is given in grades 9–10. Coverage in these subjects coincides closely with the entrance requirements for higher educational establishments.
11. *General science,* consisting of various subjects. Descriptive introductory survey of nature (grade 4). Botany (grades 5–6). Zoology (grades 6–7. Human anatomy and physiology (grade 8). Principles of Darwinian theory and Soviet contribution to it, Soviet genetics (grade 9). All these subjects are commonly called natural sciences and biology (*yestestvoznaniye i*

biologiya). Teaching approach is primarily a descriptive systematic presentation, and includes classification, morphology, development of plants, invertebrates, vertebrates, insects, mammals, etc.

12. *Chemistry.*—Introductory chemistry is taught in grade 7. Systematic inorganic chemistry taught in grades 8–10. In grade 10 introductory organic chemistry is taught. Coverage in chemistry is about the same as required from entrants into higher educational establishments.
13. *Physics.*—Introduction to physics is given in grades 6–7. Systematic physics by branches is taught in grades 8–10. Coverage is about the same as required from entrants into higher educational establishments.
14. *Astronomy.*—Brief introductory survey course in grade 10 only.

NOTE.—Before the war (1935–41) an introductory course in geology and mineralogy was taught in the 10th grade. It has apparently been discontinued since then.

The four subjects below, though part of the regular curriculum, are not considered as part of the basic course. Grades are given but not viewed as significant for promotion or graduation.

15. *Singing.*—Those who absolutely cannot sing are excused, although they have to learn by heart at least the hymn of the U. S. S. R.
16. *Drawing.*—Primarily designed to develop ability to reproduce perceptual images on paper.
17. *Drafting.*—Introduction to technical drafting in pencil and ink.
18. *Physical culture and sports.*—During the instruction periods primary attention is paid to gymnastics and "light athletics." Supplementary subject in the curriculum, which is required for all male students.
19. *Military training.*—Primarily drill and target practice, supplemented by some map reading, tactics, antiaircraft and antichemical defense.

Note on recent changes in curriculum: In recent reports (*Izvestiya*, July 16, May 20, 1954; *Pravda*, May 13, 1954), it was announced that in view of the introduction of polytechnical education, starting September 1954, pupils in grades 1–4 would be required to do "handwork" 1 hour per week. Students in grade 5 would be required to do 2 hours' work per week in school shops or in school gardens. The program in chemistry in grade 7 has been increased and strengthened. The program in physics in the eighth grade has also been increased and strengthened. The teaching program in logic and psychology in grades 8 and 9 has been cut in half. The time allocated to general science (biology), arithmetic, Russian language, geography, history, and foreign language in grades 5–8 has been cut "somewhat." In grades 7 and 8 the time for drafting has been increased. It is worth noting that this recent change, though very vague, stresses the increase of instruction time for physics, chemistry, and technical drafting, at the expense of general science (biology) and other general subjects.

On the basis of the curriculum presented in table B, further generalization is possible. The general distribution of class instruction by group of subjects is presented below.

SUPPLEMENT TO TABLE B.—*Allocation in percent of class instruction time by group of subjects in Soviet primary and secondary schools*

Group of subjects	By level of grades			Cumulative in all grades		
	Elementary, grades 1–4	Intermediate, grades 5–7	Upper, grades 8–10	Elementary, grades 1–4	7-year, grades 1–7	10-year, grades 1–10
I. General education	57.5	54.2	50.0	57.5	55.9	53.9
II. Science and mathematics	28.5	36.3	40.8	28.5	32.3	35.2
III. Other	14.0	9.5	9.2	14.0	11.8	10.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total number of class instruction hours	3,300	3,135	3,234	3,300	6,435	9,669

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TABLE C–1.—*Number of primary- and secondary-school teachers, 1914–50*

Year end (fall)	(a) Regular primary and secondary schools only	(b) All types of primary and secondary schools, technicums, and other secondary establishments
1914	231, 000	
1922	223, 000	
1923	224, 000	
1924	251, 600	
1925	281, 100	
1926	305, 400	
1927	346, 500	
1928	365, 100	
1929	394, 900	
1930	481, 300	
1931	572, 900	Not applicable.
1932	614, 900	
1933	667, 500	
1934	709, 800	
1935	757, 000	
1936	858, 800	
1937	913, 500	
1938	1, 027, 200	
1939	1, 117, 100	
1947	1, 194, 000	
1948	1, 300, 000	
1949	(1, 370, 000)	1,520,000.
1950	(1, 450, 000)	1,600,000.

Figures in parentheses are estimates.

NOTES AND SOURCES TO TABLE C–1

Place in Table — *Source and Discussion*

a *1914, 1922–38.—Kul't Stroi–1940*, p. 37.

a *1939.—Kul't Stroi–1940*, pp. 86, 246.

a *1947.—Trud*, Sept. 4, 1948 (feature).

a *1948.—Nar Khoz SBX*, No. 3, 1950, p. 421.

a, b *1949, 1950.—Nar Khoz SBX*, No. 4, 1951, p. 424, states that in 1950 there were about 80,000 more teachers than in 1949. The 1950 total number of teachers, including technicum and other secondary educational establishment teachers, was about 1,600,000. Consequently, the total number of teachers in 1949 was about 1,520,000. The increase between 1948 and 1949 of about 220,000 is due to the change in definition and due to the actual increase of teachers in regular primary and secondary schools. Since in 1948 about 100,000 new teachers were trained (graduates from higher and secondary specialized teachers training establishments ([*Komsomol'skaya Pravda*, Mar. 13, 1948; *Pravda*, June 17, 1948]), there was an *increase of at least 120,000 due to change in definition* (i. e., inclusion of teachers from technicums and other secondary training establishments). Since the annual attrition rate may be assumed to have been at least 2 percent, or about 25,000 to 30,000 in 1948, it is apparent that *technicum teachers in 1949 accounted for anywhere from 130,000 to 150,000.* Therefore a downward adjustment for 1949 and 1950 was made on the basis of an upward limit (i. e., subtracting 150,000 from total in col. (b) in order to get col. (a)).

SUPPLEMENT TO TABLE C–1.—*Student-teacher ratio for selected years*

Year:	*Number of primary and secondary school pupils per teacher*
1930	36.6
1939	28.2
1950	23.0

These ratios were derived on the basis of data presented in tables A and C–1 above. The fact must be stressed that since enrollment in primary and secondary schools after 1949 was decreasing (see table A, appendix to ch. II) and since the training of teachers continued at a high numerical rate (see table A–1, appendix to ch. III and table A–1, appendix to ch. IV), it is obvious that in the early 1950's the student-teacher ratio had improved even further (probably less than 20 pupils per teacher). It must be noted that in the prewar period there were very sharply pronounced rural-urban differences in student-teacher ratios. While in 1938 urban schools had 25 students per teacher, in rural areas this ratio was as high as 35–40 students per teacher (*Kul't Stroi—1940*, pp. 25 ff., 37). These differences apparently were still in existence in recent years.

TABLE C–2.—*Number of primary and secondary schools, 1922–50*

[In thousands]

Year end	Total	Elementary schools with grades 1–4 only	7-year schools with grades 1–7 only	10-year schools with grades 1–10
1922	88.6	82.6	3.5	2.5
1923	91.8	85.7	4.0	2.1
1924	93.6	87.6	4.0	1.8
1925	103.3	96.1	4.8	1.6
1926	111.0	102.7	5.7	1.7
1927	118.6	108.8	6.5	1.8
1928	124.8	114.4	7.1	1.8
1929	133.2	121.7	7.8	1.9
1930	152.8	136.0	12.4	.6
1931	168.1	139.2	21.8	(1)
1932	166.3	136.2	26.7	1.3
1933	166.5	133.9	28.6	2.4
1934	163.1	127.9	30.0	4.0
1935	164.1	125.7	31.5	6.0
1936	164.8	122.6	33.0	8.1
1937	168.4	122.1	34.2	9.9
1938	171.6	121.7	36.3	12.5
1939	172.8	110.2	55.1 (combined)	
1947	197.0			
1950 plan	193.0			
1950 actual	220.0			

[1] Negligible.

Sources: *Kul't Stroi—1940*, p. 27; *Pravda*, Mar. 21, 1946; *Trud*, Sept. 4, 1948; *Uchitel'skaya Gazeta*, Jan. 22, 1952.

Appendix to Chapter III

TABLE A–0.—*Enrollment in secondary semiprofessional schools, 1914–27*

[At the end of the year in thousands]

Field	1914	1920	1921	1922	1923	1924	1925	1926	1927
Engineering	.....	.....	.....	.....	43.3	42.4	46.1	46.7	41.7
Agricultural	.....	.....	.....	.....	17.7	21.9	23.9	25.1	30.0
Educational	.....	.....	.....	.....	55.8	50.2	55.9	56.8	62.7
Health	.....	.....	.....	.....	11.1	14.2	15.0	15.0	18.9
Other (unspecified, predominantly socioeconomic)	.....	.....	.....	.....	26.0	35.9	41.4	34.6	35.4
Total	57.0	70.5	123.3	132.7	153.9	164.6	182.3	178.2	188.7

Sources and notes

For all years except 1914, figures were abstracted from: Beilin, *Kadry*, p. 77. Enrollment for 1914 from ibid., p. 60.

The grouping of enrollment by field is about the same as defined below in the notes to table A–1, appendix to this chapter. For years 1923–27 there is an undistributed residual which contains primarily socioeconomic field students and some art students.

TABLE A–1.—*Enrollment, acceptances, and graduations in Soviet secondary semiprofessional schools, 1928–40*

[Number of students in training, yearly acceptances and graduations in thousands]

	(A) 1928	(B) 1929	(C) 1930	(D) 1931	(E) 1932	(F) 1933	(G) 1934	(H) 1935	(I) 1936	(J) 1937	(K) 1938	(L) 1939	(M) 1940
I. Enrollment (year end):													
1. Engineering total	53.4	68.8	264.9	294.6	345.5	241.9	250.1	221.1	230.5	222.3	235.9	252.9	—
(a) Industry and construction	—	—	—	203.6	242.2	—	178.9	149.7	159.2	162.8	173.2	190.0	—
(b) Transportation and communication	—	—	—	91.0	103.3	—	71.2	71.4	71.3	59.5	62.7	62.9	—
2. Agricultural	32.2	38.3	97.0	147.7	150.6	102.8	125.0	123.9	131.2	136.2	136.9	137.7	—
3. Socioeconomic	13.6	14.6	40.7	39.6	49.5	(34.6)	35.6	(40.0)	(35.0)	29.7	30.0	35.9	—
4. Educational	87.0	89.3	147.4	187.7	192.1	164.8	186.2	177.1	209.8	253.7	285.7	270.3	—
of which (a) Arts	16.0	15.1	18.0	—	—	—	—	—	—	25.7	29.7	27.8	—
5. Health	21.6	24.6	43.7	52.5	59.3	57.5	71.6	98.8	163.9	220.4	263.4	248.2	—
6. Total (1–5)	207.8	235.6	593.7	722.1	797.0	(601.6)	668.5	(660.9)	(770.4)	862.5	951.9	945.0	820.4
7. Official grand total	207.8	235.6	593.7	754.1	797.0	601.6	668.5	692.2	818.7	862.5	951.9	945.0	—
II. Acceptances (fall):													
9. Engineering total	17.7	25.1	165.9	126.3	177.8	108.6	99.3	91.0	79.0	78.2	93.1	—	—
(a) Industry and construction	—	—	—	—	124.0	77.6	70.8	65.7	58.8	58.1	69.2	—	—
(b) Transportation and communication	—	—	—	—	53.8	31.0	28.5	25.3	20.2	20.1	23.9	—	—
10. Agricultural	5.2	13.1	52.0	72.6	63.8	49.1	61.1	49.8	42.8	44.9	48.2	—	—
11. Socioeconomic	3.9	5.0	23.0	28.9	44.3	18.1	15.9	13.0	12.3	12.0	13.4	—	—
12. Educational	21.4	31.9	99.7	111.3	95.5	79.2	93.2	94.8	105.7	104.7	114.3	—	—
(a) Arts	—	—	—	—	—	—	—	—	9.5	9.2	8.8	—	—
13. Health	8.0	9.6	18.2	22.1	42.6	32.5	33.3	45.6	83.1	128.9	126.0	—	—
14–15. Total (9–13) and official grand total	56.2	84.7	358.8	361.2	424.0	287.5	302.8	294.2	322.9	368.7	395.0	—	330.0
III. Graduations (summer):													
17. Engineering total	6.8	8.3	14.0	29.6	46.7	52.6	36.7	45.4	40.9	37.6	44.1	(36.2)	(31.7)
(a) Industry and construction	—	—	—	—	33.6	31.4	29.2	31.9	27.9	27.1	30.5	(25.7)	(23.0)
(b) Transportation and communication	—	—	—	—	13.1	21.2	7.5	13.5	13.0	10.5	13.6	(10.5)	(8.7)
18. Agricultural	4.4	6.1	9.9	17.8	24.2	25.2	14.2	14.5	17.5	23.0	28.8	(25.7)	(23.5)
19. Socioeconomic	1.2	2.5	3.0	3.8	5.2	7.2	6.9	6.5	7.3	7.8	7.3	(7.1)	(7.1)
20. Educational	11.3	16.1	25.2	22.5	18.7	33.2	28.5	31.1	37.6	49.1	57.2	(67.3)	(74.2)
(a) Arts	—	—	—	—	—	—	—	—	2.1	2.2	2.8	—	—
21. Health	4.8	4.9	9.3	10.5	12.9	14.5	11.0	14.7	21.6	38.4	63.8	(72.3)	(79.4)
22. Total (17–21)	28.5	37.9	61.4	84.2	107.7	132.7	97.3	112.2	124.9	155.9	201.2	(208.6)	(215.9)
23. Official grand total	28.5	37.9	61.4	84.2	107.7	132.7	97.3	112.2	124.9	155.9	201.2	—	207.8

( ) Figures in parenthesis are estimates. See sources and notes to table A–1 for details.
(—) Figures are not available.

General notes to table A–1

Soviet educational establishments which train secondary specialized and semiprofessional personnel are called technicums. Soviet statistical sources group institutions of secondary specialized training, as well as semiprofessionals who graduate from these institutions, into five training or occupational specialization categories:

1. *Engineering* technicians, which includes technicum students or trainees in—
   (*a*) Industry and construction, such as machine building, civil, mechanical, power, mining, metallurgical, chemical, aviation, architectural, light consumer industry, and lumber industry engineering technicians.
   (*b*) transportation and communication, with all transportation and communication (cable and electronics) fields of engineering technicians.
2. *Agricultural*, which includes agronomy technicians, veterinary technicians; land conservation, electrification and mechanization of agriculture, breeding technicians; forestry technicians.
3. *Socioeconomic*, which includes accounting, planning, trade, economics technicians; jurisprudence semiprofessionals such as archive workers, court clerks, etc.
4. *Educational*, which includes—
   (*a*) some primary school (primarily elementary grade) teachers; creche and nursery school teaching personnel. Also included in this category are "cultural service specialists": librarians, club organizers, etc.
   (*b*) intermediate level art, music, and theatrical schools.
5. *Health*, which includes medical technicians, nurses, dentists, dentistry technicians, trained instructors of physical education, coaches and sports instructors.

This grouping greatly resembles that for professionals (specialists with completed higher education). The difference of course, is the level of training. Thus, while an electrical engineer is included in the industrial group of professionals with higher education, an electrical engineering technician is included in the industrial group of semiprofessionals with secondary education. In other words, the distinction between professional and semiprofessional is made on the basis of the level of formal training, and the occupational specialization grouping for both remains about the same.

Table A–1 is arranged as follows:

I. *Rows 1–7: Enrollment:*

The table is arranged in such a way that enrollment is shown as of the end of a given year and thus applies to the whole academic year which starts in the fall of the indicated year. Thus enrollment in 1928–29 is tabulated under the year 1928. Also, statements in official Soviet sources such as "end of 1928" or "beginning of 1929" are viewed as equivalent. In fact the drop in enrollment between September 15 and December 31 of the preceding year is neglected.

II. *Rows 9–15: Acceptances:*

Since most entrances take place in the fall, they appear in this table under that year. Thus the 1928 figure on matriculation refers to the entering class of 1928–29, or new acceptances in 1928.

III. *Rows 17–23: Graduations:*

Graduations usually take place in the summer and thus the figures in the table refer to graduations for that year. Thus 1928 means the graduating class of the academic year 1927–28, or graduations in 1928.

Rows 8, 16, 24: Deliberately omitted. Originally these rows were to designate the grand total, *including extension students*, but the figures for these, although known to be negligible, were not ascertainable.

In each of these subdivisions the grouping is as indicated in the discussion of specialization fields above.

A checkerboard code is used in order to identify each place in the table. In the discussion and sources which follow, the letter-number code refers to the appropriate place in table A–1. This procedure avoids complicated footnotes.

Unfortunately, up to the time of the completion of this report, a detailed breakdown of graduations for the last 2 prewar years, 1938 and 1939, could not be obtained from official Soviet sources. In substitution, estimates were made on

the basis of actual enrollment by class (*kurs*) given as of September 15, 1938.[1] After the graduating classes of 1939 and 1940 were estimated on the basis of enrollment by class as of September 1938, the estimate consisted in the simple reduction of these classes by the average annual rate of success of the students in 1938. For 1940 the official total was available, and it appears that such a technique was justifiable since the discrepancy between the estimate and the official figure is quite small.

Table A–1 gives annual enrollments, matriculations, and graduations in thousands with accuracy to the first decimal point.

SOURCES AND NOTES TO TABLE A–1

Place in Table — *Sources and Discussion*

1–7 A (28).—*Nar Khoz—1932*, pp. 512–515, *Kul't Stroi—1940*, p. 107, gives a slightly lower total enrollment (206,300), without any breakdown.

1–7 B (29).—*Nar Khoz—1932*, pp. 512–515. Ibid., p. 537, gives a breakdown by year of study (*kurs*) for 1929–30. It gives a slightly different composition and a grand total of 207,100. No explanation is given, but it is apparent that the breakdown by year of study was made according to incomplete statistics (*po nepolnomu krugu otchetnosti*). About the same total as indicated in the table was reported in *Kul't Stroi—1940*, p. 107. This source gives it as 237,500.

1–7 C (30).—The figures incorporated in the table are from *Nar Khoz—1932*, pp. 512–515. *Kul't Stroi—1934*, p. 39, gives a breakdown as follows:

C 1.	229,100
2.	114,500
4.	149,800
5.	43,700
7.	593,700

This distribution of students by field accounts for about 537,100, and the residual is 56,600, which apparently contains socioeconomic and art students (3–C). It is stated that the figures refer to "the end of 1930." The grouping of students in engineering, agricultural and socioeconomic segments is slightly different from that presented in the table. The figures on education and health students check. These differences are due to the classification of some engineering students as agricultural specialists (mechanization of agriculture technicians) and also due to the subtraction of *tekhnik-ekonomist* students from engineering. The grand totals reported in other sources are:

(1) *Sots Stroi—1934*, p. 406, 593,700 (same as in table)
(2) *Kul't Stroi—1940*, p. 107, 586,800 (lower than in table)

1–7 D (31).—All figures except 3–D from *Sots Stroi—1936*, p. 573.

3 D (31).—*Podgotovka*, p. 36.

6–7 D (31).—There were several slightly different totals found:

(1) *Kul't Stroi—1940*, p. 107, gives the total, with no breakdown, as 747,300;
(2) *SC–Eng—1936*, p. 456; *Sots Stroi—1934*, p. 407; *Sots Stroi—1936*, p. 116, gives total as 754,100 (same as in table). It is apparent that the official grand total is somewhere between 747,000 and 754,000. Thus the discrepancy between the sum (6–D) of breakdowns (1–5) and the grand total is 25,000 to 30,000. This residual undoubtedly includes some art students.

1–E (32).—*Sots Stroi—1934*, p. 407. The figures in the table were accepted from this source. Other sources give slightly different breakdowns with about the same total. Beilin, *Kadry*, p. 110, gives a different breakdown for engineering and agricultural students, which again is a reflection of the classification procedures for agricultural equipment technicians.

[1] *Kul't Stroi—1940*, p. 128, gives the breakdown of enrollment for technicums and other secondary specialized educational establishments by class for each of the fields grouped under the jurisdiction of different People's Commissariats (*narkomats*) in charge of different branches of Soviet economy. The enrollment figures must be deflated, in order to arrive at the expected graduations, by the rate of success of students, which was accepted also on the basis of 1938 data and was assumed to be true for the next 2 years. This rate of success of students is given in *Kul't Stroi—1940*, p. 133. For more details, see the source discussion which follows.

Vtoroi FYP, vol. I, p. 514, gives a somewhat different breakdown but the same total.

Kul't Stroi—1940, p. 107, gives the total as only about 723,700, without any breakdown. This figure seems to be far too low as compared with those given in other sources. In this connection, it might be said that this source tries to "smooth" over the jumps and declines in enrollment in the years between 1930 and 1933.

Finally *Itogi Pervogo FYP*, pp. 218, 275, gives the total enrollment figure as 949,200, which includes correspondence students. Consequently, there were about 150,000 "technicum" students who took correspondence training (*zaochniki*).

1–7 F (*33*).—*Kul't Stroi—1934*, p. 41. The figures in the table were accepted from this source. 3–F is derived as a residual. *1935 Plan*, p. 687, gives the same total with a somewhat different breakdown. Finally, *Kul't Stroi—1940*, p. 107, gives the total enrollment figure of 588,900, without any breakdown. This is a slightly lower figure than that accepted in the table.

1–7 G (*34*).—*Sots Stroi—1936*, p. 577. Approximately the same breakdowns and totals are given in *Kul't Stroi—1934*, pp. 46–50, and *Kul't Stroi—1935*, pp. 80–85. The latter sources, however, give detailed distribution of technicums and enrollment by *narkomat* (i. e., subordinate people's commissariats). Finally, *Kul't Stroi—1940*, p. 107, gives the total enrollment as 671,500, which is quite close to the figure accepted in the table.

1–7 H (*35*).—All figures in the table except 3–H are accepted from *1937 Plan*, p. 150. Other sources (*Sots Stroi—1936*, p. 573; *1936 Plan*, vol. I, p. 459) give about the same total and breakdowns. In these sources the residual between the total of breakdowns and the official grand total ranges from about 57,000 to about 70,000. It was assumed that the socioeconomic segment accounted for about 40,000 students, and therefore from 20,000 to 30,000 students remain unaccounted for, a large proportion of whom were probably enrolled in art schools.

1–7 I (*36*).—All figures except 3–I are from *1937 Plan*, p. 151. This source gives the only set of figures which give a breakdown for 1936. They represent "preliminary, expected" (*ozhidayemyye*) figures. *Kul't Stroi—1940*, p. 107, gives the grand total as 768,900, which, if accepted with the breakdowns from *1937 Plan*, p. 151, gives a residual of about 35,000. This residual was accepted for 3–I. It must be observed that in this case the adjustment of figures as described above is not quite legitimate since the final total (from *Kul't Stroi—1940*, p. 107) is compared with figures for the preliminary breakdown. There seems to be no other way to handle this problem.

1–7 J (*37*).—*Kul't Stroi—1940*, p. 129. Census of students enrolled by field as of Sept. 15, 1937. A slightly different breakdown is given in *Tretii FYP*, p. 237; the total enrollment given in this source is about 851,000.

1–7 K (*38*).—*Kul't Stroi—1940*, p. 129. Census of students enrolled by field as of Sept. 15, 1938. Identical breakdown and total in *Sots Stroi–1933–38*, p. 121.

1–7 L (*39*).—*BSE–SSSR*, col. 1229–1230; *Kul't Stroi—1940*, p. 256.

9–23 A–K (*28–38*).—All years and all breakdowns from *Kul't Stroi—1940*, pp. 111–112.

17–23 F, K (*33–38*).—*Sots Stroi—1933–38*, p. 123, gives figures exactly as those selected for this table.

17–22 L (*39*).—*Kul't Stroi—1940*, pp. 128, 133. Figures in table are estimates based on the actual enrollment by classes as of Sept. 15, 1938. The estimate of missing graduation figures can be made either on the basis of entering (matriculating) classes if the average rate of attrition is known, or on the basis of the statistics which give a breakdown by class if some indication of the annual success rate of students is available. The latter method was used in this case since a comprehensive breakdown of enrollment by class was found as of fall 1938 and success rates for 1938 were made available in the Soviet official source. After the size of a given graduating class has been established, it is deflated by the amount of the annual success rate of students in order to determine the size of the class in the next year. This procedure can be repeated several times. Thus the graduating class of 1939 was determined in 1938 and then reduced by the known annual

rates of success in various fields. The resulting figure is an approximation of graduations in the year 1939. The process of estimate is tabulated below:

Estimate of 1939 graduating class

	Graduating class of 1939 in fall of 1938 (all figures rounded) (A)	Average annual success rate in percent (B)	Graduations in 1939 (all figures rounded) (C)
Engineering total	41,200	88.0	36,200
of which—			
Industry and Construction	29,200	88.0	25,700
Transportation and Communication	12,000	88.0	10,500
Agricultural	28,600	90.0	25,700
Socioeconomic	7,900	91.0	7,100
Educational	73,100	92.0	67,300
Health	78,600	92.0	72,300
Total			208,600

Notes on the estimate of 1939 graduating class

(A) derived by addition from the breakdown in *Kul't Stroi—1940*, p. 128. (B) *Kul't Stroi—1940*, p. 133. (C) Derived from cols. (A) and (B). Caution must be exercised in the determination of the original graduating class. It must be kept in mind that the length of study in engineering technicums was primarily 4 years. The same length of study was required of agricultural specialists. Semiprofessionals in socioeconomic fields and education received 3 years of training, and medical (health) specialists received 2- and 3-year training. About half of them receive training of 2 years and the other half training of 3 years (actually distribution is 53 percent with 2 years, and 47 percent with 3 years; for simplicity they were assumed to be equal). Thus the graduating class of 1939 is computed by addition of students enrolled in the last year of study, whichever the last year may be, for a given field.

Place in Table — *Source and Discussion*

6 M (40).—*Kratkaya Sovetskaya Entsiklopediya*, 1948, col. 1761, gives total enrolment as 820,400. This figure is confirmed by other statements. *Pravda*, Jan. 20, 1949 (Itogi 1948), states that enrollment in 1948 was 1,094,000 or 133 percent of 1940. Consequently enrollment in 1940 was 822,500. Zhirnov, *Kul'turnoye*, p. 24, states that planned enrollment in 1950 was to be 1,280,000 and was to be 56 percent over actual enrollment in 1940. Consequently 1940 enrollment was about 820,000.

15 M (40).—*Pravda*, Oct. 15, 1949 (Itogi 3d quarter 1949). Acceptances in the fall of 1948 were 360,000. This was 9 percent over 1940 (fall acceptances). Therefore in 1940 acceptances were about 330,000.

17-22 M (40).—*Kul't Stroi—1940*, pp. 128, 133; the technique of estimates is the same as described above in 17–22 L, except for the fact that the original (1938) size of the 1940 graduating class has to be deflated twice in order to arrive at estimates which are summarized in the table below:

Estimate of 1940 graduating class

	Graduating class of 1940 in fall of 1938 (rounded)	Average annual success rate in percent	Graduating class of 1940 in fall of 1939 (rounded)	Graduations in 1940 (rounded)
Engineering, total	40,900	88	36,000	31,700
Industry and Construction	29,700	88	26,100	23,000
Transportation and Communication	11,200	88	9,900	8,700
Agricultural	29,000	90	26,100	23,500
Socioeconomic	8,800	91	7,900	7,100
Educational	87,700	92	80,700	74,200
Health	93,800	92	86,300	79,400
Total				215,900

23 M (40).—The figure was obtained from V. F. Vasyutin, *SSSR v 1950 godu* (The U. S. S. R. in 1950), Moscow, 1947, p. 17. About the same figure can be obtained from *Pravda*, Jan. 20, 1949 (Itogi 1948), which states that 1948 graduations were 252,000, and 44,000 over 1940. Consequently 1940 graduations were about 208,000.

TABLE A–2.—*Enrollment, acceptances, and graduations in Soviet secondary semiprofessional schools, 1941–55*

[All figures in thousands]

Year	Enrollment (year end)		Acceptances (fall)		Graduations (spring)	
	Without extension Col. 6	With extension Col. 8	Without extension Col. 14	With extension Col. 16	Without extension Col. 22	With extension Col. 24
n 1941	—	—	—	—	158	—
o 1942	—	—	170	—	—	—
p 1943	500	—	253	—	—	—
q 1944	700	—	—	—	—	—
r 1945	940	—	—	—	70	—
s 1946	1,077	—	377	—	191	—
t 1947	1,113	—	350	—	230	—
u 1948	1,094	—	360	—	252	—
v 1949	—	1,308	—	450	242	272
w 1950	1,119	1,298	—	450	—	327
x 1951	—	1,369	—	400	—	262
y 1952	—	1,475	—	—	—	—
z 1953	—	1,644	—	534	—	300
zz 1954	—	1,744	—	440	—	320
zzz 1955	—	—	—	—	—	350

(—) Figures not available.

SOURCES AND NOTES TO TABLE A–2

Originally this table was designed as a continuation of table A–1 above. However, the available data were too fragmentary to permit presentation of distribution of enrollment, acceptances and graduations by field.

