School Building Costs (1953)

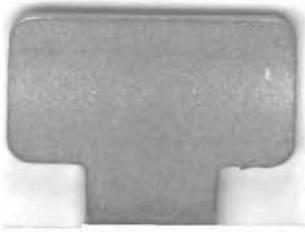
Pages
86

Size
8.5 x 10

ISBN
0309347106

Building Research Advisory Board; National Research Council

Price fifty cents per copy
Published by the BUILDING RESEARCH ADVISORY BOARD
February, 1953



CONFERENCE MEMBERS

CHAIRMAN: Mr. Frederic A. Pawley, American Institute of Architects

KEYNOTE SPEAKERS

Dr. Walter D. Cocking
Editor, The School Executive
New York 6, New York

Mr. John W. McLeod
McLeod & Ferrara
Washington, D. C.

Mr. Tyler S. Rogers, Technical Consultant
Owens-Corning Fiberglas Corporation
Toledo, Ohio

Mr. William H. Scheick, Executive Director
Building Research Advisory Board
Washington, D. C.

DISCUSSION LEADERS

Dr. E. J. Braun
Assistant Superintendent of Schools
Arlington, Virginia

Mrs. Elizabeth Campbell
School Board
Arlington, Virginia

Mr. Charles R. Colbert
Orleans Parish School Board
New Orleans, Louisiana

Dr. Shirley Cooper
American Association of School Administrators
Washington 6, D. C.

Mr. Don L. Essex
National Council on Schoolhouse Construction
Albany, New York

Dr. W. R. Flesher
The Ohio State University
Columbus 10, Ohio

Mr. Alonzo J. Harriman
Alonzo J. Harriman, Inc.
Auburn, Maine

Mr. Stanley J. McIntosh
Motion Picture Association of America
Washington, D. C.

Mr. Irving G. McNayr
Montgomery County Manager
Rockville, Maryland

Mr. John R. Miles
Chamber of Commerce of U.S.
Washington, D. C.

Mr. R. S. Noonan
R. W. Noonan, Inc.
York, Pennsylvania

Mr. James L. Reid
State Department of Education
Baltimore 1, Maryland

Mr. John Lyon Reid, AIA
San Francisco, California

Mr. Donald P. Setter
Magney, Tusler & Setter
Minneapolis 2, Minnesota

Mr. Eberle M. Smith
Detroit 1, Michigan

Mr. Ralph Swann
Pennsylvania Economy League
Harrisburg, Pennsylvania

Dr. N. E. Viles
U. S. Office of Education
Washington, D. C.

Mr. Henry L. Wright, Architect
Kistner, Curtis & Wright
Los Angeles, California

INTRODUCTION

OBJECTIVES AND SCOPE OF THE CONFERENCE

by

William H. Scheick, Executive Director, BRAB

First of all, I am sure there are some people at this meeting who would like to know what the Building Research Advisory Board is. We use the initials B R A B, sometimes saying "BRAB" as a short name for ourselves. We are a unit of the Division of Engineering and Industrial Research of the National Academy of Sciences National Research Council. The Academy is a non-profit corporation, chartered by Congress in Lincoln's time, for the advancement of science and to aid and advise the Government on scientific matters. The National Research Council is the operating arm of the Academy, chartered by Congress during World War I. BRAB's basic operations are sponsored by the building industry through grants to the National Research Council and through the payment of membership dues in the Building Research Institute, another unit of NRC which serves as BRAB's liaison with the business organizations of the building industry.

From the beginning of our activity in 1949, BRAB's objectives have been to correlate and stimulate building research and related affairs for the development of building technology as an integrated science. One method for fulfilling our functions is to conduct meetings and conferences on problems of building. Our meetings do not formulate any standards or set any regulations because BRAB has no authority to do so. But through our conferences, we bring together, for face to face discussion, leaders from many fields of building technology from all parts of the building industry. We know that discussions of this kind are a most fruitful means for stimulating the thinking of the people who participate and consequently for stimulating progress.

BRAB has conducted five large research conferences. This meeting is a trial of a smaller meeting where we have eliminated the "public" audience and confined the program to unrehearsed discussions by everyone in attendance. We are trying this technique because of the highly exploratory nature of our attack upon the subject of school building costs.

In all of our work, and especially in the matter of conferences, BRAB is glad to collaborate with other organizations. In fact, in everything we do we seek to further the interest of any or all organizations interested in building technology. We find that we can perform a service by conducting conferences for sponsoring organizations whose interests are broad and diversified and who find in the Academy of Sciences an ideal neutral meeting ground for discussing controversial questions.

Today, we have three very well known organizations sponsoring this meeting - three organizations which represent very broad viewpoints in matters pertaining to school building construction. The American Institute of Architects represents essentially the interests of building technology, the U. S. Office of Education represents the interests of educators, and the Chamber of Commerce of the United States represents the interests of citizens and business groups of the communities that build public schools.

When these organizations asked BRAB to conduct this Conference, the subject at first seemed to us to be considerably detached from the direct line of building technology. After some study of the information presented by the sponsoring groups, BRAB's Executive Committee was satisfied that building technology is extensively involved in the subject matter of the Conference and that BRAB should indeed accept the problem as a suitable one for our conference approach.

My assignment is about the equivalent of the kick-off which starts a ball game, and I propose to do it with a brief resume of the problem of school building costs as I understand it. I am completely a layman on this subject, knowing only what I've heard as we discussed this program with representatives of our three sponsoring organizations.

There is a ten billion dollar need for school buildings in the United States, with the prospect of local communities being able to meet only about one-half this cost. The urgency for the construction of this huge volume of school buildings comes from the pressure of the population curve and the intoleraly crowded conditions in many schools today. The communities, the organizations, and the people confronted with this school building need find cost the obstacle that defeats an adequate building program.

Evidently the single question of cost has many facets and few people are aware of all of them. Each one sees only one or two aspects of the total cost problem and is inclined to put the blame for

frustration in one place. There are questions of building costs which are, of course, of direct concern to the building industry. These costs are reckoned in sq. ft. or cu. ft. of building space and can be analyzed in relation to the rising curve of the costs of all kinds of buildings, which is similar to the rising curve of other durable goods and commodities over the past decade.

There is the question of cost per pupil, which reflects the additions we have made in space other than classroom space to provide the educational facilities now believed to be necessary. This question involves the whole philosophy of education and eventually leads into the programming requirements for school building design.

There are other questions of cost limits and the costs of providing public funds for school building construction. Questions are raised about the bonding and taxing limits of various communities and whether they are right or realistic in relation to present-day construction costs.

Undoubtedly, this Conference will subdivide these aspects of cost still further and will probably identify others that I have not mentioned. In any event, our responsibility today is to take apart the subject of school building costs to determine what parts it has, and to show how the parts are related.

I believe that everyone here wants this meeting to amount to something more than just conversation. The final results of the group discussions, as they are presented tomorrow, will become a part of a record available for public distribution. I do not think we should attempt to come up with definite recommendations since an exploratory, working conference of this nature should be more concerned with outlining the problems and setting the stage for future conferences and investigation of this subject. I think we should begin by setting some tangible goals for our discussions that will give tangible value to this record. We want your analysis of school building costs to be a formula for better understanding of the whole cost problem by any group concerned with any part of it. We want your analysis of the cost problem to become a tool for solving the problem in the various disciplines. I believe we would all like to go even further by indicating what direction the solution of each cost factor must take, and, finally, by indicating who should take the responsibility

for constructive research upon each cost factor.

This last matter of the definition of responsibility is very important. The cost factors which lie in the field of economics and community affairs are completely beyond BRAB's purview, and once identified and described, cannot be followed by our organization. We could, in the future, continue to work with organizations in the building industry to further any solution of the technical aspects of the cost problem.

BRAB appreciates this opportunity to aid this exploration of a major problem in the science of building, and appreciates the cooperation of all of you who are here to engage in these discussions.

SESSION I
School Building Costs from the Educator's Viewpoint

Keynote Speech

by Walter D. Cocking

Editor, THE SCHOOL EXECUTIVE and THE AMERICAN SCHOOL AND UNIVERSITY

The need for new school buildings continues to mount. As far as can be foreseen, school construction will continue at its present pace for the next twelve to fifteen years. In terms of new buildings, 6000 - 7000 new structures will be built each year. At present prices, more than one billion dollars per year will be required. This is big business even for fabulous America. All of us should consider well if we are getting the best return for money spent. As we look to the years ahead, we must give careful consideration to two issues related to these new buildings (1) how can we secure better buildings for the tasks to be conducted in them, and (2) how to obtain them at less cost.

These two issues are not incompatible. In fact there is reason to believe that they may well supplement one another. I need not tell this group that too often in the past insufficient and unrealistic educational planning on the one hand, and inadequate interpretation of educational needs in terms of design and structure on the other have resulted in poor educational facilities purchased at great cost. Evidence to support such a conclusinn can be found throughout the country.

We must have better and more intensive planning of educational needs. Likewise we must have far keener interpretation of these needs in terms of design. In my judgment, more and better research should give us better answers. In fact little research has been done, and small use has been made of the results of research we have had. There has been too much guessing, too much trial and error, too much rule of thumb, the exercise of too much prejudice or preconceived opinion. All this means, we have too few facts upon which to act.

It is my function today to suggest some of the areas in educational planning where research is

needed, and where it is possible that we might get better educational facilities and at less cost. I believe that there are many such possibilities. Good research should help to give us some of the answers. To sharpen our thinking, I wish to propose several possible areas for further study and research. It will be necessary for all of us to put aside our preconceived notions and to be open-minded enough to accept the possibility at least of some improvement and some departures from usual practice.

USE OF CORRIDORS AS INSTRUCTIONAL SPACE

Corridors, either single loaded or double loaded, are the most expensive space in a school building. They have little use except as circulation passages. In my opinion, we can no longer justify this valuable space for only circulation purposes. Ways must be found to use it also as instructional space. There are enough examples of possibilities to justify detailed study and further experimentation.

The junior high school at Darien, Connecticut, the new elementary school buildings at New Castle, Delaware, and New Canaan, Connecticut, the new high school planned for Newton, New Jersey, show some of the opportunities. Undoubtedly, much more can be done.

CLASSROOMS OF VARYING SIZE

The single standard-size classroom must go. Classrooms, especially in secondary schools, should vary in size both for economy and for educational reasons. After all, classes in the same school do vary considerably in size. They also employ varying types of procedures which require greater or lesser amounts of floor area. A recent study conducted in connection with planning a new high school in New Jersey demonstrated a considerable saving of money, and increased efficiency in use by providing for three different classroom sizes. Further study is needed.

REDUCED NUMBER OF PARTITIONS

Another way we clutter up school buildings, increase cost, and lower educational efficiency is through the excessive use of partitions. The result is a building divided into many small spaces which, if justified when the building is constructed, later on limit the usefulness and utility of the building as programs change. An example of "over-partitioning" is the customary method of dividing the commercial department into many small rooms. The chances are greater efficiency would be secured by having one

large space free from floor to ceiling of partitions. The emotional desire of teachers for exclusive walled off spaces muct be overcome. Much can undoubtedly be done in this area of educational and building planning.

DECREASED SIZE OF AUDITORIUMS

The usual large auditorium found in school buildings has always been a poor, if not impossible, educational facility. By its very size, it is a self-defeating type of space. The large auditorium seating 1000 or more people cannot be educational. It brings about separation rather than intimacy and a lack of cohesiveness between audience and those on the stage. It also is very expensive space to design and build originally. It is expensive to maintain. It has a very low utility of use. It is just too big and unwieldy. It cannot be justified on the complete use made of it a half dozen times during a year.

On the other hand, a small well designed auditorium and stage can be one of the greatest assets to any educational program. Such an auditorium should not seat more than 500 persons. Many may well be much smaller. The resulting cost will be much lower because of smaller size and less heavily structured design. Here again is a fruitful possibility for saving money and improving educational space.

CHARACTER AND PLACEMENT OF EQUIPMENT

In the past too frequently the use of space in school buildings has largely been determined by the character and placement of the equipment. Spaces could only be used for certain purposes because they were cluttered up with equipment used only a small percentage of the time. And even for the given use designated, much more efficiency could be developed if the equipment were more appropriate.

Let's take science rooms and equipment by way of illustration. These spaces traditionally in the secondary school were based on the conception of a demonstration by the instructor with students observing and taking notes, hence a demonstration desk and tiered rows of seats in a semi-circle. Also another space was provided for individual student experimentation, and it was based upon the idea of all students performing the same experiment at the same time. This idea still prevails although different procedures and techniques have been accepted. The lecture room, always a wasteful space, must go -- it cannot be justified educationally. No informed scientist today believes it necessary for all students

to perform the same experiment at the same time. Changes have come and are coming. The modern science space makes provision for all types of equipment around the perimeter of the room with free and flexible space inside this perimeter. The result is decrease in the amount of space with the elimination of the lecture or demonstration room. Manufacturers of science equipment such as the John E. Sjostrom Company of Philadelphia have recognized this principle and after extensive experimentation have developed types of equipment to meet this concept. Equally important improvements and economies undoubtedly can be found in other phases of the school's program.

CENTRAL KITCHENS

Schools have become the largest restaurant system in the community. Although under the same management, the tendency has been to provide lunchroom facilities entirely separate and complete in themselves and with no relationship to other lunchrooms in the system. At last two promising experiments are taking place however in various places. One the use of the central kitchen. In it, food for the entire system is prepared and then taken in warm cabinets to the various schools. The plan saves both personnel and space and expensive equipment. The other type of experiment eliminates the dining room as such. The lunch is eaten in classrooms and other spaces in the building. Here we have examples of money savings with improved educational results claimed by the protagonists. Further study and experimentation are needed.

ORGANIZATIONAL AND OPERATIONAL CHANGES

School personnel have always liked to claim a given space for their exclusive use. Hence a teacher controls a given room, a department or a series of rooms. The result is that frequently a given space under such a plan is not used intelligently or to its best capacity. A large classroom used part of the day as an office or conference room is bad administration. Such use of space is wasteful and indefensible. All space in a building should be recognized as belonging to the total school. A given space should be used at any given time for the purpose which it serves best. Offices for teachers should be provided completely separate from teaching space. Schools which have tried this plan of operation have found in some cases that the utilization of the building has increased as much as 30 per cent. Organization should operate

for the most efficient use of space at all times. Space should be planned and designed so that it can be used for many purposes.

OTHER PROMISING AREAS FOR STUDY

Time does not permit attention to other areas. Study and experimentation in planning and using such spaces as those devoted to libraries, the so-called general purpose rooms, shops, gymnasiums, home-making suites, arts and crafts will undoubtedly result in demonstrating how these spaces can be used more efficiently and at the same time how financial economies can be made.

We are only at the threshold of intelligent planning of school buildings for the best and most intelligent use of such structures. We must intensify such studies. Our primary purpose should be to discover how to provide better space for school purposes. It can be done, I am sure. An inseparable corollary to such results will be more economy. The two go along together. If this conference can stimulate such studies and investigations, it will have served a most useful purpose.

SUMMARY OF DISCUSSION GROUP REPORTS IN SESSION I

by

Dr. Walter D. Cocking

I first want to express for our section our appreciation to BRAB and the cooperating agencies for making this meeting possible. We feel that it has a good deal of promise and that the effort begun here should be encouraged and continued until we begin to get some real research flowing.

I might make also one other general statement. We feel that preliminary to further research there should be a very careful analysis of the research which we have to date. There is a good bit floating around over the country. Efforts have been made to review it from time to time but it's never been complete, and some agency or agencies should be interested in making exhaustive search and analysis of the research which has been made.