Place in Table — *Source and Discussion*

n 22 (41), o-p 22 (42–43) (combined), q-s 22 (44–45) (combined).—See derivation of technicum graduations for 1941 and other war years (1942–45)

o 14 (42).—Voznesenskii, *Voyennaya*, p. 116.

o 14 (42).—Voznesenskii, *Voyennaya*, p. 116.

p 6 (43).—*Pravda*, Apr. 17, 1944 (feature story), states that enrollment was about 500,000.

p 14 (43).—Voznesenskii, *Voyennaya*, p. 116.

q 6 (44).—*Bol'shevik*, No. 2, 1944, pp. 19–20, states that anticipated enrollment in 1944 was to be 204,000 over 1943 actual enrollment. Consequently, anticipated 1944 enrollment was about 700,000.

r 6 (45).—*Pravda*, Mar. 18, 1946 (Kaftanov speech). A somewhat lower figure can be derived from another source. Zhirnov, *Kul'turnoye*, p. 24, states that 1950 enrollment is planned to be 1,280,000, which is 41 percent over actual enrollment in 1945. Consequently, 1945 enrollment can be estimated as 907,800. This figure excludes extension students.

r 22 (45).—*VVSh*, Nos. 11–12, 1946, p. 2, states that 1946 graduations from VUZ and technicums combined were 240,000, which is twice as many as graduated in 1945. Consequently, 1945 graduations from VUZ and technicums

were 120,000. Since VUZ graduations alone were 50,200 (Bartošek, *Vysoké*, p. 26), technicum graduations alone were 69,800, or (rounded) 70,000.

s 6 (46).—*Gudok*, Jan. 21, 1947 (Itogi 1946), states that between 1945 (fall) and 1946 (fall) enrollment in technicums and other specialized secondary semiprofessional establishments increased by 137,000. Since 1945 enrollment was about 940,000, 1946 enrollment was about 1,077,000.

s 14 (46).—*VVSh*, Nos. 11–12, 1946, p. 3. New technicum acceptances were 377,000, excluding extension students.

s 22 (46).—*VVSh*, Nos. 11–12, 1946, p. 2, states that graduations in 1946 from VUZ and technicums combined were about 240,000. Consequently, since VUZ graduations alone were 49,000 (*BSE–SSSR*, 1947, col. 1237), technicum graduations were about 191,000.

t 6 (47).—*Pravda*, Jan. 18, 1948 (Gosplan, Itogi 1947), reported that technicum enrollment increased by 36,000 over 1946. Since 1946 enrollment was about 1,077,000, 1947 enrollment was 1,113,000.

t 14 (47).—*Pravda*, March 1, 1947. Anticipated acceptances were 350,000 in the fall of 1947.

t 22 (47).—*Pravda*, Nov. 1, 1947. Graduations were 230,000.

u 6 (48).—*Pravda*, Jan. 20, 1949 (Itogi 1948); technicum enrollment without extension students was 1,094,000.

u 14 (48).—*Nar Khoz SBX*, No. 2, 1948, p. 512, states that acceptances in the fall of 1948 were 360,000.

u 22 (48).—*Pravda*, Jan. 20, 1949 (Itogi 1948), states that graduations in 1948 were 252,000. They apparently exceeded the plan, since *Gudok*, March 2, 1947 (1947 Annual Plan), states that planned graduations in 1948 were to be 230,100, excluding extension students.

v 8 (49).—*Pravda*, Jan. 18, 1950 (Itogi 1949), states that, including extension students, enrollment was 1,308,000.

v 16 (49).—*Nar Khoz SBX*, No. 3, 1949, p. 435 (Itogi 1949, 3d quarter), states that 1949 fall acceptances, including extension students, were 450,000.

v 22, 24 (49).—*Nar Khoz SBX*, No. 3, 1949, p. 428 (Itogi 1949, 2d quarter), states that VUZ and technicums graduated 390,000, excluding extension students. Since VUZ graduations were 148,000 (*VVSh*, No. 7, 1949 p. 1), technicum graduations were 242,000. The former source also states that there were about 60,000 extension student graduates from VUZ and technicums. It was assumed that 30,000 of them were technicum graduates. Grand total (v 24) by addition.

w 8 (50).—*Pravda*, Jan. 29, 1952 (Itogi 1951), states that enrollment in 1951 was 1,384,000, which was 86,000 more than in 1950. Consequently 1950 enrollment, including extension students, was 1,298,000. Same enrollment figure is reported in *Pravda*, April 18, 1951 (Itogi 1946–50).

w 6 (50).—*BSE* (2d ed.), vol. 16, p. 422, states that extension students in technicums accounted for 179,000. Assuming w 8 (50) as 1,298,000 we obtain, by subtraction, 1,119,000 for regular students in 1950.

w 16 (50).—*Izvestiya*, Oct. 24, 1950 (Itogi 1950, 3d quarter), states that acceptances, including extension students, were 450,000.

w 24 (50).—*Izvestiya*, Oct. 24, 1950 (Itogi 1950, 3d quarter), states that 1950 VUZ and technicum graduations combined were 500,000. Since VUZ graduations were 173,000, technicums graduated 327,000.

x 8 (51).—*Pravda*, Jan. 29, 1952 (Itogi 1951), states that technicum enrollment in 1951 was 1,384,000. A slightly higher figure can be obtained from the following statement. *Pravda*, Jan. 23, 1953 (Itogi 1952), states that in 1952 there were 1,475,000 students, which was 106,000 more than in 1951. Consequently 1951 enrollment, including extension students, was 1,369,000.

x 16 (51).—*Pravda*, Aug. 15, 1951 (feature story). Anticipated acceptances in the fall were to be 400,000.

x 24 (51).—*Pravda*, Jan. 29, 1952 (Itogi 1951), states that graduations were 262,000, including extension students.

y 8 (52).—*Pravda*, Jan. 31, 1954 (Itogi 1953), states that in 1953 enrollment, including extension students, was 1,644,000 and was 166,000 over 1952. Consequently 1952 enrollment was 1,478,000. *Pravda*, Jan. 23, 1953 (Itogi 1952), states that there were 1,475,000 students including extension students.

z 8 (53).—*Pravda*, Jan. 31, 1954 (Itogi 1953), states that in 1953 enrollment including extension students was 1,644,000.

z 16 (53).—Shtyl'ko, *Pod'yem*, p. 44, gives figure for 1953 acceptances as 534,000.
z 24 (53).—*Pravda*, Jan. 31, 1954 (Itogi 1953), states that VUZ and technicum graduations combined were about 500,000. Since *Izvestiya*, Nov. 3, 1953, states that VUZ graduations were about 200,000, technicum graduations were about 300,000. Shtyl'ko, *Pod'yem*, p. 44, gives the figure of 304,000 for 1953 graduations.
zz 8 (54).—*Pravda*, Jan. 21, 1955 (Itogi 1954), states that enrollment, including extension students, in 1954 was almost 1,790,000 and was 144,000 more than in 1953. Assuming 1953 as 1,644,000, we obtain for 1954 an enrollment of 1,788,000, which is about the same as stated. *Pravda*, Sept. 15, 1954, gives the figure for enrollment as "far above 1,600,000."
zz 16 (54).—Acceptances in technicums including extension students in the fall of 1954 were 440,000, of whom 160,000 were accepted with completed 10-year-school education (*Pravda*, Sept. 15, 1954).
zz 24 (54).—*Pravda*, July 23, 1954 (Itogi 1954, 1st half-year), states that graduations from VUZ and technicums combined were 550,000. Since VUZ graduations were 230,000, technicum graduations were 320,000.
zzz 24 (55).—*Izvestiya*, June 25, 1955. Graduations from higher educational establishments and secondary semiprofessional schools were 600,000. Higher education graduates were 250,000; consequently, secondary semiprofessional schools graduated 350,000.
Note to (r–w) 22–24.—The sum of the graduation figures given in this table does not equal the total of 1,278,000 reported for the 5-year period (1946–50), which is given in table A–3, appendix to ch. III. The sum of annual graduations is 1,272,000. This discrepancy of 6,000 is probably due to the exclusion of graduates of the extension training programs. For further details, see also table B–1 in the appendix to ch. VI.

TABLE A–3.—*Reconstruction of graduations from Soviet secondary semiprofessional schools, 1946–50*

Field	Total planned graduations (in thousands) [b]	Percent distribution by field [c]	Total actual graduations reconstructed by field (in thousands) [d]	Average annual graduations (in thousands) [e]
Engineering	350	26. 4	337	67. 4
Agricultural	200	15. 1	193	38. 6
Educational	300	22. 6	289	57. 8
Medical	270	20. 4	261	52. 2
Unspecified [a]	206	15. 5	198	39. 6
Total	1, 326	100. 0	[f] 1, 278	255. 6

Sources and notes

[a] Unspecified categories include socioeconomic segment graduates, physical culture and arts graduates.
[b] *BSE–SSSR*, 1947, column 1232.
[c] Computed from column on planned graduations.
[d] Distribution by field computed from preceding column, total as indicated below.
[e] Average annual graduations computed from preceding column by division. Obviously graduations were larger toward the end of the 5-year period (see table A–2).
[f] *Pravda*, Apr. 18, 1951 (Itogi, 1946–50).

NOTE.—Actual distribution of technicum graduates by field is derived by projecting planned distribution upon actual figure for total graduations during 1946–50.

TABLE B–1A.—*General technicum curriculum in mining engineering*

Name of courses	Total hours	Distribution in percent	Distribution of hours by type of instruction			
			Classwork		Laboratory work	Calculating and group work
			Lectures	Practical work		
General courses	1,493	24	551	804	138	0
1. History of U. S. S. R.	265		175	90	0	0
2. Russian language and literature	316		100	216	0	0
3. Mathematics	400		100	300	0	0
4. Physics	228		100	38	90	0
5. Chemistry	98		50	0	48	0
6. Foreign language	186		26	160	0	0
General technical courses	704	12	268	292	124	20
7. Drawing	172		12	160	0	0
8. Technical mechanics	232		110	82	20	20
9. Electrotechnology	146		60	26	60	0
10. Machinery	84		40	24	20	0
11. Technology of metals	70		46	0	24	0
Special courses	1,717	28	866	210	441	200
12. Geology	100		60	20	20	0
13. Mining	452		252	40	60	100
14. Geodesy and mine surveying	93		50	0	23	20
15. Mining machinery	270		100	0	130	40
16. Mine transportation	154		60	20	54	20
17. Mining mechanics	152		70	42	40	0
18. Mining electrotechnology	182		80	22	60	20
19. Fundamentals of enriching coal yield	64		40	0	24	0
20. Economics and organization of production	94		60	34	0	0
21. Calculation (cost accounting)	32		20	12	0	0
22. Rules for technical exploitation	60		40	20	0	0
23. Mine safety	64		34	0	30	0
Industrial practice	2,022	33	0	2,022	0	0
24. Work in workshops	210		0	210	0	0
25. Practice work (field trips)	372		0	372	0	0
26. Practice work (in courses)	1,440		0	1,440	0	0
Premilitary training and physical culture	186	3	0	186	0	0
Grand total of hours	6,122		1,685	3,514	703	220
Distribution in percent		100	27	58	11	4

Source: This is a proposed curriculum of mining technicums abstracted from *Ugol'*, No. 8, 1951, as reproduced in Gorokhoff, *Materials*, p. 216. On the basis of the article itself the actual curriculum can be reconstructed and is presented in table B–1B.

TABLE B–1B.—*Reconstructed technicum curriculum for mining engineering with specialization in exploitation of mineral deposits*

Name of course	Total hours	Class-work	Laboratory and practical work
General courses:			
1. History of U. S. S. R.	252	252	0
2. Russian language and literature	299	299	0
3. Mathematics	401	401	0
4. Physics	214	198	26
5. Chemistry	91	71	20
6. Foreign language	186 (?)	186 (?)	0
General technical courses:			
7. Drawing	172 (?)	172 (?)	0
8. Technical mechanics	232 (?)	232 (?)	0
9. Electrotechnology	125	100	25
10. Machinery	84 (?)	84 (?)	0
11. Technology of metals	70 (?)	70 (?)	0
Special courses:			
12. Geology	100 (?)	100 (?)	0
13. Mining	421	421 (?)	0
14. Geology and mine surveying	76	76	0
15. Mining machinery	162	112	50
16. Mine transportation	117	97	20
17. Mining mechanics	110	110	----
18. Mining electrotechnology	144	114	30
19. Fundamentals of enriching coal yield	64 (?)	64 (?)	----
20. Economics and organization of production	94 (?)	94 (?)	0
21. Calculation (cost accounting)	32 (?)	32 (?)	0
22. Rules for technical exploitation	54	54	0
23. Mine safety	0	0	0
Industrial practice:			
24. Work in workshops	(?)	(?)	(?)
25. Practice work (field trips)	0	(?)	(?)
26. Practice work (by courses)—c. 25 weeks (12.6 percent of total time).			
Thesis (about 1 semester).			
Premilitary training and physical culture	186	0	186
Grand total—approximate	6, 100	----	----

Source: This somewhat fragmentary actual curriculum refers to 1950–51. It does not differ drastically from the proposed curriculum, which, except for omission of time allocated for final examinations for certification and diploma project, is undoubtedly based on the general pattern of an engineering technicum curriculum. This reconstruction of the actual curriculum was done by Gorokhoff, *Materials*, p. 217. Further comments and additional information about syllabi may be found in this study.

TABLE B–2.—*Secondary semiprofessional curriculum in 3-year (Feldsher) medical schools*

	Percent of time allocated	Total	Theory	Practice
		Hours	*Hours*	*Hours*
A. General instruction:				
1. Native language		58	58	
2. Russian language		196	196	
3. Mathematics		78	78	
4. History of U. S. S. R		138	138	
5. Economic geography		78	78	
6. Latin		80	80	
Total	14	628		
B. General medical and biologic instruction:				
7. Anatomy and histology		196	118	78
8. Physiology		94	56	38
9. Biology		60	40	20
10. Physics		100	84	16
11. Chemistry		118	78	40
12. Bacteriology		94	56	38
13. Pharmacology and materia medica		207	130	77
14. Pathology		96	58	38
15. Hygiene		176	98	78
16. Public health and sanitation		40	20	20
Total	26	1, 181		
C. Medico-military instruction:				
17. Barrage preparation		46	46	
18. Frontline preparation		156	156	
19. Special preparation		48	12	36
20. History of Red Army		46	46	
21. Military topography		12	12	
22. Therapy of gas warfare		54	38	16
23. Organization of sanitation service of Army		40	40	
24. Medical air-raid defense		30	30	
Total	10	432		
D. Clinical instruction:				
25. Internal medicine with care of patients and medical technics		326	174	152
26. Surgery, with traumatology and field surgery		354	174	180
27. Obstetrics and gynecology		230	118	112
28. Pediatrics		140	76	64
29. Infectious diseases with epidemiology, disinfection and immunization		261	140	121
30. Dermatology and venereal diseases		92	58	36
31. Neuropsychiatry		73	52	21
32. Ophthalmology		60	40	20
33. Otorhinolaryngology		38	20	18
34. Physiotherapy, massage and physical culture		67	32	35
35. Medical practice in district hospitals		288		288
Total	43	1, 929		
E. Examinations	7	324	324	
Total hours of instruction		4, 494	2, 952	1, 542
Percent of time allocated	100		66	34

Source: M. B. Shimkin, "Medical Education in the Soviet Union," *in American Review of Soviet Medicine*, The American-Soviet Medical Society, New York, 1943, p. 478. This curriculum refers to 1942. Apparently medical-military instruction was heavier at that time than ordinarily. Further comments about secondary medical training may be found in this source.

TABLE C–1.—*Number of Soviet secondary semiprofessional schools, 1921–54*

Year end	Total number of institutions (a)	Of which distributed by field— Engineering (b)	Agricultural (c)	Socio-economic (d)	Education and art (of which art only) (e)	Health (f)
1921	936					
1922	950					
1923	914					
1924	921					
1925	979					
1926	1,016					
1927	1,033	201	204	58	473(90)	97
1928	1,054	215	207	60	477(81)	95
1929	1,111	280	226	59	449(71)	97
1930	2,932	1,129	651	217	717(99)	218
1931	3,096	906	801	[289]	867	233
1932	3,509					
1933	2,861	737	646		917	252
1934	2,639	645	652	[186]	905	251
1935	2,597					
1936	2,861					
1937	3,496					
1938	3,732	634	515	111	1,035	1,437
1939	3,733	671	550	163	1,029(192)	1,320
1940	3,772					
1943	2,173					
1945	3,164					
1949	c. 3,500					
1951	3,543					
1953	3,728					
1954	c. 4,000					

[ ] Figures derived as a residual.

SOURCES AND NOTES TO TABLE C–1

In general it must be observed that the number of institutions fluctuated not only from year to year but also within a given year. Some stability in the number of institutions was reached only toward the end of the 1930's. Year references in the table refer to year end (or fall of an academic year).

Place in Table — *Sources and Discussion*

a (1921–26).—Pedagogicheskaya Entsiklopediya, 1930, vol. 3, column 170.
a–f (1927–30).—Nar Khoz—1932, p. 514.
a–f (1931).—Sots Stroi—1936, p. 573.
a (1932, 1933).—Kul't Stroi—1940, p. 107.
b, c, e, f (1933).—Kul't Stroi—1935, pp. 68–69.
a–f (1934).—Kul't Stroi—1934, p. 39. About the same distribution is given in *Sots Stroi—1936*, p. 573.
a (1935–37).—Kul't Stroi—1940, p. 107.
a–f (1938).—Sots Stroi—1933–38, p. 121.
a–f (1939).—Kul't Stroi—1940, p. 256; also (a) in *BSE–SSSR*, 1947, column 1761.
a (1940).—Kratkaya Sovetskaya Entsiklopediya, 1948, column 1761.
a (1943).—Pravda, Apr. 17, 1944.
a (1945).—Bol'shevik, No. 2, 1946, p. 32.
a (1949).—Pravda, Dec. 16, 1949 (Kaftanov article).
a (1951).—Pravda, Jan. 29, 1952 (Itogi 1951).
a (1953).—BSE (2d ed.), 1954, vol. 29, p. 140.
a (1954).—Pravda, Sept. 15, 1954.

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Appendix to Chapter IV

TABLE AHX–1.—*Distribution in percent of entrants into Soviet higher educational establishments in the fall of a given year*

Previous preparation of entrants	*(A) 1926*	*(B) 1927*	*(C) 1933*	*(D) 1934*	*(E) 1935*	*(F) 1938*	*(G) 1945*
Graduates from secondary school	52.0	[a] 39.2	13.3	14.6	[a] 16.5	[d] 58.8	80.0
Rabfak preparatory (workers' faculty)	26.8	25.2	43.5	40.0	38.4	22.9	None
Technicums	17.7	9.8	17.7	16.5	13.4	12.9	5.0
Other (courses, self-preparatory, other VUZ)	3.5	[b] 25.8	25.5	28.9	31.7	5.4	15.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a] Includes graduates of 2d-level schools (*shkoly storoi stupeni*) and 9-year schools (*devyatiletki*).
[b] Includes 6.3 percent FZO graduates, 8 percent military-school graduates, and 11.5 percent "other" self-preparatory.
[c] In engineering fields, 20.8 percent were regular secondary-school graduates.
[d] In engineering fields, 71.2 percent were regular secondary-school graduates.

Sources and notes

Columns (A), (G)—Bartošek, *Vysoké*, p. 26. Until 1934 the majority of secondary-school graduates had a 9-year primary and secondary education.
Column (B)—*BSE* (1st ed.), 1929, vol. 14, col. 33.
Columns (C), (D), (E)—*Kul't Stroi*—1935, p. 93; also Bartošek, *Vysoké*, p. 28.
Column (F)—*Kul't Stroi—1940*, p. 127; *Kul't Stroi— 1935*, p. 93; also Bartošek, *Vysoké*, p. 28.

TABLE A–0.—*Total enrollment in Soviet higher educational establishments, 1914–28*

Year (fall or year end)	*Enrollment in all fields (thousands)*	*Year (fall or year end)*	*Enrollment in all fields (thousands)*
1914	124.6	1924	165.3
1920	214.6	1925	162.0
1921	224.2	1926	160.4
1922	213.2	1927	159.8
1923	204.8	1928	166.8

Source: *Nar Khoz—1932*, p. 507. The enrollment excludes Communist Party higher educational establishments. The year 1928 provides a connection with table A–1 (row 6) which follows.

TABLE A–1.—*Enrollment, acceptances, and graduations in Soviet higher educational establishments, 1928–54*

[All figures in thousands]

	(a) 1928	(b) 1929	(c) 1930	(d) 1931	(e) 1932	(f) 1933	(g) 1934	(h) 1935	(i) 1936	(j) 1937	(k) 1938	(l) 1939	(m) 1940	(n) 1941
I. Enrollment:														
1. Engineering total	52.3	62.8	130.3	197.3	233.4	188.3	198.8	193.9	175.6	170.5	194.6	201.5	179.1	—
Industry and construction	—	—	112.0	160.5	187.4	148.7	157.1	152.7	136.7	133.7	153 9	160.5	151.5	—
Transportation and communication	—	—	18.3	36.8	46.0	39.6	41.7	41.2	38.9	36.8	40.7	40.0	27.6	—
2. Agricultural	26.9	34.0	44.7	57.5	62.2	54.2	61.3	63.5	58.5	53.3	62.5	56.6	44.0	—
3. Socioeconomic	16.5	18.3	21.7	30.7	34.3	38.2	31.1	30.8	29.5	30.1	26.8	27.7	21.0	—
4. Educational-cultural	45.5	49.9	47.8	76.4	93.5	88.5	113.1	120.0	138.5	149.4	196.7	221.1	189.0	—
5. Health	25.6	26.1	27.6	32.1	46.4	47.7	61.4	76.3	85.3	91.2	109.9	113.0	113.3	—
6. Total	166.8	191.1	272.1	394.0	469.8	416.9	465.7	484.5	487.4	494.5	590.5	619.9	546.4	312.8
7. CP schools	9.8	13.1	18.9	36.0	38.9	45.4	56.1	40.1	48.3	54.0	12.4	—	—	—
8. Total	176.6	204.2	291.0	430.0	508.7	462.3	521.8	524.6	535.7	548.5	602.9	619.9	582.0	—
9. Extension	—	42.9	—	—	—	32.8	—	—	—	—	—	250.0	230.0	—
09. Grand total	—	247.1	—	—	—	495.1	—	—	—	—	—	870.0	812.0	—
II. Acceptances:														
10. Engineering total	16.8	22.9	78.4	88.6	114.5	55.8	53.3	49.1	34.6	40.0	54.2	53.4	41.1	26.9
Industry and construction	—	—	—	—	93.3	43.7	42.6	39.0	26.5	31.8	43.5	—	—	—
Transportation and communication	—	—	—	—	21.2	12.1	10.7	10.1	8.1	9.2	10.7	—	—	—
11. Agricultural	5.4	7.9	22.5	28.4	26.9	19.2	24.7	20.2	12.3	13.2	18.6	13.6	9.2	5.8
12. Socioeconomic	5.0	5.4	5.0	16.9	22.0	10.8	12.2	11.0	7.3	7.1	9.5	8.5	6.1	3.6
13. Educational-cultural	10.4	14.1	29.9	36.6	56.4	38.4	46.3	54.1	51.7	60.0	86.4	86.3	82.1	37.4
14. Health	5.2	5.9	8.4	14.4	26.0	16.7	20.1	29.5	24.1	24.4	29.2	26.9	23.0	20.9
15. Total	42.8	56.2	144.2	184.9	245.8	140.9	182.3	163.9	130.0	147.7	197.9	188.7	161.5	94.6
16. CP schools	—	—	—	—	—	22.7	18.1	18.4	18.6	10.6	6.7	—	—	—
17. Extension	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18. Grand total	—	—	—	—	—	163.6	200.4	182.3	148.6	158.3	204.6	—	—	—
III. Graduations:														
19. Engineering total	8.9	11.0	20.8	18.8	17.1	7.9	18.9	37.2	35.8	34.6	31.3	28.4	29.3	27.5
Industry and construction	—	—	—	—	14.5	6.1	14.9	29.6	29.2	27.6	25.4	—	—	—
Transportation and communication	—	—	—	—	2.6	1.8	4.0	7.6	6.6	7.0	5.9	—	—	—
20. Agricultural	6.4	7.0	6.7	8.5	8.4	4.8	6.3	8.8	10.4	11.3	10.2	10.7	10.1	8.0
21. Socioeconomic	2.0	4.8	4.8	5.0	8.3	2.5	2.5	5.0	6.4	5.0	5.9	5.9	4.8	3.9
22. Educational-cultural	5.2	5.7	7.2	11.6	10.1	10.5	7.9	12.5	21.6	31.7	37.9	39.6	40.6	47.6
23. Health	6.2	4.0	4.4	6.5	4.3	4.6	2.5	7.5	9.2	12.3	12.9	13.7	17.4	17.7
24. Total	28.7	32.5	43.9	50.4	43.2	30.3	38.1	71.0	83.4	94.9	98.2	98.3	102.2	104.7
25. CP schools	—	—	—	—	—	4.3	11.1	12.7	14.2	9.9	5.6	—	—	—
26. Extension	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27. Grand total	—	—	—	—	—	—	49.2	83.7	97.6	104.8	103.8	—	—	—

	(o) 1942	(p) 1943	(q) 1944	(r) 1945	(s) 1946	(t) 1947	(u) 1948	(v) 1949	(w) 1950	(x) 1951	(y) 1952	(z) 1953	(zz) 1954	(zzz) 1955
I. Enrollment:														
1. Engineering total	—	—	—	170.0	204.4	—	—	289.3	266.8	—	—	—	—	—
Industry and construction	—	—	—	—	171.2	—	—	—	228.6	—	—	—	—	—
Transportation and communication	—	—	—	—	33.2	—	—	—	38.2	—	—	—	—	—
2. Agricultural	—	—	—	—	60.3	—	—	78.7	90.0	—	—	122.0	132.2	—
3. Socioeconomic	—	—	—	—	31.5	—	—	38.0	—	—	—	—	150.0	—
4. Educational-cultural	—	—	—	—	220.4	—	—	312.9	—	—	—	—	—	—
5. Health	—	—	—	—	136.7	—	—	105.6	—	—	—	—	—	—
6. Total	227.0	320.8	440.0	539.2	653.3	—	—	774.5	—	—	—	—	—	—
7. CP schools	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Total	—	—	—	539.2	653.3	689.0	734.0	774.5	841.0	950.0	942.0	1,062.0	1,087.0	—
9. Extension	—	—	—	165.0	212.0	294.0	270.0	346.0	406.0	406.0	500.0	500.0	645.0	—
09. Grand total	—	—	—	704.2	865.3	983.0	1,004.0	1,120.5	1,247.0	1,356.0	1,442.0	1,562.0	1,732.0	—
II. Acceptances:														
10. Engineering total	40.2	66.0	57.2	56.8	—	43.0	45.0	—	70.0	—	—	—	106.8	—
Industry and construction	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Transportation and communication	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11. Agricultural	8.3	13.9	16.6	15.0	16.0	17.0	16.0	—	22.4	—	—	—	27.6	—
12. Socioeconomic	3.7	7.1	7.7	9.0	—	13.0	13.0	—	—	—	—	—	—	—
13. Educational-cultural	34.7	50.0	62.6	71.0	—	92.0	82.0	—	—	—	—	—	—	—
14. Health	21.2	30.2	30.2	25.0	—	22.0	17.0	—	20.0	22.0	—	—	—	—
15. Total	108.1	167.1	174.3	177.0	195.0	187.0	173.0	197.0	235.7	245.0	240.0	—	287.0	—
16. CP schools	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17. Extension	—	—	—	—	—	—	—	123.0	114.3	110.0	135.0	—	163.0	—
18. Grand total	—	—	—	—	—	—	—	320.0	350.0	355.0	375.0	415.0	450.0	—
III. Graduations:														
19. Engineering total	13.4	9.7	9.3	9.2	11.0	15.0	29.0	32.0	—	30.0	30.0	40.0	53.0	—
Industry and construction	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Transportation and communication	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20. Agricultural	6.2	1.9	2.3	2.7	—	8.0	—	—	—	12.0	15.0	17.0	18.0	—
21. Socioeconomic	2.7	1.0	1.1	1.4	—	3.0	—	—	—	(11.0)	(13.0)	—	(8.0)	—
22. Educational-cultural	25.4	5.9	15.2	30.1	—	48.0	50.0	—	—	80.0	90.0	70.0	70.0	—
23. Health	21.2	9.3	7.8	6.8	14.8	18.0	26.0	23.4	—	20.0	(32.0)	—	24.0	—
24. Total	68.9	27.8	35.7	50.2	49.0	92.0	122.0	143.0	148.0	(153.0)	180.0	—	173.0	—
25. CP schools	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26. Extension	—	—	—	—	—	—	—	30.0	25.0	(48.0)	41.0	—	57.0	—
27. Grand total	—	—	—	—	—	—	—	173.0	173.0	201.0	221.0	200.0	230.0	250.0

(—) Figures not available or estimate cannot be obtained. ( ) Figures in parentheses are estimates.

GENERAL NOTES TO TABLE A–1

In table A–1, academic years are broken up into calendar years. Thus, enrollment in 1950–51 is indicated by the year 1950 in the table. First-year acceptances in 1950–51 are indicated by the year 1950 in the table. Graduations in 1950–51 are indicated by the year 1951 in the table. Places in the table are indicated by a checkerboard code with small letters and numbers.

Higher educational establishments, enrollment (rows 1–5), acceptances (rows 10–14), and graduations (rows 19–23) are grouped into five branches [a] as follows:

1. *Engineering*, which includes machine building, civil, mechanical engineering, power, electrical, mining, metallurgy, oil, chemical engineering, food engineering, aviation, architecture, construction, light industry, lumber, transportation, communication (radio and electronics) engineering, and also prior to 1932 included "engineering economics" in all these fields.[b]
2. *Agriculture*, which includes agronomists, veterinarians, all specialists on land conservation, electrification and mechanization of agriculture;[c] forestry specialists.
3. *Socioeconomic*, which includes economics, law, planning, accounting, banking, trade and distribution specialists, archival and statistical experts, economists.[b]
4. *Education*, which includes university-trained specialists, university teachers, trainees of pedagogical institutes, teachers' institutes, foreign language institutes, and art schools (conservatories, theatrical schools, etc.).
5. *Health*, which includes medicine (both therapeutic and preventive), some dentistry, pharmacy, physical culture and sports instructors and professional coaches.

Rows 7, 16, 25 present enrollment, acceptances and graduations of Higher Communist Schools (*Kom VUZ—Kommunisticheskiye Vysshiye Uchebnyye Zavedeniya*) and Higher Communist Agricultural Schools (*VKSKhSh—Vysshiye Kommunisticheskiye Sel'sko-Khozyaistvennyye Shkoly*), which were considered as higher educational establishments in 1930's. The two abbreviations *Kom VUZ* and *VKSKhSh* are used in the appendix to designate these training establishments. In some years this category also includes industrial academies (*promyshlennyye akademii*).

Rows 9, 17, 26 present enrollment acceptances and graduations of extension-correspondence training programs, which are of particular significance for the postwar years.

Rows 5, 15, 24 are derived by addition of enrollment, acceptances and graduations by branch and then verified against available totals reported in primary sources.

Rows 09, 18, 27 represent grand totals including students and graduates of Higher Communist Schools and extension training programs.

Further details about enrollment, acceptances and graduations by branch and derivation of totals are found in sources and notes to table A–1, which are as follows:

SOURCES AND NOTES TO TABLE A–1

Place in Table — *Sources and Discussion*

1–6a (*28*).—*Kul't Stroi—1935*, pp. 42, 73, 276, and *Podgotovka*, pp. 13, 65, present the data incorporated into this table. The former gives rounded figures, the latter up to the unit (which is not significant of course). *Nar Khoz—1932*, pp. 512–13, presents the same data, only universities are not broken down by field:

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[a] I. M. Bogdanov, *Statistika kul'tury* (Statistics of Culture), Moscow, 1950, esp. pp. 68–73. This breakdown is also due partly to the survival of the institutional setting in higher education. Prior to 1936, different people's commissariats were directly in charge of the training of specialists in higher education and institutions were classified in accordance with the occupation of the specialists they were training.

[b] Since the number of "engineer-economists" in the years prior to 1932 was small both in training and on the job, the inclusion of this group does not lead to any considerable error. In the years after 1932 the majority of this group is included under "economists" in the category "socioeconomic."

[c] Again a small, unappreciable error arises because specialists (engineers) in the mechanization of agriculture were included prior to 1931 under the category of "engineers" (i. e., industrial). Thereafter they are included with agricultural field students.

	Enrollment
Industrial VUZ	49,000
Agricultural VUZ	24,400
Socioeconomic VUZ	7,300
Pedagogical VUZ	17,800
Art VUZ	6,400
Universities	52,100
Medical VUZ	9,800
Total	166,800

7a (28).—*Kul't Stroi—1940*, p. 105, gives total enrollment including Kom VUZ, as 176,600; consequently Kom VUZ alone had an enrollment of about 9,800. There were no industrial academies or VKSKhSh. It is known that a year before that, Kom VUZ enrollment was 8,400 (*Sots Stroi—1936*, p. 572) and therefore this estimate appears to be a consistent one. Bartošek, *Vysoké*, p. 23, gives the figure 9,600 for Kom VUZ.

8a (28).—By addition, see discussion above.

1–6b (29).—*Podgotovka*, pp. 42, 65, 131 as quoted in Gorokhoff, *Materials*, pp. 36–57. The data presented here refer to Jan. 1, 1930. Although agricultural enrollment (2b) is said to exclude mechanical engineers on the mechanization of agriculture, it probably does include them. *Nar Khoz—1932*, p. 512, gives for (2b) an agricultural enrollment figure, Nov. 1, 1929, as 31,400, and states (p. 667) that it does include mechanical engineers on the mechanization of agriculture. *Kul't Stroi—1935*, p. 276, gives a slightly different distribution of students as of Nov. 1, 1929—apparently there the agricultural segment excludes these mechanization engineers (2b, agricultural—23,100 and 1b, engineering—74,000). In the latter source universities are broken up even further than in *Podgotovka*. *Nar Khoz—1932*, p. 512, gives university enrollment with no breakdown by field as 53,400. All sources agree on total enrollment.

7b (29).—*Kul't Stroi—1940*, p. 105, gives total enrollment including Kom VUZ as 287,900, and therefore Kom VUZ enrollment as a residual is 13,100.

8b (29).—By addition; see also discussion above.

9b (29).—42,900. *Podgotovka*, p. 101, as quoted by Gorokhoff, *Materials*, p. 35a.

C9b (29).—By addition.

1–6c (30).—*Kul't Stroi—1934*, p. 39, which agrees closely with the figures given in *Podgotovka*, p. 13. However, the latter source, p. 65, gives a somewhat different distribution, especially for the agricultural and engineering segments, which total to about the same figure (175,000–178,000). *Nar Khoz—1932*, p. 512, breaks up universities and distribution of enrollment given there approximately agrees with figures adopted in this table. All sources agree on total enrollment (6c).

7c (30).—*Kul't Stroi—1940*, gives total including Kom VUZ as 287,900, consequently Kom VUZ accounted for about 15,800. *Kul't Stroi—1935*, p. 274, gives the slightly higher total of 295,500 on the basis of which the Kom VUZ enrollment appears to have been about 23,400. Finally, *Sots Stroi—1934*, p. 406; *Sots Stroi—1935*, p. 616, give the Kom VUZ enrollment as 18,900. The figure of 18,900 was adopted for this table.

8c (30).—By addition; see also discussion above.

1–6d (31).—*Sots Stroi—1936*, p. 573. There is no ambiguity as to the categories of enrollment. 8d was derived as a residual. Mechanical engineers on the mechanization of agriculture definitely are included in the agricultural segment (2d) in this year and all subsequent years. 1d (total engineering enrollment) agrees also with the figure given in *Kul't Stroi—1935*, p. 276, and it is quite close to the figure given in *Podgotovka*, p. 13 (201,400). 2d, 5d are identical with the figures stated in the latter source and in *Kul't Stroi—1934*, pp. 192–193. Similarly, 4d (educational) is in close agreement with both sources. *Kul't Stroi—1935*, p. 276, states that 4d is 75,600, and in addition there were 4,200 in arts, which totals to 79,200, or slightly higher than the figure (76,400) adopted for this table. 6d (total enrollment) is in agreement with all sources named above.

7d (31).—This figure is easily obtained from *Sots Stroi—1936*, pp. 572–573. It is stated that Kom VUZ and VKSKhSh had 30,500 and industrial academies 5,500 students. Total is 36,000. *Kul't Stroi—1940*, p. 105, gives the total (8d) enrollment in regular higher educational establishments, Kom VUZ, and industrial academies as 405,900. Subtracting the regular higher educational establishment enrollment (394,000) from this total, we

ascertain that enrollment in Kom VUZ and industrial academies was about 11,900 students and Kom VUZ alone was about 6,400.

8d (31).—By addition. See discussion in 7d above. This total (430,000) is higher than the one which appears in *Kul't Stroi—1940*, p. 105 (405,900), due to the inclusion of VKSKhSh students.

1–6e (32).—*Sots Stroi—1934*, p. 407, reports enrollment as of Jan. 1, 1933 (i. e., end of 1932 in this table). There is no ambiguity since all students are distributed by segments of study and no derivations or adjustments of any sort are required. Total engineering enrollment (1e) agrees with figure given in *Kul't Stroi—1935*, p. 274, and total enrollment (6e) agrees with the figure given on pp. 66–67 of the same source. Data presented in *Podgotovka*, p. 13, were discarded, since it is explicitly stated that they refer to preliminary reporting (figures given there are slightly higher).

7e (32).—This figure can be derived in a variety of ways. *Kul't Stroi—1940*, p. 105, gives the total enrollment in higher education as 512,100 (including industrial academies). Since we know the total in all regular higher educational establishments (469,800), we can derive (7e) as a residual—42,300. *Vtoroi FYP*, vol. I, p. 515, states that industrial academies had 8,200, VKSKhSh 22,500, and Kom VUZ 8,500, which totals to 39,200. *Sots Stroi—1935*, p. 616, states that the Kom VUZ and VKSKhSh had 31,000 students; and *Kul't Stroi—1940*, p. 105, reveals that in industrial academies there were 7,900, which totals to 38,900. *Kul't Stroi—1935*, p. 274, reveals the total enrollment as 513,400, and subtracting (6e equals 469,800), we obtain 43,600. Thus this enrollment was anywhere between 38,900 and 43,600. For this table we assumed the lower figure since it is more directly derived than the others. Bartošek, *Vysoké*, p. 23, gives this figure as 41,200.

8e (32).—By addition; see also discussion above.

1–6f (33).—*1935 Plan*, p. 687, gives actual enrollment as of the end of 1933 distributed by field, except the socioeconomic segment (3f), which was derived as a residual. 2f, 4f, 5f, 6f (total enrollment) are identical with figures given in *Kul't Stroi—1935*, p. 68, but this source reveals the engineering total as 175,100 (industry 135,500 and transportation 39,600, the latter agreeing with figure adopted for this table).

7f–(33).—*Kul't Stroi—1940*, p. 105, reveals the total including Kom VUZ and industrial academies as 464,200. *Kul't Stroi—1935*, p. 68, reveals this aggregate enrollment as 453,000. Consequently, assuming regular enrollment (6f) as 416,900, we obtain a residual of about 36,000 for enrollment in Kom VUZ and industrial academies. *1935 Plan*, pp. 687–688, reveals that industrial academies had an enrollment of 7,400; VKSKhSh 32,000, and Kom VUZ 6,000, which totals to 45,400. The latter figure was accepted for this table due to its direct derivation.

8f (33).—By addition; see also discussion above.

9f (33).—*Kul't Stroi—1934*, pp. 48–50. The figure is derived by addition of extension and evening students (*bez otryva ot proizvodstva*). This figure is biased upward due to double counting. Extension students only accounted probably for about 20,000–25,000.

09f (33).—By addition.

1–6g (34).—There are 11 sets of figures on enrollment available for this year. This was a year of extensive reorganization of higher educational establishments and apparently there was such chaos that most figures disagree with one another by anywhere from 2,000 to 10,000. These discrepancies, though significant per se, shed very little light upon enrollment as a whole and therefore no attempt was made to unscramble the enrollment for each category as to why or how it appeared. In the first place, all figures pertaining to fall enrollment (i. e., October reporting) except the socioeconomic segment were discarded, since this is the time when the reorganization turmoil was taking place. The figures which were accepted in this table are from *1936 Plan*, vol. I, pp. 458–9, where actual enrollment at the *end* of 1934 is given. Figures for 1g, 2g, 4g, 5g, 6g differ in this source only by the first decimal place of a thousand from those presented in *Kul't Stroi—1935*, p. 68. The latter refers to Jan. 1, 1935, thus being of about the same reporting date. From the first source, 3e (socioeconomic segment) can be determined as a residual and equals 38,100. The latter source (pp. 80–85), however, reveals that (October 1934) enrollment in the socioeconomic segment was 31,600. Another source, *Kul't Stroi—1934*,

pp. 46–50, reveals that enrollment in arts was 7,000. The residual (38,100) apparently contains both arts and socioeconomic segment enrollment. Thus, 31,100 was allocated to the socioeconomic segment and 7,000 to arts, which was incorporated into the educational enrollment (106,100 plus 7,000 equals 113,100). These figures were used in the table, and the remainder were adopted from *1936 Plan*.

7g (34).—*1936 Plan*, vol. I, pp. 458–459, gives the following enrollment in other than regular higher educational establishments:

Industrial academies	8,200
VKSKhSh	40,100
Kom VUZ	7,800
Total	56,100

This figure was adopted for 7g.

8g (34).—The sum of breakdowns of enrollment by field (1–7g) equals 521,800. This figure differs somewhat from other officially reported totals. *Kul't Stroi—1940*, p. 105, reports 533,600; *Kul't Stroi—1934*, p. 274, reports it as 513,800; the one which was adopted here appears to be close enough.

1–6h (35).—*1937 Plan*, pp. 148–149, gives the actual enrollment in 1935 at the end of the year. All figures except 3h were obtained from it. The accepted figures check closely with those which were reported by *Kul't Stroi—1935*, p. 68, but are consistently lower than the ones reported by the same source (p. 71) but which refer to October 1935 reporting date. *Sots Stroi—1936*, p. 573, gives figures based on preliminary reporting and again they are slightly higher than those accepted here. 3h was obtained as a residual, which was 37,800, 7,000 of which were in arts, and consequently the socioeconomic segment enrollment was 30,800 and the educational figure (including arts) was adjusted by 7,000 to a total of 120,000.

7h (35).—*1937 Plan*, pp. 148–149, reveals the following enrollment:

Industrial academies	6,800
VKSKhSh	27,300
Kom VUZ	6,000
Total	40,100

This figure was adopted for 7h.

Kul't Stroi—1935, p. 68, reveals total enrollment including all Kom VUZ as 515,900, which gives a residual of 31,400 for 7h. *Kul't Stroi—1935*, p. 71, gives the total enrollment as 523,400, which gives a residual of 39,900. *Kul't Stroi—1935*, p. 275, gives the total as 576,300, which apparently includes also schools for administrative and party apparatus (ordinarily excluded from this series). Residual in the latter case is 91,800, which can be broken up if we consider the data given by *Sots Stroi—1936*, pp. 572–573, which reveal:

Industrial academies	9,200
VKSKhSh	36,200
Kom VUZ	6,800
Schools for administrative and party apparatus	37,600
Total	89,800

which is quite close to this residual. Finally, *Kul't Stroi—1940*, p. 105, gives total enrollment including all types of other schools as 569,400, giving a residual of 84,900. It is obvious that schools for administrative and party apparatus were included in these two latter total enrollments to conceal the fact that enrollment in 1934 and 1935 was not expanding, but remained about stationary.

8h (35).—By addition; see discussion above.

1–6i (36).—For 1936 because of a lack of any other data on enrollment the preliminary reporting figures had to be accepted. *1937 Plan*, pp. 146–147, reveals the preliminary reporting of actual enrollment at the end of 1936. These figures were accepted for this table, 3i was derived as a residual (36,500) which was then distributed—29,500 for the socioeconomic segment and 7,000 for arts students. The latter was incorporated into educational enrollment and this increased the originally stated figure (131,500) to 138,500.

7i (36).—*1937 Plan*, pp. 146–147, states the actual enrollment in other than regular higher educational establishments at the end of 1936 according to preliminary reporting as follows:

Industrial academies	8,300
VKSKhSh	33,600
Kom VUZ	6,400
Total	48,300

Kul't Stroi—1940, p. 105, states that total enrollment, including VKSKhSh and industrial academies, was 548,700 of which 6,700 were in industrial academies. This gives a residual of 61,300. Apparently the schools for administrative and party apparatus are again included in this total. If this is the case, this enrollment figure would have been about 23,000, which seems plausible. Since we exclude schools for administrative and party apparatus in this series, the first figure (48,300) was accepted.

8i (36).—By addition; see discussion above.

1–7j (37).—In order to ascertain actual enrollment in 1937 we have to compare actual vs. planned enrollment revealed by two sources. The actual enrollment is given in *Tretii FYP*, p. 237, and the planned one in *1937 Plan*, pp. 148–149.

	Actual 1937 (year end)	*Planned 1937 (year end)*
(8j) Aggregate	553,400	555,500
of which:		
1] Industrial engineering	133,700	126,700
1] Transportation engineering	36,800	37,500
2] Agricultural	53,300	57,100
4] Educational	141,400	147,500
5] Health	91,200	94,600
Subtotal	456,400	463,400
Residual (8j) minus subtotal	97,000	92,100
of which:		
(7j) Industrial academies	6,200	9,200
VKSKhSh	(1)	36,800
Kom VUZ	(1)	8,000
Subtotal	6,200	54,000
Residual	90,800	38,100

[1] Unknown.

In the case of 1937 planned enrollment, this last residual certainly includes only two items—arts and socioeconomic enrollment. In the case of 1937 actual enrollment this last residual contains VKSKhSh and Kom VUZ enrollments and in addition probably some schools for administrative and party apparatus (which, as we have already shown above, were included in some previous years). Consequently we assumed for 1937 that there were about 30,100 students in the socioeconomic segment and about 8,000 in arts (this latter enrollment was also true for 1938). These figures, which probably are somewhat higher than actual enrollment, are nevertheless close approximations of it. These figures were introduced in the table; arts enrollment was aggregated with education as it always has been. Furthermore, planned figures were also assumed for 7j. Total (8j) is by addition (thus excluding schools for administrative and party apparatus). This is the last year in which party schools give trouble in enrollment statistics.

1–7k (38).—For this year there is no trouble in obtaining comprehensive distribution figures. The figures in the table refer to Sept. 15, 1938, and are from *Sots Stroi—1933–38*, p. 121. This also gives a breakdown for the socioeconomic segment (trade, 5,600; economics and administrative, 21,200). Enrollment in arts (as a part of 4) is given as 7,500. Industrial academies and Kom VUZ are singled out (12,400); the latter can be broken down from *Kul't Stroi—1940*, p. 105, industrial academies, 7,700 and the remainder Kom VUZ, 4,700. A check from *Kul't Stroi—1940*, p. 105 ff., reveals about the same distribution of enrollment by field.

1–7l (39).—Again no trouble. Comprehensive distribution is given by *BSE-SSSR*, 1947, column 1233, *Kul't Stroi—1940*, p. 256. Out of 221,100 educational segment students, 8,300 were in arts.

8l (39).—*Pravda*, June 18, 1940 (Strumilin article), states that in 1939–40 there were 24,268 students in economic VUZ and industrial academies. This is lower than the figure of 27,700 accepted in the table, but it shows the magnitude of enrollment in economic VUZ alone.

6l (39).—*Pravda*, May 17, 1940 (editorial). On Nov. 1, 1939 (date stated), total enrollment in VUZ was 619,900. *Pravda*, June 18, 1940 (Strumilin article), states that there were somewhat more than 600,000 students at the "present time" (i. e., 1939–40). Same figure (slightly over 600,000) is given by Kaftanov (*Pravda*, Sept. 2, 1939).

9l (39).—*BSE–SSSR*, 1947, column 1333, states that there were about 250,000 extension students.

09l (39).—By addition (rounded).

10–15a–k (28–38), 16f–k (33–38).—*Kul't Stroi—1940*, p. 111. Acceptances in art (13 i–k) in 1936–38 were about 1,800, for each year. The same series, 1928–38, is presented by Bartošek, *Vysoké*, pp. 25–26.

19–24a–k (28–38), 25f–k (33–38).—*Kul't Stroi—1940*, p. 112. Graduations in arts (21 i–k) in 1936–38 were about 600 for each year. The same figures are presented by Bartošek, *Vysoké*, pp. 25–26. For all years 1928–33 the figures (19–25 a–f) adopted for this table are also identical with those presented in Beilin, *Kadry*, p. 313.

24k (38).—*Pravda*, May 26, 1940 (editorial), states that actual graduations in 1938 from regular VUZ alone were about 97,000.

21l (39).—*Pravda*, June 18, 1940 (Strumilin article), states that economic VUZ alone graduate annually on the average about 5,000 specialists.

General note to 10–15, 19–25a–k (28–38).—In addition, a check of various plans reveals that the figures accepted from *Kul't Stroi—1940* are duplications of actually reported annual acceptance or annual graduation figures reported elsewhere. Unlike enrollment statistics, there is little trouble in reporting or compiling these acceptance and graduation figures. Unless figures refer to preliminary reporting, they are consistent on the whole with those adopted here. All TsUNKhU statistical handbooks and especially Gosplan annual and 5-year plans prior to 1938 were used for checking purposes (see bibliography).

1–6m (40).—Actual 1940 enrollment can be computed as follows. Sinetskii, *PP Kadry*, gives the average number of students per full-time faculty member (p. 111) and faculty staffs (p. 108) on the basis of which the 1940 enrollment can be computed:

	Field	*Average number of students per 10 faculty members*	*Faculty*	*Enrollment*
1m	Engineering industrial	150	10,100	151,500
1m	Engineering transportation	120	2,300	27,600
2m	Agricultural	80	5,500	44,000
3m	Socioeconomic	140	1,500	21,000
4m	Education	100	18,200	182,000
4m	Arts	50	1,400	7,000
5m	Health	110	10,300	113,300
6m	Total			546,400
6m	All fields	110	49,300	542,300
---	Unaccounted	110	700	7,700

It is obvious that this computation is only a rough approximation, because of rounding of both average number of students per faculty member and faculty staffs. The last row, "unaccounted," results from the discrepancy in Sinetskii's charts on p. 104 and p. 108. However, this computation is sufficiently accurate for our purposes, especially since there are various checks available which tend to indicate that the figures adopted are not too far off from other types of estimates which are presented below.

1m (40).—*BSE* (2d ed.), vol. 9, p. 512, states that as of Oct. 1, 1940, there were 176,800 engineering students of all types. This figure can be checked from the following statements. *VVSh*, No. 4, 1951, p. 8, states that in 1940 the average size of engineering VUZ enrollment was 1,130 students. Since there were 152 engineering VUZ (Bartošek, *Vysoké*, p. 23), the total engineering enrollment can be estimated as 173,000, which closely confirms the figure accepted above. Also, since it is known that the 1940 enrollment in engineering institutes was 269,000 (see 1w (50)) and since *VVSh*, No. 4, 1951, p. 9, reports the increase in engineering enrollment as 56 percent over 1940, the 1940 enrollment may be estimated as about 172,000.

2m (40).—*VVSh*, No. 4, 1951, p. 10, states that there were 90,000 agricultural students enrolled in the fall of 1950, which constitutes 95.5 percent increase

over enrollment in the fall of 1940. Consequently the 1940 enrollment was 46,000. The magnitude of this figure is also confirmed by another statement. *Pravda*, Oct. 6, 1953 (Kaftanov's speech, who reappeared as Assistant Minister of Culture after 2½ years of silence and speculations that he had been purged), states that in 1953 the fall enrollment in agricultural VUZ was 122,000, which is about a 2.5-fold increase over the enrollment in 1940. Consequently the 1940 agricultural enrollment may be estimated as 48,800.

5m (40).—*Sovetskoye Zdravookhraneniye*, No. 6, 1951, p. 5, states that the health enrollment was about 115,000 in 1940.

6m (40).—*Gudok*, Feb. 21, 1946 (Zverev, 1947 budget), states that at the end of 1947 there would be (planned) 696,000 students, which is 155,000, or 28.7 percent more than in 1940. Consequently the actual enrollment in 1940 (year end) was 541,000. The slightly higher figure of 565,000 is given in Bartošek, *Vysoké*, p. 24. About the same figure is quoted by Gorokhoff, *Materials*, p. 36b.

A somewhat higher estimate of the 1940 enrollment (at the beginning of the school year) may be obtained from *VVSh*, No. 4, 1951, pp. 8–9. On the one hand, it is stated that the average enrollment per one establishment was 732 students; since there were 782 establishments, the enrollment may be estimated as 572,000. On the other hand, it is stated that there were 841,000 students in 1950, which was 43.5 percent more than in 1940; consequently the 1940 enrollment was 586,000. Both figures refer to all; i. e., including some nonregular higher educational establishments and therefore they were not accepted for this table. All these checks suggest that the figures accepted, though obviously approximate, nevertheless are of a substantially correct order of magnitude.

09m (40).—Enrollment in all types of VUZ, including extension students, was 812,000 in 1940 (*Pravda*, Apr. 17, 1951 [Itogi 1946–50]).

Note to 8m (40).—The Baltic provinces, which were annexed in that year, could account for about 20,000 to 25,000 students. (Actually the 1941 planned enrollment was 23,500, *1941 Plan*, pp. 708, 715, 722.)

8m (40).—This figure was introduced here because again and again it appears in various sources. It is referred to as the beginning of the school-year figure (1940–41). It is important for checking purposes because it is frequently referred to in the postwar period.

9m (40).—By subtraction: (09m) minus (8m).

10–15l–q (39–44).—Bartošek, *Vysoké*, p. 25. Figures on total acceptances in 1942, 1943 (15o, 15p) are also identical with Voznesensky, *Voyennaya*, p. 116.

15m (40).—Confirmed by statement in *VVSh*, No. 4, 1951, p. 9, which states that, excluding correspondence students, acceptances in 1940 were 161,400. *Pravda*, May 27, 1940 (feature), states that anticipated acceptances, including all types of extension students, were 280,000, of which anticipated acceptances in regular higher educational establishments were to be 183,000. Apparently these planned targets were revised downward.

10m–q (40–44).—Confirmation of figures from Bartošek, *Vysoké*, p. 25, may be found in *VVSh*, No. 1, 1946, p. 1, which reveals identical figures for engineering acceptances for all these years.

19–24l–r (39–45).—Bartošek, *Vysoké*, p. 26.

24l (39).—*Pravda*, Sept. 2, 1939 (Kaftanov article), states that 1939 graduations from regular higher educational establishments were about 96,000, which tends to confirm Bartošek's figure. Apparently there were still 2,000 to 3,000 industrial academy graduates in that year.

24m (40).—*Pravda*, May 26, 1940, reveals planned graduations for 1940, which were set at 111,000 (vs. actual of about 102,000 adopted in the table).

19m (40).—Confirmation of figure from Bartošek, *Vysoké*, p. 25, in *VVSh*, No. 1, 1946, p. 1. Engineering graduations in 1940 were 29,300.

6n (41).—Gorokhoff, *Materials*, p. 36b.

6o (42).—Total enrollment was 227,000 (Ashby, *Scientist in Russia*, p. 69, as quoted from *VVSh*, No. 2, 1945, p. 27). Same figure in Bartošek, *Vysoké*, p. 24.

6p (43).—Gorokhoff, *Materials*, p. 36b.

6q (44).—P. F. Yudin (ed.), *Strany mira* (Countries of the World), Moscow, 1946, p. 172. About the same figure (455,000) is given in Ashby, *Scientist in Russia*, p. 69. Bartošek, *Vysoké*, p. 24, gives figure of 455,000.

15q (44).—Confirmation of Bartošek's figure in *Trud*, June 20, 1944. Anticipated acceptances are 170,000.

1r (*45*).—*VVSh*, No. 1, 1946, p. 1. The actual enrollment in 1945–46 ("at the present time") was 170,000.

6r (*45*).—Zhirnov, *Kul'turnoye*, p. 24, states that actual enrollment in 1945 was 539,200. This figure is confirmed to some extent by *Gudok*, Oct. 16, 1946 (Zverev, 1946 budget), which states that by the end of 1946 there were to be (plan) 653,000 students enrolled, which was 22.6 percent more than those actually enrolled at the end of 1945. Consequently the 1945 enrollment may be estimated as 532,600, which is slightly lower than the figure accepted in the table. Ashby, *Scientist in Russia*, p. 69, gives this figure as about 565,000, which is a preliminary figure for anticipated enrollment reported to him by Kaftanov.

9r (*45*).—*VVSh*, Nos. 8–9, 1945, p. 34, states that at the beginning of the academic year 1945–46 (i. e., end 1945) there were 165,000 extension students in 16 independent extension institutes and 347 divisions attached to regular higher educational establishments. This figure is somewhat lower than the one which can be obtained as follows: *VVSh*, No. 10, 1946, p. 45, states that during the 4th Five-Year Plan the number of correspondence students would increase 50 percent and would be 300,000. Consequently 1946 correspondence students numbered about 200,000.

09r (*45*).—By addition (about 701,000).

10r (*45*).—*VVSh*, No. 1, 1946, p. 1, states the actual acceptances in engineering VUZ as 56,800.

10–14r (*45*).—Bartošek, *Vysoké*, p. 27, gives distribution of acceptances in the fall of 1945 in percent, from which the following distribution of acceptances may be ascertained. Total acceptances are given (see 15r below) as 177,000. Acceptances by field were as follows:

(10r)	Engineering	57,000
(11r)	Agricultural	15,000
(12r)	Socioeconomic	9,000
(13r)	Educational-cultural	71,000
(14r)	Health	25,000
	Total	177,000

10r checks closely with another source (56,700 from *VVSh*, No. 1, 1946, p. 1).

15r (*45*).—*Izvestiya*, May 26, 1945, gives expected acceptances in the fall of 1945. These acceptances were reported as somewhat overfulfilled; however, no adjustment was made.

1–6s (*46*).—*Actual* enrollment in 1946–47 (i. e., 1946 in the table) may be obtained in the following way. Sinetskii, *PP Kadry*, p. 111, gives the average number of students per faculty member in higher educational establishments in a given field. The same source (p. 105) also reveals the number of faculty members. The following are the data and the computation of actual enrollment based thereon:

	Field	*Average number of students per 10 faculty members*	*Faculty*	*Computed enrollment*
1s	Engineering industrial	105	16,300	171,200
1s	Engineering transportation	133	2,500	33,200
2s	Agricultural	90	6,700	60,300
3s	Socioeconomic	121	2,600	31,500
4s	Education	95	21,800	207,100
4s	Arts	46	2,900	13,300
5s	Health	97	14,100	136,700
6s	Total	.....	.....	653,300
6s	All fields	97	67,300	652,800

The discrepancy between the two last rows is obviously due to rounding. Now if we work systematically through this source we obtain the following figures.

1s (*46*).—Sinetskii, *PP Kadry*, p. 107. As of Jan. 1, 1947, there were 207,100 (against 204,400 derived above) engineering students of all types, which was 31.5 percent of the total number of students. Consequently the total number of students was 652,300.

2s (*46*).—Sinetskii, *PP Kadry*, p. 110. Total number of agricultural students was 61,400 (against 60,300 derived).

4s (*46*).—Sinetskii, *PP Kadry*, p. 105. Total number of students in educational fields was 199,800, or 30.7 percent of the total enrollment. Consequently the total enrollment is estimated as 650,800.

4s (*46*).—Sinetskii, *PP Kadry*, p. 100. Enrollment in arts was 13,400.

5s (*46*).—Sinetskii, *PP Kadry*, p. 109. Enrollment in medical schools alone was 131,800. Of course this figure differs slightly from that which was derived above by computing enrollment figures from teaching staffs and average number of students per faculty member. The figure computed above (in 1–6s [46]) i. e., 136,700, was incorporated into the table since it appears to be of more inclusive coverage.