Now in order to save time and to center attention primarily on the research factor, I'm not going to report at all on the first and third items in the suggested procedure on Page 1 which was handed to us yesterday. In other words, I'm not going to spend any time on definition of terms and I'm not going to spend time on what agencies or organizations should conduct the research. At this moment, any advice that we have on that subject would be ill-considered. We haven't had time enough to analyze the field and the competency of the various agencies to do different phases of research. Rather, I'm going to try to select from these reports the two or three pieces of research proposed that we thought worthy of presentation to this group; so my report should not be considered as being complete or final in any sense but, rather, typical of the type of research proposed by the groups yesterday morning. I shall take them as they come, and if you will follow your outline, you will notice that we are not following the order that is on the outline.

The first one I have before me deals with administrative spaces--those parts of the building which will be used for the building principal and his staff or for central office purposes. And these are the types of study proposed in this area.

It is proposed that there should be a job analysis, very carefully done, of the administrative functions for which space is needed.

The second proposal is that a study should be made of the percentage of space now being used for administrative purposes in buildings, particularly with respect to those buildings built since World War II.

Third, it is proposed that we discover, through the setting up of criteria, those buildings which have good administrative facilities. With such a list in hand, case studies should be made on what's good about them--that is, it is proposed that we analyze these spaces and these supposedly good administrative functions and see what qualities they have.

Number four--an analysis of basic factors in planning central administrative offices. What are the basic factors which should be used and are being used in planning these central administrative buildings? I might voice one personal notion at this moment. I saw, within the past two weeks, the new central administrative building at San Diego, California. It's a million-and-a-half dollar structure just being completed now. They've moved into it. It appeared to me that it is the first building for this purpose that really has had some real planning going into it. It is worthy of a good deal of detailed study. We can learn a great deal from what they did and how they did it.

So much for the types of studies proposed for administrative spaces. Let's turn to the report on special instructional rooms.

There are three studies which are being proposed by this report. The group suggested a study of the size and character of general-purpose rooms and library rooms. The committee wanted me to suggest that they had in mind particularly general-purpose and library spaces in elementary schools. This would be an analytical study, I suppose.

Second, case studies should be conducted to discover the uses made of general-purpose rooms and also of library spaces. Do we talk about one set of uses and actually have in practice a differing set of uses? At the moment we don't know. With the information in hand we would be able to go farther than we are now able to go.

And then, third -- I don't know how this is going to be done but I state it as given to me -- that the possible multiple uses of various rooms in secondary schools should be studied.

Turning to the next subcommittee, which dealt with the problem of single versus multi-storied buildings, I wish to propose four types of studies that this group came up with.

(a) The relation of the amount and cost of land for various types of buildings. That is, one-story buildings as against multi-storied buildings. We have some studies on that already, but it's proposed that we need more.

(b) The relative cost of single and multi-storied buildings. Again, we have studies. Alonzo Harriman reported studies in this area, probably among the most objective that we have up to now.

(c) The relative adaptability of these buildings for educational programs and for community use. That is, the relative adaptability of the single-story versus the multi-story buildings for housing educational programs and for general community use.

And finally, (d) a study of the health factors involved in these two types of buildings. I believe the committee had in mind such matters as the effect of climbing stairs on young children and youths.

Turning to the next group which explored two very interesting subjects: Toilet facilities and Food services.

In regard to toilets, four studies are proposed:. (1) A review and analysis of previous studies in this area; (2) Case studies, which would endeavor to get at such items as the utilization by size of school of the mass toilet as against the single-room toilet and the effect of recesses in relationship to mass toilets versus the single-room toilet. And, again, case studies are suggested on the type of toilet with respect to the aid of children -- the young child and the older child. Further, it is suggested that an effort should be made to discover at what point the use of the single-room toilet or the toilet connected with a single classroom should be discontinued. (3) The adaptability of the single-room toilet versus the mass toilet for multiple use and for community use of buildings should be investigated. What problems do we run into at those points and what does it mean in cost and what does it mean in use? (4) A rather involved

study is recommended into the whole matter of costs of the toilets in connection with the single room as over against the costs of mass toilets.

In reference to food services there are four studies proposed:

(1) Cost of the utilization of central versus various individual school installations, with particular reference to both kitchen and dining room.

(2) The relative convenience of the central kitchen and related facilities versus a decentralized, individual building type. Also, the factor of safety is involved.

(3) A series of studies, called space studies, of utilization, timing, and the factors in the sanitation and hygiene when the dining room space is used for other purposes such as playrooms or libraries or auditoriums or platforms or double floors.

(4) A study of the needs of school lunchroom spaces for general community use; and, also, the extent to which school lunchrooms are being used for community use. It varies widely, as I think you all know, at the present time.

Turning to the sub-committee that dealt with the problems of auditoriums and gymnasiums, under gyms it was proposed that there should be a case study made of physical educational programs to determine the need of indoor and outdoor space in order to carry out physical educational programs. It was proposed in that subcommittee that many of the uses made of indoor space could better be carried on in the out-of-doors. Perhaps we need studies to determine what the truth is. Those studies would have to be widely carried on in order to take care of the different climatic and geographical changes. It is interesting that the proposal was made, I believe, by Alonzo Harriman of Maine.

Second, assuming that you are going to have some indoor space for gymnasium purposes, what are the indoor space requirements needed?

And, third, the study of the need for a separate space for gymnasium purposes which probably would not be used for any other activity should be made.

Turning to auditoriums, the group felt that the proper size of auditoriums should be evaluated.

It was also felt that the difference in function and use between school and commercial stages should be defined along with the implications for the school stage.

The groups considered the use of the same space for an auditorium and a gymnasium. They also discussed other multiple uses of these spaces. Again there is the approach which considers this: If you have a separate auditorium, what uses can be made of it? And if you have a separate gymnasium, for what purposes other than physical activities can it be used?

The groups proposed a whole series of studies to discover how the peculiar needs of both gymnasiums and auditoriums can be met effectively using a single space. This will include studies of environmental conditions, heating, lighting, ventilating and the emotional phases.

On classroom sizes, two types of studies were recommended: (1) The studies of sizes and shapes of classrooms in secondary buildings, including the matter of flexibility for multiple use. (2) A status study of kinds of classrooms currently being built in elementary and secondary schools, together with the thinking that lies behind whatever types of classrooms are being built.

We had a subcommittee that dealt with provisions for audio-visual use. I think they proposed fifteen different studies, but will mention only two in this report.

One suggested study concerning individual classroom equipment for audio-visual use versus the special room specially constructed and set up for audio-visual use. A study in each case should be made of the efficiency and cost.

The second type of study proposed by the group is the relative percentage of cost for the various unit phases of audio-visual instruction. In other words, where can you cut down in terms of equipment and kinds of equipment, and cut down in terms of the type and kinds of space. How must the space be treated so that we can get a unit cost for each phase of it? The committee strongly recommends the need for that type of study.

Those in general, then, are the suggestions of these subcommittees which dealt with the educational phase of studies in this area.

MR. PAWLEY: This is a detail that occurred to me when we were preparing the material on gyms and auditoriums. There has been a considerable movement in the legitimate theatre toward the use of the arena stage, in which there is no proscenium and the action takes place in the center of the audience. It seems to me that the typical gymnasium could very easily be adapted for that use.

DR. COCKING: Good comment, I happen to know about that subcommittee because I was a member of it. It came up in a related way in the discussion of the Committee.

MR. COOPER: It would be an oversight to this group not to give some attention to facilities for the use of television in instructional programs. We are certainly on the threshold of a period when that medium of teaching is likely to become more common, and some research in advance might be given to installation of equipment or type of facilities needed to use that type of instruction.

MR. McINTOSH: That came up only in a related way. The National Committee on Educational Television is in the midst of problems of that kind now.

DR. COCKING: Do you have advice to give to this group on that issue?

MR. McINTOSH: I have no advice whatsoever except from the standpoint of utilization of television programs which compares favorably with the same circumstances which you use in other objective materials.

MR. SCALES: I don't want to pour cold water on this discussion, but it seems to me that the theme of this whole conference is reducing costs to get more schools. I believe also that the greater fields of endeavour lay in the broad area of small towns, rural areas, and suburban areas. Now, in reference to television. Television is a wonderful proposition. I know that from actual experience with it how far it can be carried because it has been used by my university in teaching of chemistry and medicine and so on. But I believe in talking about schools, where school money is most difficult to obtain and we are trying to find ways to make more schools available, I don't think it would be well to give a great deal of emphasis to such things as television and so on in a report that's going to go to school boards. Now the reason for that is not because television isn't a good thing but because of the effect it may have --

a psychological effect. Too much emphasis on things which can be done later and can be kept out of the picture at the present moment until more funds are available would have the tendency to discourage those people who are really hard up and looking for help. They might say, "Well, that's all right, but you people have got too much gingerbread in this proposition to make it feasible." I think the psychological effect might be bad. I'm not trying to pour cold water, nor am I trying to belittle any efforts to get all we possibly can to aid education. But I' m thinking in the terms of grass roots propositions, in which we are trying to get more school facilities for what money we have available.

DR. COCKING: Thank you, sir. The economy, of course, might well be, as a bunch of engineers have stated, that, if television is here to stay, to put in necessary conduits at the present time when buildings are being erected is an economy and not an expenditure or an extravagance. Rather than tearing the building to pieces later on to run conduits, it might be better to put them in at the first. So it might well be that we are considering a matter of economy.

DR. VILES: I want to speak to the conference on audio-visual instruction for just a minute. Mr. McIntosh knows of this and so does Mr. Pawley and some of the rest of us who had a round on it recently. It seems that there should be some research on the possibilities of audio-visual in the average classroom without the complete darkening of the room. Now, in some schools complete darkening is almost impossible.

My contention is that for the complete use of screen work, audio-visual needs some more attention. But how we are going to do it without complete darkness, because complete darkness is almost out of the picture in the classroom.

MR. SNOW: Just the other day there was a gentleman in the office interested in building schools, and he talked about the school programs; whereupon he launched into quite a discussion. He has four children and he said, "The trouble with the schools is, in my opinion, my children are not getting reading, writing and arithmetic. There are too many extra-curricular activities going on in trying to make the schools a pleasant place for the students to be, what with catering to his interests in athletics, and so forth. In one place, believe it or not, they have a smoking room for students."

There may be something in that approach. If schools are developing into that phase, maybe

those factors could be balanced better, eliminating perhaps some of these extra-curricular activities he mentioned, which would reduce the cost of school construction. In other words, his point is children are not coming out educated the way they were fifteen or twenty years ago.

DR. COCKING: Of course the idea isn't original; and, second, the man you refer to hasn't studied the problem thoroughly, because such research as we have is all to the contrary of his conclusions. I have to say that in the interests of research.

MR. SCHEICK: Returning to the discussion on television, it would seem to me that economies could be effected in terms of teaching personnel by the use of television. I'm referring to its use on such specialized subjects as science, physics, home economics, and so forth. One instructor could take care of a great number of school rooms, and the chances are that this instructor could be a little more expert than a teacher having to instruct in a number of subjects.

MR. MC INTOSH: I would like to say one word in connection with this subject. There has been up to date only one educational television, per se, in operation, that being at Iowa State at Ames. And there are still to be television stations installed for educational use only. But it is in a stage where perhaps the National Committee on Educational Television and the Fund for Adult Education are going to get the initial information to study this.

Another statement I want to make regards Dr. Viles' reference to a true daylight screen. There is research data on this, and the Society of Motion Picture and Television Engineers are working on it, with reference to everybody concerned who seems to know anything about it. That's mentioned in the report, incidentally.

MR. COLBERT: I would just ask this question, Dr. Cocking. So many of the things we discussed in our groups revolved around self-evaluation within various school systems, and further having a clearing point where we could get that information and be able to utilize it properly. I would like to see available experience records in self-evaluation made by comparable district persons. It seems to me that that is one of the things we're searching for.

DR. COCKING: Thank you, Mr. Colbert. Dr. Hamon, do you wish to speak on that point?

DR. HAMON: You know the American Association of Educational Research puts out a publication about five times a year, and once every three years an issue is devoted to school plants and equipment. It is a selected, annotated bibliography. It is a good source of general information and cataloging of what has been done in research in the past three years in each issue. There have, I think, been four, maybe five, issues, devoted to the school plant. One every three years. It doesn't carry many of the answers, but it does give you a source of reference. Unfortunately, in a way, research has been defined in that publication rather loosely. I add, probably wisely. For example, a magazine article by an authority might actually be better than research by a graduate student for his master's thesis. And so, a large number of the items listed in that are really magazine articles rather than what we would call research. It is about the only source I know that attempts to catalog research and authoritative articles.

DR. COCKING: Mr. Colbert, I agree with what Dr. Hamon has said, that you're putting your finger on a real need which is not now being currently satisfied. The studies, few as they are, the results of them, are not available readily to the school systems, and to architects and other interested groups concerned with school plants. Maybe such a group as this should give attention to that problem at a later date.

DR. FLESHER: May I make one comment?

DR. COCKING: Yes, Dr. Flesher is Chairman of the Committee on Research of the National Council on Schoolhouse Construction.

DR. FLESHER: I think in this connection that there have been losses in the review of educational research in that we used to have in the cycle one issue completely devoted to school plants. Recently the issue has bee made up of several factors. I believe that there is only one chapter in a particular issue, devoted to school plants. So I think we are losing ground with respect to that one thing that we have had in the past -- that is a collating agency, which I think underscores the need that Mr. Colbert has mentioned for some other agency to collect, make available, disseminate, maybe synthesize and make more useful those things that are happening, many of which don't even appear as a magazine article. A lot of thinking, experimentation and data collecting has taken place in terms of just mimeographed copies for local circulation;

and we have no way of getting access to them, and I think that is one of the big needs in our field.

MR. TAYLOR: Since I am not a specialist in the school field, I tend to theorize and generalize, but I believe that this may have some bearing on this question of who does the research. My version of the problem is that in any building type there are three phases of research. Two of them have been mentioned this morning in the various reports. The first is obviously the research on research. That is a necessary first step. The second type is the survey type, or study type of existing experience and practice and the self-evaluation that Mr. Colbert spoke of.

Now the third type -- I hope we may get more comments on this -- is controlled experimentation, where you definitely start out in an existing building or in a mock-up or in an experimental building to control conditions to resolve some of these unresolved questions. So we need different types of research personnel for each of those three different kinds of research.

DR. COCKING: Very well said, Mr. Taylor; and with that remark we'd better conclude our phase of the program and turn the meeting back to Mr. Pawley.

MR. PAWLEY: Thank you, Dr. Cocking, for a stimulating session on the educational area.

SESSION II
School Building Costs from the Citizen's Viewpoint

Keynote Speech

by Tyler S. Rogers

Technical Consultant, Owens-Corning Fiberglas Corporation

The problem before this panel is in three parts: (1) to define the citizens' problems with respect to school building costs, (2) to determine what specific research, if any, is needed to advance their solution, and (3) to recommend the existing organizations which are qualified to study these problems further or to sponsor the indicated research.

The sponsors of this conference have been wise in recognizing that the citizen they speak of is a composite of many people, with many different attitudes toward school building costs. So we are asked to think of the citizen as a school board member, as a builder, as a taxpayer, as a parent, and as an investor.

We are expected to deal with school building costs, which necessarily puts a fence around our subject that to some degree excludes teaching tecniques, teacher qualifications and a host of other operative phases, except as they have an impact on the physical plant and its costs. Other panels will discuss the educational and architectural aspects; hence, we are further limited in our scope. All of this means, of course, that we should stick to our part of the problem, or at least only treat these other parts from the viewpoint of a "composite" citizen.