1–6s (*46*) (*check*).—There are additional checks available. *VVSh*, No. 1, 1946, p. 1, states that the contemplated enrollment in engineering (1s) would be over 200,000. *Sotsialisticheskoye Zemledeliye*, July 9, 1946, states that the planned enrollment in agricultural fields (2s) would exceed 50,000 in the fall of 1946. *BSE–SSSR*, 1947, column 1237, states that the 1946–47 total enrollment (6s) would be 632,000. In the postwar years it is obvious that enrollment quotas were overfulfilled due to the influx of students whose work had been interrupted by the war.

6s (*46*).—*Gudok*, Oct. 16, 1946 (Zverev, 1946 budget), states that toward the end of 1946 there would be 653,000 students enrolled in regular VUZ. Medynskii, *Nar Obr*, 2d ed., 1952, p. 162, also gives the actual 1946 enrollment as 653,000. Another statement confirms the figure accepted in this table. Zhirnov, *Kul'turnoye*, p. 24, states that *actual* enrollment in VUZ in 1946–47 was 648,900. The same source also states that the 1945 enrollment was 539,200. At the same time *Gudok*, Jan. 21, 1946 (Itogi, 1946), states that the total number of students enrolled in the VUZ increased between 1945 (fall) and 1946 (fall) by 109,000. Assuming the 1945 figure, we obtain 648,200 for 1946, which checks closely with the figure accepted in the table (653,800).

19s (*46*).—*VVSh*, No. 1, 1946, p. 1. Expected graduations in 1946 were to be 11,000 in engineering.

15s (*46*).—*VVSh*, Nos. 11–12, 1946, p. 3 (Kaftanov article). Actual acceptances of 195,000 in VUZ. The plan was fulfilled.

8s (*46*).—*VVSh*, No. 6, 1947, p. 34, states that there were 212,000 extension students.

09s (*46*).—By addition.

23s (*46*).—*Meditsynskaya Sestra*, No. 1, 1947, p. 3.

24s (*46*).—*BSE-SSSR*, 1947, column 1237—actual 1945–46 graduations (i. e., 1946) were 49,000.

11s (*46*).—*Sotsialisticheskoye Zemledeliye*, July 9, 1946.

8t (*47*).—Sinetskii, *PP Kadry*, p. 110, states that in 1947–48 there were 689,000 students. This figure was adopted for the table. *Pravda*, May 17, 1948, reveals the enrollment during the academic year (1947–48) as 670,000.

9t (*47*).—*VVSh*, No. 11, 1947, p. 39, states that in addition to regular students, there were 294,000 extension students.

09t (*47*).—By addition.

10–15t (*47*).—*Moscow News*, May 14, 1947, gives the following breakdown of anticipated fall acceptances for 1947:

Total		187,000
Engineering		43,000
Agricultural		17,000
Educational		90,000
Pedagogical	66,000	
Universities	24,000	
Medical (health)		20,000
Total		170,000
Unaccounted		17,000

This unaccounted residual is composed of the socioeconomic arts and physical culture segments. It was assumed that arts accounted for 2,000, physical culture for 2,000, and the residual 13,000 were socioeconomic segment acceptances. Thus, health, 22,000; socioeconomic, 13,000; education (including arts), 92,000.

15t (*47*).—*VVSh*, No. 4, 1947, p. 2, states that actual acceptances were 187,000. *Gudok*, Mar. 2, 1947 (1947 annual plan), states that planned acceptances in 1947 were to be 182,300, excluding extension students. Apparently both planned and anticipated acceptances were realized.

19–24t (*47*).—Total anticipated graduations 91,200 (*Gudok*, Mar. 2, 1947). *Moscow News*, May 28, 1947, reveals expected graduations as follows: Engineering, 15,000; agricultural, 8,000; medical, 18,000; education (pedagogical institutes, 41,000; arts, 1,000; universities, 6,000), total 48,000; socioeconomic segment graduates as a residual. Confirmation of 1947 actual graduations is given in *Pravda*, July 7, 1947, as about 90,000. Confirmation of medical graduates can also be obtained, since *BSE–SSSR*, 1947, column 1178, states that planned graduations in 1947 would be between 17,000 and 18,000, a figure which was apparently realized.

8u (*48*).—The actual enrollment of 734,000 is given in *Pravda*, Jan. 20, 1949 (Itogi 1948); and *Nar Khoz SBX*, No. 3, pp. 413, 421 as against planned enrollment which was to be 722,000 (*Nar Khoz SBX*, No. 2, p. 485).

9u (*48*).—*Pravda*, Jan. 20, 1949 (Itogi 1948), states that there were 270,000 extension students. But *Nar Khoz SBX*, No. 3, p. 421, states that there were 298,000 extension students at the beginning of 1949.

09u (*48*).—By addition, 1,004,000. In the second case (9u above), we obtain 1,032,000, which is not on the table.

10–14u (*48*).—*Komsomol'skaya Pravda*, Mar. 13, 1948. The figures in the table refer to planned acceptances in the fall of 1948.

15u (*48*).—By addition. *Komsomol'skaya Pravda*, Mar. 13, 1948, reveals that the total acceptances would be 180,000. Consequently 7,000 remained undistributed or unaccounted for. *Nar Khoz SBX*, No. 2, (Itogi, 3d quarter 1948), states that *actual* acceptances in the fall of 1948 were 188,000. Thus the actual acceptances were above plan by about 4–5 percent. No adjustment was made.

19–23u (*48*).—*Pravda*, June 27, 1948, gives figures on expected graduations by field. It states that total expected graduations would be 124,600 (see 24u (48) below). Unaccounted for are 19,600, which consists of agricultural, socioeconomic, and arts graduates.

23u (*48*).—*Meditsynskii Rabotnik*, Feb. 5, 1948, states also that anticipated graduations in 1948 will be 26,000. However, actual graduations were 24,000 (ibid., Feb. 9, 1949). This figure, however, includes physicians only.

24u (*48*).—*Pravda*, Jan. 20, 1949 (Itogi 1948), states that actual graduations were 122,000.

1–6v (*49*).—*BSE* (2d ed.), vol. 9, p. 515. No ambiguity. Three evening engineering schools are included in 1v (49) enrollment. 13,100 arts students are included under education (4v (49)), and 5,700 physical culture students under health (5v (49)). Total enrollment (6v (49)), also in *VVSh*, No. 12, 1949, p. 10.

9v (*49*).—*VVSh*, No. 12, 1949, p. 10, states that enrollment in extension training was 346,000.

09v (*49*).—By addition (and also stated in the source above). *Pravda*, Jan. 18, 1950 (Itogi 1949), and *Nar Khoz SBX*, No. 3, p. 445, give slightly higher total enrollment, including extension students, as 1,128,000. A slightly different figure (1,132,000) may be derived by another method—using reported percentage increases over the preceding years.

15v (*49*).—*Izvestiya*, Sept. 6, 1949. Acceptances exclude extension students.

18v (*49*).—*Nar Khoz SBX*, No. 3, p. 435 (Itogi, 3d quarter 1949), explicitly states that extension student acceptances are included.

17v (*49*).—As a residual (18v minus 15v).

19v (*49*).—*VVSh*, No. 1, 1946, p. 1. *Expected* graduations in engineering. It is stated that already (*uzhe*) after 1948 graduations would surpass the prewar level and would be 32,000.

23v (*49*).—*Meditsynskii Rabotnik*, Mar. 30, 1950, states that actual graduations in 1949 were 23,400 from medical VUZ. It is important to stress the fact that *Sovetskaya Meditsyna*, No. 11, 1949, p. 4, states that the number of physicians increased by almost 30,000. Thus the increase in the number of physicians was probably larger than the influx of graduates due to the discharge of physicians from military duty.

24v (*49*).—*VVSh*, No. 7, 1949, p. 1, states that actual graduations in 1949 were 143,000.

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26v (49).—*Nar Khoz SBX*, No. 3, p. 428 (Itogi 1949, 2d quarter), states that in 1949 there were 60,000 extension student graduates from technicums and VUZ combined. It was assumed that of these, 30,000 graduated from technicums and 30,000 from VUZ.

27v (49).—By addition.

1w (50).—*BSE* (2d ed.), vol. 9, p. 512, gives a detailed breakdown of enrollment by type of institution in engineering as of Sept. 15, 1950. In addition to 280,700, there were 40,700 extension students or 12.7 percent of the total 321,400 in engineering. Another estimate of the engineering enrollment is available. *VVSh*, No. 4, 1951, p. 8, states that the average technical VUZ had 1,690 students. *BSE* (2d ed.), vol. 9, p. 515, states that there were 167 technical VUZ. Consequently the 1950 enrollment may be estimated as 282,000. A somewhat lower figure (266,800) is given in *BSE* (2d ed.), vol. 9, p. 512, but it excludes certain categories of engineering students.

2w (50).—*VVSh*, No. 4, 1951, p. 10, gives the figure of about 90,000.

5w (50).—*VVSh*. No. 4, 1951, p. 8, states that regular (*statsionarnyye VUZ*) students by the end of 1950 exceeded by 167,000 the planned enrollment. Since the *planned* enrollment was 674,000 (*BSE–SSSR*, 1947, column 1237), the 1950 actual enrollment must have been 841,000. A further check is available. The same article (*VVSh*, No. 4, 1951, p. 8), states that the average VUZ had 994 students. Since there were 847 VUZ, the total enrollment in 1950 may be estimated as 841,900.

09w (50).—Total enrollment in VUZ, including extension students, was 1,247,000. (*Pravda*, Apr. 17, 1951 [Itogi 1946–50]).

9w (50).—As a residual.

10w (50).—*VVSh*, No. 4, 1951, p. 9, states that acceptances in the field of industrial and construction engineering in 1950 were 174 percent of 1940. In the fields of transportation and communication engineering, they were 151 percent of 1940. Assuming 1940 acceptances given in the table, we obtain 1950 acceptances as about 70,000 (rounded).

11w (50).—*VVSh*, No. 4, 1951, p. 10, states that acceptances in agricultural fields in 1950 were 243 percent of 1940. Consequently they were about 22,400. *Komsomol'skaya Pravda*, Sept. 1, 1950, states the *anticipated* acceptances as about 21,000.

15w (50).—*VVSh*, No. 4, 1951, p. 9, states that the total acceptances, excluding extension students, were 235,700 in 1950.

18w (50).—*Nar Khoz SBX*, No. 4, p. 414 (Itogi, 3d quarter 1950), states that total acceptances in the VUZ, including extension students, were 350,000. Another source (*Moskovskii Komsomolets*, Aug. 31, 1950) states that acceptances in 1950 were about 335,000 (or about 15,000 less than the figure accepted for this table from Gosplan report).

17w (50).—As a residual (18w minus 15w).

14w (EJ).—*Meditsynskii Rabotnik*, Nov. 16, 1950, states that fall acceptances in all medical VUZ were over 20,000.

24, 26, 27w (50).—*VVSh*, No. 4, 1951, pp. 8–9. All figures refer to actual graduations in 1950.

8x (51).—*Izvestiya*, June 19, 1952, states that there were about 400,000 extension students. If we assume the total number of students as 1,356,000, there were 950,000 (rounded) regular students.

09x (51).—*Pravda*, Jan. 29, 1952 (Itogi 1951), states that enrollment in 1951 had increased by 108,000 over 1950, which gives 1,355,000. *Pravda*, June 14, 1952; Sept. 1, 1952, gives the figure 1,356,000.

9x (51).—As a residual.

14x (51).—*Meditsynskii Rabotnik*, Sept. 2, 1951, specifies acceptance in all types of medical VUZ as 22,000.

17x (51).—*Pravda*, July 12, 1951, states that extension students accepted "last year" were 110,000.

15x (51).—Since total acceptances, including extension students, are given (355,000) and since extension student acceptances were 110,000, as a residual 15x equals 245,000.

18x (51).—*Komsomol'skaya Pravda*, Sept. 1, 1951; *VVSh*, No. 10, 1951, p. 1, state that acceptances in 1951, including extension students, were over 350,000.

19x (51).—*Pravda*, May 24, 1951, states that 30,000 were preparing to graduate. *Komsomol'skaya Pravda*, July 20, 1951, states that over 29,000 graduated.

20 x (51).—*Komsomol'skaya Pravda*, July 20, 1951.

21x (51).—Socioeconomic graduations are assumed to have been about 10,000 to 11,000.

22x (51).—*Pravda*, May 24, 1951, states that about 80,000 were preparing for graduation. This includes universities. *Komsomol'skaya Pravda*, July 20, 1951, gives "pedagogical and teachers institutes" alone as 66,000.

23x (51).—*Meditsynskii Rabotnik*, Jan. 4, 1951, states that anticipated graduations in medicine alone in 1951 will be 18,000. Consequently in all health fields, graduations would be about 20,000.

24x (51).—Figure obtained by addition of actual figures and one (21x (51)) estimate.

27x (51).—*Pravda*, Jan. 29, 1952 (Itogi 1951), states that 201,000 were graduated. This apparently includes all extension graduates.

26x (51).—Figure derived as a residual: 27x (51) minus 24x (51).

8y (52).—As a difference: 09y (52) minus 9y (52), or about 942,000.

9y (52).—*Izvestiya*, July 9, 1952, states that in 1952 there should be 500,000 extension students, a figure accepted for the table.

09y (52).—*Pravda*, Jan. 23, 1953 (Itogi 1952).

15y (52).—*Pravda*, Sept. 1, 1952; *Izvestiya*, June 19, 1952. Figure in the table (240,000) refers to regular *VUZ* acceptances only.

17y (52).—Derived as a residual.

18y (52).—Acceptances in the fall of 1952 were 375,000 in all types of VUZ (*Pravda*, Oct. 6, 1952 (Malenkov speech)).

19–27y (52).—*Pravda*, June 14, 1952 (feature), reveals the following breakdown of graduations:

(19y)	Engineering	30,000
(20y)	Agricultural	15,000
(22y)	Pedagogical (alone)	70,000
(22y)	Universities	18,000
	Subtotal	133,000
	Total graduations from regular VUZ	180,000
	Unaccounted residual	47,000

Note to 23y (52).—It is stated that this residual contains health, economics, jurisprudence, and arts graduates. We can single out the health field as about 32,000 in the following way. We know that between the end of 1951 (data from *Meditsynskii Rabotnik*, Jan. 31, 1952) and the end of 1953 (data from ibid., Aug. 14, 1953), the number of Soviet physicians increased by 58,000 (1951, 242,000, and 1953, 300,000). Consequently the annual increase was in the neighborhood of 30,000. If annual losses are taken into consideration, graduations must have been somewhere between 30,000 and 33,000. We simply assumed graduations to have been about 32,000. Consequently there are 15,000 left for the socioeconomic and the arts segments. Arts graduates could have been anywhere between 1,000 and 2,000. We accepted them as 2,000. Consequently the socioeconomic segment alone is about 13,000 (21y). The educational segment (i. e., pedagogical 70,000, plus universities 18,000, plus arts about 2,000) was about 90,000 (22y). There is, however, some uncertainty about health field graduates since such high graduations from medical schools seem to be questionable in view of the following fact. The conversion to a 6-year medical curriculum began in 1945, and in each of the 4 subsequent years about 15 institutions were converted. Thus, in 1952 graduations should still be falling off rather than rising. In addition, 1951 anticipated graduations were reported to be about 18,000. Though the figures were retained in the table, only limited use will be made of them. Of course it is quite plausible that in 1952 an unusually large graduating class did in fact exist because of the influx of students whose studies had been interrupted by the war (these graduates cannot be estimated on the basis of acceptance data since returning students are not reported as new acceptances).

26y (52).—*Pravda*, June 14, 1952, states that in addition to the graduations given above, there were about 41,000 extension students graduated (presumably at least 70 percent of them in education).

27y (52).—By addition, and as stated in the same source. Also stated in *Pravda*, Oct. 6, 1952 (Malenkov speech).

2z (*53*).—*Pravda*, Oct. 6, 1953 (Kaftanov speech, who reappeared as an Assistant Minister of Culture), states that in 1953 there were 2.5 times as many agricultural students as in 1940. Assuming 1940 as 48,000 (see 2m [40]), we obtain 122,000.

8z (*53*).—Residual (09z minus 9z, or about 1,062,000).

09z (*53*).—*Pravda*, Apr. 8, 1955. Total enrollment in 1953 was 170,000 less than in 1954, when it was 1,732,000. Consequently 1953 enrollment was 1,562,000.

9z (*53*).—*Pravda*, Dec. 5, 1953 (feature), states that among over 1,500,000 students, there were almost 500,000 extension students. Consequently there were over 1 million regular students.

18z (*53*).—*Pravda*, Jan. 31, 1954 (Itogi 1953). Actual acceptances in 1953 were 25,000 less than the planned acceptances of 440,000 in 1954 (*Pravda*, May 11, 1954 (Yelyutin article, Minister of Higher Education)). Actual acceptances in the fall were over 400,000 (*Izvestiya*, Nov. 3, 1953).

19, 20, 22z (*53*).—*Izvestiya*, July 15, 1953, reports (19z) as 40,000, (20z) as 17,000. The number of graduates of teachers and pedagogical institutes and universities was 67,000 (22z). This figure was adjusted upward by 3,000 to allow for arts graduates.

27z (*53*).—*Izvestiya*, Nov. 3, 1953, states that *actual* graduations in 1953 were about 200,000. This is the same figure as stated in *Pravda*, May 21, 1953, as anticipated graduations. It apparently includes all types of extension students.

19z (*53*).—Actual graduations of engineers in 1953 were over 40,000 (*Pravda*, May 11, 1954, Yelyutin article).

2zz (*54*).—*VVsh*, No. 11, 1954, p. 54, states that in 1954 there were 32,800 agricultural field extension students and that they represented 20 percent of all agricultural field students. Consequently, all agricultural students totaled to 164,000, of which regular were 132,200 and extension were 32,800.

3zz (*54*).—*Izvestiya*, Feb. 18, 1955, states that in the socioeconomic segment there were about 245,000 students, of whom 95,000 were extension students. Consequently, there were 150,000 regular students. Some of these are students in departments of universities (perhaps as many as 10,000 to 15,000), but no adjustment was made.

09zz (*54*).—*Pravda*, April 5, 1955. Also *VVSh*, No. 10, 1954, p. 1, states that the 1954 enrollment was over 1,700,000.

9zz (*54*).—*Pravda*, Jan. 6, 1955, states that there are 645,000 extension and evening students. No adjustment was made to account for evening students, though they may number 20,000 to 30,000.

8zz (*54*).—As a residual.

10, 11, 15zz (*54*).—*Pravda*, Nov. 13, 1954 (Yelyutin article, Minister of Higher Education). Engineering student acceptances in 1954 were 2.6-fold over those of 1940. Since 1940 acceptances were about 41,000, 1954 engineering field acceptances were 106,800. Agricultural field acceptances were threefold over those of 1940. Since 1940 acceptances were 9,200, 1954 acceptances were 27,600. Engineering student acceptances accounted for 37.2 percent of all acceptances in regular VUZ (i. e., excluding extension students); consequently, regular VUZ acceptances were about 287,000.

18zz (*54*).—Actual acceptances in 1954 were 450,000 (*Pravda*, Sept. 1, 1954). This exceeds planned acceptances by 10,000, since fall 1954 acceptances were planned as 440,000 in all types of VUZ (*Pravda*, May 11 and May 19, 1954).

17zz (*54*).—As a residual.

19–27zz (*54*).—*Pravda*, May 11, 1954, states that expected graduations in the summer of 1954 would be:

27zz	Grand total	230,000
26zz	Extension	57,000
24zz	(Total (residual))	173,000
	of which—	
19zz	Engineering	53,000
20zz	Agricultural	18,000
22zz	Universities	17,000
22zz	Pedagogical	53,000
	Total	141,000
	Unaccounted (which includes socioeconomic, health, arts)	32,000

These 32,000, however, can be distributed as follows. (*Narodnoye Zdravookhraneniye*, No. 10, 1954, p. 44, states that medical schools are graduating about 24,000 annually at the present time (i. e., 1954). Consequently, 23zz is 24,000, and 21zz, as a residual, 8,000 (which seems quite an acceptable figure).

27zz (*54*).—Actual graduations in 1954 from all types of VUZ were about 230,000 (*Pravda*, July 5, 1954 [editorial]). Same figure is given in *Pravda*, May 19, 1954 (feature), where it is stated that this is the number who are taking graduation examinations.

27zzz (*55*).—Anticipated graduations, including extension students, in 1955 will be 250,000 (*VVSh*, No. 2, 1955, p. 1). This figure was confirmed as actual graduations (*Pravda*, June 25, 1955; *Izvestiya*, June 25, 1955).

TABLE A–2.—*Reconstruction of graduations from Soviet higher educational establishments, 1946–50*

Field	(*A*) *Planned graduations (thousands)*	(*B*) *Distribution of planned graduations (percent)*	(*C*) *Reconstructed graduations (thousands)*	(*D*) *Average annual graduations (thousands)*
Engineering	148.0	24.6	160.3	32.0
Agriculture	47.0	7.8	50.8	10.1
Socioeconomic	32.0	5.3	34.6	6.9
Education	275.0	45.7	298.0	59.6
Health	100.0	16.6	108.3	21.7
Total	602.0	100.0	• 652.0	130.3

• Actual graduations in thousands, *VVSh*, No. 4, 1951, p. 9.

Notes and sources

(*A*) Planned distribution of graduations in thousands. *VVSh*, Nos. 11–12, 1946, pp. 1–3; *VVSh*, No. 4, 1951, p. 5 ff.; *Sovetskii Kalendar', 1917–47*, 1948 edition, passim, "education" section.

(*B*) Percentages derived from col. (*A*).

(*C*) Reconstructed distribution of actual graduations in thousands for different fields on the basis of percentages in col. (*B*).

(*D*) Average annual graduations in thousands derived by division of col. (*C*) figures by 5.

NOTE.—The actual distribution of graduates by field is derived by projecting planned distribution upon actual total of graduates. Some error is involved in this procedure particularly because no adjustment has been made to account for extension training graduates. The method used probably results in a slight upward bias of engineering and agricultural field graduates and a slight downward bias of education and health field graduates.

TABLE A-3.—*Relative proportion of women among students in Soviet higher educational establishments, 1927–38*

[Percent of women enrolled in higher educational establishments by field at the beginning of a given year]

	(x) 1927	(a) 1928	(b) 1929	(c) 1930	(d) 1931	(e) 1932	(f) 1933	(g) 1934	(h) 1935	(i) 1936	(j) 1937	(k) 1938	Average, 1928–38
1. Industrial	7.2	13.4	14.3	15.6	15.5	[1] 17.7	19.8	22.4	23.3	25.6	26.6	28.0	20.2
2. Agricultural	16.3	17.4	18.4	20.4	25.4	[1] 28.1	30.6	32.1	31.8	30.2	29.3	30.2	26.7
3. Socioeconomic	16.5	21.1	22.4	19.4	24.8	[1] 29.8	34.9	36.0	39.0	40.1	39.7	41.3	31.7
4. Education	48.0	48.7	[1] 49.0	[1] 46.7	44.4	[1] 46.9	49.3	50.2	48.4	46.8	47.4	48.2	47.8
5. Health	52.0	52.0	[1] 54.0	[1] 56.0	58.0	[1] 64.7	71.4	75.1	71.2	69.0	68.8	67.5	64.3
6. All fields	30.9	28.5	29.1	29.2	28.3	[1] 30.8	33.3	36.5	38.0	39.5	41.0	43.1	34.3

[1] Figures obtained by interpolation.

SOURCES AND NOTES TO TABLE A-3

Table Code — *Sources and Discussion*

1–6, a, d, f, g.—Beilin, *Kadry*, p. 367; also *Sots Stroi—1933*, p. 617; *SC-Eng—1936*, p. 457.

1–6h.—*SC-Eng—1936*, p. 457; also *Sots Stroi—1936*, p. 576.

1–6k.—*Sots Stroi—1933–38*, p. 124.

1–6a, g, h, i, j, k.—*Kul't Stroi—1940*, p. 113.

1–3, 6b, c.—*Plan Kadrov—1930*, p. 127.

4c.—By averaging 5a and 5d.

5c.—By averaging 6a and 6d.

4, 5b.—By averaging, and by 2 percentage points upward adjustment in order to reflect the general upward trend.

1–6e.—Derived by averaging (d) and (f) for each field. Some justification for this procedure is implied in the statement in *Itogi Pervogo FYP*, p. 175, which reveals that in 1932 the relative proportion of women in industrial colleges "increased up to 18 percent" (thus 1e is 18 percent as against 17.7 derived by interpolation in the table).

1–6x.—*Plan Kadrov—1930*, p. 127.

General note.—It must be noted in general that the averaging procedure in (b) and (c) columns does not lead to any appreciable error. However, in 1932, when the enrollment rose tremendously, it is conceivable that the share of women also greatly increased. So far the only justification of the method employed was found in *Itogi pervogo FYP*, p. 175. The suppression of 1932 statistics in all publications of later years is extremely conspicuous.

Column "Average 1928–38" represents an unweighted average and is derived by averaging yearly percentages of relative share of women for the period in question.

TABLE A-4.—*Composition by social origin of students in Soviet higher educational establishments, 1927–38*

[In percent at the beginning of a given year]

	(a) 1927	(b) 1928	(c) 1929	(d) 1930	(e) 1931	(f) 1932	(g) 1933	(h) 1934	(i) 1935	(j) 1938	Average, 1927–38	Averaging error	1937–38 adjusted average
1. Industrial:													
Worker	40.0	38.3	46.4	60.0	61.9		64.6	62.2	59.8	43.5	52.9		53.0
Peasant		14.6	12.8		11.3		7.8	7.1		9.6	10.5		10.4
Other		47.1	40.8		26.8		27.2	30.7		53.1	36.7	+0.1	36.6
2. Agricultural:													
Worker		18.2	23.0		33.0		37.1	36.4	37.1	30.5	30.8		30.8
Peasant		44.4	35.0		34.8		34.4	29.3		36.7	35.7		35.7
Other		37.4	42.0		32.2		28.5	34.3		32.8	34.5	+1.0	33.5
3. Socioeconomic:													
Worker		34.2	38.0		41.6		46.0	46.5	44.1	39.2	41.4		41.4
Peasant		23.1			22.7		19.2	15.8		24.9	21.1		21.1
Other		43.7			35.7		34.8	37.7		35.9	37.6	+0.1	37.5
4. Education:													
Worker		16.3			28.8		29.8	28.1	26.9	23.9	25.6		25.6
Peasant		27.8			24.1		24.9	20.3		30.3	25.5		25.5
Other		55.9			47.1		45.3	51.6		45.8	49.1	+0.2	48.9
5. Health:													
Worker		17.0			35.0		40.9	38.5	37.1	33.6	33.7		33.7
Peasant		14.8			19.9		21.3	18.6		17.6	18.4		18.4
Other		66.2			45.1		37.8	42.9		48.8	48.1	+0.2	47.9
6. All fields:													
Worker	24.2	25.4	30.3	35.2	46.4	58.0	50.3	47.9	45.0	33.9	39.7		39.7
Peasant	23.3	23.9	22.4	20.9	19.3	14.1	16.9	14.6	16.2	21.6	19.3		19.3
Other	52.5	50.7	47.3	43.9	34.3	27.9	32.8	37.5	38.8	44.5	41.0	0.0	41.0

Worker: Workers and their children. Peasant: Peasants and their children. Other: Intelligentsia, white-collar workers, proprietors and their children.

NOTES AND SOURCES TO TABLE A-4

Place in Table — ***Sources and Discussion***

(1–6) (*wpo*) *b, e, g.*—*Sots Stroi—1934*, p. 411.

(1–6) (*wpo*) *b.*—*Podgotovka*, p. 19.

(1–6) (*wpo*) *l.*—*Kul't Stroi—1940*, p. 114.

(1–6) (*w*) *i.*—*Sots Stroi—1936*, p. 576.

6 (*wpo*) *i.*—Bartošek, *Vysoké*, p. 24.

1 (*wp*) *l.*—*Sots Stroi—1933–38*, p. 126. This source gives the percentage for workers and peasants combined as 53.0 percent, as against the accepted 53.1 percent. Reference is made to heavy industry engineering schools only.

6 (*wpo*) *f.*—*Podgotovka*, p. 19.

4 (*wp*) *l.*—*Sots Stroi—1933–38*, p. 126, states that for Soviet universities only workers and peasants combined comprised 50.2 percent of the students.

(1–6) (*wpo*) *b, e, g, h.*—Bellin, *Kadry*, p. 311

1 (*w*) *c, d.*—*Plan Kadrov—1930*, p. 124.

1 (*wpo*) *c.*—*Podgotovka*, p. 19.

2 (*wp*) *c.*—*Plan Kadrov—1930*, p. 125.

3 (*w*) *c.*—*Plan Kadrov—1930*, p. 126.

6 (*wp*) *a, b, c, d.*—*Nar Khoz—1932*, p. 535.

***1927–1938 average.*—1927–38 average is derived from available data for individual years. This procedure of averaging resulted in an error because of incomplete reporting and some lack of precision in official reporting of this type of data. 1927–38 adjusted average was obtained essentially for statistical purposes in carrying out estimates presented elsewhere in this volume so that the distribution would total 100 percent. Adjustment was made to benefit worker and peasant categories. Thus, when each row was averaged separately, the three categories combined totaled to more than 100 percent in the 1927–38 unadjusted average. The averaging error was then subtracted from "other" category to obtain adjusted average for 1927–38.**

TABLE A–5.—*Composition of students by nationality in Soviet higher educational establishments, 1929–35*

[In percent of total enrollment in all fields]

Nationality	U. S. S. R. national composition (1926 census)	Distribution of enrollment by nationality					1929–35 average
		(a) 1929	(b) 1930	(c) 1933	(f) 1934	(g) 1935	
Russians*	52.9	56.1	53.2	53.5	56.0	54.4	54.6
Ukrainians*	21.2	14.6	17.8	16.1	15.5	14.3	15.7
Byelorussians*	3.2	2.9	2.6	3.3	2.7	3.0	2.9
Kazakhs*	2.7	.2	.3	.5	.3	.4	.3
Usbeks*	2.7	.3	.4	.7	.9	.5	.6
Tatars	2.0	.8	.9	1.3	1.4	1.3	1.3
Jews	1.8	13.5	11.3	12.8	12.2	13.3	12.4
Georgians*	1.2	2.4	4.3	2.9	2.7	3.5	3.2
Turks (Azerbaidzhans)*	1.2	1.1	1.4	1.4	1.5	1.3	1.3
Armenians*	1.1	2.0	2.4	2.3	2.0	2.3	2.2
Mordvinians	.9	.2	.2	.2	.3	.3	.2
Germans	.8	.5	.6	.7	.5	.7	.6
Chuvashes	.8	.5	.4	.4	.5	.5	.4
Tadzhiks*	.7	.05	.1	.1	.1	.1	.1
Bashkirs	.5	.1	.1	.2	.2	.2	.2
Poles	.5	.6	.8	.8	.8	.7	.8
Turkomen*	.5	.005	.1	.1	.1	.1	.1
Other	5.3	4.1	3.1	2.7	2.3	3.1	3.1

*Nationalities of the union republics.

SOURCES AND NOTES TO TABLE A–5

Column in Table — *Sources and Discussion*

a, e, g.—*Sots Stroi—1936*, p. 576 (data as of Jan. 1).

Cens., a, b, f.—*Sots Stroi—1934*, p. 411.

a, f, e.—*Sots Stroi—1935*, p. 617. This source actually reveals that (*e*) is as of Jan. 1, 1933, while (*f*) is of Nov. 1, 1933. Thus (*f*) actually represents year-entry 1934 figure. Same data presented in *SC–Eng—1936*, p. 457.

General note.—Definition of nationality in table A–5 refers to the concept of root nationality. Since this concept was abolished in the mid-1930's, Soviet sources have refrained from publishing statistics of this type and statistics on the geographic distribution of enrollment have replaced them. Geographic distribution, however, does not reveal which nationality the students actually are, since national minorities might attend institutions located in other localities outside the territorial boundaries of a given union republic. Also some Russians or other nationalities might attend institutions located in the territory of other national republics.

TABLE B–1.—*Soviet mechanical engineering curriculum with specialization in design and technology of machine tools*

Subjects	Hours	Distribution in percent	Year of study
I. Political	377	7. 6	
1. Principles of Marxism-Leninism	248		1–2
2. Political economy	129		3–4
II. General scientific	1, 456	28. 8	
3. Foreign language	266		1–4
4. Higher mathematics	340		1–2
5. Physics	200		1–2
6. Chemistry	138		1
7. Descriptive geometry	92		1
8. Drawing and graphics	216		1–2
9. Theoretical mechanics	204		1–2
III. General engineering	1, 407	27. 8	
10. Physical metallurgy	107		2–3
11. Strength of materials	170		1–2
12. Theory of machines and mechanisms	124		2–3
13. Machine components	201		2–3
14. Metallography	105		3
15. Nomography	30		3
16. Electrical engineering	112		3
17. Fluid mechanics	54		4
18. Tolerances and measurements	72		3
19. Thermodynamics and heat-power engineering	91		4
20. Study-practice	341		1–3
IV. Specialized engineering	1, 286	25. 4	
21. Lifting machines	76		3–4
22. Machine tools (general)	80		3
23. Kinematics of machine tools	36		4
24. Design and calculation of machine tools	116		4
25. Technology of metal cutting	80		3
26. Cutting tools	100		4
27. Technology of machine building	230		4–5
28. Welding	64		4
29. Machine foundings	48		4
30. Drives	16		4
31. Cold stamping	60		5
32. Structures and their design	40		5
33. Machine-shop layout	60		5
34. Electric equipment	50		5
35. Automatic machine tools	40		5
36. Heat treatment (tempering)	30		5
37. Organization of production	78		4–5
38. Cost accounting and norms	32		4
39. Fire prevention and safety	50		5
V. Other	528	10. 4	
40. Physical training	124		1–2
41. Military training	404		1–3
Total	5, 054	100. 0	
of which—lectures	2, 390	47. 2	
laboratory, practice	2, 664	52. 8	

Source and Notes

This curriculum was obtained from *VVSh*, No. 10, 1946, p. 29, and refers to the academic year 1946–47. There probably have been some minor changes since then. This curriculum refers to a 5-year program. The last half of the 5th year is devoted entirely to the diploma project, the time for which is not included in the curriculum. On the average there are about 40 instruction hours per week, of which lectures occupy an average of 19 instruction hours. The total number of examinations in these 41 subjects was 55; the number of credit tests (*zachet*), in addition to examinations, was 46.

SUPPLEMENT TO TABLE B–1.—*Reconstruction of MIT curriculum in mechanical engineering, with specialty in materials and material processing.*

Subjects	Hours	Distribution in percent	Term of study
I. Humanities and social sciences (not differentiated)	360	12. 4	1–8
II. General scientific	1, 125	38. 9	
General inorganic chemistry	210		1–2
Physics	330		1–4
Calculus and differential equations	180		1–4
Descriptive geometry	90		2
Engineering and machine drawing	180		1, 3
Theoretical mechanics:			
Statics	45		3
Dynamics	90		4, 6
III. General engineering	630	21. 8	
Technical mechanics:			
Strength of materials	90		5, 7
Testing materials laboratory	60		6
Machine design	135		5, 6
Fluid mechanics	75		5, 6
Fundamentals of heat power engineering	120		5, 6
Fundamentals of electrical engineering	60		6
Engineering metals	90		4
IV. Specialized engineering	510	17. 6	
Machine tool laboratory and practice	120		3, 4
Engineering laboratory	120		7, 8
Metal processing	60		7
Mechanical behavior of metals	30		7
Metal cutting principles	45		7
Mechanical engineering problems	45		8
2 elective half courses	90		7, 8
V. Other	270	9. 3	
Athletics	60		1, 2
Military science	180		1–4
Quiz periods	30		1, 2
Total	2, 895	100. 0	

NOTE.—Reconstruction is made on the basis of instruction offered during the academic year, which assumedly has a total duration of 30 weeks (15 weeks per term). Losses of instruction time due to holidays coming during the week time are not accounted for.

Source: *MIT Bulletin*, catalog issue for 1952.

TABLE B–2.—*Soviet chemical engineering curriculum with specialization in technology of silicates.*

Subjects of instruction	Number of instruction hours, year and semester										Total		Of which—	
	1		2		3		4		5		Hours	Distribution in percent	Lectures	Laboratory and practice
	i	ii	iii	iv	v	vi	vii	viii	ix	x				
I. Political											384	8.1		
1. Political economy	60	60	40								160		120	40
2. Dialectical and historical materialism					54	80					134		96	38
3. Leninism							60	30			90		90	
II. General scientific											1,490	31.4		
4. Foreign language	40	40	40	40	36	40					236			236
5. Descriptive geometry and graphics	140	60									200		40	160
6. Higher mathematics	120	120	60								300		160	140
7. Physics	80	100	40								220		120	100
8. Inorganic chemistry	120	100									220		120	100
9. Organic chemistry			80	60	54						194		100	94
10. Theoretical mechanics		80	40								120		80	40
III. Prespecialization engineering										DP	1,506	31.8		
11. Analytical chemistry			180	180						DP	360		20	340
12. Physical chemistry					90	120				DP	210		92	118
13. Colloidal chemistry							80			DP	80		40	40
14. Technical mechanics						120	108			DP	228		114	114
15. Thermodynamics and thermokinetics				100						DP	100		60	40
16. Heat-power engineering					108	140				DP	148		72	76
17. Electrical engineering							120			DP	120		60	60
18. General chemical technology						100	60			DP	160		120	40
19. Chemical processes, equipment and materials						100				DP	100		60	40
IV. Narrow specialization										DP	1,060	22.4		
20. Specialized mineralogy and related subjects					90	40				DP	130		70	60
21. Physical chemistry of silicates						80				DP	80		60	20
22. Safety and fire prevention								50		DP	50		50	
23. Processes and equipment of silicate industry							120			DP	120		70	50
24. Plant layout and design							40			DP	40		40	
25. General silicate technology							120	70		DP	190		80	110
26. Ovens and driers of silicate industry								80	60	DP	140		80	60
27. Special silicate technology								40	200	DP	240		100	140
28. Organization of production								30	40	DP	70		70	
V. Military-physical training											300	6.3		
29. Military training			80	60							140			140
30. Physical training	40	40	40	40							160			160
Total distribution	600	600	600	600	540	600	600	300	300	DP	4,740	100.0	2,164 (45.7)	2,576 (54.3)

NOTES AND SOURCES TO TABLE B–2

This curriculum was abstracted from *Tsement*, No. 11, 1938, p. 6. Comments are as follows:

DP—Indicates that the entire time during the 10th semester in the second half of the fifth year of study is devoted to diploma projects. Time spent thereon is not counted in the curriculum.

14. Technical mechanics.—Includes study of strength of materials, applied mechanics and theory of machines and mechanisms. In other courses these subjects are given as separate courses.

19. Chemical processes.—Includes also chemical resistivity of materials. This course is on general chemical technology.

20. Specialized mineralogy.—Contains microstructures, geology and petrography of silicate materials.

Although this curriculum refers to 1938, it does not appear that it has been changed very drastically since then. There has been an increase of twelve weeks in the length of study in this type of engineering institutes since the war. It is believed that only a couple of specialized subjects of instruction have been added, while on the whole the original curriculum has remained unaltered.

SUPPLEMENT TO TABLE B–2.—*Reconstruction of MIT curriculum in chemical engineering, with specialty in industrial chemistry*

Subjects	Hours	Distribution in percent	Term of study
I. Humanities and social sciences (not differentiated)	360	11. 5	1–8
II. General scientific	945	30. 1	
General inorganic chemistry	210		1–2
Physics	330		1–4
Calculus and differential equations	180		1–4
Descriptive geometry	90		2
Engineering drawing	90		1
Theoretical mechanics Statics and dynamics	45		3
III. General engineering (and nonspecialized chemistry)	795	25. 4	
Chemistry, qualitative analysis	105		3
Chemistry, quantitative analysis	105		4
Physical chemistry, I, II	120		5–6
Physical chemistry laboratory I, II	60		5–6
Organic chemistry I, II	120		5–6
Organic chemistry preparations I	90		5
Qualitative organic analysis	90		6
Strength of materials	45		4
Electrical engineering fundamentals	60		7
IV. Specialized chemical engineering	765	24. 4	
Industrial chemistry	195		5–8
Industrial chemistry laboratory	150		7
Chemical engineering	180		5, 6, 8
Chemical engineering laboratory	150		7
Electives (2 half courses)	90		7–8
V. Other	270	8. 6	
Athletics	60		1–2
Military science	180		1–4
Quiz	30		1–2
Total	3, 135	100. 0	

NOTE.—Reconstruction is made on the basis of instruction offered during the academic year, which is assumed to have a total duration of 30 weeks (15 weeks per term). Losses of instruction time due to holidays coming during the week time are not accounted for.

Source: *MIT Bulletin*, catalog issue for 1952.

TABLE B–3.—*Soviet mechanical engineering curriculum, with specialization in agricultural machinery maintenance engineering*

	Term	Total	Distribution in percent	Lectures	Laboratory and practice
I. Political		383	8.0		
Political economy	1, 2, 3	162		122	40
Dialectical and historical materialism	5, 6	135		96	39
Marxism-Leninism	8, 9	86		86	
II. General scientific		1, 347	28.0		
Higher mathematics	1–3	326		200	126
Chemistry	1–2	144		82	62
Physics	1–2	225		123	102
Theoretical mechanics	1–3	203		123	80
Foreign language (required)[a]	1–6	224			224
Graphics and descriptive geometry	1–3	225		42	183
III. General engineering		936	19.5		
Technical (applied) mechanics	3–4	120		60	60
Machine components	4–5	163		80	83
Properties and processing of metals and woods	4, 5, 7	341		170	171
Fundamentals of electrical engineering	5, 6	132		72	60
Strength of materials	3, 4	180		90	90
IV. Specialized courses (including electives)		2, 069			
A. Required		1, 835	38.2		
Soil mechanics and agriculture	4–5	142		80	62
Agricultural machinery	5–8	413		163	250
Fuel and lubricants	5	84		42	42
Heat-power engineering	5–6	192		120	72
Electric drives	9	64		32	32
Tractors and automobiles[c]	6–8	398		210	188
Operation and utilization of MTS machinery[b]	8–9	188		90	98
Administration of agriculture	8	72		36	36
Maintenance and repair of MTS machinery[b]	7–9	258		108	150
Safety and fire prevention	9	24		24	

See footnotes at end of table.

TABLE B–3.—*Soviet mechanical engineering curriculum, with specialization in agricultural machinery maintenance engineering*—Continued

	Term	Total	Distribution in percent	Lectures	Laboratory and practice
B. Electives [d]		234			
Introduction to radioengineering [e]	6	30			
Construction of roads and their maintenance	7	50			
Elements of hydrodynamics	4	40			
Mechanization in animal husbandry	8	30			
Foreign language (elective) [a]	7–9	84			
V. Other		302	6.3		
Military instruction	3–4	140			140
Physical training	1–4	162			162
Total (with electives)		5,037			
Total (without electives)		4,802	100.0		

Sources and notes

This is the curriculum reported by a refugee and was abstracted from J. Budanow, *Technical Institute in the USSR*, RP-USSR, mimeographed series No. 26 (Russ.), 1952, pp. 16, 19, 22, 24, 25, 27. The Budanow curriculum in several instances does not agree with statements made by him in the text as to the number of instruction hours per subject during a given term. The definitions of some subjects of instruction are ambiguous (like *elektroprovod* [networks], used instead of *elektroprivod* [electric drives], "radio engineering," etc.). Despite these shortcomings, the materials presented are of interest and value in the evaluation of this type of Soviet training.

[a] Reconstructed on the basis of the statement in the text, p. 25 (does not agree with the stated 261 instruction hours on p. 14, even if the number of hours allocated to electives is added). The author states that English was taught predominantly. Instruction in foreign language as an elective is a peculiar occurrence.

[b] MTS—Machine tractor stations, which own agricultural machinery and where tractors and other agricultural machinery are concentrated under state control. This machinery is contracted for by collective farms, which in return make payments in kind to the state.

[c] This is the course on the fundamentals of design of tractors and automobiles.

[d] These are so-called *fakul'tativnyye* subjects. The author states that they were not required.

[e] "Radio-engineering" apparently is nothing but the operation of receiving and transmitting equipment.

Throughout his presentation Budanow stresses the point that "agricultural machinery maintenance engineers" received adequate training as junior officers for tank troops. Budanow also presents allocation of time by number of days. Instruction, according to him, lasts four years and ten months (which is peculiar, since Soviet sources usually state that instruction in these types of technical training establishments lasts only 4 years). During these five years the number of days is allocated as follows:

	Days	Distribution in percent
Classroom instruction of all types	946	55.4
Industrial practice	175	10.0
Examinations	165	9.4
Diploma project	144	8.2
"Vacations"	300	17.0
	1,760	100.0

The 10th term is devoted entirely to the "diploma project." Topics for this project were either design of MTS shops, their operation, or design of some type of equipment. The thesis report was usually 100 to 150 typewritten pages, accompanied by some 8 to 12 drawings of machinery, repair shop layout, production (i. e., repair), planning charts, etc.

TABLE B–4A.—*Soviet 6-year curriculum in clinical medicine (M), public health (H), and pediatrics (P)*

Subject	Faculties	Total	Lectures (hours)	Practice (hours)	Years of course
Marxism-Leninism	MHP	250	150	100	1, 2
Latin	MHP	108		108	1
Foreign language	MHP	190		190	1, 2
Physics	MHP	144	90	54	1
Biology and parasitology	MHP	216	108	108	1, 2
Human anatomy	MHP	398	136	262	1, 2
Histology and embryology	MHP	250	100	150	1, 2
Chemistry	MHP	162	54	108	1
Biological chemistry	MHP	374	192	182	1, 2
Physiology	MHP	278	164	114	2
Military medicine	MHP	180	62	118	2, 5
Microbiology	MHP	255	102	153	3
Pathological physiology	MHP	162	132	30	3
Pharmacology	MHP	219	102	117	3
Pathological anatomy	MP	264	102	162	3, 6
Do	H	228	102	126	3
Diagnostic methods	MHP	332	200	132	3, 4
General surgery	M	213	132	81	3, 4
Do	H	196	98	98	3, 4
Do	P	179	98	81	3, 4
Operative surgery	M	127	48	79	4
Do	P	119	51	68	4
Do	H	113	48	65	4
Hygiene	M	254	96	158	4
Community hygiene	H	228	76	152	4, 5
Hygiene of nutrition	H	169	62	107	4, 5
Labor hygiene	H	230	92	138	5, 6
School hygiene	H	92	46	46	5, 6
Do	P	260	113	147	4, 5
History of medicine	MHP	34	34		4
Formal clinical medicine	M	276	152	124	4, 5
Do	H	214	107	107	4, 5
Do	P	208	90	118	4, 5
Formal clinical surgery	M	248	124	124	4, 5
Do	HP	180	90	90	4, 5
Skin diseases and venereal diseases	MP	124	62	62	4, 5
Do	H	107	45	62	4, 5
Nervous diseases	M	138	62	76	5
Do	H	110	48	62	5
Do	P	124	62	62	5
Organization of health services	M	85	51	34	5
Do	HP	96	48	48	4, 5
Obstetrics and gynecology	M	279	124	155	4, 5
Do	HP	192	96	96	4
Clinical medicine	M	304	120	184	5, 6
Do	H	198	92	106	5, 6
Do	P	184	92	92	5, 6
Clinical surgery	M	332	148	184	5, 6
Do	H	184	92	92	5, 6
Do	P	240	120	120	5, 6
Children's diseases	M	212	106	106	5, 6
Do	H	174	64	110	6
Hospital pediatrics	P	248	92	156	6
Children's infectious diseases	P	128	64	64	5, 6
Infectious diseases and epidemiology	M	184	92	92	5, 6
Do	H	132	50	82	5, 6
Do	P	124	62	62	5
Eye diseases	M	96	46	50	5, 6
Do	H	72	36	36	5, 6
Do	P	82	32	50	5, 6
Ear, nose, and throat diseases	MP	96	46	50	5, 6
Do	H	72	36	36	6
Psychiatry	M	100	64	36	5, 6
Do	H	70	42	28	6
Do	P	92	64	28	6
Medical jurisprudence	M	100	36	64	6
Do	HP	84	28	56	6
Practical pediatrics	P	158	96	62	5
Child surgery	P	128	64	64	6

Source: Ashby, *Scientist in Russia*, table V, pp. 88–89.

TABLE B–4B.—*Soviet 6-year medical curriculum for students of general medicine (introduced in 1945–46)*

Model of 6-year curriculum introduced into Soviet medical institutes beginning with 1945–46 academic year

[Authorized by decree of Dec. 1, 1944]

Subject	*Term*	*Hours*
1. Principles of Marxism-Leninism	1, 2, 3, 4	250
2. Latin	1, 2	108
3. Foreign language	1, 2, 3, 4	190
4. Physics	1, 2	144
5. Biology and parasitology	1, 2, 3	216
6. Anatomy of the human body	1, 2, 3, 4	397
7. Histology and embryology	2, 3, 4	250
8. Inorganic and analytical chemistry	1, 2	162
9. Biological chemistry (including organic and colloidal)	2, 3, 4	374
10. Physiology	3, 4	278
11. Training in military medicine:		
(a) General training	4	42
(b) Chemical defense	9	68
(c) Sanitation	10	70
12. Microbiology	5, 6	255
13. Pathological physiology	5, 6	162
14. Pharmacology	5, 6	219
15. Pathological anatomy, including autopsy	5, 6, 11	264
16. Diagnostics and special pathology and therapy	5, 6, 7	332
17. General surgery	6, 7	213
18. Operational surgery, including topographical anatomy	7, 8	127
19. Hygiene	7, 8	254
20. History of medicine	7	34
21. Clinical therapy, including course on tuberculosis	8, 9	276
22. Clinical surgery	8, 9	246
23. Skin and venereal diseases	8, 9	124
24. Neuropathology	9, 10	138
25. Organization of health services	9	85
26. Obstetrics and gynecology	7, 8, 9, 10	279
27. Hospital therapy	10, 11, 12	304
28. Hospital surgery, including course in maxillofacial surgery	10, 11, 12	332
29. Pediatrics	10, 11, 12	212
30. Infectious diseases and epidemiology	10, 11, 12	184
31. Ophthalmology	10, 11	96
32. Otorhinolaryngology	10, 11	96
33. Psychiatry	10, 11	100
34. Forensic medicine	11, 12	100
Total		6,414

Source: Mark G. Field, *Organization of Medical Services in the Soviet Union*, Air Research and Development Command, Human Resources Research Institute, Maxwell Air Force Base, Ala., January 1954, p. 84 (as compiled from primary sources).

This version of the medical curriculum excludes athletics and military training (not military medicine).

TABLE B–4C (SUMMARY).—*Comparison of general curriculum of Soviet and American medical schools*

	Hours of instruction					
	Soviet			Duke, 1942	Harvard, 1940	Columbia, 1943
	1930	1936	1942			
Premedical sciences	588	822	648	----------	----------	----------
Medical sciences	3,448	4,808	4,494	4,529	3,877	4,456
Anatomy and histology	378	631	576	550	440	662
Physiologic sciences	456	695	612	550	593	519
Pathology and bacteriology	492	650	588	641	479	571
Medicine, surgery and specialties	1,342	2,072	2,081	1,970	1,719	2,115
Pediatrics	162	180	185	191	212	213
Obstetrics and gynecology	216	255	182	468	317	288
Hygiene and sanitation	342	325	270	59	124	88
Other subjects:						
Language	120	353	306	----------	----------	----------
Philosophy and economics	380	153	216	----------	----------	----------
Medico-military science and tactics	864	174	420	----------	----------	----------

Source: Michael B. Shimkin, "Medical Education in the Soviet Union," in *American Review of Soviet Medicine, 1943–44*, vol. 1, No. 1, American-Soviet Medical Society, p. 474.

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TABLE B–5.—*Soviet curriculum in veterinary medicine*

Subject	Year of study	Instruction hours allocated	Distribution	
			Hours	Percent
I. Political			396	7.1
1. Principles of Marxism-Leninism	1, 2	252		
2. Political economy	3, 4	144		
II. General scientific			1, 584	28.4
3. Inorganic and analytical chemistry	1	180		
4. Organic and biochemistry	1, 2	324		
5. Physics	1	108		
6. Botany	1, 2	144		
7. Zoology	1	90		
8. Anatomy	1, 2	306		
9. Darwinism	1	72		
10. Histology and embryology	1	162		
11. Physiology	2	198		
III. Specialized			3, 604	64.5
a. Preclinical			1, 098	19.7
12. Microbiology	3, 4	198		
13. Animal hygiene	3, 4	162		
14. Pathological anatomy	3, 4	256		
15. Pathological physiology	3, 4	162		
16. Pharmacology	3, 4	120		
17. Clinical diagnostics and roentgenology	3, 4	200		
b. Clinical			1, 792	32.0
18. Clinical therapeutics (internal diseases)	3, 4	322		
19. General surgery	3, 4	342		
20. Operational surgery	3, 4	180		
21. Clinical epizootics	3, 4	320		
22. Parasitology	3, 4	240		
23. Obstetrics, gynecology and artificial insemination	3, 4	204		
24. Military veterinary medicine and hygiene	3, 4	184		
c. Animal breeding and administrative			714	12.8
25. Animal breeding	2, 3	306		
26. Animal feeding	2, 3	90		
27. Organization of socialist agriculture and collective farming	2, 3	198		
28. Economics of socialist agriculture	3, 4	60		
29. Legal veterinary medicine	3, 4	60		
Total		5, 584	5, 584	100.0

Source: V. Koropov, *Veterinarnoye obrasovaniye v. SSSR* (Veterinary Education in the U. S. S. R.), Moscow, 1948. Reproduced in "Higher Education in the Soviet Union," unpublished manuscript in Russian, New York; Research Program on the U. S. S. R., pp. 178–9.

TABLE B–6.—*Chemistry instruction required for chemistry majors of Moscow University*

Branch of chemistry	Total	Lectures	Laboratory practice	Year of course
Nonspecialized	1,839	493	1,346	
Inorganic		136	300	1
Organic		204	400	2–3
Physical		102	442	3–4
Analytical		51	204	2
Specialized	859	638	221	
Crystallography		34	51	3
Chemical technology		102		3
Theoretical physics		68		3
Molecular structure		68		4
Colloid chemistry		68	68	4
History of chemistry		68		5
Advanced inorganic		68	68	4
Quantum mechanics		68		5
Spectrochemistry		54		5
Biochemistry		40		5
Glassblowing			34	5
Total	2,698	1,131	1,567	

Source: Ashby, *Scientist in Russia*, p. 92.

This is an abstract of chemistry courses from the curriculum of the Division of Chemistry of Moscow University. Chemistry courses represent roughly one-half of the curriculum of some 5,200 to 5,400 hours. The other half of the curriculum consists of physics, higher mathematics, strength of materials, mechanics, drawing, descriptive geometry, foreign language, political instruction, military and physical training, etc. This curriculum refers to 1945.

APPENDIX B–7.—*Soviet program of training in civil engineering with specialization in hydrotechnical structures*

These data were abstracted from a refugee report: N. Ivanov, *Higher Technical Training in the U. S. S. R.*, mimeographed series, No. 42, RP–USSR, 1953. This refugee was a student in the Moscow Construction (Civil) Engineering Institute, and the program of study refers to the late 1930's.

This institute had six divisions (civilian and industrial structures; hydrotechnical structures; highway construction; mechanization of construction; water supply, sewerage and sanitation; heating and ventilation engineering), which offered narrow specialization in the respective fields. The refugee was a student in the division of hydrotechnical structures and upon completion of training he was assigned as civil engineer on the construction of Kuibyshev on the Volga hydroelectric power station and dam (the construction of which was supervised by Gulag NKVD—Central Administration of Forced Labor Camps of the Soviet Ministry of the Interior [secret police]). The first 2 years of the 5-year course were devoted to general engineering courses, which he described as follows:

1. *Higher mathematics.*—Total number of class instruction hours during 2 years was about 350. The course covered analytical geometry, plane and special; differential and integral calculus (including the solution of differential equations); fundamentals of vector analysis; series and their application; higher algebra; nomography. The course included also slide rule calculations practice.
2. *Theoretical mechanics.*—Covered statics, kinematics, and dynamics.
3. *Descriptive geometry and advanced graphics.*—Included, among "other"

topics, the theory of perspectives, graphic and projective transformations in their application to engineering problems.

4. *Physics.*—"Extensive" coverage, including optics, electricity, and atomic physics.

5. *Chemistry.*—"Quite simplified," a course which offered only general inorganic chemistry (organic chemistry was not taught at all).

6. *Fluid mechanics.*—Very detailed and thorough course, which included the "most complex" equations of (hydro) dynamics. This course was taught in other departments of the same institute in a "simplified" version without theoretical refinements.

7. *Strength of materials* (and materials test laboratory).—Taught in this institute, as well as in other engineering schools, very thoroughly. It was considered one of the most important courses and the study of this subject was spread over the first 2 years.

8. *Foreign language.*—Taught to the extent of enabling students to make technical literature translations from a foreign language into Russian. Students not taught conversational aspects nor could they speak the language freely. Two hours per week for the duration of the first 3 academic years were devoted to foreign language.

Other subjects during the first 2 years of study:

9. *Physical culture.*—Consisted primarily of athletic exercises, supplemented by military drill exercises.

10. *Drawing and engineering drafting.*

11. *Construction materials.*

12. *"Political subjects."*—Consisted of political economy, dialectical materialism, and historical materialism.

13. *Geodesy and geodetic surveying.*

Courses in the last 3 academic years were specialized engineering courses consisting of—

14. Hydrology.

15. "Hydrometry" (hydromechanics).

16. Hydrogeology.

17. Hydraulic structures.

18. Structural mechanics.

19. Structures 1: metal structures design.

20. Structures 2: reinforced concrete structures design.

21. Structures 3: wooden structures design.

22. Structures 4: bridges and bridge design.

23. Structures 5: components design (apparently covers such unit design as arches, building frames, etc., with stress on indeterminate structural components).

24. Organization and management of construction undertakings.

25. Amelioration and development.

26. Fire prevention and safety.

27. *Political subjects*—Political economy and history of the Communist movement in the USSR.

28. *Foreign language.*

N. Ivanov admits that he may have left out some subjects or aggregated subdivisions into larger courses. In total, during the 5 years of study he was required to pass examinations in 42 subjects.

The institute offered civilian and military civil engineering specializations. Military specialization required one additional year of study (total 6 years), which was devoted primarily to: military tactics, light armaments, military drill, military regulations and code, military bridges, ferry construction and ford operations, blasting and demolition operations, combat engineering, and additional courses in athletics.

The last term was devoted to the diploma project.

During the period of study the student was assigned to industrial practice, which consisted of assignment on some construction project.

Classroom instruction, laboratory exercises, etc., were conducted 6 days per week, with six hours' duration 3 days per week and 8 hours' duration the other 3 days. All types of instruction lasted 42 hours per week. In addition, the student had to spend "many hours" in self-preparation.

Grading was strict. More than two failures resulted in expulsion. Repeat examinations were permitted only once. Failure in one subject deprived the student of his monthly stipend.

Summary note

On the basis of these statements, it is apparent that civil engineering training, with narrow specialization in hydrotechnical structures, is based on probably more than forty instruction subjects and over 6,000 instruction hours.

APPENDIX B–8.—*Thesis requirements in Soviet engineering higher educational establishments* [1]

A "diploma project" (usually a thesis or a project of some kind) is required of higher educational establishment graduates. Study of what is expected of a student in the thesis is a good method of evaluating the curriculum of technical higher educational establishments.

An article by Dr. M. E. Egorov, of the Moscow Automechanical Institute, gives some idea of what is involved. He writes describing the work at the institute [2] and presents an outline of the thesis required of students there:

The diploma project is the last stage in the course of special education, adding up the total of the knowledge received by the student in the higher educational establishment, and reflects the specialty which the student is mastering and his future work field.