Five eminently qualified people are going to comprise this composite citizen for the purpose of this study. No matter what I say, I am bound to encroach upon one or more of them. Recognizing the risk, I propose to express my views of the subject, hoping that I may bring up some points worthy of debate.

First as a business man, I feel that there is inadequate appreciation of the importance of education to business, industry and the professions. The more broad-minded executives of this country

recognize that inadequate school plant facilities in their community means inadequate education for the current school generation. This in turn means, in just a few years, an inadequate supply of employees to staff their offices and plants, less earning power and therefore diminished markets for their goods and services, and less prospect of continued progress.

The level of education and the nation's strength and standard of living are tied tightly together.

To most citizens, school building costs are measured in taxes. While most schools are financed by bond issues, the interest and amortization of these bonds are reflected in taxes. Any investor recognizes that not only the plant cost is a factor but the number of years during which interest and amortization costs must be paid determine the final cost. The taxpayer may decide to spread building costs over several generations to come, but in doing so, he increases the total dollars that must be extracted from the community.

The citizen who invests in these securities is well protected by law against serious loss. Nevertheless, he must rely upon a solvent school district and, in the long run, he wants the school plant to be neither too large nor too small, neither extravagantly costly nor so cheaply built that its life expectancy cannot be realized.

This suggests another aspect that the Building Research Advisory Board has studied with respect to conservation. It has concluded that the cost of a building should be its total cost throughout its useful life. That means first cost, operating costs, maintenance and repair costs, all added together. This concept of building costs is, I believe, a sound one that most businessmen accept.

Certainly this philosophy applies to school structures for it is the total of these costs that the taxpayer pays. Here, at least, is one field for needed research, because we do not have adequate knowledge of the life performance, or more specifically, the life costs of the many different materials that might be chosen for school structures -- and the public is almost completely unaware of this variable and what it means to them.

Where the citizen is a parent or school-age children, he has a special interest in school plant

facilities. He wants them adequate, of course, but I think he wants them human, too, and more homelike than the institutional character of most of our older schools. Here I am expressing a personal viewpoint. To me it is silly to expect children to enjoy schooling if their environment is so cold and prison-like that they feel they are being punished by their enforced attendance. I have seen schools that have a human - even a children's scale - treatment that gives them charm and appeal equal to that of a well mannered home. I have seen more that are ugly, severe and utterly repelling.

A citizen-parent has many other interests, but some of them parallel the interest of the citizen-builder, the citizen-school board member, and the citizen-taxpayer. Here are some of them:

My experience on a county planning commission taught me that we have located our schools very badly in the past. Too many are on main traffic arteries, creating safety hazards, unnecessary and disturbing noises to annoy teachers and pupils alike, and equally objectional to the motorist whose speed is restricted in passing these misplaced schools. In fact, city planning has much to offer in the proper location of schools and the paths of access to them, but obviously this knowledge is not possessed in sufficient degree by citizens and school boards.

I have never served on a school board, but I know something of their problems and my heartfelt sympathies go to all school board members. They face immense responsibilities and are too often paid for their fine services in bitter criticism from less civic-minded parents and other taxpayers.

Their effort to cut school building costs, without adequate technical knowledge, often goes too far as not far enough. I can cite from personal experience a school gymnasium in New Hampshire that rained indoors on the inaugural celebration from condensation forming under the roof, because the school board, as an economy measure, refused to install the mechanical ventilation designed by the architect. In Michigan, a school board refused to accept from the contractor a new school that showed excessive dampness, but here the architect had not even provided any ventilation, except by opening windows, in his effort to keep costs down. I know of schools that have had serious fires because in the interest of minor economies, the board chose combustible acoustical and finishing materials instead of surfaces that simply cannot burn.

Cutting costs is not a job for amateurs. School boards need the guidance of highly skilled architects working in harmony with highly skilled contractors.

A month ago I saw the new buildings on the new campus of Trinity University at San Antonio where a skilled architect, using the very newest techniques, showed us buildings costing less than $10.00 a square foot, complete with furnishings and appointments. But you will hear of other schools costing up to $25.00 a square foot. This wide discrepancy obviously reveals an equally wide range of approaches to design and construction methods.

The last observation I wish to make is to remind us all that as citizens we can help our school boards and their architects in the use of new designs and new building materials or techniques. One way is to accept contemporary design instead of insisting on the imitation of past architectural concepts whenever a truly functional approach solves the problem satisfactorily at less cost.

Another way is to help modernize building codes which are unduly restrictive. Out of some 2500 such codes, it is estimated that about one-half fail to make adequate provision for the use of new materials and techniques without expensive tests and long delays.

Schools of today should not be forced to follow obsolete patterns. A recent study shows that modern flourescent lighting costs substantially less over a five or ten-year period than incandescent lighting. We formerly required high ceilings to provide a certain minimum volume of air per pupil; now we can get better ventilation with cleaned and conditioned air by mechanical means. Fire laws applicable to multi-story buildings need modification when applied to one-story structures which provide safe egress to ground level at all openings, including windows. Modern flush valves on toilet fixtures speed up use as compared to old style, slow-filling tanks; thus fewer fixtures can serve more pupils than some obsolete codes require.

Our job as citizens is to make certain that we aid our school authorities in utilizing the best talents, designs, materials and technologies that will produce good school facilities at the lowest life-time cost by freeing them of the shackles imposed by obsolete or inflexible codes, or equally obsolete and inflexible concepts of design.

I mention this responsibility specifically because Mr. Paul Baseler, Code Coordinator of

of the Building Code Committee of the Ohio Program Commission, made this comment recently: "While savings of many kinds would be possible under the new code, as it now stands, there can be no assurance that these savings will be achieved, since so much depends upon the planning of the local school authorities and their architects."

It is not alone important that, as citizens, we encourage needed code revisions; we must also encourage our school authorities to take advantage of the modern materials and techniques that are now proven to be sound.

So much for my personal concept of the scope of this discussion. I now ask the discussion leaders to take over.

SUMMARY OF DISCUSSION GROUP REPORTS IN SESSION II

by

Mr. Tyler S. Rogers

The first of these group reports is Mr. Miles' report on the Citizen's Viewpoint as a Schoolboard Member. Mr. Miles acted for Mr. John A. Johnson, who is listed as the discussion leader. He writes: "Any typical schoolboard member must of course have many exceptions. This panel group nevertheless sought to define school construction problems as the typical schoolboard member might see them. First it was agreed that most board members are overwhelmed by the multiple problems in school construction; that is, the problems of finance, design materials and the alternative curricula implications involved in their decisions. To most boards, construction is a new problem. Recommendation: That better means of getting reliable information on these matters to schoolboards be found, that such research bulletins as that which the AIA now is publishing be sent directly to schoolboards as well as to superintendents; that the AASA and the schoolboard associations take more responsibility for informing boards on such matters; that clinics for schoolboards be sponsored in all states as they are now sponsored in Michigan and Georgia by other State departments of education or State universities.

"Second, it was agreed that a more selective approach to publicizing school construction information is desirable. It is noted that half of our recent population increase is concentrated in suburban areas rather than in cities or in rural areas. It is further noted that consolidations or district reorganization is a problem, both where population increase is occurring and where the reverse, or a comparative decrease, has occurred in many rural areas. Recommendation: That state departments of education further research on the problem of school district reorganization from the standpoint of school building costs and apprise local boards of the alternatives confronting them; that they also apprise state legislatures of such research and needed changes in state statutes -- that is, codes, reorganizations, state aid, etc., if conditions conducive to lower building costs and better buildings are to be encouraged through state leadership. The second recommendation in this group is that Public Law 815, Section 1, be amended to permit and encourage state departments of education to do selective research on those areas of the states where school construction needs are most critical.

"Third, that the schoolboard members see school building costs as a community problem, with able administrators as their executives. Most schoolboards still need research suggestions on effective means of maintaining adequate communications with their constituents. If this is done, such problems as school building costs will be solved through community action, assuming wide distribution of research information. Recommendation: That research information on all aspects of construction costs be made more readily available to Boards of Education from both commercial and educational sources at the time the Boards need it."

The second group on the Citizen as a Builder was reported by Mr. R. S. Noonan.

"Construction of a school building is a complex operation and cannot be approached from one point of view. Consensus of this group was that continuing and increased cooperation among builders, architects and educators is the only way to achieve economies. The following subjects were discussed and are recommended to the conference as a whole:

"First, cooperation between architects and contractors. There is a national joint committee of the Associated General Contractors and the A.I.A. doing good work. There are also many local joint committees representing these two organizations, some of which are active in interchanging construction information in regular monthly meetings. There is need for expansion of such mutually educational activities which might be directed at this time toward the school construction program.

"Contractual services: There are many unknowns in this field for average schoolboards. We need studies of (1) separate versus general contracts; (2) different kinds of contracts, especially those suitable for small school building projects of four to ten rooms; and (3) bidding problems.

"The next heading is 'Data for School Boards.' We need simple information on the selection of an architect. There is a wide lack of understanding by the general public and schoolboards of adequate architectural services.

"A.I.A. is actually trying to improve this situation by its publications, and its Committee on School Buildings is currently working on this specific problem.

"The next heading is 'Research Identification.' This group suggests the formation of a continuing guiding group to determine kinds of research looking towards construction economies. The membership

would represent school board members with no organization identified. School administrators with the A.A.S.A. identified. Contractors through A.G.C., and architects through A.I.A."

The final heading on their report is "Other Factors Influencing Building Costs." One is completeness of plans and specifications; and, second, need for more architects experienced in inexpensive construction.

Our third report, by Ralph Swan, on the Citizen as a Taxpayer:

"No one is more interested in more building for less money than a citizen as a taxpayer. He is a taxpayer for so many things and yet finds himself confronted with a backlog of school plant needs at a time where there are more children than ever before and at a time when buildings cost more than ever before. Specifically, he finds himself confronted with a number of problems for which he needs answers.

"1. How are we to find money for school buildings when the tax base, usually imposed by law, is inadequate for raising the necessary funds?

"2. How are taxpayers to know the building facilities necessary for a modern educational program?

"3. How are we to provide the buildings needed in communities too small or too poor to support a building program?

"Consideration of the above questions and an analysis of other problems confronting many communities places emphasis on the following problems demanding further study:

"1. What is the desired size of our school administrative units and how can we best create these desired unites?

"2. How can we best finance local building programs when limitations on borrowing will not provide needed facilities?

"3. In what manner can the State subsidize in order to equalize the financial burdens of school districts providing these buildings?

"4. What should be the permanency, size and location of buildings in communities of shifting school population?"

Except for the notes contained in the earlier part of this report there are no recommendations as to research agencies that might undertake these problems.

Now a fourth group on the citizen as a parent was reported upon by Mrs. Elizabeth Campbell as follows:

"The problem: Parents have an emotional approach to school building problems in terms of their own children and the adequacy with which the physical plant meets their needs. The problem is complicated in communities where there is a wide discrepancy between the old school building and the new. Parents are prone to compare the two facilities and to express their feeling caused by the inequalities, either by forming pressure groups to secure new facilities in their own neighborhood or by taking a defensive attitude and saying that the new schools are unnecessarily elaborate and provide facilities which are unnecessary because they and their own children received a good education without them. Either attitude is a deterrent to a successful school program.

"Solution of the problem: It is suggested that more education is needed in order that average parents, informed and uninformed, may think not in terms of specific school buildings but in terms of the physical environment which is essential for the health and safety of children today and for the learning precesses to go forward with maximum efficiency. Also, that all school building programs include renovating of old school buildings.

"Research needed:

"1. A study of parent opinion as to those environmental factors which are essential to a good school building. Which are good if not too costly? Which are non-essential?

"2. A study of communities which over a period of years have supported school building programs in order to determine what common factors were responsible for this support or, if there were sudden changes in the picture, what caused the lack of support.

"Appropriate organizations to study these problems:

"1. The P. T. A. might initiate the first study suggested.

"2. The 'Citizens' Committee', having been in existence now for four years, might evaluate the community groups organized on its pattern."

The last of our groups is the citizen as an investor and I will take the blame for authorship

of this in the place of Mr. Irving G. McNayr, who was unable to remain throughout the session.

The group immediately recognized that, in one sense, everybody is an investor in schools -- every taxpayer. And it's an investment, not a cost. But we also recognized that the citizen as an investor as strictly interpreted limited us to his purchase of bonds, so we changed the scope to include investor or financeer -- that is, the citizen's attitude toward the financing of schools.

The problems:

"In addition to the life costs of school buildings, which includes initial building costs, operating and maintenance costs, the taxpayer's expense includes the cost of land acquisition, the cost of financing, and the costs resulting from obsolescence.

"1. The land costs may vary widely for a given site depending upon when the purchase was made in relation to the development of the area to be served by the school and the number of years it will be held before use. It appears that long-range planning may make it possible to acquire undeveloped land at such a comparatively low cost that perhaps twenty years may elapse before the loss of taxes on the property and interest on the investment bring the total cost up to what would be paid if the purchase were delayed until its development with an actual school building became necessary. Combining long-range school site planning with long-range development of recreational areas for expanding communities offers further possible economies in site costs.

"2. Financing costs may also vary widely. Financing school construction by assessments on a pay-as-you-go basis appears to be low in cost but not feasible in many communities. It is said that while our school building needs total ten billion dollars, the maximum tax limits imposed by law now restrict the available funds to five billion. Therefore, not only may there be need to raise these restrictive limits but to find every resource for reducing financing costs. When a pay-as-you-go basis is impractical, the funds come largely from bond issues and outside aid. The bonds may be issued by school districts, municipalities, counties or States. They may be short-term or long-term. The timing

of their issue may affect the interest rate quite substantially. The borrowing power or credit rating on the market of the issuing agency affects this rate. The life of the issue -- or the years required to amortize the bonds -- majorly affects the total taxes to be paid. If short-term bonds are issued, refunding costs must be considered. It is believed that these factors may actually affect school plant costs as much as, or perhaps more than any economies potentially in sight through structural or design savings. And when you realize that you can pay $2.00 for every dollar that you get, if the life of a bond issue is great, that is, in interest, then you can see that it is highly possible to reduce building costs as much as 50 per cent; whereas it is possible, within reason, to reduce financing costs to a very large degree.

"3. When funds are derived from sources outside of the municipality or school district, the taxpayer should give thought to the indirect cost to him for the money thus received. Since all governmental funds come originally from the taxpayer, he should know before deciding upon a financing plan what part of his original tax dollar comes back after going through county, state, or federal channels.

"4. An intangible but significant factor in financing costs is the rate of obsolescence of school buildings. It is costly to finance a structure for longer than its actual useful life. Its physical life may theoretically be indefinite if properly maintained. But obsolescence is usually the determinant of useful life, and altogether too little is known about this fact.

"Research needs:

"1. What are the relative costs of acquiring land for school sites when purchased long in advance of building development or when so acquired in conjunction with long-range recreational needs as compared with costs closely prior to actual building needs? This study should include the relative costs of sites removed from traffic arteries and high-cost developed land, the cost of tax income lost by public ownership and the cost of interest, if any, paid for the money used for land purchases in advance of actual needs.

"2. What are the relative costs of the school building dollar when that dollar is obtained by tax assessments on a pay-as-you-go basis, by short-term and long-term bonds, by careful timing of bond issues with respect to market conditions and the actual construction programs or by variations in the credit strength of the issuing agency? This study should be made as a fiscal study, without regard to existing laws or practices, for the purpose of informing citizens and school boards and, possibly, legislative bodies of the actual variations in the cost of the school-building dollar that may be subject to their option or, possibly, their control.

"3. What is the actual cost of the taxpayers' school-building dollar that is returned to his community after passing through other Governmental channels and his own community or school district, such as through county, State of Federal aid? This study is needed to help citizens to appraise the hidden costs that he now believes he can avoid by seeking outside aid.