In our opinion, it would be wise to make it a rule that the industrial practice of the students be closely tied in with the nature of the diploma project. * * *

The diploma project should represent a completed work, explaining a complex of theoretical, engineering, constructing, analytical and accounting, organizational, economic and research problems.

For the actual fulfillment of the diploma project the students must be given a full semester. * * *

A diploma project in the specialty "Machine construction engineering" must reflect the practical application of theoretical knowledge received by the student in the field of the mechanical processing of metals and the assembly of machines, a correct distribution and use of equipment, as rational a use of equipment as possible, as well as of workers, tools and industrial areas, the most economical use of the whole setup of the production, etc. * * *

A consideration of the specialty, place of work, and the practicalness of the problem are necessary factors in the selection of a subject for the problem. * * *

But, within the limits of each branch of machine construction one must select the type of machine construction: machine tool construction, engine construction, turbine construction, pump and compressor construction, etc. In selecting the subject for the project this factor must be taken into account too.

In accordance with the propositions outlined above, the following themes may serve as examples for the specialty "Machine construction engineering."

1. A plan of a machine assembly shop for the production of metalworking tools (of a certain type and size).
2. A plan of a machine assembly shop for the production of automobile or tractor engines, or other engines of a certain type.
3. A plan for a machine assembly shop for the production of automobiles or tractors of a certain type. * * *
9. A plan for a complex of several metal working and assembly shops connected with a general technological process. * * *
15. A plan for the reconstruction of existing shops and plans and making existing production more efficient. * * *

For the specialty "machine construction engineering," the contents of the diploma project on one theme or another may be divided into the following fundamental sections:

1. The production problem (program, study of the subject and technical conditions of it).
2. Designing section.
3. Engineering section.

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[1] Quoted from Gorokhoff, *Materials*, pp. 111–115.
[2] *VVSh*, No. 1, 1946, pp. 15–20, taken from Gorokhoff, *Materials*.

4. Accounting and analysis section pertaining to the engineering, construction and the shop or part of the shop.
5. Planning and general subdivisions of the productive and auxiliary rooms in accordance with the nature of the theme.
6. Organization of production (in accordance with the nature of the theme).
7. Economic section (in accordance with the nature of the theme).
8. Explanatory notes.

Let us now examine the contents of the basic sections of the project. First of all, the production problem. This section of the project must include:

1. The nomenclature of the parts, their quantity, weight, planned price, and the total value of the annual production of the shop.
2. A short description and analysis of the construction of the auxiliary products going with the product (study of the object to be produced).
3. Technical conditions for the preparation of the products made and of its basic parts with which the technological process is concerned.
4. Working sketches of the basic parts and assembly sketches of the product (may be copies).
5. Sketches or plans of the raw materials for the parts, to which the technological process is applied (may be copies).
6. Specifications for the details.
7. Information on the gross and net weights for production for a year, with indication of the type of raw materials (casting, founding, stamping, rolling) and the amount of scrap.

The designing and engineering sections of the project include:

1. Elaboration of the working sketches of 1 or 2 basic parts and the materials for them, with a calculation and indication of the surpluses, allowances and quality of processing, and likewise a working sketch of one assembly center.
2. More detailed charts in accordance with the established form for several basic parts (the number of parts may vary depending upon their nature and complexity, but on the average should be 4 or 5) with all the calculations and completions of each chart.
3. A calculation of the methods of cutting for the basic operations of one part (speed of cutting, supply, depth of cutting, strength of cutting, torque, power).
4. A calculation of the processing time of the elements for the basic operations of one part.
5. A generalization of the operational scheme for the parts, for which detailed processing charts are not made.
6. Drawings or sketches of the processing (sketches for instruction charts) illustrating the process, for 3 to 5 parts out of those for which processing charts were made.
7. An analysis of the construction of 2 or 3 different adaptations used in the planning of the engineering process (for processing, assembly, control).
8. Analysis of the design of cutting and measuring tools used in the planning of the engineering process.
9. An analysis of the tolerances and settings according to the National Standards system for the details of one subassembly center, including those for which engineering charts were made, with a calculation and justification of the settings selected.
10. Engineering charts for assembly according to the established form.
11. Information as to the time required for the subassembly and assembly of the whole machine.
12. Sketches or drawings of the transfer points (sketches to the instruction charts) or engineering schemes of the assembly summarizing the process of the general assembly of one unit or machine.
13. A reworking of the design of the parts caused by engineering requirements, if this becomes necessary.

The accounting and analytical part of the project assumes:

1. A calculation of one of the basic parts or subassemblies prepared by the shop, if its design changes in connection with the engineering.
2. A calculation of the elements of the equipment for processing or assembly or control.
3. A calculation of the cutting and measuring tools.
4. A calculation of the quantity required of equipment to fulfill the production program:
   (*a*) A table of the load on the machines;
   (*b*) Determination of the coefficients of the load;

(*c*) A chart of the load of the machines;
(*d*) Information on the equipment with engineering characteristics and cost.
5. A calculation of the number of assembly points:
(*a*) Tables of the load of the assembly points.
(*b*) A chart of the load.
(*c*) Information as to the equipment for the assembly points.
6. A determination of the quantity required of tools, appliances, accessories, and materials:
(*a*) Information on the working tool;
(*b*) Information on the measuring tool;
(*c*) Information on the electric motors;
(*d*) Information as to the materials.
7. A calculation of the workers required and a detailed list of the staff:
(*a*) for the machine shop;
(*b*) for the assembly shop.
8. A calculation of the quantity of the necessary weight-lifting and transportation equipment for the machine and assembly shops, a selection of the types and information about them.
9. A calculation of the area of the machine shop:
(*a*) The machine tool division;
(*b*) The shop storage facilities for material and semifinished products;
(*c*) Intermediate storage;
(*d*) Control section;
(*e*) Sharpening branch;
(*f*) The section for sharpened tools.
10. A calculation of the area of the assembly shop.
11. A determination of the basic sizes and general area of the machine and assembly shop.
12. A calculation of the toolshop according to technical and economic indexes:
(*a*) Calculation of the quantity of equipment, and information as to its characteristics;
(*b*) A calculation of the area of the shop;
(*c*) A calculation of the number of workers and of the staff.
13. A calculation of the repair shop according to technical and economic indexes:
(*a*) Calculation of the amount of equipment and information on its characteristics.
(*b*) Calculation of the area of the shop.
(*c*) Calculation of the number of workers and of the staff.
14. A calculation of the area of the office for the shop and of space for the personnel's use according to the National Standards.
15. A calculation of the power section: electricity, compressed air, gas, steam, and water.

Planning.—This section of the project should include:

1. Planning of the equipment of the machine shop (or branch) and a distribution of the accessory branches (warehouses, control section, sharpening section, sharpened tool storage, etc.):
(*a*) A plan of the shop or branch on a scale of 1:100;
(*b*) A diagram of the movement of the parts.
2. Planning of the equipping of the assembly shop or branch, with information as to the assembly stands, and working places for the machinists and the subassembly workers:
(*a*) A plan of the shop (or branch) on a scale of 1:100;
(*b*) A diagram of the movement of the details and parts.

If the plan of the machine or assembly shop branch is worked out in detail, then it is necessary to give a plan of its general subdivisions.

3. Determination of the height of the machine and assembly shops:
(*a*) Lateral section on a scale of 1:50;
(*b*) Longitudinal section on a scale of 1:50.
4. A detailed plan of the working place of the machine operator or assembler.
5. A plan of the toolshop.
6. A plan of the repair shop.
7. A plan of the office and workers' quarters.
8. A general breakdown of all the production shops, skilled workmen's shops, auxiliary branches and service quarters in the building.

The section of the project which we called organization of production should include:

1. An organization of the production process and working places in the machine and assembly shops.
2. Organization of technical control.
3. Organization of internal transportation.
4. Organization of the lubrication management.
5. Organization of shop storage areas.
6. Organization of tool management.
7. Organization of the repair work in the shop.
8. Organization of the management of the shop.

The economic part of the project should include:

1. A determination of the general demand for materials, fuel and power.
2. A determination of the annual budget for workers' wages.
3. A determination of the shop's expenses.
4. A budget of the production and a determination of the cost of production.
5. A determination of the basic facilities of the shop.
6. Engineering and economic indices for the shop.

Finally, the last part of the project—explanatory notes—should contain a discussion of the following basic problems:

1. A description of the production problem, a description and analysis of the design of the parts and the engineering conditions for their production.
2. A description of the nature of the production.
3. Basic principles used as the basis for the project.
4. A method of calculating the materials required and the scrap.
5. The work methods of the shops.
6. Engineering and economic indices for the shop.
7. Description of engineering processes; justification for the methods of processing taken in the project; methods of processing of the equipment selected, as well as of the accessories, tools, methods of cooling and the work time established.
8. A description of the special equipment, tools, and accessories; calculations of the design of the parts, accessories, and tools.
9. A determination of the number of machine tools and the load coefficients.
10. The nature of the drive of the equipment.
11. Methods of technical control.
12. Calculation of the workers.
13. Calculation of the areas of the shops, storage areas, and auxiliary rooms.
14. Calculation of the quantity of means of transportation.
15. Calculation of the tool and repair shops.
16. Descriptions of the planning of the equipment and the planning of all the shops and repair shops, the general subdivisions of the shops and the justification of the decisions reached.
17. A calculation of the power unit (electricity, compressed air, steam, gas, water).
18. The organization of production and the economic aspect of the contents indicated above are included in an explanatory note divided by sections.
19. Conclusions—in regard to the project on the basis of engineering and economic results.

TABLE B–9.—*Soviet curriculum in agronomy (at Timiryazev Agricultural Academy in Moscow)*

Subjects	Year of study	Total hours	Distribution in percent	Lectures	Practice and laboratory
I. Political		356	8.6	218	138
Marxism-Leninism	1, 2	218		128	90
Political economy	3	138		90	48
II. General scientific		1,530	37.3	660	780
Physics	1	146		64	82
Inorganic and analytical chemistry	1	206		72	134
Organic chemistry	2	108		72	36
Physical and colloidal chemistry	2	72		36	36
Botany	1	178		82	96
Zoology	1	72		36	36
Animal physiology	1, 2	110		64	46
Plant physiology	2	108		54	54
Microbiology	2	72		36	36
Soil science and geology	2	180		90	90
Geodetics (geodesy)	1	54		18	36
Meteorology and climatology	2	54		36	18
Foreign language	1, 2	170			170
III. Specialized agriculture		1,919	46.8	1,013	906
Introduction to agronomy	1	36		18	18
General agriculture	3	144		80	64
Agrochemistry	3	162		57	105
Plant breeding	3, 4	194		102	92
Vegetable cultures	3	64		40	24
Fruit cultures (horticulture)	4	56		42	14
Pasture production	4	60		30	30
Selection and seed production	4	129		70	59
Entomology and phytopathology	3, 4	141		82	59
Nutrition and breeding of animals	3	126		76	50
Zootechny	4	115		70	45
Plant introduction	4	75		45	30
Forestry	4	42		28	14
Mechanization of agriculture	1, 2, 3	228		112	116
Organization and business management	4	174		88	86
Food storage and technology	4	75		45	30
Agricultural statistics	4	56		28	28
Bookkeeping	4	42			42
IV. Other (military training)	1–4	299	7.3	60	239
Total		4,104		1,951	2,153
Distribution			100.0	47.5	52.5

Source: E. Ashby, *Scientist in Russia*, p. 90. Curriculum refers to 1945–46 and is based on 4 years of training.

TABLE C–1.—*Number of Soviet higher educational establishments, by field, for selected years*

Year end	Engineering			Agriculture	Socioeconomic	Educational				Health			(m)	Extension and Party			(q)
	(a) ET	(b) EIC	(c) ETC	(d) A	(e) SE	(f) TED	(g) U	(h) TCO	(i) AR	(j) TH	(k) M	(l) PC	TR	(n) ACP	(o) IEX	(p) EXB	GT
1913	19	—	—	15	10	[45]	9	30	6	6	6	N	95	N	N	N	N
1919	27	—	—	14	6	—	37	54	17	9	9	N	*166	N	N	N	N
1926	23	—	—	30	8	[65]	22	30	13	10	10	N	136	—	—	—	—
1927	25	—	—	30	6	[59]	20	27	12	—	9	—	129	—	—	—	—
1928	26	—	—	31	7	[54]	19	28	12	—	11	—	129	—	—	—	—
1929	32	—	—	38	11	[60]	20	27	13	—	11	—	152	—	—	—	—
1930	248	—	—	96	50	[105]	N	91	14	—	38	—	537	—	—	—	—
1931	[241]	199	42	125	(27)	154	19	—	—	45	—	—	[592]	53	—	—	645
1935	[150]	127	23	92	(23)	194	—	—	—	55	—	—	[514]	99	—	—	613
1938	[165]	135	30	87	44	286	—	—	22	77	—	—	659	49	—	—	708
1939	[165]	137	28	85	47	375	22	(329)	24	78	—	—	750	—	—	—	—
1946	169	—	—	88	36	[406]	31	320	55	89	74	15	[788]	—	16	372	[808]
1949	166	—	—	90	32	[462]	32	379	51	86	72	14	836	—	16	410	852
1954	177	157	30	109	35	[382]	33	303	46	88	75	13	791	—	23	—	812

[ ] By addition. ( ) Derived figure. * Does not total. N None. (—) Not available.

Capital letters designate grouping of institutes by field

ET—Engineering total (EIC plus ETC).

EIC—Engineering, industry and construction.

ETC—Engineering, transportation and communication.

A—Agricultural.

SE—Socioeconomic.

TED—Total education (U, TCO, AR—residual is primarily pedagogical institutes).

U—Universities.

TCO—Pedagogical and teachers institutes, institutes of foreign languages.

AR—Arts.

TH—Total health.

M—Medical only.

PC—Physical culture only.

TR—Total regular higher educational establishments (ET, A, SE, TED, TH).

ACP—Industrial academies and Higher Communist Party schools.

IEX—Independent extension training higher educational establishments.

EXB—Extension training divisions attached to regular higher educational establishments.

GT—TR plus IEX.

SOURCES AND NOTES TO TABLE C–1

Place in Table — *Sources and Notes*

1913 a, d, e, g–k, m.—Medynskii, *Nar Obr* (2d ed.), 1952, p. 169.

1919 a, d, e, g–k, m.—*Statisticheskii Yezhegodnik, 1918–20*, vol. 2, pp. 112–113, as quoted by Gorokhoff, *Materials*, pp. 35a–35d. Note that *m* does not total—2 institutions short.

1926 a, d–k, m.—*Pedagogicheskaya Entsiklopediya*, 1930, vol. 3, col. 263, as quoted in Gorokhoff, *Materials*, pp. 35a–35d.

1927 a, d, e, g–i, k.—*Podgotovka*, pp. 64-65, as quoted by Gorokhoff, *Materials*, pp. 35a–35d.

1928–30 a, d–i, k, m.—*Nar Khoz—1932*, p. 513. Socioeconomic segment (1930e) is biased upward by inclusion of Kom VUZ and industrial academies.

1931 b–d, f, j, n, q.—*Sots Stroi—1936*, p. 573.

1931 e.—*Sots Stroi—1936*, p. 573. Since the number of Kom VUZ is given (53 institutions), socioeconomic segment institutions are derived as a residual (645 minus 53 minus sum of *a, d, f, j*).

1935 b–d, f, j, n.—*Sots Stroi—1936*, p. 573. *n.* includes 17 Kom VUZ, 20 industrial academies, and 62 VKSKhSh.

1935 q.—*Kul't Stroi—1940*, p. 101. The total (596 institutions) includes 17 Kom VUZ and some other than regular higher educational establishments. If double counting in *Sots Stroi—1936*, p. 573, is eliminated (i. e., VKSKhSh subtracted from total and industrial academies and Kom VUZ added), it gives about the same total as in the table—614 institutions.

1935 e.—Derived as a residual.

1938 b–f, i, j, m, n.—*Sots Stroi—1933–38*, p. 121.

1939 b–g, i, j, m.—*BSE-SSSR*, col. 1233. *Kul't Stroi—1940*, p. 256.

1946 a, d, e, g–l.—Medynskii, *Nar Obr* (1st ed.), 1948, p. 73.

1946 m.—By addition. *VVSh*, No. 7, 1947, p. 2, reports the total as 792, which differs from the derived total by four institutions.

1946, o, p.—*VVSh*, No. 6, 1947, p. 34.

1949, a, d, e, g–m, o–q.—Medynskii, *Nar Obr* (2d ed.), 1952, p. 167; and *BSE* (2d ed.), vol. 9, p. 515.

1954 a–e, g–m, o, q.—Compiled from MVO SSSR, *Spravochnik dlya postupayushchikh v VUZ'y SSSR v 1954 godu*, Moscow, 1954, passim.

TABLE C–2.—*Teaching staffs in Soviet higher education*

Year end	(*a*) *Staff and plurality*	(*b*) *Staff only*	(*c*) *of which—Ranking professor*	(*d*) *Assistant professor*
1927	---	16, 454	---	---
1929	22, 876	13, 758	---	---
1931	58, 220	26, 200	---	---
1940	60, 000	50, 890	5, 361	13, 123
1943	---	24, 749	---	---
1944	51, 904	42, 072	4, 669	10, 125
1946	74, 341	67, 280	5, 370	13, 386
1950	87, 000	80, 000	---	---
1954	---	86, 000	---	---

SOURCES AND NOTES TO TABLE C–2

Place in Table — *Sources and Notes*

1927b.—Sinetskii, *PP Kadry*, p. 61.

1929a, b.—Ibid., pp. 66, 104; also *Nar Khoz—1932*, p. 540.

1931a.—Sinetskii, *PP Kadry*, p. 79.

1940a.—Ibid., p. 93.

1931, 1940, 1942, 1944, 1946b.—Ibid., p. 104.

1946a, b, c, d.—Ibid, p. 105, and *VVSh*, No. 11, 1947, p. 30.

1940c, d.—*VVSh*, No. 5–6, 1946, p. 2.

1944a, b, c, d.—Ibid., No. 11, 1947, p. 31.

1950a.—Ibid., No. 4, 1951, p. 11, states that professorial staffs, including *sovmestiteli*, increased between 1940 and 1950 by 45 percent. Assuming 60,000 for 1940, we have 87,000 for 1950 (year end).

1950b.—*Bol'shevik*, No. 20, 1950, p. 24.

1954c.—*VVSh*, No. 3, 1955, p. 3.

Appendix to Chapter V

TABLE A–1.—*Aspirantura enrollment, 1928–53*

[In thousands]

Year	(a) Total	(b) Higher educational establishments	(c) Research establishments
1928	---	0.8	---
1929	[3.0]	2.0	1.0
1930	---	6.3	---
1931	---	7.4	---
1932	[14.8]	8.4	6.4
1933	[13.0]	7.0	6.0
1934	[10.6]	6.3	4.3
1935	[9.8]	6.4	3.4
1936	[9.0]	6.1	2.9
1937	[8.3]	5.8	2.5
1938	[12.2]	9.2	3.0
1939	12.0	---	---
1940	16.9	13.2	[3.7]
1941	12.0	---	---
1942	---	---	---
1943	---	2.8	---
1944	---	3.7	---
1945	8.5	6.9	[1.6]
1946	---	9.6	---
1947	12.5	8.6	3.9
1948	[1] 19.4	---	---
1949	[1] 19.0	---	---
1950	[1] 21.0	---	---
1951	[1] 24.0	---	---
1952	[1] 27.0	---	---
1953	[1] 27.0	---	---

[ ] By addition or subtraction. [1] Including extension aspirantura students.

SOURCES AND NOTES TO TABLE A–1

Place in Table — *Sources and Notes*

b 1928–40, 1943–46.—Sinetskii, *PP Kadry*, p. 177.
b, c, 1929, 1932–38.—*Kul't Stroi—1940*, p. 242.
a 1940.—*VVSh*, No. 10, 1946, p. 48.
a 1945.—*VVSh*, No. 10, 1946, p. 48, states that in addition to about 7,000 VUZ aspirants, there were 18 percent aspirants in academies and research institutions. Consequently, total aspirantura students were about 8,500.
a, b, c, 1947—*VVSh*, No. 12, 1947, p. 19.
a 1939.—*BSE* (2d ed.), vol. 3, p. 252.
a 1941.—*BSE–SSSR*, col. 1241.
a 1948.—*Nar Khoz SBX*, No. 4, p. 399 (Itogi, 1st quarter 1943).
a 1950.—*Pravda*, Jan. 26, 1951 (Itogi 1950).

a 1949.—*Pravda*, Jan. 26, 1951, states that during the year 1950 aspirantura enrollment increased by about 2,000 and was 21,000. Consequently 1949 enrollment was about 19,000.

a 1951.—*Pravda*, Jan. 29, 1952 (Itogi 1951).

a 1952.—*Pravda*, Jan. 23, 1953 (Itogi 1952).

a 1953.—*Pravda*, Jan. 29, 1954 (Itogi 1953), states simply that the "number of aspirantura students increased somewhat" in 1953 as compared with 1952. *VVSh*, No. 5, 1954, p. 31, gives aspirantura enrollment for 1953–54 as 27,000.

General note.—After 1948 the figures on aspirantura enrollment begin to be biased by the inclusion of extension training advanced degree students. In 1940 (*VVSh*, No. 10, 1946, p. 48) there were already about 1,700 extension aspirantura students, in addition to some 16,900 regular aspirantura students. Since 1948 there probably have been anywhere from 3,000 to 5,000 extension training aspirantura students included in the totals.

TABLE A–2.—*Number of candidate degrees awarded in the U. S. S. R., 1934–53*

Year	Number of degrees	Year	Number of degrees
1934	[2, 350]	1944	2, 203
1935	[2, 169]	1945	1, 952
1936	-----	1946	3, 188
1937	2, 099	1947	(2, 857)
1938	2, 328	1948	4, 000
1939	3, 839	1949	(4, 250)
1940	4, 287	1950	4, 536
1941	3, 013	1951	5, 464
1942	1, 195	1952	c. 5, 000
1943	1, 425	1953	8, 530

( ) Derived by interpolation.
[ ] The figure apparently refers to "completion of aspirantura," rather than to award of candidate degree.

SOURCES AND NOTES TO TABLE A–2

1934—*Kul't Stroi—1934*, p. 66. There is some uncertainty whether this figure refers to the number of candidate degrees awarded or to the number who "completed" aspirantura training.

1935—*Kul't Stroi—1935*, pp. 96–97. There is some uncertainty whether this figure refers to the number of candidate degrees awarded or to the number who "completed" aspirantura training.

1937–1945—*VVSh*, No. 10, 1946, p. 47.

1946—*Izvestiya*, Aug. 14, 1954; *Bol'shevik*, No. 10, 1952, p. 2.

1948—*Izvestiya*, Jan. 11, 1949.

1950—*VVSh*, No. 6, 1951, p. 24.

1951—*Bol'shevik*, No. 10, 1952, p. 2.

1953—*Izvestiya*, Aug. 14, 1954.

1947—This figure can be derived as follows. The total award of candidate degrees—from 1937 to 1947 was 28,386 (*VVSh*, No. 9, 1948, p. 27.) The period 1937–46 accounted for 25,529 candidate degrees. Consequently, the residual of 2,857 candidate degrees is for 1947. Another statement (*VVSh*, No. 9, 1948, p. 24) reveals that the award of degrees from 1937 to 1946 was "almost" 26,000. Furthermore, it is stated (*VVSh*, No. 11, 1947, p. 30) that the award of advanced degrees between 1937 and 1946 was 25,957. On an annual basis, however, we can account for only 25.529 (i. e., some 420 candidate degrees are missing). If the two previous statements are taken into account, it appears that the 1947 award might have been about 2,430. The discrepancy is not a grave one. The first estimate (2,857) was used in the table. The discrepancy, however, is partly explainable from the fact that all these figures make reference to a slightly different date of reporting totals (some run from Jan. 1937 to Jan. 1947, others from Sept. 1937 to Sept. 1947).

1949—In addition, 1949 can be derived by simple interpolation as about 4,250. The interpolation is valid in this instance because continuity (and consistency with increasing enrollment) may be assumed.

1952—*VVSh*, No. 7, 1953, p. 24. This source states that this year (i. e., 1952) about 5,000 candidate degrees were awarded.

TABLE A-3.—*Distribution, by field, of aspirantura students for selected years*
[In percent]

	(a) 1934	(c) 1939	(d) 1940	(e) 1944	(f) 1945	(g) 1946	1934–46 unweighted average	1934–46 assumed distribution
Engineering total	32.8	37.2	32.7	44.4	44.9	38.6	38.4	39.0
of which—								
Industry and construction	26.0	30.0	27.4	38.8	38.0	33.4	--------	--------
Transportation and communication	6.8	7.2	5.3	5.6	6.9	5.2	--------	--------
Agricultural	10.2	9.3	7.2	7.6	6.1	8.9	7.1	7.0
Socioeconomic	7.1	7.2	6.8	4.4	4.9	10.5	5.5	6.0
Educational total	37.2	27.9	37.1	37.6	37.1	35.7	34.1	35.0
of which Arts	--------	2.9	2.3	4.5	3.1	4.6	--------	--------
Medical	12.7	18.4	15.9	6.0	7.0	11.7	12.9	13.0
Subtotal							98.0	100.0
Discrepancy							2.0	
Total							100.0	
Total enrollment	6,259	9,172	13,200	(1)	(1)	9,600	--------	--------

[1] Unspecified.

(*a*) *1934*—Distribution computed for VUZ aspirantura enrollment as of Jan. 1, 1934, Sinetskii, *PP Kadry*, p. 83.

(*c*) *1939*—Distribution computed for VUZ aspirantura enrollment as of Jan. 1, 1939. Data from Sinetskii, *PP Kadry*, p. 90.

(*d*) *1940*—Distribution computed for VUZ aspirantura enrollment as of Jan. 1, 1940. Data from Sinetskii, *PP Kadry*, p. 176.

(*e*) *1944*, (*f*) *1945*—Distribution given in *VVSh*, No. 10, 1946, p. 48.

(*g*) *1946*—Distribution computed for VUZ aspirantura enrollment as of Jan. 1, 1946. Data from Sinetskii, *PP Kadry*, p. 176.

1934–46.—Unweighted average enrollment for 1934–46. Assumed distribution derived by adjusting discrepancy.

TABLE A–4.—*Number of doctor degrees awarded in the U. S. S. R., 1934–53*

Year	Number	Year	Number
1934	112	1944	509
1935	223	1945	431
1936		1946	469
1937	391	1947	484
1938	607	1948	648
1939	727	1949	428
1940	978	1950	484
1941	663	1951	529
1942	266	1952	c. 500
1943	511	1953	569

Sources

1934–36: *VVSh*, No. 11, 1947, p. 29.
1937–45: Ibid., No. 10, 1946, p. 47.
1947, 1948: Ibid., No. 9, 1948, p. 27.
1949: Ibid., No. 7, 1949, p. 11.
1950: Ibid., No. 6, 1951, p. 21.
1951: *Bol'shevik*, No. 10, 1952, p. 9.
1946, 1953: *Izvestiya*, Aug. 14, 1954 (for 1946, see also *Bol'shevik*, No. 10, 1952, p. 9).
1952: *VVSh*, No. 7, 1953, p. 24.

Appendix to Chapter VI

351459—55——24

GENERAL NOTE ON ESTIMATES OF THE SIZE AND OCCUPATIONAL COMPOSITION OF SOVIET TRAINED MANPOWER AND ORGANIZATION OF THE APPENDIX TO CHAPTER VI

This appendix consists of various tables which present employment data and summarize the number of graduates by year and period, and finally presents estimates on the basis of both types (employment and graduates) of data. Finally, various checks are employed to ascertain the reliability of estimates and their relation to various official pronouncements.

Throughout this appendix the term "professional" is used to designate persons with completed higher education, and the term "semiprofessional" is used to designate technicum graduates; i. e., persons with completed secondary specialized education.

Tables A–1, A–2, A–3, A–4, A–5, A–6, and A–7 summarize various data concerning the employment of trained specialists. Table B–1 and the supplement to it present data about graduates. Finally, all "C" tables represent various estimates of trained personnel and checks upon these estimates. The technique of each estimate is explained in the notes to each "C" (or set of "C") tables.

It should be borne in mind that estimates presented in this appendix are rough approximations. When Soviet sources state, for example, that there were "about 6 million" trained specialists employed in the national economy of the U. S. S. R. in 1954, it is indeed a very rough figure. When Soviet sources report an increase of 109 percent, it could obviously mean at least a variation of 1 percent from 108.5 to 109.5 percent. After making use of this type of information, which admittedly lacks precision, it is obvious that various estimates do and should differ one from another. The usefulness of these estimates consists not in their precision as absolutely exact magnitudes but in the fact that they are consistent and that they do agree as rough approximations.

TABLE A–1.—*Composition of Soviet trained manpower, by employment, year end 1928*

[Number employed in thousands]

	Professional	*Semiprofessional*	*Professional and semiprofessional combined*
I. All production, administrative, and exchange branches of national economy	90. 0	56. 0	146. 0
1. Industry, construction, transportation, communication	--------	------	-------
a. Production engineers and technicians only	17. 9	19. 9	37. 8
2. Agriculture	--------	------	-------
a. Agricultural specialists without administrative functions	9. 3	8. 5	17. 8
3. Administrative, government, and exchange	62. 8	27. 6	90. 4
a. Socioeconomic segment only	--------	------	-------
II. Educational-cultural	[a](130. 0)	------	-------
1. Primary- and secondary-school teachers	26. 0	185. 5	211. 5
2. Higher education teachers	[b] (10. 4)	------	-------
III. Health	63. 5	72. 0	135. 5
1. Medical personnel only	--------	------	-------
Total	[c] (283. 5)	------	-------

[a] In this segment in 1932 there were about 155,000 (see table B–1 below) persons. Since about 80,000 graduated during the 5-year period, there were about 130,000 "educational-cultural" specialists in 1928.
[b] *Plan Kadrov—1930*, p. 104.
[c] By addition of I, II, III, where II is an estimate.

Sources and notes

All figures except those in parentheses from *Itogi Pervogo FYP*, pp. 215–219, 275. The source does not give full coverage of all trained specialists employed. Productive branches in engineering and in agriculture are singled out, but administrative employment of trained specialists is not given by segment.

TABLE A–2.—*Composition of Soviet trained manpower, by employment, year end 1932*

[Number employed in thousands]

	Professional	*Semi-professional*	*Professional and semi-professional combined*
I. All production, administrative, and exchange branches of national economy	229.2	386.6	615.8
1. Industry, construction, transportation, communication	------	------	-------
a. Production engineers and technicians only	73.6	132.5	206.1
2. Agriculture	------	------	-------
a. Agricultural specialists without administrative functions	36.3	58.5	94.8
3. Administrative, government, and exchange	119.3	195.6	314.9
a. Socioeconomic segment only	------	------	-------
II. Educational-cultural	156.9	382.1	539.0
1. Primary- and secondary-school teachers	43.2	344.0	387.2
2. Higher education teachers	------	------	-------
III. Health	76.3	135.0	211.3
1. Medical personnel only	------	------	-------
Total (I, II, III)	462.4	903.7	1,366.1

Sources and notes

Vtoroi FYP, pp. 512–513. This table is compiled from Gosplan reporting with full coverage. Administrative personnel (I–3) is singled out from all productive branches of the national economy and is not distributed by field.

The total of 1,366,000 trained specialists constitutes about 50 percent of all specialists employed in the national economy (2,737,000).

TABLE A–3.—*Composition of Soviet trained manpower, by employment, year end 1937*

[Number employed in thousands]

	Professional	*Semi-professional*	*Professional and semi-professional combined*
I. All production, administrative, and exchange branches of national economy	411. 9	702. 4	1, 114. 3
1. Industry, construction, transportation, communication	262. 2	372. 3	634. 5
a. Production engineers and technicians only	------	------	-------
2. Agriculture	89. 5	145. 5	235. 0
a. Agricultural specialists without administrative functions	------	------	-------
3. Administrative, government, and exchange.	------	------	-------
a. Socioeconomic segment only	60. 2	184. 6	244. 8
II. Educational-cultural	231. 0	524. 3	755. 3
1. Primary- and secondary-school teachers	------	------	-------
2. Higher education teachers	------	------	-------
III. Health	105. 9	213. 3	319. 2
1. Medical personnel only	------	------	-------
Total	748. 8	1, 440. 0	2, 188. 8

Sources and notes

Tretii FYP, p. 238. This is again Gosplan reporting of so-called full coverage of number of specialists employed. Administrative personnel is reported within a given segment and is not singled out as one group for all productive branches of the national economy. No indication is given as to the number of non-trained specialists employed in addition to trained personnel.

TABLE A–4.—*Postwar pronouncements about the number of trained specialists employed in the national economy of the U. S. S. R., 1946–54*

[Year-end references]

Year	*Reference of increase*	*Source*
1946	"Somewhat over 3 million"	*VVSh*, Nos. 11–12, 1946, p. 1 (Kaftanov).
1948	155 percent of 1940	*Nar Khoz-SBX*, No. 3, p. 413 (Itogi 1948).
1949	168 percent of 1940	*Nar Khoz-SBX*, No. 3, p. 445 (Itogi 1949).
1950	109 percent of 1949	*Nar Khoz-SBX*, No. 4, p. 423 (Itogi 1950).
1950	184 percent of 1940	*Voprosy Ekonomiki*, No. 5, 1951, p. 13 (Itogi 1946–50).
1951	108 percent of 1950	*Voprosy Ekonomiki*, No. 2, 1952, p. 11 (Itogi 1951).
1951	"Somewhat over 5 million"	*Bol'shevik*, No. 7, 1952, p. 28 (Kulagin article).
1952	108 percent of 1951	*Pravda* (Malenkov), Oct. 6, 1952.
1952 (fall)	"About 5,500,000" or "about 220 percent of 1940"	*Pravda*, Jan. 23, 1953 (Itogi 1952).
1953	108 percent of 1952	*Pravda*, Jan. 31, 1954 (Itogi 1953).
1953	137 percent of 1949	*Pravda*, Mar. 13, 1954 (Saburov speech).
1954	109 percent of 1949	*Pravda*, Jan. 21, 1955 (Itogi 1954).

NOTES TO TABLE A–4

These pronouncements have to be elaborated upon and worked out in numerical terms. Then they may be used for checking purposes with various estimates.

In the first place, by using 1952 or 1951 as a base, we can obtain several rough approximations as to the size of the professional and semiprofessional labor force for various years. On the basis of the data stated in the table above, the following derivations can be made:

1. 1952 (fall) total size was about 5,500,000, which was 2.2 times larger than in 1940, making 1940 about 2,500,000.

2. 1952 total was about 5,500,000, which was 108 percent of 1951, and therefore 1951 total was 5,093,000; 1951 total was 108 percent of 1950 or 4,715,000.

(*a*) 1950 was 184 percent of 1940; consequently 1940 was 2,562,000.

(*b*) 1950 total was 109 percent of 1949 and therefore 1949 total was 4,325,000; 1949 total was 168 percent of 1940, making 1940 total 2,574,000.

3. Total size in 1951 was about 5 million, which was 108 percent of 1950 and 1950 therefore was about 4,630,000.

(*a*) 1950 total was 184 percent of 1940; consequently 1940 was 2,516,000.

(*b*) 1950 total was 109 percent of 1949 and therefore 1949 total was 4,248,000; 1949 total was 168 percent of 1940, giving 2,528,000 for 1940.

4. 1951 total was about 5 million, which was 108 percent of 1950, thus 1950 was about 4,630,000; 1950 total was 109 percent of 1949, and therefore 1949 total was 4,248,000. 1953 total was 137 percent of 1949, and therefore 1953 total was 5,820,000.

5. 1952 total was about 5.5 million, 1953 total was 108 percent of 1952 or 5,940,000; 1953 total was 137 percent of 1949 total, and therefore 1949 total was 4,336,000. 1949 total is 168 percent of 1940, and consequently 1940 total is about 2,580,000.

6. 1951 total was about 5 million; 1952 total was 108 percent of 1951 total, making 1952 total 5.4 million; 1953 total was 108 percent of 1952 total, or 5,832,000; 1953 total was 137 percent of 1949 total, and therefore 1949 total was 4,257,000. 1949 total is 168 percent of 1940, making 1940 total 2,534,000.

7. 1948 total was 155 percent of 1940; consequently—

(*a*) Assuming 1940 as 2,500,000, 1948 total was 3,875,000.

(*b*) Assuming 1940 as 2,550,000, 1948 total was 3,952,000.

8. 1954 total was 109 percent of 1953; consequently assuming 1953 total as about 5,820,000, we obtain 1954 total of 6,345,000.

All these computations tend to show that, although none of the figures coincide for a given year and they all show differences depending on the way in which they were derived, nevertheless, from official pronouncements rough approximations can be obtained about the size of the Soviet professional and semiprofessional labor force combined. The variation is obviously due to the rounding of both base figures for 1952 and 1951 and reported percentage increases. Despite this, the figures for the following years can be accepted as rough approximations:

Size of professional and semiprofessional labor force

Year end	*Set of estimated figures (in thousands)*	*Rough approximations (in thousands)*
1940	2, 500	About 2,550.
	2, 562	
	2, 574	
	2, 580	
	2, 528	
	2, 534	
1946	(1)	About 3,000.
1948	3, 875	About 3,920.
	3, 952	
1949	4, 325	About 4,270.
	4, 248	
	4, 336	
	4, 257	
1950	4, 715	About 4,680.
	4, 630	
1951	(1)	About 5,000.
1952	(1)	About 5,500.
1953	5, 820	About 5,850.
	5, 940	
1954	6, 376	About 6,350.
	6, 345	

[1] Given.

TABLE A–5.—*Reconstruction of the composition of the Soviet professional and semiprofessional labor force in 1940*

One source (*VVSh*, No. 10, 1946, p. 4) gives the following figures on workers and employees in the national economy per trained specialist:

1. In 1940 there were 36 workers and employees per each professional with completed higher education.
2. In 1940 there were 21 workers and employees per each semiprofessional with completed secondary specialized education.
3. In 1940 there were 13 workers and employees per each trained professional and semiprofessional combined with completed higher and secondary specialized education, respectively.

Since there is no indication as to whether these figures refer to year end, average annual, or the January 1 reporting of nonagricultural labor force of Soviet salaried workers and employees employed in the national economy, it is impossible to be certain which employment figures should be used in reconstruction. Therefore the following estimates were made:

	Thousands
I. Assuming the 1940 (Jan. 1) nonagricultural labor force as 30 million (W. Eason in A. Bergson (ed.), *Soviet Economic Growth*, p. 110):	
1. Estimate of number of professionals	833
2. Estimate of number of semiprofessionals	1,429
3. Total	2,262
4. Estimate of number of professionals and semiprofessionals combined	2,308
II. Assuming the 1940 (average annual) nonagricultural labor force as 31.2 million [idem]:	
1. Estimate of number of professionals	866
2. Estimate of number of semiprofessionals	1,486
3. Total	2,352
4. Estimate of number of professionals and semiprofessionals combined	2,400
III. Assuming the 1940 (year end, i. e., Jan. 1, 1941) nonagricultural labor force as 31,500,000 [idem]:	
1. Estimate of number of professionals	875
2. Estimate of number of semiprofessionals	1,500
3. Total	2,375
4. Estimate of number of professionals and semiprofessionals combined	2,423

The discrepancies are obviously due to rounding of both figures on workers and employees and number of workers and employees per one specialist of any given level. There is admittedly no precision in such estimates, but it seems most likely that the figures refer to the beginning of the year. If we assume that the 1940 (year end) number of specialists was about 2,550,000 (table A–4 above) and that graduations of specialists in 1940 were about 320,000 (table B–1 below), then 1939 (year end, i. e., Jan. 1, 1940) should have been somewhat above 2,230,000 (without accounting for attrition), or about the same as in Version I above. Consequently, there is a probability that the figures stated do refer to January 1940 rather than to the end of that year.

Regardless of these discrepancies and uncertainty as to the date of reporting, on the basis of these data it is possible to ascertain that by 1940 the labor force of trained specialists consisted of 33 to 35 percent professionals with higher education and 67 to 65 percent semiprofessionals with secondary specialized education. Applying this ratio, there were, by 1940, 850,000–900,000 professionals and 1,650,000–1,700,000 semiprofessionals. There is another check available for these estimates (for further details, see notes to table C–4 in this appendix).

Another significant statement about the professional labor force relates to this estimate of professionals with completed higher education from among all trained specialists. One source (Zhirnov, *Kul'turnoye*, p. 23) states that just

before the beginning of the war in 1941, the number of professionals employed in the national economy was "almost 1 million." Since graduations in 1941 were about 100,000, the 1940 total number of professionals employed was less than 900,000, or about the same as indicated in the reconstruction presented above. These figures will be used for checking estimates in the latter part of this appendix.

TABLE A–6.—*Reconstruction of the composition of the Soviet professional and semiprofessional labor force in 1950*

One source (F. Koshelev, *Pod'yem material'nogo i kul'turnogo urovnya zhizni sovetskogo naroda*, Moscow, 1954, p. 40) states that between 1940 and 1950 the total trained labor force (number of employed specialists) increased by 84 percent, and that the number of professionals increased by 85 percent. The first part of this statement confirms the relationship utilized for estimates in Table A–4 above that the 1940 total trained labor force was about 2,550,000 and in 1950 it was about 4,680,000. Assuming the 1940 professional labor force (table A–5 above) we obtain the 1950 composition as follows, depending upon which assumed distribution for 1940 is taken:

[In thousands]

	1940 Version (a)	*1940 Version (b)*	*1950 Version (a)*	*1950 Version (b)*
Professionals	850	900	1, 573	1, 665
Semiprofessionals	1, 700	1, 650	3, 107	3, 015
Total trained labor force	2, 550	2, 550	4, 680	4, 680

These estimates of the actual number of employed specialists will be used in the latter part of this appendix for checking purposes.

For 1940 estimated figures of professionals by field, see table C–9, and for 1950, table C–10 below. For further comments, see appendix C–11 below.

TABLE A–7.—*Reconstruction of the composition of the Soviet professional and semiprofessional labor force in 1953*

One source (*VVSh*, No. 10, 1954, p. 1) states that the number of professionals with higher education employed in the national economy increased between 1940 and the end of 1953 by 220 percent. Assuming the 1940 composition, we obtain the following composition of professional and semiprofessional labor force, depending upon which assumed distribution for 1940 is taken:

[In thousands]

	1940 Version (a)	*1940 Version (b)*	*1953 Version (a)*	*1953 Version (b)*
Professionals	850	900	1, 870	1, 980
Semiprofessionals	1, 700	1, 650	3, 980	3, 870
Total trained labor force	2, 550	2, 550	5, 850	5, 850

This estimate of the actual number of professionals and semiprofessionals will be used for checking purposes in the latter part of this appendix.

TABLE B–1.—*Summary of graduations of Soviet professionals and semiprofessionals, 1928–54*

[In thousands]

	1928	1st 5-Year Plan					2d 5-Year Plan						3d 5-Year Plan	
		1929	1930	1931	1932	1929–1932	1933	1934	1935	1936	1937	1933–1937	1938	1939
Graduations of professionals from higher educational establishments:														
1. Engineering	8.9	11.0	20.8	18.8	17.1	67.7	7.9	18.9	37.2	35.8	34.6	134.4	31.3	28.4
2. Agricultural	6.4	7.0	6.7	8.5	8.4	30.6	4.8	6.3	8.8	10.4	11.3	41.6	10.2	10.7
3. Socioeconomic	2.0	4.8	4.8	5.0	3.3	17.9	2.5	2.5	5.0	6.4	5.0	21.4	5.9	5.9
4. Educational	5.2	5.7	7.2	11.6	10.1	34.6	10.5	7.9	12.5	21.6	31.7	84.2	37.9	39.6
5. Health	6.2	4.0	4.4	6.5	4.3	19.2	4.6	2.5	7.5	9.2	12.3	36.1	12.9	13.7
6. Total (1–5)	28.7	32.5	43.9	50.4	43.2	170.0	30.3	38.1	71.0	83.4	94.9	317.7	98.2	98.3
7. C. P. schools	—	—	—	—	—	—	4.3	11.1	12.7	14.2	9.9	52.2	5.6	N
8. Correspondence-extension	N	—	—	—	—	—	N	N	N	N	N	N	—	—
9. Total (6–8)	28.7	32.5	43.9	50.4	43.2	170.0	34.6	49.2	83.7	97.6	104.8	369.9	103.8	98.3
Graduations of semiprofessionals from secondary specialized schools:														
10. Engineering	6.8	8.3	14.0	29.6	46.7	98.6	52.6	36.7	45.4	40.9	37.6	213.2	44.1	(36.2)
11. Agricultural	4.4	6.1	9.9	17.8	24.2	58.0	25.2	14.2	14.5	17.5	23.0	94.4	28.8	(25.7)
12. Socioeconomic	1.2	2.5	3.0	3.8	5.2	14.5	7.2	6.9	6.5	7.3	7.8	35.7	7.3	(7.1)
13. Educational	11.3	16.1	25.2	22.5	18.7	82.5	33.2	28.5	31.1	37.6	49.1	179.5	57.2	(67.3)
14. Health	4.8	4.9	9.3	10.5	12.9	37.6	14.5	11.0	14.7	21.6	38.4	100.2	63.8	(72.3)
15. Total (10–14)	28.5	37.9	61.4	84.2	107.7	291.2	132.7	97.3	112.2	124.9	155.9	623.0	201.2	(208.6)
16. Correspondence-extension	N	—	—	—	—	—	N	N	N	N	N	N	—	—
17. Total (15–16)	28.5	37.9	61.4	84.2	107.7	291.2	132.7	97.3	112.2	124.9	155.9	623.0	201.2	(208.6)
Total of professional and semiprofessional graduates:														
18. Grand total (9, 17)	57.2	70.4	105.3	134.6	150.9	461.2	167.3	146.5	196.9	222.5	260.7	992.9	305.0	306.9

See footnotes at end of table.

TABLE B–1.—*Summary of graduations of Soviet professionals and semiprofessionals, 1928–54*—Continued

	3d 5-Year Plan		War years						4th 5-Year Plan		5th 5-Year Plan			
	1940	1938–1940	1941	1942	1943	1944	1945	1941–1945	1946–50 total	1946–50 annual average	1951	1952	1953	1954
Graduations of professionals from higher educational establishments:														
1. Engineering	29.3	89.0	27.5	13.4	9.7	9.3	9.2	69.1	(160.3)	(32.0)	30.0	30.0	40.0	53.0
2. Agricultural	10.1	31.0	8.0	6.2	1.9	2.3	2.7	21.1	(50.8)	(10.1)	12.0	15.0	17.0	18.0
3. Socioeconomic	4.8	16.6	3.9	2.7	1.0	1.1	1.4	10.1	(34.6)	(6.9)	(11.0)	(13.0)	[12.0]	(8.0)
4. Educational	40.6	118.1	47.6	25.4	5.9	15.2	30.1	124.2	(298.0)	(59.6)	80.0	90.0	70.0	70.0
5. Health	17.4	44.0	17.7	21.2	9.3	7.8	6.8	62.8	(108.3)	(21.7)	20.0	(32.0)	[21.0]	24.0
6. Total (1–5)	102.2	298.7	104.7	68.9	27.8	35.7	50.2	287.3	652.0	(130.3)	(153.0)	180.0	[160.0]	173.0
7. C. P. schools	N	5.6	N	N	N	N	N	N	N	N	N	N	N	N
8. Correspondence-extension	—	—	—	—	—	—	—	—	—	—	(48.0)	41.0	[40.0]	57.0
9. Total (6–8)	102.2	304.3	104.7	68.9	27.8	35.7	50.4	287.3	652.0	(130.3)	201.0	221.0	200.0	230.0
Graduations of semiprofessionals from secondary specialized schools:														
10. Engineering	(31.7)	(112.0)	—	—	—	—	—	—	(337.0)	(67.4)	—	—	—	—
11. Agricultural	(23.5)	(78.0)	—	—	—	—	—	—	(193.0)	(38.6)	—	—	—	—
12. Socioeconomic	(7.1)	(21.5)	—	—	—	—	—	—	(198.0)	(39.6)	—	—	—	—
13. Educational	(74.2)	(198.7)	—	—	—	—	—	—	(289.0)	(57.8)	—	—	—	—
14. Health	(79.4)	(215.5)	—	—	—	—	—	—	(261.0)	(52.2)	—	—	—	—
15. Total (10–14)	(215.9)	(625.7)	[a] 158.0	[a] 182.0		[a] 193.0		[a] 533.0	1,278.0	(255.6)	—	—	—	—
16. Correspondence-extension	—	—	—	—		—		—	—	—	—	—	—	—
17. Total (15–16)	(215.9)	(625.7)	158.0	182.0		193.0		533.0	1,278.0	(255.6)	262.0	[250.0]	300.0	320.0
Total of professional and semiprofessional graduates:														
18. Grand total (9, 17)	318.1	930.0	263.0	—	—	—	—	820.3	1,930.0	(385.9)	463.0	[471.0]	500.0	550.0

N—None or negligible. ( ) Estimated figures. [ ] Figures derived by interpolation. (—) Figures not available. [a] See sources and notes to table B–1.

SOURCES AND NOTES TO TABLE B–1

All figures without footnotes are from tables A–1, A–2, A–3 of the appendix to chapter III and from tables A–1 and A–2 of the appendix to chapter IV. The totals for the periods are the sums of individual years. Row 18 (grand total) is obtained by addition of rows 9 and 17. Figures in parentheses are estimates derived in appendices to chapters III and IV. Figures in brackets are interpolations. The following supplement to this table gives the derivation of figures for technicum graduates during the war years which are indicated by footnote *a* in table B–1.

SUPPLEMENT TO TABLE B–1.—*Total number of graduates from higher educational establishments and secondary semiprofessional training institutions reported for certain periods*

[All figures rounded in thousands]

Period	(A) Higher education graduates in all fields	(B) Secondary semiprofessional graduates in all fields
1. 1928	29	29.
2. 1929–32	170	291.
3. 1933–37	370	623.
4. 1938–45	590	1,150.
5. 1928–37	567	943.
6. 1929–37	540	914.
7. 1928–45	1,159	2,099.
8. 1929–45	Over 1,100	----------
9. 1942–45	183	375.
10. 1928–43	----------	Over 1,900.
11. 1941–43	----------	340.
12. 1946–50	652	1,278.

Sources and notes

1, 2, 3A, B.—*Kul't Stroi—1940*, p. 112. Also 2A, 3A in *VVSh*, No. 5–6, 1946, p. 1. All totals agree roughly with figures given for given periods in table B–1.

4A.—*VVSh*, No. 4, 1948, p. 12.

4B.—*VVSh*, No. 4, 1948, p. 12. There is an obvious error in the figure given by this source. It states that technicum graduates (1938–45) were about 1,050,000. A check with all other figures reveals that it should read "about 1,150,000."

5A.—*BSE-SSSR*, 1947, col. 1235.

5B.—Ibid., col. 1231.

6A, B.—*VVSh*, No. 4, 1948, p. 12.

7A, B.—*BSE–SSSR*, 1947, col. 1143.

8A.—*VVSh*, Nos. 5–6, 1946, p. 1.

9A.—Idem.

9B.—*BSE-SSSR*, 1947, col. 1231.

10, 11B.—Movshovich (compiler), *Tekhnikumy . . .*, 1945, p. 17.

12A, B.—*Pravda*, April 17, 1951 (Itogi 1946–50).

NOTE.—As far as the aggregate number of graduates from higher educational establishments is concerned, there is close correspondence if figures for shorter periods are added together to obtain data for longer periods. There are minor discrepancies of several thousand due to rounding. The same applies to technicum graduates, where, however, the discrepancies are somewhat larger and run up to 10,000.

On the basis of the number of technicum graduates reported for given periods, the number of graduates during the war can be ascertained. This is done as follows: 1942–45 graduates are given (9B) as 375,000. 1938–45 graduates were (4B) 1,150,000. Therefore, 1938–41 graduates would be about 775,000. At the same time, 1928–43 graduates (10B) were "over 1,900,000." 1941–43 graduates (11B) were 340,000, consequently 1928–40 graduates were 1,560,000. Subtracting (6B) 943,000 for 1928–37 graduates, we obtain about 617,000 for 1938–40, or about 10,000 lower than the figure for 1938–40 in table B–1, which serves as a check. Thus 1941 graduates were (775,000 [1938–41] minus 617,000 [1938–40]) 158,000, or somewhat above this figure. 1942–43 graduates were about (340,000 [1941–43] minus 158,000 [1941]) 182,000. Finally, 1944–45 graduates were about (375,000 [1942–45] minus 182,000 [1942–43]) 193,000. To sum up:

1941 graduates	About 158,000
1942, 1943 graduates	About 182,000
1944, 1945 graduates	About 193,000
1941–45 total	533,000

These figures are introduced into table B–1, row 15, for given years and footnoted as [a].

The problem of distributing these graduates by field is a difficult one. The only justifiable assumption is the projection of the 1938–40 trend into the war period. This is done as follows:

Semiprofessionals by field	*1938–40 graduates (thousands)*	*Distribution in percent*	*Hypothetical distribution of 1940–45 graduates by field (thousands)*
Engineering	112	17.9	96
Agriculture	78	12.4	66
Socioeconomic	21	3.4	18
Education	199	31.8	169
Health	216	34.5	184
Total	626	100.0	533

This, however, probably favors the educational field because it is more likely (and various reports indicate that this is the case) that the relative share of engineering technicians trained during the war increased in comparison to other fields of secondary specialized training. Therefore this distribution is of limited use only (it was not incorporated into table B–1).

Finally, in order to make estimates concerning the total size of the professional and semiprofessional labor force, data about graduating classes for postwar years (1946–50) will be used. These graduating classes in the postwar period (1945–50) were as follows:

[In thousands]

Year	*Graduating class from higher educational establishments*	*Graduating class from technicums*	*Total graduates*
1945	50	70	120
1946	49 [64]	191 [196]	240 [260]
1947	92 [120]	230 [235]	322 [355]
1948	122	252	374
1949	173	272	445
1950	173	327	500

The graduating classes include extension training graduates. The data are identical with those presented in the appendices to chapters III and IV. However, an adjustment of figures for graduates in 1946 and 1947 is necessary. The 1946–50 total of technicum graduates officially reported was 1,278,000, but when the annual figures for this period are totaled, a figure of 1,272,000 is obtained. Extension training graduates were not reported in 1946 and 1947. Among technicum graduates there were apparently about 10,000. While higher education extension graduates were not reported for 1946 and 1947, there is a discrepancy of 43,000 between the total number of graduates (652,000) reported for 1946–50 and the total of annual figures on graduating classes. Therefore, arbitrary adjustments of graduating classes for these years (1946, 1947) were made, and they are given in the table above in brackets. Only limited use of these data will be made in the estimates below, and they were not included in table B–1.

APPENDIX C.—*Note on estimates of the total size of the Soviet professional and semiprofessional labor force*

On the basis of the data presented in the "A" tables and in table B–1, it is possible to make estimates of the total size of the professional and semiprofessional labor force, their respective size, aggregate losses during a given period, occupational composition of the professional labor force, and rough approximations for the occupational composition of the semiprofessional labor force.

The procedure of estimates is a relatively simple one. There are two types of estimates. One type is designed to ascertain net losses within a given period and to verify totals, and the other, to ascertain the occupational composition in any given year. While the former type of estimates does not require any specific assumptions—since employment of trained personnel and influx of graduates during any given period are given (in the "A" tables and in table B–1 above)—the second type of estimate is based on two assumptions.

The first assumption is that there are no transfers from one occupational field into another. Despite the policy of forced placement of Soviet specialists (see discussion in the text in chs. IV and VI), some transfer from one occupation into another undoubtedly takes place. It is certainly much more limited than in any free democratic society, and such transfers have become increasingly difficult since the late 1930's. While in some occupational fields (like medicine, for example) there is hardly any transfer, in certain others (like the socioeconomic segment) there is significant flux. Therefore, under this assumption we can ascertain in the process of estimates the manpower trained in a given occupation, but there is only a strong probability that persons with such training are employed in this very occupation.

The second assumption concerns the uniformity of attrition rate or average annual losses. Estimates are made under the assumed 2- and 4-percent average annual losses. Furthermore, it is assumed that the 2- and 4-percent average annual losses hold for all occupational fields. These percentages were chosen on the basis of the evidence found in Soviet sources. In 1948 I. A. Lyasnikov, in a discussion of a "staff method" of determination of needs for trained specialists (especially engineers), employed these percentages in his calculations.[1] He stated that for the 1930's this rate of losses was proven to be correct. (Lyasnikov himself was concerned with the projection of need and supply of specialists for the 1950's.) In the early 1930's the Gosplan designed the "staff method" of estimating the requirements of professionals.[2] It was stated at that time that the average annual losses for professionals and semiprofessionals should be about 4 percent, which included losses due both to natural causes and to "political causes" [*ubyl' po fizicheskim prichinam (smert', invalidnost') i otsev vvidu politicheskogo nesootvetstviya*].[3] It is true that in certain cases (for example, statistical-economic personnel) the losses were anticipated to be considerably larger (between 10 and 15 percent). But for the professional and semiprofessional labor force as a whole and in most occupational fields, average annual losses were viewed as not exceeding 4 percent. Lyasnikov seems to confirm, in his statements, that these anticipations were correct. Therefore, the estimates were made on the basis of hints supplied by Soviet statistical experts.

Thus the first method implies the technique of straight addition in accordance with the formula

$$T_n = T_{n-1} + G_n,$$

where T_n is the size of the trained labor force or a component within it in a certain year n; T_{n-1} is the size in a preceding year $(n-1)$; and G_n represents the number of graduations in the year n. This formula applies for a given period as well. After the estimate is made, it is "verified" with available employment figures to ascertain net losses in absolute terms or in percent.

The second method of estimates was made in accordance with the formulas

$$T_n = (T_{n-1} - 0.02\,T_{n-1}) + G_n$$

or

$$T_n = (T_{n-1} - 0.04\,T_{n-1}) + G_n.$$

In these latter two formulas the letters designate the same as in the first method; however, the formula has to be repeated for each subsequent year in order to

[1] *VVSh*, No. 4, 1948, pp. 12–17.
[2] *Plan Kadrov*—1930, esp. pp. 11–30.
[3] Ibid., pp. 24 and 103.

build up the series. These formulas cannot be used for periods since the base figure (T_{n-1}) changes every year. The application of this technique results in a series of year-end figures for the size of the professional or semiprofessional labor force as a whole (i. e., totals) or for individual occupational fields within it. Again, estimates derived in such a way may be checked with available employment figures for a certain year, for which either "adjustments" can be made or the verification of estimates is possible.

Such are the simple tools employed in the actual estimating procedures below, which consist of a set of "C" tables, each of which is accompanied when necessary by notes and comments. Most tables dealing with aggregates present rounded figures in thousands, while those dealing with annual graduation data and repeated estimates give figures in thousands with accuracy to the first decimal place. All percentages are rounded to the first decimal place. The "C" tables use data presented above and only when different sources are used are they acknowledged by a specific reference. Throughout the entire estimates, if not otherwise indicated, year-end reference is made (i. e., 1932 means "year end 1932").

TABLE C–1.—*Total size of the Soviet professional labor force, 1928–32*

[In thousands]

1. Number employed in 1928	283.5.
2. Graduations, 1929–32	170.0.
3. Hypothetical 1932 size of professional labor force	453.5.
4. Actual number employed in 1932	462.4.
5. Net losses (1928–32)	(Plus) 8.9.
6. Net losses (in percent)	Gain.