"4. What is the reasonable life of school buildings, based upon past experience with obsolescence, and a projection of this experience into the future? If this study established that the useful life is less than the probable physical life of the structure, what economies can be gained by designing and building for shorter than maximum physical life?

"Agencies to conduct research:

"1. Land acquisition costs is referred to the Land Planning Institute or similar organizations dealing with land utilization and city or regional planning.

"Items 2 and 3 on the costs of raising the school-building dollars through various taxing and financing channels is referred to Dr. Harold Clark of Columbia University or to presently unidentified organizations concerned with political economics, taxation and finance. The Brookings Institute was mentioned as a possible agency capable of undertaking these studies.

"Item 4 on obsolescence was referred to the U. S. Office of Education and to the Department of Education of the U. S. Chamber of Commerce for the study of useful life and to study groups

to be organized by the Building Research Advisory Board or the A.I.A. for consideration of possible economies through designing for less than maximum physical life."

Now from these reports you see we have a very complex citizen. We have various ideas on the citizen's point of view, and those summaries are now open for discussion, criticism and comment.

QUESTION AND ANSWER PERIOD

MRS. CAMPBELL: I want to do everything I can to emphasize the importance of getting information to the school board members. Had it not been true that we had on our school board men who knew what research was, who had been active in research themselves, our board would not have known what problems we needed to consider before we set up our building program. When you break this problem down to the level of the individual community, which is the point at which we really have to do something, we find that the average school board member doesn't even know the area in which he needs to get information before he tries to set up a building program.

Now, if I had the money to set up a foundation, or if I could get a foundation to advance the money, I would like to get some studies made by someone who has served on a school board to put down in very simple language the area in which a school board member needs to be interested before he embarks on a building program. The various agencies that could help school boards to get needed information should be listed. These are closed doors to the average school board member who is faced with the problem of the taxpayer who does not want a tax increase and the impossibility of borrowing from any sources other than through bond issues. He also has the problem of planning for the future. He's never thought in those terms, and somehow, we've got to get it broken down to help these people. One of the ways that has been suggested is that at least they have mailed to them the kind of material that will suggest to them what their problems are.

MR. ROGERS: Thank you, Mrs. Campbell. Are there any further comments? Mr. Pawley?

MR. PAWLEY: I think this should be addressed to Mr. Swann. Is any work being done to find out the variations in the taxable limits -- the bond limits throughout the country? I understand there is a tremendous variation and if there were some standardization in that field it might result in significant savings.

MR. ROGERS: Mr. Swann do you have any comment?

MR. SWANN: I don't know that there is any particular study on this subject. The limits of which our group talked, of course, varied according to the district. We were concerned with the immediate district. The committee discussed at some length such problems as small districts in which one has the industry and another has the children. The assessed value, the market value of the property is so low in the residential area that the limits permitted by law would not permit them to build at all and would not permit bond issues. I might point out statistically -- I'm thinking in terms of Pennsylvania -- that many of the school districts that find themselves in need of building found that the 7 per cent limit, which is the state law, would not permit them to build at all. The Commonwealth three years ago set up a school building authority and, three years ago, permitted the setting up of municipal authorities in Pennsylvania -- a situation where an authority was set up, the authority borrowed the money and built the building, and the school district yearly amortizes this in the form of annual rent. It is a method by which the building was made possible. You who are familiar with Pennsylvania know that practically all building being done now is being built through a local or a State authority. I think the last figure I got last week was that we have built through the State authority 170 million dollars worth of buildings since that law has been enacted.

DR. VILES: Mr. Chairman, may I ask Mr. Swann whether actually all the state authorities aren't virtually throwing up their hands at the illogical, nonsensical, complicated situation of bonding limitations and tax levies and assessed valuations? Aren't they saying they'll go outside of the law that has been accumulated for so many years and establish an authority by which they can bypass all the laws and all the traditions that have accumulated? Isn't that really the situation?

MR. SWANN: It is, Dr. Viles.

DR. VILES: Isn't there something needed there?

MR. SWANN: Yes. However, the problem was so urgent that that was done. At the same time the State set up a tax equalization board and is making a study and has done a great deal of work on assessment laws; and we now have a new law going into effect by which we are trying to professionalize the matter of assessment. We are setting up an office of county assessors instead of local districts within the counties.

The state also has a tax equalization board whose job is to find the market value of the several districts. The state of preparations at the present time is made on the basis of the market value as is determined by the tax equalization board instead of the assessment in the district, as had been the case previously. But I am sure that you are correct that that was an action for just getting around the law to get the buildings. I come from a rural county where I was county superintendent, and we all had building problems. None of the districts in the county could build school plants under the present law, and it was only the authority which gave these districts the opportunity to build.

DR. VILES: I would like to ask a further question, Mr. Chairman. If it's so complicated then in a single State to make any supposition that even presumes to be a valid estimate of the sources for school construction how much more difficult must Dr. Viles and Dr. Hamon find it to make any statement about it on a national basis. I think we should all be most interested in their forthcoming report on the actual resources for school construction are on upon which they base their statement as to what those sources are.

DR. HAMON: The question was asked about any tabulation of the bonding limits set by different states. All but two states have bonding limits expressed either in percentage of assessed valuation or in percentage of our tax levies to be made to retired bonded debt. All but two have such limitations, ranging from 2 per cent up to, I think, 30. That can be found in a recent bulleting by the Office of Education, the title of which is " Financing Capital Outlay Programs." I think it is Bulletin No. 6, 1951.

To another question that has been raised, half a dozen or more States, including Connecticut, Pennsylvania, Indiana, Georgia and Kentucky have set up school building authorities of various kinds. Actually I'm appalled at the extent that the States will go to circumvent a law rather than to change the law.

MR. ROGERS: Thank you, Dr. Hamon.

MR. PAWLEY: I think we should allow Henry Wright five minutes to say something about California.

MR. WRIGHT: We do have a solution in California. We have a State Aid Bill that is raised by bonds on the State budget, on the State income. These bonds are authorized by State referendum. This has been done twice -- in 1949 and just this last year. The first issue was $250 million and the last issue

$185 million. Any school district which can justify a need may borrow from the State as a loan any amount needed to house school children, be it a million dollars, a hundred thousand or ten million. This money is paid back to the State and goes into the general fund - it is not a revolving bund -- at the rate of 40 cents on $100 accessed valuation for 30 years. For instance if it took 20¢ to retire the existing outstanding bonds, the remaining 20¢ would go to the State. The next year it might be 19¢ and 21¢ would go to the State. Now, if it takes more than thirty years to pay it off, the district does not owe any more money to the State. However, if it takes less than thirty years, then the district must pay off the full debt to the State. It's kind of a grant in the sense that we don't know how much money will be paid back to the State as each year the assessed valuation changes. In some instances where small amounts were borrowed - they would be paid back in four or five years. In other instances there may be a balance of two or three million dollars. This has worked very well. There are certain restrictions, however. Schools may only borrow money to finance 55 square feet per elementary school child, and 75 square feet for the seventh, eighth and ninth grades, and 80 square feet for the high school child. Those are arbitrary figures which were set by the legislature. Architects and school people have been required to design within that area -- within the area allowable. And in a school with, say, 250 to 500 children, 55 square feet is fairly adequate by building certain areas such as multiple-use rooms that can be used for many, many activities of the school. It has worked out very well.

Our problem in California is that we need another $250 million in order to meet the 1956 enrollment. It is hoped that in the next general session two years from now we will be able to get more of that money.

MR. ROGERS: Thank you, Mr. Wright.

DR. VILES: I want to make one comment added to what Mr. Wright said. You know we have talked all the time about local economy in control of schools. But you will notice that the California plan that he describes leaves all control in the hands of local boards. Some of the other plans are not so liberal. That's an important point in the local control of schools.

MR. ROGERS: Mr. Wright?

MR. WRIGHT: I want to add this. Before a school district can borrow this money they must

vote a maximum bond levy. They first have to help themselves as much as they can before they are eligible for State aid.

MR. ROGERS: Any further comments?

QUESTION: Mr. Chairman, I'd like to ask Mr. Swann the general question of how it developed that school building costs in education has never taken on the business flavor. There was a time when business buildings also were thought of as permanent structures, and you didn't take into account such things as obsolescence, use, and maintenance and charge these factors off on an annual basis. Has it been considered at any time the reason why we never developed in this country a business-like approach to the question of providing school facilities and considering these costs as part of the annual cost? This should be regarded as an annual part of citizen's obligation to provide school buildings. Has there any research been made on that? What are the statutory limitations? What are the legal complications to prevent that?

MR. ROGERS: Does anybody want to answer that question? I have a suggestion that may be an amateur answer. In the field of privately owned buildings for investment purposes, the evolution of a competent study of the end-use, the life, the income, total cost and so forth came of economic necessity, to be sure. But it also came out of the development of experts in the field who were available to investors. Men like the members of the Building Managers and Owners Association are experts in long-range reality values and are consultants. I am surprised not to have heard more comment, if any is deserved, on the need for or the existence of available school consultants of this type to school boards. It seems to me that there is a whole field of need that could be filled by men who can devote their studies to these problems and go before school boards on a fee basis and give them the guidance on many of these problems discussed here today. For example, boards could be helped in the selection of architects and contractors, the evaluating of relative costs of money and the advantages of one method of financing over another. I think investment building is now reduced quite to a science. We know exactly how the columns should be spaced, what depth for windows, the amount of air to be given to elevators and stairways and things like that to get maximum rental. It is a foolish investor, indeed, who undertakes a major building operation today who doesn't utilize those talents.

MR. COLBERT: We touched on this subject before, and Dr. Viles has more or less driven

the nail home, in my opinion, in that a lot of school planning throughout the country has been done on an individual unit or single school building basis rather than on a school system basis. I have felt a very strong need at this conference for representatives from the field of planning -- I am thinking specifically of the American Association of Planning Officials and the American Institute of Planners.

It seems to me that the major thing we have missed, if we are really interested in school costs, is where we locate our schools, how big they're going to be, how long they are going to last and what type of school we are going to have. We haven't discussed that at all. You brought up the point that we can't possibly in a unit building save the money that we might lose through poor finance. But I do say this: We can lose an awful lot more money through poor planning and location of buildings than we can lose through poor financing, and we haven't spoken of location. We haven't spoken of plans over a period of time. I have been thinking of this for a long time. Unfortunately, school people, school architects, school administrators, are very blind to their own problems. They have not become a part of the over-all planning of our various divisions of government, whether it be county, city or state. I think that in itself could be a source of enormous savings. I think the Bureau of the Census is developing something about population shifts in various areas, and if we don't consider those things we're certainly writing off the value of our efforts.

MR. ROGERS: I'd like to reinforce that myself for just a moment. We did mention it in one of these comments from one of the subcommittees. This committee said this study should consider the relative costs of sites removed from traffic arteries and high-cost developed land, etc. It was considered, and I also would speak in support of your statement from personal experience, because one of my remote qualifications is that I have served on a County Plan Commission myself and my training was that of city planning and landscape architecture in the early days, and I found an amazing disrespect on the part of the school boards for the land planning studies of the Plan Commissions. I mean disrespect to the point of violent opposition -- we shouldn't butt in -- it isn't our business -- keep your hands off. And we have schools on main arteries that were widening, and even turning into superhighways with school buildings planted right smack on them. The Plan Commission had suggested that these buildings be moved

into the centers of natural neighborhoods. So there is not only a need for coordination, there is a need for respect of the importance of that very problem.

MR. GARRABRANT: Our Construction and Civic Development Department has been working very closely with the American Institute of Planners in an attempt to develop more interest among local Chambers of Commerce and business men in comprehensive city planning. Now, from that contact, I can assure you the planners are perfectly willing to play ball on this thing and do think they can contribute a great deal. But the real hazard, as has already been brought out, is the fact that a great many school boards want to do their own deciding and don't want anybody else to interfere.

SESSION III
School Building Costs from the Architect's Viewpoint

Keynote Speech

by John W. Mc Leod

Mc Leod and Ferrara, Washington, D.C.

In looking over the schedule for this conference it was indeed a pleasant surprise to find that the architect was not in his usual place - in the middle. We are happy indeed to be at the tail-end.

Facetious as that may sound, it does serve to point up one of the most serious aspects of this cost problem, at least from the point of view of the architect. Satisfying the needs of the educator is relatively simple compared with onerous task of justifying the result to the taxpayer. The architect is suited, neither by temperament nor training to being cast as the central figure in a public controversy.

Before discussing any of these features in detail, it might be well to look back for a moment and examine in retrospect the changing values in school building design. Only in this way can we honestly evaluate present performance.

Within my own experience, I can well remember working on school building plans twenty-two years ago, in the depths of the depression. What were those buildings like? One might expect that in keeping with the temper of the times that the school buildings would be stripped-down minimum accomodations, with economy the watchword. Insofar as the classrooms were concerned this was probably true, but architecturally - they were anything but economical.

I came across an old book the other day, published by the Federal Government, illustrating several hundred buildings constructed under P.W.A. The school buildings shown therein were, almost uniformly, monumental in appearance. Limestone columns and cornices, slate roofs, cupolas and balustrades. I can easily remember the yards and yards of intricate plaster cornices and marble wainscots that used to go into our schools of that time.

This sort of thing continued, at least in the East, right up to World War II, and I for one

cannot ever remember any public outcry against the frills and frosting going into those buildings. Was this due to the fact that these projects were possibly government financed or aided? I firmly believe that it was simply a matter of public acceptance. This was the sort of building they were used to seeing, and therefore, no objection could be found to its cost. Civic pride demanded that the community put its best face foremost, and the school buildings were considered a part of this community window dressing.

Thus it was that the public, and most architects too, were much more interested in the external appearance of a school than they were in its provisions for education. Educational requirements for school buildings were uniformly accepted and architecturally uncomplicated.

The onset of World War II, which put a stop to most school construction for five or six years, was in many respects a blessing in disguise. It gave educators and architects a breathing spell in which to re-examine the needs and trends of modern education. The net result of this period of soul-searching was the emergence, postwar, of a completely changed concept of school building design. The emphasis was now placed on making the building a suitable envelope for housing the expanded curriculum.

Architecturally, this new concept provided just the challenge needed by a whole new generation of architects which had been chafing under the restraint of years of traditional thinking and public acceptance of stereotyped, stylistic designs for schools. The single-storied, informally arranged, classroom-centered school building, pioneered so successfully in California, even before the war, began to mushroom throughout the country. The need for adequate daylighting of classrooms, partly due to the elimination of fixed seating, plus the added requirements of activity programs, made mandatory the abandonment of such time-honored cliches as symetrical wings and small window groupings.

The first few post-war years were to see considerable experimentation and development. All types of bilateral and multilateral lighting were tried and re-tried. Classroom shapes and sizes were juggled into squares and L-shapes. Octagonal and saw-tooth designs were conjured up, sometimes with very good results. Here at last the educator and the architect were working in close harmony, unhampered by prejudice. Their objectives were the same - to provide the proper environment for the educational processes, to give life and color to a building type which had previously been included in that awesome group -

institutional architecture.

How was the general public reacting to this honeymoon? Generally speaking, the public was favorably impressed by the "new look" in its schools. Any nostalgic feeling they may have had for the familiar monumental school buildings of their day, was submerged by the enthusiasm of their children for the attractive and stimulating surroundings. This brings up a point which was often overlooked. The money which had previously gone into outside ornamentation was now going into expanded instruction facilities. The construction cost was the same but the emphasis had changed.

Much has happened in the intervening years to upset the harmonious relationships which existed between the educator and the architect on the one had and some elements of the taxpaying public on the other. It might be well to examine some of the causes for this rift.

The rising cost of construction alone would have created difficulties. Bond issues which were supposed to cover specific projects were constantly falling short of their goals. Additional funds had to be made available to keep programs from falling behind. This unfortunate condition tended to create an impression in the public mind that individual projects were costing more than they should, even though the same situation was taking place in every citizen's own personal life. Food, clothing and housing costs were all creeping steadily upward. Aggravating the school building picture was the staggering increases in enrollment which were constantly upsetting school building programs. These increases were predictable to a degree, particularly in terms of birth rate. But the national movements of population and the increasing shifts to the suburbs made any attempt at fixing program limits seem futile. The net result of these conditions was the increasing demand for more and more funds to construct more and more schools, and the average citizen, while still in favor of good schools, was beginning to question some of the bills he was asked to pay. Remember too, that operating expenses for the schools were also increasing, and an ever-expanding teaching staff was required to staff the new schools. All of these items were competing, as it were, for the same tax dollar.

Another factor which was giving the taxpayer considerable concern was the increasing Federal expenditures for military purposes, with a resultant demand for greater Federal taxation. The

net effect of taxation at the national level is to create a feeling in the average taxpayer that while being quite unable to influence such Federal taxation, he can and will "clamp" down on taxation at the local level. Thus many a taxpayer will vent his spite at taxation in general by voting against bonds for school construction in his own district.

With all of these elements constantly exerting their influences on the taxpayer, is it any wonder that he should begin to question not alone the cost of constructing school buildings, but the whole program of education, particularly the curriculum itself. In short, are educators and architects sooner or later to be faced with a choice between quality or quantity?

Naturally, architects are concerned that some of the advances made in the past few years will be nullified by over-zealous pruning of the school construction budget. Likewise architects, as taxpayers themselves, are equally conscious of the enormous expenditures that have yet to be made for school buildings, particularly in the junior and senior high school areas which are bound to feel the pressures of the rising crest of pupil enrollment in the next few years.

We trust that this conference will point up the areas of needed research leading to solution of some of the architect's more perplexing problems. We are well aware that economy in school housing can only be achieved in terms of the educational program. Remember this, the educator and the parent must make the decision between the desirable and the necessary. The problem then, and only then, becomes an architectural one. Public acceptance of the costs of providing adequate school buildings can only be achieved when sincere and dedicated school administrators work in harmony with conscientious architects to produce buildings which are, at once, -- functional, attractive and economical.

SUMMARY OF DISCUSSION GROUP REPORTS IN SESSION III

by

John W. McLeod

In discussing our particular phase of the program, one thing that seems to carry through all the discussions is the fact that we feel, as architects, that one of the major problems that we have to face is the fact that we probably ought to think that the period of experimentation in our school buildings is over. It's never over; but the problem that presents itself is that this is just about the time to take a little stock in what we've done. Most architects, and school people too, have been just too busy in the past few years to think. That, I think, has contributed a lot to a number of the mistakes that have been made in the school buildings of the past few years. I'm not speaking of mistakes in the broad sense but mistakes we've all made individually on certain buildings. I know it's quite true that over the country as a whole we have been dealing to a great extent in fads. California starts them and then we all copy them, and we don't have the same excuse -- or maybe the word is reason -- for doing so that California has. But the fact remains that there has been an awful lot of experimentation in school building, and some of the results have been very much worthwhile and a lot of them have been possibly unnecessary expenditures of the taxpayer's money. One of the things that Dr. Hamon keeps emphasizing is that it's pretty expensive experimentation, and we all realize that. But I doubt if it could have been avoided (over the past few years). We were all trying to do what we thought at the time was the best thing to do, and in lots of cases it was. It's worked out very weel. I think our school buildings as a whole are far superior to anything that has been done before. But I do believe that the thought that runs through this whole session -- I know it has in the panels I've been in and in the discussions we've had outside of the meetings -- is that we as architects think it's about time that the educators in conjunction with the architects take a little stock to see if, on a cost basis, we should continue to do some of the things we've been doing. I'm thinking at the moment of some of the things that we've been accused of as having been frills. I'm wondering whether or not we should re-examine the whole school building type to see if there are any areas where further study would possibly reveal places where money could be saved.

Architecturally I believe you can save a few dollars here or there on any building. But the real savings, if there are any to be made, in my estimation, are to be found in the basic building itself -- the programming. We architects are becoming more and more conscious that programming is vital. There, again, we've been too busy to actually sit down with the proper people and program a job thoroughly. The educators. have been prone to skip it a little bit. And even the consultants who have worked on some of these buildings have been very apt to take a set of conditions that they have met up with before and translate them into terms of the particular building they're working on. That perpetuates a whole series of things that nobody has taken the time to sit back and really think whether or not they were worth it.

I think we've licked most of the problems on daylighting and roof shapes and sections and room sizes. -- We've reached the point now where I think we really do have to sit back and consider whether rooms could be smaller, whether we ought to think in terms of not so much controlled daylight, and think a little more of the human values that go into a school building. I think that a lot of that will appear in some of these items, but I just want to get that off my chest. I hope that the research that's indicated in these reports can be carried out so that we'll have some factual basis for going ahead with this school building program that's facing us.

I would like to take up the first one on our discussion group list which is the question of Programming, Economies and Job Procedure. There seemed to be a little question there of just what was meant by "Job procedure" but that doesn't have to concern us at the moment.

That sub-committee reports on the problems they uncovered, and a lot of these, you will find, came up at earlier discussions this morning. So it indicates that there is considerable thinking along definite lines here.

The first problem uncovered is: "The need for expert advice in site selection to avoid extra or unneeded cost of site development as part of the program.

"Second, the need of guidance in program preparation by all the people involved." That is, the architects and the educators. The research that was indicated by that group was the development of a

manual on site selection and program procedure to be used by school boards and superintendents. I think probably there's a good supply of information on both of those sources in magazines and books, but I don't think it's been put in the form that might be accepted as a standard for proceeding with this sort of thing. I think that there's a need for that on a national basis.

The points that were discussed -- to give you a little idea of how they arrived at the research indicated - - were on the site selection. They suggested retaining architects, landscapers and so forth to advise the board on the site selection well in advance if possible.

Another point raised was the intensive study of programs to make all instructional areas active throughout the school day and to reduce the special instructional areas as much as possible. I think that's a most important one.

Large auditoriums should be eliminated if possible on the basis of their infrequent use, and to provide, instead, small auditoriums for little theater use. They indicate that they feel we ought to play down the community center function. I think that probably in the question-and-answer period that might be challenged by some.

And then the group felt it necessary to check the necessity of teachers'home rooms. There was no indication on this sub-panel as to which organization should carry on the research; but I think the programs are broad enough there that there are enough groups already in the field to carry out research in those fields.

The next sub-group that reported was the one on Cost Measurement and Reporting.

Under measurement, they agreed that we needed a workable unit of measurement, and to formulate a clear definition of this unit of measurement. I think that possibly that's one of the most important things we have to do today. I think it would do away with a lot of the argument that comes up about whose building cost less than whom else's.

It was felt that there was a need for preparing a uniform form for reporting school costs to enable architects, school boards and school administrators to obtain reliable information on relative costs of various buildings and to satisfy the justified interests of taxpayers, citizens groups, and law makers.

This would be relative in each case to the value obtained in a particular building or building program. That's the taxpayer's interest in comparing his building with somebody else's.

The report goes on to list a number of items that should be included in the reporting form, but I don't think we need to go into them since this will be turned in as a part of the paper.

The needed research indicated was research on a standard measuring unit. The following units are suggested as worthy of investigation: Cost per square foot. Cost per cubic foot. Cost per pupil. Cost per classroom. Further than that, they indicated that research was needed on what items should be included in a reporting form which would reveal a clear description of the facilities and other pertinent factors that would influence the cost in any one project, so that fair comparisons may be made to other projects.

The suggested organizations that they point out to possibly do this research. are as follows: On the units of measurement, they indicate that the American Standards Association, the American Institute of Architects and the National Council on School House Construction. On the reporting form they indicate that the A. I. A. and the National Council on School House Construction and, possibly, an organization such as the F. W. Dodge Corporation, which does considerable reporting and analyzing of costs, would be useful.

The next topic that was reported on was the human values in school design, and, since this gets into the realm of the abstract a little, I'd like to just read this paper to give you an idea of what that committee discussed. I think it's rather worthwhile, because this is a point that all architects and lots of school people feel that we've missed. We've got all the scientific factors worked out, and now we feel possibly we ought to get in there and make these school buildings a little less institutional, a little more homelike. So I'll read this paper from beginning to end.

"Human values as qualities of a school design are defined by the discussion group as:

"a. The effect of the character and facilities of the building on the program. The provision of the facilities for music, art, guidance, etc., will assure, with the cooperation of the teachers, that adequate opportunity for work and study exists and that this will create an incentive and a challenge

to make best educational use of such features. Conversely, the omission of features required by the program will inevitably curtail the educational offering.

"b. The effect of the character and facilities of the building on the individual and the community. A school building designed to incorporate features of welcome, warmth and friendliness will create an environment that stimulates the learning process and makes school work a pleasurable experience to be treasured. The elements of a building that will contribute these desirable characteristics are: (a) Color. A well-designed color scheme conditions and stimulates students and improves learning efficiency. (b) Light. Artificial and natural lighting design should be based on proven physical and psycholological requirements. (c) Thermal environment. This should be created to provide not only bodily comfort but psychological needs. Temperatures should be instantly responsive to changing work tasks. (d) Acoustical treatment. This should be designed to provide suitable classroom working conditions and to eliminate distracting noise interferences.

"School buildings should be clean, warm, friendly and attractive, and should provide a stimulating environment that invites a feeling of ownership and provokes in the users a desire for maximum accomplishment. Flexible equipment will invite teachers and students to invent arrangements that will effectively implement the educational program and that will cultivate a sense of ownership by allowing the teacher to arrange spaces according to personal preference."

The research programs which this group indicated as being needed are as follows:

"The research programs are recommended to be carried out by graduate students in university schools of education and schools of psychology, the latter applying particularly to the above four points of color, light, thermal environment and acoustics. This psychological study should supplement technical and engineering research programs."

The next report was on the subject of Refinement, Finish and Casework. I sat on this committee myself and we went all around on this one. Under refinements, the question always comes up of initial cost versus maintenance. A lot of the so-called refinements that people find fault with in schools are based on the fact that they want the cheapest thing that can be used. But, there again, it's a decision on whether to consider the initial cost of a particular material or to consider the long-range problem

of keeping it clean and in repair. This is usually a local problem to decide.

Other refinements were discussed but we came up with no particular recommendations. We discussed a problem which probably belongs in the audio-visual section and was probably thoroughly covered in that group. But the question was raised about the high cost of providing draperies. and so forth, in all these class rooms. This amounts to a considerable percentage of the finish cost. We can only hope that some of the experimentation with daylight screens will work out so that we can make some savings in that particular sphere.

We felt that as far as the refinements are concerned the research that was needed was concerned with the use of new materials. For example, wainscoting, and the use of larger building units in terms of sheets or blocks so that they can be more readily cleaned and less expensive to install.

There was an indicated need for a study of all the mechanical phases of the building finish, particularly lighting equipment, plumbing equipment, and so forth. These probably overlapped other discussion group subjects, but they were brought up and it was felt that some point should be made of them.

The group felt that there should be study research on finish. Of course there's always considerable of that being done by the manufacturers, but we felt there was a need for some study which had no commercial taint that could really evaluate these materials in terms of school buildings, particularly with reference to new materials. School systems and their maintenance people are usually most reluctant to adopt a new material unless it's about five years old, and everybody else has tried it. Ithink that's one phase that should be looked into, and, if research could be done on the basis of its use purely for school buildings, we could eliminate a lot of the factors that enter into it in other buildings but don't particularly relate to school buildings.

On the problem of casework, we came up against the problem of how much and how little casework do we actually need in school buildings. Everyone of the panel felt that this was a subject that should be given some real study. It belongs probably in the lap of the educators. I think in this field there's a very particularly unhappy trend towards keeping up with the Joneses on cabinetwork. We all

mentioned the fact that school people have a tendency, in looking at other people's buildings, to see some nice features that they'd like in theirs. Their particular program may not need these, but they do think it's a good idea, so it gets in there. And that's how we gradually get cabinet work all around us.

For some time we discussed the problem of mobile classroom equipment versus built-in equipment. I think here's another whole field for study. In California they have done considerable work on the use of movable classroom equipment which permits a great deal of flexibility in the classroom and gets away from that same thing we all talk about - this feeling of regimentation throughout the building. If you have movable equipment, the individual teacher is in a position to move it all around and set up the requirements for her room as she sees them at the moment. And since most of our teachers are women, in the elementary schools anyway, why, it gives them the housewifely prerogative of moving the furniture all around. So we felt that the research needed was a complete restudy of the problem of casework in schools, and the point was raised that possibly there is a field there for the mass production of cabinet and casework. This hasn't been done in the elementary schools to any great degree. Most of the cabinet work in elementary schools is custom built for that particular job. When we speak of mass production, we're not particularly thinking of mass production on a national basis but mass production within a school system where some economies could possibly be effected by having equipment that could be moved around, even from building to building. Mass production equipment is naturally far cheaper than built-in equipment. That probably is a problem that should be studied by both architects, educators and perhaps some of the school furniture people.

The other subject was the low-cost planning and details in two climates -- warm and cold.

The points that were brought up in the group working on cold-climate planning are as follows: They felt that research was needed on a subject that has been discussed here a few times this morning -- the usable life of school buildings in terms of years. Two, they felt that studies should be undertaken on plan economies, such as multi-use of corridors, lecture rooms, classrooms, and lower artificial light intensity and the reaction on children. Three, the group recommended an analysis of costs of various completed schools, tabulated for detailed comparison of the cost, man hours, material.

Information to be used for composite low-cost buildings. That doesn't mean a standard building type; it simply means that with all that information it is possible to fit the individual building into a pattern which would group it in any class the designer would desire to have it.

Another point which seems to me particularly important and hasn't been brought up heretofore is the factor of safety in the design of structures, to be reviewed with reference to present-day knowledge of design and uniformity of present-day materials. A lot of our schools are built so that structurally they would last a couple of hundred years. The decision that should be made, based on research, is --does it make sense to do that?

The next sub-group report was concerned with low-cost planning in warm climates. One of the recommendations was that --(a) natural lighting and its control should be studied in connection with the reduction or possible elimination of artificial lighting. An investigation of restrictive and /or definitive codes should be undertaken. (b) Natural ventilation and mechanically induced ventilation should be carefully evaluated. The cost factors of natural ventilation, such as operating sashes, should be compared with the cost of exhaust fans and vision panels. (c) It was the consensus of opinion that the single-story versus the multi-story school should be further studied on the following basis: Foundation problems of the Gulf Coast; Real Estate costs; Outdoor facilities; Insurance rates; Safety of children, etc; Maximum productive educational space and minimum circulation space. (d) The economy of the repetitive structural bay should be considered in connection with indigenous material, such as laminated wood members and pre-stressed concrete. (e) The use of luxuriant plant growth should be fully explored as activity barriers, shade, supplementary study and instructional areas, screens and windbreaks. It should be considered of real economic value to make such a study and to use this material in that way. (f) The exact degree to which complete space enclosures must accompany covered terraces and yards should be related to classroom sizes. Some members felt that classroom spaces might be reduced 25 to 30 per cent with auxiliary outdoor areas usable 50 to 60 per cent of the school year.

Bear in mind that this report was based on warm climates. (g) The use of cottage or totally independent classroom units should be explored. This as a planning concept might relate itself to

the campus plan or school village idea. They indicated that all of these subjects should be studied and the appropriate organizations to study them would be the U. S. Office of Education, the American Institute of Architects, and the National Council of School House Planning.