Notes and comments

This paradoxical occurrence needs explanation. As was already indicated in table A–1, the original number of employed professionals (1928) is not based on full coverage. At that time (1928), no account was made of small enterprises and specialists employed there. There was a considerable segment of private enterprise, "free professions," unemployed specialists, etc. which were not counted.

Furthermore, during this period of transition a number of specialists were "upgraded." Some of those who had not completed higher education (and thus were not reported in figures of graduates) were sent through accelerated "courses" and were considered as having had "higher education." Finally, the Higher Party Schools and industrial managerial academies were turning out graduates (probably as many as 3,000 to 5,000 per annum) considered to have had "higher education," but these graduates were not reported consistently anywhere.

Despite its paradoxical nature, this table enables us to ascertain two facts. There were upwards of 283,000 professionals in 1928, and while the entire field of higher education was in a process of flux with quite inferior accelerated programs of training, people who really did not have higher education were often thus classified.

If we compare semiprofessionals, an even more startling "discrepancy" is found. While in 1928 one can account for only about 315,000 semiprofessionals, by 1932 there are some 900,000 reported. Since there were only 290,000 trained, some 300,000 remain unaccounted for. "Upgrading" by reclassification was taking place on a large scale. For example, ordinary production workers, after attending a *rabfak* or taking some technical courses, would be classified as semiprofessionals with completed secondary education. Large segments of regular secondary school graduates (*at that time shkoly vtorogo kontsentrata*) would be given 3 to 6 months' training and considered as persons with complete secondary semiprofessional education, equivalent to 3 years of training in a technicum.

Thus, one fact is obvious, that during this "prereform" period (i. e., prior to the emergence of a sound school system and rigorous specialized training) people classified as having professional or semiprofessional "completed education" did not in fact have it. Literally speaking, during the First Five-Year Plan (1929–32), many Soviet specialists came from "nowhere" as far as training is concerned.

Such is the situation with the overall professional and especially the semiprofessional labor force during this period. However, if we consider two professional occupations, those of engineers and medical doctors, where "transfers" or "upgrading" are not very likely, we obtain the following results (see tables C–2, C–3, below).

TABLE C–2.—*Soviet professional engineers and medical doctors, 1928–32*

[In thousands]

	Engineers with completed higher education	*Medical doctors*
1. Number employed in 1928	17.9	63.5
2. Number of graduates, 1929–32	67.7	19.2
3. Hypothetical number of engineers or doctors in 1932	85.6	82.7
4. 1932 estimate at 2 percent average annual losses	82.2	77.2
5. 1932 estimate at 4 percent average annual losses	79.2	75.5
6. Actual number employed in 1932	79.4	76.3
7. Net losses (1928–31)	6.2	6.4
8. Net losses (or turnover) in percent of 1928	34.6	10.0

NOTE.—This table reveals that for professional engineers the average annual losses during this period (1928–32) were slightly below 4 percent, and for medical doctors they were in the neighborhood of 3 percent. While the net losses (1928–31) among doctors and among engineers were about the same (slightly over 6,000), a turnover of almost 35 percent occurred among engineers, and only 10 percent among doctors.

TABLE C–3.—*Total size of the Soviet professional and semiprofessional labor force, 1932–37*

[In thousands]

	Professional	*Semi-professional*	*Professional and semi-professional*
1. Number employed in all fields in 1932	462	904	1,366
2. Graduates 1933–37	370	623	993
3. Hypothetical number in 1937 (addition)	832	1,527	2,359
4. 1937 estimate at 2 percent average annual losses	776.6	1,417.2	2,193.8
5. 1937 estimate at 4 percent average annual losses	725.2	n. a.	n. a.
[1937 estimate at 3 percent average annual losses]	[750.4]	n. a.	n. a.
6. Actual number employed in all fields in 1937	749	1,440	2,189
7. Net losses (1932–36)	83	87	170
8. Net losses in percent of 1932 base	17.9	9.6	12.4

n. a.—Not applicable, estimate not made.

NOTES.—No ambiguity exists in ascertaining the total size and losses among trained personnel during this period (the Second 5-Year Plan), because additions of specialists to the professional and semiprofessional labor force were made primarily through ordinary channels of training. "Upgrading" had in general been considerably reduced, and training was formalized.

Average annual losses among professionals were about 3 percent, among semiprofessionals somewhat below 2 percent (about 1.7), and among specialists of both levels they were about 2 percent.

TABLE C–4.—*Total size of the Soviet professional and semiprofessional labor force, 1937–40*

[In thousands]

	Professional	*Semiprofessional*	*Professional and semiprofessional*
1. Number employed in all fields in 1937	749	1, 440	2, 189
2. Graduates 1938–40	304	626	930
3. Hypothetical number in 1940 (addition)	1, 053	2, 066	3, 119
4. 1940 estimate at 2 percent average annual losses	1, 003	1, 969	2, 972
5. 1940 estimate at 4 percent average annual losses	955	1, 875	2, 830
(1940 estimate at 8 percent average annual losses)	(864)	(1, 699)	(2, 563)
6. Actual number employed in 1940	850	1, 700	2, 550
[alternative]	[900]	[1, 650]	----------
7. Net losses (1937–39)	203	366	569
[alternative]	[153]	[416]	----------
8. Net losses in percent of 1937 base	27. 1	25. 4	26. 0
[alternative]	[20. 4]	[28. 9]	----------

NOTES.—If we assume average annual losses of 2 to 4 percent for the period 1937–40, we obtain an estimate on the basis of actual employment and annual graduations considerably larger (by some 300,000 to 400,000) than the actual number of trained specialists employed in 1940 (see table A–5 for its derivation). In other words, if we compare the 1940 estimates derived from the 1937 base with figures reconstructed on the basis of postwar pronouncements, we observe a discrepancy of at least 300,000. This discrepancy is particularly interesting and deserves special attention.

There are three basic reasons for the occurrence of such a large discrepancy. One is that Soviet pronouncements for the postwar period try to minimize war losses and therefore assume a reduced prewar figure as a base. Another reason is that between the end of 1937 and 1940 the actual losses of professional and semiprofessional labor force were about 300,000 in excess of those which would be anticipated on the basis of average annual losses (2 or 4 percent) that existed throughout the 1930's (as exemplified by the 1932–37 estimates, table C–3 above). In other words, this latter statement implies that as a result of the purges in 1937–38 the professional and semiprofessional labor force suffered a reduction of about 300,000. The third reason is that these excess losses occurred because a large number of trained personnel were withdrawn from employment in the national economy temporarily, i. e., due to military draft calls, Russo-Finnish, Russo-Polish wars, and military preparation for World War II. Any of these explanations is valid, but it seems that the last two (purges and the temporary withdrawal from civilian employment) are most plausible.

Whatever the explanation for the occurrence of these losses, the fact remains that in order to obtain the 1940 estimate of the number of professionals and semiprofessionals employed, it is necessary to make some downward adjustment of figures derived on the basis of 1937 employment figures and the annual influx of graduates with specialized training. This downward adjustment was assumed to be 100,000 for professionals and 200,000 for semiprofessionals. This adjustment must be taken into consideration when distribution of trained specialists by occupational field is estimated (see tables below).

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TABLE C–5.—*Total size of the Soviet professional and semiprofessional labor force, 1937–46*

[In thousands]

	Professional	*Semiprofessional*	*Professional and semiprofessional*
1. Actual number employed in 1937	749	1,440	2,189
2. Graduations 1938–46	639	1,241	1,880
3. Hypothetical number in 1946 (addition)	1,388	2,681	4,069
4. Estimate at 2 percent average annual losses	1,220	2,439	3,659
5. Estimate at 4 percent average annual losses	1,060	2,132	3,192
6. Actual number employed in 1946	----	----	3,000
7. Net losses 1937–45	----	----	1,069
8. Net losses in percent of 1937 base	----	----	48.8

TABLE C–6.—*Total size of the Soviet professional and semiprofessional labor force, 1940–46*

[In thousands]

	Professional	*Semiprofessional*	*Professional and semiprofessional*
1. Actual number employed in 1940	850	1,700	2,550
2. Graduations 1941–46	351	729	1,080
3. Hypothetical number in 1946 (addition)	1,201	2,429	3,630
4. 1946 estimate at 2 percent average annual losses	1,084	2,297	3,381
5. 1946 estimate at 4 percent average annual losses	979	2,087	3,066
6. Actual number employed in 1946	----	----	3,000
7. Net losses 1940–45	----	----	630
8. Net losses in percent of 1940 base	----	----	24.7

TABLE C–7.—*Total size of the Soviet professional and semiprofessional labor force, 1937–50*

[In thousands]

	Professional	*Semiprofessional*	*Professional and semiprofessional*
1. Actual number employed in 1937	749	1,440	2,189
2. Graduations 1938–50	1,142	2,428	3,570
3. Hypothetical number in 1950 (addition)	1,891	3,868	5,759
4. Estimate at 2 percent average annual losses	1,692	3,287	4,979
5. Estimate at 4 percent average annual losses	1,448	2,824	4,272
(Estimate at 3 percent average annual losses)	(1,564)	(3,048)	(4,612)
6. Actual number employed in 1950	1,573	3,107	4,680
7. Net losses, 1937–49	318	761	1,079
8. Net losses in percent of 1937 base	42.4	52.3	49.3

TABLE C–8.—*Total size of the Soviet professional and semiprofessional labor force, 1940–50*

[In thousands]

	Professional	*Semiprofessional*	*Professional and semiprofessional*
1. Actual number employed in 1940	850	1,700	2,550
2. Graduations 1941–50	939	1,811	2,750
3. Hypothetical number in 1950 (addition)	1,789	3,511	5,300
4. Estimate at 2 percent average annual losses	1,567	3,077	4,644
5. Estimate at 4 percent average annual losses	n. a.	n. a.	n. a.
6. Actual number employed in 1950	1,573	3,107	4,680
7. Net losses 1940–49	216	404	620
8. Net losses in percent of 1940 base	25.4	23.7	24.3

n. a.—Estimate not applicable; it was not made.

NOTES TO TABLES C–4–C–8

On the basis of these estimates, it becomes obvious that the total size of the Soviet professional and semiprofessional labor force can be estimated both with relative ease and sufficient reliability. However, so far we have not considered war losses in any of these estimates as one separate component. This problem can be approached by an assumption of hypothetical war losses.

War losses suffered by the Soviet population as a whole can be ascertained as follows. Assuming that hypothetical losses due to military deaths were about 5 million and those due to excess civilian deaths about 9 million during the period 1940–45, we may arrive at the conclusion that military losses were about 14 million (i. e., this excludes, of course, losses due to the decrement in the birth rate), or about 8 percent of the Soviet population.[1] Now, if it can be assumed that the Soviet professional and semiprofessional labor force suffered hypothetical war losses proportionate to those of the whole population, then it is apparent that the size of the Soviet professional and semiprofessional labor force declined between 1940 and 1945 by about 8 percent of the 1940 total. This, of course, would account only for the hypothetical losses of the original (i. e., 1940) professional and semiprofessional labor force due to the war. At the same time the increments (due to the influx of new graduates) and the original size are subject to a certain average annual rate of losses which would be present if the war had not taken place. Therefore, both the existing average annual rate of losses and the hypothetical war losses (as defined above only on the basis of military deaths and hypothetical excess death rate for adults) account for the decline in the size of the professional and semiprofessional labor force during the war. In other words, under such assumptions the size of the professional and semiprofessional labor force by 1945 is the normal projection of 1940 to 1945 minus hypothetical war losses estimated under the previously stated assumptions.

There is no direct way of testing such an assumption or the results obtained. Soviet authorities seem to have remained absolutely silent on this subject. Thus far, no direct clues have been found upon which to base a rejection of this assumption. A variety of arguments can be presented for assertions that specialists in general and professionals in particular were better off during the war than the rest of the population and thus suffered proportionately smaller losses. Likewise, there are a number of arguments to the contrary. So far, only one study, published by a Soviet writer, has been found which tends to support

[1] Details on the basis of which this argument is based and more precise figures can be found in F. Lorimer, *The Population of the Soviet Union*, 1946, esp. pp. 181–184, and W. Eason in A. Bergson (ed.), *Soviet Economic Growth*, 1953, pp. 101–105 (and W. Eason, Appendix to "Population and Labor Force," copyright, private circulation, 1953).

the magnitude of the assumed hypothetical war losses among professionals only. In 1950, A. Sinetskii published a book which is based on data of a detailed survey of teaching staffs of Soviet higher educational establishments in 1947.[2] One of his tables [3] reveals that as of January 1, 1947, there were 45,400 full-time teachers in higher educational establishments in all ranks and all fields, who had been engaged in this work (*stazh pedraboty v vuzakh*) for over 5 years. From the same source it is learned that in 1941 there were 50,100 [4] teachers; thus if we neglect the difference of 1 year in coverage, it is apparent that 4,700, or 9.4 percent, of those who were employed in 1941 were no longer employed in 1947. There is no way of knowing what fraction of this factor represents war losses exclusively and what part of it is attributable to other factors (such as dismissal, incarceration, retirement, etc.). However, its magnitude is quite suggestive, especially since we have teachers of all fields represented in the sample.

Thus, while tables C–4 to C–8 present various estimates of the total size of the Soviet professional and semiprofessional labor force, there is no account taken of actual or hypothetical war losses. Now, depending upon the choice of minimal and maximal estimates of Soviet professional and semiprofessional labor force for 1940, the hypothetical war losses of 8 percent of the 1940 base will range from 68,000 to 80,000 for professionals, and from 132,000 to 165,000 for semiprofessionals. If these hypothetical war losses are assumed, then an estimate (as is made in table C–7) at 2 percent average annual losses, with some adjustment for excess losses during the period 1937–40 (as discussed in notes to table C–4), can be made. This procedure was employed in order to obtain estimates (tables below) of the size of the professional labor force for the postwar years.

Now, it must be noted that all these methods of estimating the size of the Soviet professional and semiprofessional labor force result in rough approximations for the postwar years. The procedure suggested above (i. e., assumption of 8 percent hypothetical war losses, adjustment for 1937–40 discrepancy, and projection at 2 percent average annual losses) can be simplified extensively if we simply assume 3 percent average annual losses for the entire period between 1937 and 1950 (table C–7). In other words, about the same magnitudes for the size of professional and semiprofessional labor force can be obtained in two different ways. One is more legitimate and hypothetically more refined and the other is a simple projection (at 3 percent average annual losses) which does not take into account the differential losses which existed in distinct periods. By using the latter method, we also avoid the problem of prewar (1937–40) downward adjustment and postwar upward adjustment which results from the following consideration.

If we assume downward adjusted 1940 figures (due to excessive losses of the 1937–40 period), it becomes apparent (table C–8) that an estimate at 2 percent average annual losses for the postwar period appears somewhat too low if compared with actual employment figures for specialists. The fact is that in the immediate postwar years the increases in the professional and semiprofessional labor force were larger than the graduating classes. For example, assuming the 1946 number of professionals and semiprofessionals actually employed as 3 million and adding two graduating classes (1947 and 1948) of 696,000, we obtain a total of some 3.7 million. However, the actual number employed in 1948 was about 3.9 million. This is the reason for the statement made earlier (notes to table C–4) that 1940 downward adjusted figures reflect the temporary withdrawal of trained specialists from the civilian labor force.

To sum up: The dynamics of war disturbances were complex and the impact upon the size of the professional and semiprofessional labor force was felt in three distinct stages: prewar, war, and postwar. There was a prewar reduction in size of the professional and semiprofessional labor force which cannot be accounted for by simple projection; there were war losses in excess of and in addition to the anticipated average annual rate of attrition; and finally there was a postwar influx into the professional and semiprofessional labor force larger than graduating classes because of the return of personnel into the civilian professional and semiprofessional labor force.

Keeping all these considerations in mind, we find that there are two procedures for obtaining figures (approximate but quite reliable) for the postwar size of

[2] Sinetskii, *PP Kadry*. For full title, see bibliography.
[3] Ibid., p. 113.
[4] Ibid., p. 104.

Soviet trained manpower. One procedure is via hypothetical constructs; the other, via the assumption of a uniform (3 percent) average annual attrition rate for the entire period (1937–50). The first method is more complicated and more revealing; the second, less refined and disregards the fact that prewar (1937–40) withdrawal from the professional and semiprofessional labor force was at the rate of almost 8 percent per annum, that hypothetical war losses were probably 8 percent of the 1940 base, that slightly lower than 2 percent average annual losses were in effect in the postwar period due to the influx of personnel previously (1937–40 or during the war) withdrawn from the civilian labor force. Keeping these complications in mind, let us proceed to estimate the size of the professional and semiprofessional labor force distributed by field.

TABLE C–9.—*Soviet professional labor force, by field, 1940*

[In thousands]

	(A)	(B)	(C)	(D)
Engineering	351.2	333.9	317.3	283.5
Agricultural	120.5	114.6	108.9	97.3
Socioeconomic	76.8	72.9	69.1	61.3
Educational	349.1	333.2	317.9	284.1
Health	149.9	142.7	136.1	121.6
Total	1,047.5	997.3	949.3	848.2

(A) Derived by method of straight addition of graduating classes to the assumed 1937 distribution of employed specialists.
(B) Derived by method of assumed 2 percent average annual attrition rate using 1937 as a base.
(C) Derived by the method of assumed 4 percent average annual losses using 1937 as a base.
(D) Derived by method of assumed 2 percent average annual losses using 1937 as a base and making a downward adjustment for prewar withdrawal (100,000) of professionals from civilian employment (i. e., draft, incarceration, etc.).

TABLE C–10.—*Soviet professional labor force, by field, 1950*

[In thousands]

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Engineering	580.6	485.6	461.4	419.1	398.7	427.6	445.6
Agricultural	192.4	160.0	151.7	134.1	127.1	140.1	146.2
Socioeconomic	121.5	101.2	95.8	84.9	80.4	88.4	92.6
Educational	771.3	665.4	641.2	578.2	557.5	607.4	620.3
Health	321.0	274.2	263.6	236.4	227.7	249.1	254.7
Total	1,968.8	1,686.4	1,613.7	1,452.7	1,391.4	1,512.6	1,559.4

(A) Estimated by straight addition of graduating classes to 1937 base.
(B) Estimated by method of 2 percent average annual losses without any adjustment.
(C) Estimated by method of 2 percent average annual losses with assumed 8 percent hypothetical war losses.
(D) Estimated by method of 4 percent average annual losses without any adjustment.
(E) Estimated by method of 4 percent average annual losses with assumed 8 percent hypothetical war losses.
(F) Estimated by method of 2 percent average annual losses with assumed 8 percent hypothetical war losses and with downward adjustment for prewar (1937–40) excessive losses or withdrawals of professionals from civilian labor force.
(G) Estimated at 3 percent average annual losses without any adjustment for either hypothetical war losses or prewar withdrawals.

NOTES.—Out of the set of estimates presented above, the closest match to independently derived total of *actually* employed number of professionals (table A–6) is given by estimates (C), (F), and (G). Non of these matches exactly, but a deviation of 5 to 7 percent between maximal and minimal estimates is a sufficient degree of accuracy when dealing with social statistics of this type.
It was decided to accept one of the minimal estimates (version (F)) as the most likely one (i. e., which takes account of average annual rate of attrition of 2 percent, makes allowance for hypothetical war losses of about 8 percent, and takes account of prewar excessive losses or withdrawals), and figures derived in such a way are regarded as representative of the true situation in 1950.

APPENDIX C–11.—*Checks upon estimates of the size of the Soviet professional labor force, by field, in 1940 and 1950*

The problem of independent checks upon these estimates must be considered in some detail. The estimates ascertaining the total size of the professional

and semiprofessional labor force or total of either do not require any specific assumptions since there is no problem of definition of specialists on the basis of educational criteria. These checks, as far as totals are concerned, were made all along. Now the problem is of verifying the reliability of estimates for individual occupational fields on the basis of Soviet official pronouncements.

The first check consists of a comparison of official pronouncements concerning the employment of doctors and estimates derived for the health field segment. This procedure is as follows. It was stated that in 1951 (*Pravda*, April 17, 1951 (Itogi 1946–50)) the number of physicians employed in the national economy increased by 75 percent between 1940 and 1950. If we take the unadjusted 1940 estimate (136,000) and apply the percentage increase, we obtain 238,000 for 1950. If we take the adjusted-for-1937–40-excessive-losses figure (121,000), we obtain 213,000 for 1950. If, finally, we take the 1940 *actual* figure of the number of physicians employed given as 130,400 (*BSE–SSSR*, column 1178) and apply the percentage increase, we obtain 229,000 for 1950. The figures which were derived by estimates (on the basis of graduation trends) were in the neighborhood of 250,000, or some 20,000 in excess of the figure reconstructed on the basis of the independent official pronouncements.

Another source (Koshelev, *Pod'yem* . . ., p. 40) reveals the 1940 to 1950 relationship of engineers employed. It states that during this period the total number of engineers employed in the national economy increased by 43 percent. Consequently, assuming the 1940 adjusted estimate (283,500), we obtain 433,700 for 1950. Assuming the unadjusted figure for 1940 (317,300), we obtain 453,700 for 1950. The figure derived on the basis of annual graduations for the same period is about 430,000. The difference is within reasonable limits of errors and uncertainties involved in estimating procedures based on rounded percentages and relying upon hypothetical constructs of one sort or another.

The same source (Koshelev, *Pod'yem* . . ., p. 40) reveals the relationship between actually employed agricultural specialists in 1940 and 1950. The number of actually employed agricultural field professionals between these 2 years increased by 53 percent. Assuming the 1940 figure as 97,300, we obtain for 1950 148,800 agricultural field professionals, which is only slightly above our estimate on the basis of graduation trends (140,000).

All these checks reveal that the use of data concerning graduates from professional higher educational establishments can be employed for postwar period estimates of the occupational composition of the Soviet professional labor force and that the set of assumptions under which the estimates were made are substantially correct. The assumption of limited transfer from one occupation into another in particular seems to be valid.

Thus, to sum up, it appears that the composition of the Soviet professional labor force in 2 selected years (1940 and 1950) can be ascertained and verified with a sufficient degree of reliability (5 to 7 percent deviation, depending upon the assumptions employed in the estimating procedure). Consequently it was assumed that the occupational composition of the Soviet professional labor force in the 2 selected years was as follows:

	In thousands	
Professionals with completed higher education by field	*1940*	*1950*
Engineering	283.5	427.6
Agriculture	97.3	140.1
Socioeconomic	61.7	88.4
Education	284.1	607.4
Health	121.6	249.1
All fields	848.2	1,512.6

As was already observed, this 1950 total (1,512,600) differs slightly from that which was derived in table A–6 (1,573,000). In this connection it should be noted that the discrepancies observed are partly due to the exclusion of extension training students from distribution by field.

TABLE C–12.—*Soviet professional labor force, by field, 1950–54*

[All figures in thousands]

	1950	1951	1952	1953	1954
Engineering	427. 6	447. 3	467. 6	498. 2	541. 2
Agriculture	140. 1	149. 0	160. 7	174. 5	189. 0
Socioeconomic	88. 4	98. 4	109. 2	119. 0	124. 6
Education	607. 4	674. 5	748. 3	803. 3	857. 2
Health	249. 1	264. 1	290. 8	305. 9	323. 7
All fields	1, 512. 6	1, 633. 3	1, 776. 6	1, 900. 9	2, 035. 7
Total, adjusted to include extension graduates		1, 680. 0	1, 864. 0	2, 027. 0	2, 218. 0

Notes and checks

These estimates are derived by the method of assumed 2 percent average annual losses using 1950 as a base. The assumption is made that the 1950 distribution of professionals by field derived earlier (tables C–10, C–11) is essentially a correct estimate.

Prior to 1950, exclusion of extension students from totals does not lead to any appreciable error. After 1950, however, extension training graduates must be included. This is done by adding extension training graduates to the total derived on the basis of estimates for individual fields.

Further checks upon these estimates are essential. In the first place, as was already indicated (table A–7), the total size of the professional labor force can be checked. Assuming 1940 as 850,000, we obtain 1953 (220 percent increase between 1940 and 1953, *VVSh*, No. 10, 1954, p. 1) as 1,870,000, against the estimate made above of about 1,900,000 (excluding extension graduates).

The same source (*VVSh*, No. 10, 1954, p. 1) reveals that the number of engineers with completed higher education actually employed in the national economy increased by 80 percent between 1940 and 1953. Consequently, using the 1940 figure of 283,500, we obtain for 1953 the actual number of engineers employed in the national economy as 510,300, against the estimate made above of 498,200.

It was stated (Beriya speech at 19th CP Congress, [L. Grullow, ed.] *Current Soviet Policies*, 1953, p. 164) that the number of physicians in the fall of 1952 was about 300,000, which differs from the figure above by some 10,000. However, it was also stated (*Partiinaya Zhizn'*, No. 10, 1954 [statement of Vice Minister of Health Kochergin]) that "nowadays" (one is not sure if this refers to 1952 or 1953, but 1952 seems more likely) there are 277,000 physicians and 19,200 dentists, which totals to 296,200, employed in the U. S. S. R.

TABLE C–13.—*Soviet semiprofessional labor force, by field, 1940*

	(A)	(B)	(C)	(D)
Engineering	484. 3	459. 8	436. 4	413. 5
Agriculture	223. 5	213. 2	203. 5	191. 7
Socioeconomic	206. 1	194. 8	183. 9	174. 9
Education	723. 0	688. 5	655. 3	618. 9
Health	428. 8	412. 2	396. 2	370. 6
Total	2, 065. 7	1, 968. 5	1, 875. 3	1, 769. 6

(A) Derived by the method of straight addition of graduating classes to the assumed 1937 distribution of employed specialists.
(B) Derived by method of assumed 2 percent average annual attrition rate, using 1937 as a base.
(C) Derived by the method of assumed 4 percent average annual losses, using 1937 as a base.
(D) Derived by the method of assumed 2 percent average annual losses, using 1937 as a base and making a downward adjustment for prewar withdrawal (200,000) of semiprofessionals from civilian employment (i. e., draft, incarceration, etc.). It must be noted that, despite this adjustment, the total (1,769,600) is still about 70,000 above the estimated total semiprofessional labor force (tables A–5 and C–3). No adjustment was made to account for this difference, since such an adjustment would require further assumptions (i. e., another set of assumptions different from those used in estimates of the professional labor force), and this would complicate even further the estimating technique adopted.
Furthermore, it is essential to bear in mind that annual graduation data for the war years for semiprofessionals are lacking, and therefore any estimates of the semiprofessional labor force by field for the postwar years lack the refinement and reliability of estimates for professionals (for further details, see notes to table C–14).

NOTE.—This table and the subsequent tables were incorporated into this appendix mainly for checking purposes, and the reliability of estimates of distribution of semiprofessionals by field is hampered by lacunae of information.

TABLE C–14.—*Soviet semiprofessional labor force, by field, 1950*

	(A)	(B)	(C)	(D)
Engineering	917. 3	834. 3	795. 7	749. 4
Agriculture	482. 5	423. 9	406. 9	385. 4
Socioeconomic	422. 1	364. 8	369. 2	349. 3
Education	1, 181. 0	986. 6	931. 6	862. 0
Health	873. 8	747. 2	714. 2	672. 6
Total	3, 876. 7	3, 356. 6	3, 217. 6	3, 018. 7

(A) Estimated by straight addition of graduating classes to 1937 base.
(B) Estimated by method of assumed 2 percent average annual losses without any adjustment.
(C) Estimated by method of assumed 2 percent average annual losses with assumed 8 percent hypothetical war losses.
(D) Estimated by method of assumed 2 percent average annual losses with assumed 8 percent hypothetical war losses and with downward adjustment for prewar (1937–40) excessive losses or withdrawals of semiprofessionals from the civilian labor force.

NOTES.—From the very onset it must be stressed that because of the lacunae of data in regard to annual graduations of semiprofessionals by field during the war, the estimate for 1950 was derived on the basis of a projection of prewar (1938–40) distribution of graduates by field upon graduations during the war years (see notes to table B–1 above). This procedure undoubtedly results in errors, the extent of which cannot be assessed in any meaningful way. As far as the total semiprofessional labor force is concerned, there is a close match of estimates of versions C and D with the total obtained above (tables A–6 and C–7). Although there is no way of checking these estimates for 1950, there is one check available for 1952, and therefore the estimates have been carried one step further in the next table.

TABLE C–15.—*Soviet semiprofessional labor force, by field, 1950–54*

	1950	*1951*	*1952*	*1953*	*1954*
Engineering	749. 4	801. 8	853. 2	---------	----------
Agriculture	385. 4	416. 3	446. 5	---------	----------
Socioeconomic	349. 3	382. 3	412. 5	---------	----------
Education	862. 0	904. 8	944. 7	---------	----------
Health	672. 6	711. 4	749. 1	---------	----------
Total	3, 018. 7	3, 196. 6	3, 406. 0	3, 638. 0	3, 885. 0

NOTES.—These estimates were derived, because of gaps in data, by projecting the distribution of technicum graduates in 1946–50 upon graduates in 1951 and 1952. There is no other way of obtaining distribution of graduating classes by field.

It must be strongly emphasized that 1950–52 distributions of semiprofessionals by field were obtained on the basis of procedures (both for the war years and for the 1951–52 period) which assumed that a certain trend in graduations prevailed. This assumption was already questioned in earlier notes. The problem consists now, however, in trying to make some independent check.

As far as the total size of the semiprofessional labor force for 1953 is concerned, it appears that it is somewhat below the estimate in table A–7 above by some 150,000.

The only other check available is the statement that in 1952 the trained semiprofessional medical personnel consisted of 728,000 persons (*Partinaya Zhizn'*, No. 10, 1954), which is close to the estimate presented in this table.

Though there is great uncertainty about these estimates, they are perhaps the best one can obtain considering the lacunae of data.

In conclusion, it must be noted that the semiprofessional labor force either experienced somewhat smaller losses during the war or postwar period, or that "upgrading" of semiprofessionals was again practiced (as in the early 1930's) on a large scale. The importance of the estimates lies in the fact that they give at least some idea of the probable distribution by field of trained semiprofessionals in the Soviet Union.

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