The next report is a most important one. But it's a technical one, and I'm sure in the short space of time that sub-group couldn't do very much about it. That is the whole question of design -- ceiling heights, flat vs. pitched roof, fenestration. That's a whole range of subjects that architects and educators have been arguing about at great length.

As far as ceiling heights were concerned, they indicated the need of a thorough examination of the effect of lower ceiling heights on the level of illumination, with artificial illumination as supplementary lighting for interior parts of rooms. There again we are getting away from the totally daylighted concept.

On the subject of flat versus pitched roofs it was felt that the use of pitched roofs added nothing to the function of the building and was purely a problem of design, and they indicated that flat roofs were probably more economical than pitched roofs and posed less problems.

On fenestration they felt that enough has been built to make it possible for a complete examination and compilation of the successes and failures of the various fenestration types. I think that is a particularly important type of research for us to do.

As I said before, I believe we have enough buildings built now so that whole case studies can be made in all parts of the country of all types of fenestration.

I would like to say as one of the groups that initiated this whole conference that we hope before we get through here that Mr. Scheick will indicate to us if he has any plans in mind for a further development of this. I think we'll all agree that in the short time that we had in all our discussion groups we only scratched the surface and dug up a few problems. But they are problems that certainly affect all of us -- architects, educators, and citizens.

MR. KOENIG: I know that there has been a lot of work done by organizations which try to make the schools the center of community life with unsatisfactory results. I am inclined to think that there is one thing that we are overlooking. If you want support for schools and school construction, you have to have physical contact. It seems to me that if we can have some measure of use by the community of school facilities it will provide the opportunity for physical contact. In this way maybe people of the community can see what they are getting and make use of some of those facilities. It's just an idea.

MR. McLEOD: I think I'm going to toss that one right back, if I may, into the hands of some educator who feels pretty strongly on the adult use of school buildings. Does anyone care to take that one up?

DR. COCKING: We have been interested in this problem for a good number of years. During the past year we have been doing intensive studies on this particular problem. We now have documented evidence to show there are more than 700 school systems or communities in the United States -- and the number is increasing rapidly -- where such use as you propose, sir, is being made of school plants. It is an economy for communities to look at its various agencies as a family of agencies rather than as separate or competing agencies. I am convinced myself that we must move in this direction and that there are some distinct economies and some distinct community gains to be made by the family of agencies in the community working together to see what they can to contribute to the total life of the community. Spelled out a little more specifically, that means that we do not need grounds that at one moment are controlled by the recreation department and controlled in another moment by the school department and a third moment by some other agency. The community needs grounds for all of its uses; and with community planning, there are not only tremendous savings that can be made but there are tremendous values that can be secured by approaching problems from that particular point of view.

The smaller communities do not need two large auditoriums in town, they need one auditorium for all of its uses. Sometimes that can be applied in terms of the school district. Other times, it can be applied some other way. But still the answer is that we do not need two -- we need one.

Now as we go along with that type of thinking, we are now in an area where the community becomes the primary consideration rather than one of the many agencies that the community has. It seems to me that this and other groups would do well not only to give this consideration but to conduct studies in those communities where this type of activity has been going on. The purpose would be to see what has happened , to see what financial savings are there and what values, if any, have come of it. Also it would be wise to find out what problems this new approach has raised. There is no better way of bringing about understanding of the people of the community than to do all that is possible to get full community use out of schools' facilities.

MR. KOENIG: I was brought up in a community where full use of community schools was made, and there was I think a very fine understanding on the part of a great majority of the citizens on what problems the school board faced. This even went so far as to have public support, full community support, for part of the profits of the municipally owned electric light plant to be set aside for school purposes. Now I think that that is a quite a stride to make. The place I am speaking about is Rockville, Long Island, New York.

MR. McLEOD: I think it certainly is a problem that has to be given consideration before the planning stage. The community has to make up its mind, I think, that the building will be used for community purposes or in some cases they may not decide it's necessary. Some savings could be made in the construction if it were known that the community would not use the building at night. Small savings to be sure, but some savings anyway.

DR. HAMON: In this matter of economies in school construction, I'd like to add two cents' worth of optimism. I think this is something the taxpayers don't know. From 1936 to 1950, the General Construction Index increased 150%. During that 14 year period, the cost of a classroom increased only 87%. I think the administrators and the architects ought to take some credit for having brought about that accomplishment. And I'd like to add one more thing. I hope that from the press releases from this meeting, that no one in the public will get the idea that the purpose of this group is to regiment or standardize or to develop a fixed pattern of school construction.

DR. JAMES REID: Some of these factors contributing to holding down classroom costs have been done already.

DR. HAMON: I think I'm familiar with those. Putting the floor down on the ground is one of them. There have been objections to it, but they have been an economy. Doing away with the A-Frame roof putting on a flat roof is another economy. I think a contribution is cutting off the towers and belfries. This has certainly been a contribution to economy. And cutting out plaster tends more to dry-wall construction. I think probably the architect made more contribution than we have as educators. Some of our ideas are expanding. I really think that the public ought to know that some economies have been practised in the past 20 years.

MR. McLEOD: I think, too, that one of the things that educators should give a lot or consideration to is the fact that in the normal school building, the minute you reduce the pupil capacity of a room by five students, you are adding a couple of rooms on that building to house the difference between the original conception of pupil capacity and any new conception which may come along. It's just as simple as that. You just know that when you reduce the pupil load in one classroom, they have to go somewhere else. So then it means additional building to house them.

MR. ROGERS: I want to take advantage of this opportunity to ask for help on a very practical research problem that comes up constantly. That is in reducing the cost of buildings and using flat roofs as against A-roofs, and omitting certain materials, I am getting more and more reports of condensation problems - dampness in school-rooms dripping from ceilings, things of that sort. Nobody seems to have measured the desirable relative humidity or the actual relative humidity in schools. Therefore we have no basis for design and there is a chance of architects falling into the trap of creating a design which results in these wet conditions. I mentioned this in my summary talk yesterday, but I would like, if any of you has any data on the actual moisture content of the rooms in your schools, that you send them to me or through some other agency where they can be made use of. As far as I can find there are only three measurements, and I've taken them all, in our own schools.

MR. SCALES: It might be of some assistance to you in developing the humidity ranges

to get the data taken by the U. S. Forest Service for cities scattered all over the United States. It might be of interest to know that Albuquerque and Sante Fe, New Mexico ran something like 5% relative humidity to a maximum of about 8% or 9%. Whereas in my city of New Orleans the low was about 12% and ran as high as 18%. The humidity which was found in the materials of construction like in the wood and the acoustical materials is a gauge which can be useful in setting up condensation studies. The question has been brought up on the pitched roof versus the flat roof. The flat roof may have some initial economies, but Mr. Rogers has brought up a point that offsets those initial economies, and in order to overcome the condensation, it is necessary to install rather expensive provisions to take care of those conditions. For instance, insulation materials. The pitched roof does have certain advantageous factors. One is that unless you have a very peculiar condition as you have in some parts of the South where the humidities are very high, you don't have that condensation problem to contend with as a rule. The other is that in figuring initial costs, if you are only figuring one factor, it is not often conclusive. Now in talking about costs we ought to consider the over-all costs for the life of the building. One of those costs, particularly in the North and the colder sections, is heat. Now the pitched roof as a rule will show a saving in heating costs, whether it be a one story or two story building. Therefore if you have a saving in heating costs, you can evaluate that against the initial cost, and amortize it over the life of the building. You might find that the pitched roof in the long run might be more economical. Another angle is that in the Southern areas, where they're not so much interested in heating as keeping out the heat, the pitched roof does have that advantage of its natural insulation value. In order to reduce costs, the tendency has been, particularly in one-story buildings, to use the roof structure as the basis for a ceiling, and that complicates the situation with respect to both insulation for comfort and condensation. So there is a large field of investigation ahead.

MR. McLEOD: I'm quite sure there are, Mr. Scales.

DR. VILES: I want to speak of one item we mentioned a while ago, which is the recording and reporting of school plant costs. At the present time we are contemplating a very comprehensive tabulation of the buildings erected under the CMB program on which we were later able to get contract costs as well as

original estimates. And I have a feeling that through the State departments and through our office follow-up, if we developed some reporting means, arrangements could be made for comparable reporting by the architect or someone at the time of contract writing. This would enable us to keep a pretty comprehensive national figure by regions, by type of schools, by size of town, and so forth. I think we would be glad to sponsor it through the State departments.

MR. McLEOD: I can only say Amen to that, because the American Institute of Architects is besieged with calls from all kinds and types of organizations wanting to find out where they can get comparative costs of school buildings.

DR. VILES: We hope to put the CMP on IBM cards, tabulated according to type of building, size of building, size of town and date, and through an index establish common dates so that comparisons can be made.

MR. McLEOD: I hope that the basis will be acceptable universally.

DR. VILES: We'd better tell you about the breakdown idea also, where we will go into heating separately, and so forth.

DR. HAMON: We have basic records now on about 20,000 projects.

MR. POHLMAN: I think this conference has been very gratifying and I'm happy to learn the educators and architects have attempted to cut down and have cut down the cost of classrooms. I feel that a good deal of study has been done up to the point of putting the shovel in the ground. But the point I am particularly anxious that we take up some time is the contractor's problem. I think, and I know in our territory, that there is a lot of money wasted on the site as a result of rules and regulations. I'm wondering if we can't continue our study of school costs in the field. I would just like to put you on the right track and give you two illustrations of what I mean. There are many that I could cite. We are compelled to put about 5% to 10% of the cost of building into what is termed temporary heat, which in the final analysis hasn't anything to do with the enlargement or enhancement of the building. It is just throwing money out of the window. We have in some of our labor laws in our areas, specifications, believe it or not, of how you must put up a metal ceiling, or a hung ceiling. And they give no credit for

the weight or type of lathe and things of that sort. It is my feeling that in our area, we could save at least 15% of the costs of the building if in some manner some of these conditions could be eliminated.

MR. McLEOD: Are you referring, Mr. Pohlman, to some of the union restrictions there are?

MR. POHLMAN: Yes, the union restrictions which the general contractor must live up to.

MR. McLEOD: Do you have any comment on that, Mr. Noonan, or Colonel Snow?

COLONEL SNOW: I would say that part of what he says is true in certain areas of the country. And if it continues to grow, it might well become more serious.

MR. TAYLOR: This is another generality. I think the second panel that you reported is one of the most fundamental. Everything's been very valuable in all the studies and reports. But I am referring to the one on human values. I'm going to venture a general statement which Drs. Viles, Hamon and Flesher would probably disagree with. But it seems to me that here we have a school child and incidentally the teacher, and we want to find out the impact of space on that human being. Over here we have the technical resources, the research on heating and lighting and all the technological things, and of course as usual the architecture is in the middle. The architect has to decide how much of these resources needs to be used. So it seems to me that the psychologist, the educational psychologist, and educators have tended in the past to take the environment for granted. They think in terms of the mind, of the emotions, of the textbook and those things. I don't believe they have paid enough attention to the impact of this or to space in which they have put the students. An so the architect has to use his best judgement, his best intuition, out of his experience. But that is an area needing research. That's the reason that I think we need more of the controlled experiment type of research where you actually have a school building unit in which you can vary one after another the color, the heat, the light, and the temperature. Dr. Hamon has often reminded us that we have a lot of expensive experimentation. Now one of my definitions of research is that it's the short-cut through trial and error periods. If we can work at full-scale, actual teaching and operating conditions, we can save on expensive experimentation on completing the requirements.

MR. MCLEOD: Thank you. I think we will have to close this session and go on to the summary.

CONCLUSIONS OF DISCUSSION GROUPS IN SESSION I

SUBJECT: CLASSROOM SIZES Discussion Leader: Dr. Edward J. Braun

Sub-Group Members: Mr. Swan
Mr. Setter
Mr. Miles

THE PROBLEMS: The group was of the opinion that the problems involved in determining the size of classrooms include such factors as (a) the subject matter to be taught in the room, (b) the number of students to be seated in the room, (c) the type and kind of community in which the school is located, (d) the statutory and/or the regulatory requirements of State Departments of Education on size, ceiling height, window areas, etc., (e) the relative costs of different sizes and shapes of classrooms, (f) the lighting, heating, and ventilating requirements, and (g) the amount and kind of built-in equipment needed.

RESEARCH RECOMMENDED:

While each of these factors present problems in which research is needed, the group felt that special research should be directed to secondary classrooms to determine the sizes and shapes required for the teaching of various subjects. The group further felt that particular attention should be given to the flexibility of secondary classrooms for multiple uses.

The group felt that specific research was needed on the total time-space utilization of secondary classrooms and the effect of such utilization on the size and shape of classrooms.

The group was of the opinion that a status study could be made of present practices in communities with respect to the sizes of classrooms now being built.

The group discussed briefly the appropriate organizations who might carry out the needed research. It was pointed out that the U. S. Office of Education, the Bureaus of Educational Research in various colleges and universities, and the American Institute of Architects are organizations which might be involved.

* * * * * * * * * * * * * * * * *

SUBJECT: SPECIAL INSTRUCTION ROOMS Discussion Leader: Mr. James Reid

Sub-Group Members: Dr. Hamon
Mr. E. Smith
Mr. McLeod
Mr. Koenig

THE PROBLEMS: It is felt that the term "Specialized Instruction Room" more nearly meets the intent of this report than does the term "Special Instruction Room". A room of this type is thought of as housing permanent specialized equipment: i.e., woodworking equipment, farm shop equipment, chemistry laboratory equipment, etc.

Because of departmentalization and greater diversity of offerings, the secondary school provides more rooms of this type than does the elementary school. In the latter case, the multi-purpose room and the library are most often found, although in some cases science rooms, arts and crafts rooms and music rooms are provided.

The problems that arise most frequently concerning this type room seem to center around costs as affected by size, function, utilization of space, interchangeability, and design. Too often such rooms are considered single purpose rooms, and it is felt that more study should be given to greater flexibility of use so as to possibly reduce the over-all cost of construction.

RESEARCH RECOMMENDED:

In Elementary Schools

1. Size of the multipurpose room in relation to size of school population.
2. Efficiency of use of multipurpose rooms.
3. The size and function of an elementary school library for schools of various sizes.

In Secondary Schools

1. Multiple use of single purpose rooms.
2. Space utilization in specialized rooms.
3. Character and placement of equipment.

Because specific case studies, carried out over considerable time with data collected on the site are needed, it is felt that educational groups such as State Departments of Education or a department of a state university could best handle the problems.

* * * * * * * * * * * * * * * * *

SUBJECT: PROVISIONS FOR AUDIO - VISUAL INSTRUCTION

Discussion Leader: Mr. Stanley J. McIntosh

Sub-Group Members: Mr. John Reid
Mr. Pawley
Mr. Garrabrant

THE PROBLEMS: In the over-all discussion of the subject from the viewpoint of costs, it was recognized that (1) the primary consideration is the provision of the most effective education for the student, with costs constituting the secondary factor, and (2) that audio-visual instruction is not only desirable but essential in the teaching programs of good schools.

The meaning of audio-visual instruction was assumed to be a teacher's intelligent selection, use, (and, in some instances guidance of student production), of certain sensory aids to learning, such as: Motion pictures; filmstrips and slides; opaque materials; exhibits, maps, models; personal collection displays; museum specimens; recordings; radio broadcasts; television lessons; public address system programs.

The group defined the following problems in question form:

A. LIGHT CONTROL AND VENTILATION

1. What is the status of development of a daylight screen for movies or slides which will eliminate the cost of room darkening equipment?
2. In connection with problem 1, how effective is the teaching from images projected in daylight vs. teaching from images projected in a darkened room?
3. What satisfactory methods of room darkening can be used, and is the respective cost justified?
4. How can the problems of poor ventilation be solved economically in relation to present methods of light control?

B. ACOUSTICS

1. What kinds of satisfactory, economical drape materials are there available to serve for (a) acoustical treatment, (b) light control, and (c) wall covering? Also what are the maintenance factors in terms of cost?
2. In what ways are partitions, or walls between rooms, sound-conditioned to prevent classroom disturbance?

C. LOCATION

1. Which provides better teacher-learning effectiveness -- to have each classroom prepared for audio-visual instruction, using portable equipment, or to have students go to especially equipped designated audio-visual rooms?

2. Which is more economical (in reference to problem 1C), more efficient more time-saving?
3. In view of the present day extensive use of large school auditoriums, are we justified, in our planning, to accept their elimination and to substitute a public address system whereby all students may receive communications or programs at the same time? In other words, what is the relation of a p.a. system to a need for an auditorium?
4. To what extent may school corridors be used as a space for audio-visual instruction?

D. TYPES OF SCHOOL BUILDINGS

1. What are the problems specific to preparing these rooms for the utilization of audio-visual material in old and existing school buildings?
2. What are the problems of preparation in reference to new buildings being planned?

E. MISCELLANEOUS

1. Is the electric wiring efficient and capable of carrying the load required? Are outlets and switches in convenient locations?
2. What is the demand for interchangeable tack boards and chalk boards?
3. In percentage terms, what is the item-cost analysis of a complete classroom constructed with adequate facilities for audio-visual instruction, not including the portable equipment?

RESEARCH RECOMMENDED:

At the present time, many of these problems have been included in studies and reports - or are in the process of being studied and reported upon - in a cooperative arrangement between the Buildings Committee of the Department of Audio-Visual Instruction of the National Education Association and representative members of the following organizations: The American Association of School Administrators, the American Institute of Architects, the Association of Chief State School Audio-Visual Officers, and the U. S. Office of Education. However it was suggested that the problem raised in 1C above, dealing with location, be subjected to further study by the cooperating groups already listed. Also it was recommended that item E3 above could be investigated by representatives of the American Institute of Architects.

SUBJECT: ADMINISTRATION SPACES — Discussion Leader: Dr. William R. Flesher

Sub-Group Members: Mr. Snow
Mr. Colbert
Mr. Scales

THE PROBLEMS: The group was of the opinion that there is nothing particularly unique about administration spaces which sets them apart from other space in the school building with respect to needed research. The basic questions regarding such spaces: (1) How much space of this character is actually needed? (to be answered primarily by professional educators) (2) What is the most effective arrangement of such spaces? (to be answered by educators and architects working in cooperation) (3) What are the best methods and materials for the construction of such spaces? (to be answered by architects and their staff specialists)

The answers to such questions, the group held, should not be sought merely in terms of reduced costs but rather in terms of improved facilities at reduced costs.

From the group's brief consideration of these basic problems emerged certain specific questions which might serve as guides for research:

1. What are the various functions of administrative spaces?
2. What are the interrelationships between the central (whole school system) administration spaces and those in the various attendance centers?
3. In what way is the need for administration spaces affected by (a) the grade level of the school? (elementary, secondary, high, etc.), (b) the size of enrollment, and (c) the particular school's educational program?

4. What is the most deisrable location of these administration spaces in the building with respect to the locations of other spaces in the building?
5. How can administrative spaces be planned so as to contribute most to the efficient and economical operation of a school?
6. What are effective ways to evaluate administrative spaces?

RESEARCH RECOMMENDED:

The group suggested that job analyses of various types of administrative personnel in public schools should be made. (One or more of the CPEA centers being financed by the Kellogg Foundation)

The group recommended an analysis of the proportion of total building space actually being allocated to administration spaces in school buildings now being designed and built. Such an analysis should be made in terms of school level, size of enrollment, general geographical location, basic type of educational program, and possibly other factors. (The AIA membership could provide the data and its Committee on School Buildings, in cooperation with the U.S. Office of Education, could make the various analyses.)

The group further felt it was necessary to make a number of case studies of the actual functioning of good administration space arrangements. Such studies would involve utilization; flow of students; staff and community traffic in the building; operational bottle-necks, etc. (Architects, building-planning consultants, school administrators and others could form teams for such a study. Students for advanced degrees in architecture and education could be used.)

It was also suggested by the group that a sampling survey could be made of the actual amount of visiting to administration spaces by parents and other school patrons. (National, State and local PTA groups could assist here.)

It was recommended that some type of unit-cost comparison for the operation of different types of administrative spaces should be made. (This might be a project for the National Association of School Business Officials.)

The group further recommended making an analysis of the basic factors to be considered in planning the central administration spaces for a whole system in relation to such spaces' in the various attendance units of the system. (The National Council on Schoolhouse Construction could possibly do this.)

The final recommendation of the group concerned the development of basic principles to be observed in planning administrative spaces for the central administration building and for the various attendance centers. (This also might be of interest to the National Council on Schoolhouse Construction.)

****

SUBJECT: SINGLE VS. MULTI - STORY BUILDINGS

Discussion Leader: Dr. Shirley Cooper

Sub-Group Members: Mr. Wright
Mr. Tuttle
Mr. Kimbell

THE PROBLEMS: The basic problem as it was defined by this group is of a two-fold nature. First, is the utility of a given amount of space and building facilities for instructional purposes better in a single-story building than in a multi-story building? Second, can comparable space and facilities be provided as economically in a single-story building as in a multi-story building?

The group agreed that the purpose of the school plant is to house and facilitate an educational program and that space and equipment which has no relationship to teacher-pupil activities is unnecessarily expensive.

Specific problems which claimed the attention of the group were:

1. The relationship of cost, procurement, and use of land to planning and constructing

community school buildings. (It was felt that this problem should be studied by real estate groups and educators.)

2. The relative cost of the actual construction of the two types of buildings, assuming that both have equal space and facilities. (This problem to be studied by architects.)
3. The question of whether or not single-story buildings are more adaptable to changes in enrollment and educational programs than multi-story buildings. (This should be studied cooperatively by architects and educators.)
4. The effect of climbing stairs on the health of children. (This problem has been studied to some extent by medical groups. The findings of this research should be made available in an easy-to-read form and additional studies should be made by medical and health education people.)
5. The relationship of school building construction to building codes and other legal requirements. (This should be studied by educators, public health and public safety officials.)
6. The cost of heating and plumbing in multi-story buildings as compared to the cost of such equipment in single-story buildings.
7. The question of whether or not a single-story building is better adapted to the development of a community school program, in which various units of the building are used frequently by adults and youngsters for community activities. (This problem should be studied by architects and educators.)

RESEARCH RECOMMENDED:

This group recommended that a School Facilities Research Council be formed. This council would be made up of all organizations directly concerned in the construction and use of school buildings. It would be the purpose of this Council to plan research, act as a clearing house for research findings, and serve in securing funds to support research and in administering these funds.

• • • • • • • • • • • • • • • • • •

SUBJECTS: FOOD SERVICES and ROOM VS. GENERAL TOILETS

Discussion Leader: Dr. N.E. Viles

Sub-Group Members: Mr. Pohlman
Mr. Taylor
Mrs. Campbell
Mr. Hanrahan

THE PROBLEMS: FOOD SERVICES

This topic covers all school feeding or lunch services insofar as they involve the school's physical plant facilities. The group recognized that the problem of the extent of school lunches may become one of charity as well as a school function but did not feel obligated to pass upon the need or desirability of such services with reference to charity.

The group considered the following factors: (a) Essentiality relative to pupil travel distance, travel time, and community desires; (b) central system vs. a kitchen in each building with reference to convenience, staffing, sanitation, adaptability to administrative unit size, and costs; (c) dining room service in each building, relative to special room vs. classroom lunch service, and possible multiple use of special dining room space.

RESEARCH RECOMMENDED:

The group indicated that comparative studies should be made on types of installations,

installation costs and operation costs, and the adequacy of various types. It was suggested that a survey be made of schools serving meals (a) from a central kitchen, i.e., one supplying several schools, (b) from a kitchen within a single school building, (c) in a cafeteria or multi-purpose dining space, (d) in individual classrooms.

THE PROBLEMS: ROOM VS. GENERAL TOILETS

The group was of the opinion that this seemingly simple problem is actually quite complex, involving, for elementary schools, the problems of school organization, utilization, convenience, pupil welfare, and costs. The group considered such matters as pupil control, age and sex segregation, comfort, convenience to both teachers and pupils, and community use of buildings. The group further indicated that a comparative cost study should be made of toilets in individual rooms as opposed to toilets used by two or more rooms and the general or group arrangement.

RESEARCH RECOMMENDED:

It was felt that studies should be made in various types of school organizations, with reference to recess periods, both regular and staggered, sizes of schools, and grade levels. It was further suggested that a study of costs should be made on the basis of pupils served, installation costs, janitorial care and maintenance. The need for code changes was anticipated by the group.

• • • • • • • • • • • • • • • • •

SUBJECT: GYMNASIUMS AND AUDITORIUMS Discussion Leader: Mr. Don L. Essex

Sub-Group Members:
Dr. Cocking
Mr. Harriman
Mr. Harris
Mr. Rogers
Mr. A.K. Smith

THE PROBLEMS: GYMNASIUMS

1. The group decided that the primary problem is whether indoor space is required at all for the activities that are normally carried on in a gymnasium. If the answer to this question is yes, how much space is required, keeping in mind the three levels of activities - children, youths and adults? A secondary problem is the number of spectator seats required for athletic games.

AUDITORIUMS

2. The basic problem here is concerned with the proper size of a school auditorium. A secondary problem to be studied is the difference in use and function of school stages vs. commercial stages.

COMBINATION GYMNASIUM-AUDITORIUM

3. The group felt that a study should be conducted to determine in what size school the peculiar functions of both the gymnasium and auditorium could be combined.

RESEARCH RECOMMENDED:

In reference to gymnasiums (1 above), the group suggested a study of physical education programs throughout the country to determine the proper size of courts and the number of courts necessary for a given enrollment. The group felt that spectator seating was primarily a matter of community desire.

In reference to auditoriums (2 above), the group recommended a survey of activities

normally housed in these rooms, keeping in mind the three levels of occupants - children, youths, adults. Again the group felt that auditorium size is largely determined by community desires, since an auditorium planned purely on the basis of educational needs is seldom large enough to house community activities. The group felt that many auditorium stages were over-designed and resembled commercial stages too much. An exact evaluation of the activities carried out on school stages could result in simplification.
In reference to combination gymnasiums-auditoriums (3 above), the group suggested research to determine if there is a given point in the size of a school at which this combining can be justified. This would involve a study of the disadvantages of the combination unit.

CONCLUSIONS OF DISCUSSION GROUPS IN SESSION II

(Citizens Viewpoint Session)

SUBJECT: THE CITIZEN AS A SCHOOLBOARD MEMBER

Discussion Leader: Mr. John R. Miles

Sub-Group Members: Mr. E. Smith
Mr. Pohlman
Dr. Cocking
Mr. Kimbell
Mr. Essex

THE PROBLEMS: This group sought to define school construction cost problems as a schoolboard member might see them.

1. It was agreed that most board members are overwhelmed by the multiple problems of finance, design, materials and the attending curricular implications involved in their decisions. To most boards, construction is a new problem.
2. It was agreed that a more selective approach to publicizing school construction information is desirable. It was noted that half of the recent population increase is concentrated in suburban areas rather than in cities or rural areas. It was further noted that consolidation or district reorganization is problem both in areas where the population is on the increase and in areas, such as rural districts, where the population is on the decrease.
3. It was observed by this group that schoolboard members regard building costs as a community problem. With able administrators as their executives, most school boards still need research suggestions on effective means of maintaining adequate contact with their constituents. If this is done, such problems as school building costs will be solved through community action - assuming wide distribution of research information.

RESEARCH RECOMMENDED:

The group recommended that better means should be found to get reliable information on these matters to school boards. It was suggested that research bulletins, such as those published by the AIA, be sent directly to schoolboard members as well as to superintendents. It was felt that the AASA and the School Boards Association take more responsibility for informing boards on research. The group went on to suggest that clinics for school boards should be sponsored in all States as they now are sponsored in Michigan and Georgia by either State Departments of Education or State Universities.

In reference to 2 (above), it was recommended that State Departments of Education further research on the problems of school district organization from the standpoint of school building costs and apprise local school boards of the alternatives confronting them; that they also apprise state legislatures of such research and the needed changes in State statutes. The group also recommended that P.L. 815, Section I be amended to permit and encourage State Departments of Education to do selective research in those areas of each State where school construction needs are the most critical.

In reference to 3 (above), it was recommended that research information on all aspects of school construction costs be made more readily available to boards of education by both commercial and educational sources.

• • • • • • • • • • • • • • • • • •

SUBJECT: THE CITIZEN AS A BUILDER Discussion Leader: Mr. R. S. Noonan

Sub-Group Members:
Mr. Hanrahan
Mr. Harriman
Mr. McIntosh
Mr. Scales
Mr. Setter
Mr. Snow
Mr. Pawley
Dr. Viles

THE PROBLEMS: The group decided that construction of school buildings is a complex operation and cannot be approached from one point of view. Continuing and increased cooperation among builders, architects, and educators is the only way to effect economies. The group pointed out that there is a national joint committee of the AGC and the AIA working cooperatively on building problems in general. Further, there are many local joint committees of these two organizations all over the country who meet to interchange construction information in regular monthly meetings. There is a need for expansion of such mutually educational activities which might be directed at this time toward the school construction program.

RESEARCH RECOMMENDED:

1. The group recommended that a study should be made of the techniques and business aspects of contract arrangements between the builder, the individual school board, and the architect. Information on separate vs. general contracts, on the different kinds of contract (especially those suitable for small school building projects of 4 to 10 rooms), and on bidding procedures should be developed and made available to all school boards. (The cooperating committees mentioned above could be helpful in this.)

2. The group felt that school boards need simple information on the method of selecting an architect in view of the wide lack of understanding by the general public and school boards on what comprises adequate architectural service. (The AIA is actively trying to improve this situation through its publications, and its Committee on School Buildings is currently working on this specific problem.)

3. The group suggested the formation of a continuing guiding group to determine the kinds of research needed to effect construction economies. Its membership should represent: School Boards, School Administrators (AASA), Contractors (AGC) and Architects (AIA).

* * * * * * * * * * * * * * * * * *

SUBJECT: THE CITIZEN AS A TAXPAYER Discussion Leader: Mr. Ralph Swan

Sub-Group Members:
Mr. Colbert
Mr. John Reid
Mr. A. K. Smith
Mr. Braun

THE PROBLEMS: The group agreed that no one is more interested in "more building for less money"

than the citizen as a taxpayer. In this situation, however, he finds himself confronted with a backlog of school plant needs at a time when there are more children than ever before and at a time when buildings cost more than they ever have before.

The group defined a number of problems for which the citizen as a taxpayer needs answers:

1. How is money to be found for school buildings when the tax base (usually imposed by law) is inadequate for raising the necessary funds?
2. How are taxpayers to know the building facilities necessary for a modern education program?
3. How can facilities be provided in communities which are too small or too poor to support a school building program?

RESEARCH RECOMMENDED:

The group recommended further study on the following questions:

1. What is the desired size of school administrative units and how can these units be best created?
2. How can local building programs be financed when limitations on borrowing prevents the provision of needed facilities?
3. In what manner can States subsidize school building programs in order to equalize the financial burdens of various school districts?
4. What should be the permanency, size, and location of buildings situated in communities where the school population is shifting?

• • • • • • • • • • • • • • • • •

SUBJECT: THE CITIZEN AS A PARENT Discussion Leader: Mrs. Elizabeth Campbell

Sub-Group Members:
Mr. Harris
Mr. Cooper
Mr. Garrabrant
Mr. Tuttle
Mr. Flesher

THE PROBLEMS: It was felt by the group that parents have an emotional approach to school building problems with reference to their own children and the adequacy with which the physical plant meets their children's needs. The problem is complicated in communities where there is a wide discrepancy between older school buildings and the newer ones. Parents are prone to compare the two varieties, and express their feelings about the inequalities either by forming pressure groups to secure new facilities for their own neighborhoods or by taking a defensive attitude and observing that the new schools are unnecessarily elaborate in view of the fact that they and their children received a good education without these facilities. Either attitude is a deterrent to a successful school program.

RESEARCH RECOMMENDED:

The group suggested more effort along lines of parent education, in which parents could be led to think not in terms of specific school buildings but more in terms of the physical environment whinh will contribute most to the health, safety, and learning efficiency of the children.

Specific research recommended by the group was:

1. A study of parent opinion as to those environmental factors which they consider essential in a good school building. Also a study should be made of those factors which parents consider non-essential. (This study might be implemented by P.T.A. groups.)

2. A study of communities which over a period of years have supported school building programs in order to determine what community factors were responsible for this support. Also a study should be made of communities where such support has been withdrawn. (It was suggested that the Citizens' Committee, which has been in existence for four years, might be in a position to evaluate these community factors.)

• • • • • • • • • • • • • • • • •

SUBJECT: THE CITIZEN AS AN INVESTOR Discussion Leader: Mr. Irving McNayr

Sub-Group Members: Mr. Wright
Mr. McLeod
Mr. Rogers
Mr. Koenig
Dr. Hamon
Mr. James L. Reid

THE PROBLEMS: In addition to the "life cost" of school buildings (including initial building costs, operating and maintenance costs) the taxpayer's expense includes the cost of land acquisition, the cost of financing, and costs resulting from obsolescence.

1. Land costs may vary widely for a given site, depending when the purchase is made in relation to the development of the surrounding area and the number of years it is held before use. It appears that long-range planning might make it possible to acquire undeveloped land at such a low cost that perhaps twenty years might elapse before the loss of taxes on the property and interest on the investment would bring the total cost up to what would be paid if the purchase were delayed until the time of actual construction of the school building. Combining long-range school site planning with long-range development of recreational areas for expanding communities offers further possible economies in site costs.
2. Financing costs also may vary widely. Financing school construction by assessments on a pay-as-you-go basis appears to be low in cost but not feasible in many communities. It is said that while our school building needs total ten billion dollars, the maximum tax limits imposed by law now restrict the available funds to five billion dollars. Therefore, not only may there be a need to raise these restrictive limits but a need to find every resource for reducing finance costs. When a pay-as-you-go basis is impractical, the funds come largely from bond issues and outside aid. The bonds may be raised by school districts, municipalities, counties, or States. They may be short-term or long-term. The timing of these issues might affect the interest rate quite substantially. The borrowing power, or credit rating in the market, of the issuing agency affects their rate also. The life of the issue, or the years required to amortize the bonds, greatly affects the total taxes to be paid. If short-term bonds are issued, refunding costs must be considered. It is believed that thesefactors may actually affect school plant costs as much as - or perhaps more than - any economies in sight through structural or design savings.
3. When funds are derived in part from sources outside the municipality or school district, the taxpayer should give thought to the indirect cost to him of the money received. Since all Governmental funds come originally from the taxpayer, he should know, before deciding on a financing plan, what part of his original tax dollar comes back after going through county, State, or Federal channels.
4. An intangible but significant factor in financing costs is the rate of obsolescence of school buildings. It is costly to finance a structure for longer than its actual useful life. Its physical life may be theoretically indefinite if properly maintained, but obsolescence is

usually the determining factor of useful life and altogether too little is known about this.

RESEARCH RECOMMENDED:

The group felt that research should be pursued along the lines of the following questions:

1. What are the relative costs of acquiring land for school sites well in advance of building development (or acquiring land with long-range recreational needs in mind) as compared to the costs of land acquired close to the time of actual construction? This study should include the relative costs of sites removed from main arteries and high-cost developed land, the cost of tax-income lost by public ownership and the cost of interest, if any, paid for the money used for land purchase in advance of actual use.
2. What are the relative costs of the school building dollar when that dollar is obtained (a) by tax assessments on a pay-as-you-go basis, (b) through short-term and long-term bonds, (c) by careful timing of bond issues with respect to market conditions and actual construction needs, and (d) with reference to the variations in credit strength of the issuing agency? This should be a focal study, made without respect to existing laws or practices, with the purpose of informing school boards and possibly legislative bodies of the actual variations in the cost of the school building dollar which may be subject to option or control.
3. What is the actual worth of the tax-payer's school building dollar that is returned to his community after passing through county, State or Federal channels? This study is needed to help the citizen appraise the hidden costs which he now feels might be avoided by seeking outside aid.
4. Projecting past experience with obsolescence into the future, what is the reasonable life of school buildings. If this study establishes that the useful life is less than the probable physical life of the structure, what economies can be gained by designing and building for a shorter than maximum physical life?

The group recommended that item 1 under research (above) should be referred to the Land Planning Institute or similar organizations dealing with land utilization and city or regional planning. Items 2 and 3 on raising money for school construction could be referred to Dr. Harold Clark of Columbia University or to organizations concerned with political economics, taxation, and finance. The Brookings Institute might be an agency capable of undertaking these studies. Item 4 on obsolescence is referred to the U.S. Office of Education and to the Department of Education of the U.S. Chamber of Commerce for a study of the useful life of these buildings. It was further recommended that BRAB or AIA organize groups to consider the possible economies of designing for less than the physical life of school buildings.

* * * * * * * * * * * * * * * * *

CONCLUSIONS OF DISCUSSION GROUPS IN SESSION III

SUBJECT: PROGRAMMING ECONOMIES AND JOB PROCEDURE

Discussion Leader: Mr. Donald P. Setter

Sub-Group Members
Mr. Snow
Mr. Swan
Mr. Kimbell

THE PROBLEMS: The group recognized the need for well qualified professional advice on site selection to avoid excessive costs in site development, construction and maintenance.
The Committee realized that many times choice of sites is not possible due to previous purchase or other factors. However, where a choice exists, the committee agreed that the services of the Architect, Landscape Architect, and Engineers were essential and that their findings should be a part of the information considered in the final selection of a site.
The group studied the relationship of educational programs to resultant building programs. This problem was discussed chiefly in relation to building programs in rural or remote suburban areas, and where new or recently consolidated districts have or are being formed. Also where experienced school boards and superintendents are rare.
The committee felt that a comprehensive educational manual could be developed as a guide,and, combined with it, a guide for its conversion to a building program.
It was recognized that state and county agencies exist to help inexperienced school boards with their problems. However, this assistance is limited.
The inclusion of facilities in the building program not directly related to the educational program was discussed. Members of the committee had experienced the pressure from communities asking for excessively large auditoriums, gymnasiums, community rooms, and their adjunct facilities.
A comprehensive programming manual could offer assistance to school boards in evaluating these requests and give helpful guidance in their solution.
The committee touched briefly on details of programming multi-purpose classrooms that could be scheduled for constant use throughout the school day. The group also discussed the provision of teachers' offices in secondary schools in place of assigning a classroom to a teacher as her office.
It was suggested that the size of cafeterias could be reduced by staggering lunch periods.

RESEARCH RECOMMENDED:
The group advised the collection of data on the four points above, plus others from existing material, plus additional original material. Also the possible preparation of a manual was suggested, with data gathered from all related sources.
The AIA and the U.S. Office of Education were suggested as organizations to study the above problems.

• • • • • • • • • • • • • • • • • •

SUBJECT: COST MEASUREMENT AND REPORTING Discussion Leader: Mr. Henry L. Wright

Sub-Group Members:
Dr. Cocking
Mr. Noonan
Dr. Braun
Mr. A.K. Smith

THE PROBLEMS: The group agreed that there was a necessity for establishing a workable unit of measurement for establishing costs. It was suggested that a uniform form for reporting actual costs would enable architects, school boards, and school administrators to obtain reliable information on relative costs of school buildings and would also satisfy the justified interest of taxpayers, citizen groups, and law makers.

Such a reporting form, the group felt, should include: (a) a detailed list of facilities constructed, (b) the date bids were obtained, (c) the geographical location of the project, (d) a listing of material and equipment pertinent to the building itself. It was felt that such variables as unusual utility connections, street improvements, and extensive site improvements should be excluded.

RESEARCH RECOMMENDED:

In reference to the establishing of a standard unit for measuring school building costs the following unit devices were recommended for further study:
(a) cost per square foot, (b) cost per cubic foot, (c) cost per pupil, (d) cost per classroom. With a view to setting up a system so that projects could be compared one against the other, the group recommended that a study should be conducted on the cost-influencing factors which should be included in the reporting form mentioned above. The American Standards Association, the AIA and the National Council on School House Planning were suggested as agencies who might take up the problem of a workable unit for cost measuring. The group felt that the question of the reporting form could be studied by the AIA, the National Council on School House Planning and the F.W. Dodge Corporation.

* * * * * * * * * * * * * * * * * *

SUBJECT HUMAN VALUES IN SCHOOL DESIGN Discussion Leader: Mr. John L. Reid

Sub-Group Members: Dr. Viles
Mr. Miles
Dr. Flesher

THE PROBLEMS: The group identified certain characteristics in school buildings pertinent to human and psychological values. Among these were: (a) the effect of the character and facilities of the building on the school program. Providing facilities for music, art, guidance, etc., would, the group felt, assure that adequate opportunity for work and study exists and would provide an incentive and a challenge to make the best educational use of these features. The group further discussed (b) the effect of the character and facilities of the building on the individual and the community. It was the opinion of the group that a school building designed to incorporate features of welcome, warmth, and friendliness will create an environment which stimulates the learning process and makes a school work a pleasurable experience.

Elements of the building which will contribute these desirable characteristics were identified by the group as follows:

(a) COLOR: A well designed color scheme conditions and stimulates students and improves learning efficiency.
(b) LIGHT: Artificial and natural lighting should be designed to conform with proven physical and psychological requirements.
(c) THERMAL ENVIRONMENT: The group felt that temperature should be controllable with reference to various work tasks.

(d) ACOUSTICAL TREATMENT: This factor should provide suitable classroom working conditions and eliminate distracting noise interference.

The group was of the opinion that school buildings should be clean, warm, friendly, and attractive thus inviting a feeling of ownership and stimulating the users to maximum accomplishment. Flexible equipment was suggested as a means to invite teachers and students to invent arrangements to implement the educational program. This would also help to cultivate a sense of ownership.

RESEARCH RECOMMENDED:

The group felt that research programs on the above topics could be carried out by graduate students in university schools of education and schools of psychology. It was suggested that psychological studies would be particularly useful on the problems involved in color, light, thermal environment, and acoustics.

* * * * * * * * * * * * * * * * * *

SUBJECT: REFINEMENT, FINISH, CASEWORK. Discussion Leader: Mr. John W. McLeod

Sub-Group Members: Mr. Harris
Mr. Cooper
Mr. McIntosh
Mr. Hanrahan

THE PROBLEMS:

A. REFINEMENTS:

There was general agreement that a final decision as to the extent of incorporating refinements into school buildings rested with the local school board, and perhaps with the citizens themselves. Many items of low initial cost have relatively high maintenance expense, as for example, terrazzo corridor floors are more expensive than asphalt tile, but have a lower upkeep factor and longer life. This example is just one of many. But the question remains a local one and must be solved at the local level.

The matter of making provision for darkening classrooms is also an item of considerable expense and doubtful performance. Draperies and tracks for accomplishing the darkening are costly in terms of the time in use.

B. FINISH:

In connection with problems of finish, it was felt that the degree of finish depended on local desire and ability to pay.

C. CASEWORK:

The needs of the particular curriculum appear to dictate the extent and type of casework needed. There is no uniformity of design types from school to school, or from system to system. This has resulted, for the elementary schools at least, in custom designed casework for each and every project.

RESEARCH RECOMMENDED:

With reference to A (above), it was agreed that research was needed in the following fields:

1. In the use of new materials for wainscotings, floors, etc., possibly in terms of the use of larger units and sheets.

2. Study of plumbing, lighting and heating equipment with a view to obtaining reductions in the cost of mechanical features. The more complex the requirements for heating and ventilation, the larger the proportion this work takes of the building dollar.
3. Study of new developments in daylight projection equipment and screens.

Study of new materials is indicated to provide finishes which have a longer life and reduce maintenance but which allow greater latitude in color treatments and surface finishes.

A thorough study of all types of casework, with reference to C (above), is necessary to a well-rounded elementary program, with a view to determining whether there are any basic types which might be mass-produced more economically on a commercial basis, or at least on a system-wide basis.

This study should include an analysis of movable equipment versus built-in casework. Greater flexibility in equipment use and room arrangement would seem desirable.

Agencies suggested to conduct research: A.I.A., National Council on Schoolhouse Construction,
together with classroom teachers' groups and equipment manufacturers associations.

• • • • • • • • • • • • • • • • • •

SUBJECT: LOW COST PLANNING AND DETAILS (Warm Climates)

Discussion Leader: Mr. Charles R. Colbert

Sub-Group Members: Mr. James L. Reid
Dr. Hamon
Mr. Scales

THE PROBLEMS:

The group specified the following areas as those in which possible economies could be effected:

(a) Natural lighting and its control should be studied in connection with the reduction or possible elimination of artificial lighting. An investigation of restrictive and/or definitive codes should be undertaken.

(b) Natural ventilation and mechanically induced ventilation should be carefully evaluated. The cost factors of natural ventilation (such as operating controls, etc.) should be compared to the cost of exhaust fans and vision panels.

(c) It was the consensus of opinion that the single-story vs. the multi-story school should be further studied with the following considerations in mind:

1. Foundation problems of Gulf Coast areas.
2. Real estate costs.
3. Outdoor facilities.
4. Insurance rates, safety of children, etc.
5. Maximum productive educational space and minimum circulation space.

(d) The economy of the repetitive structural bay should be considered in connection with indigenous materials such as laminated wood members and pre-stressed concrete.

(e) The use of luxuriant plant growth should be fully explored. As activity barriers, shade, supplementary study and institutional areas, screens and wind-breaks it

should be considered of real economic value.

(f) The exact degree to which complete space enclosures must accompany covered terraces and yards should be related to classroom sizes. Some members of the group felt that classroom space might be reduced 25% to 30% in cases where auxiliary outdoor areas are usable 50% to 60% of the school year.

(g) The use of cottages or totally independent classroom units should be explored. This, as a planning concept, might relate itself to the "campus plan" or the "school village" idea.

RESEARCH RECOMMENDED:

The group felt that the above problems could come under the purview of the U. S. Office of Education, the American Institute of Architects, and the National Council of School House Planning.

• • • • • • • • • • • • • • • • • •

SUBJECT: LOW COST PLANNING AND DETAILS (Cold Climates)

Discussion Leader: Mr. Alonzo J. Harriman

Sub-Group Members: Mr. Essex
Mr. Koenig
Mr. Rogers

THE PROBLEMS:

The major problem considered was to reduce the overall cost of the school plant for its usable life. This major premise immediately called for clarification and division into detail problems to be considered. The following is a list of some of these problems that were thought of:

1. What is the usable life of a school building?
2. What determines end of usability? Is it obsolescence, maintenance, safety, non-conformance of plant to curriculum in uneconomically alterable buildings?
3. Can planning and design materially reduce cost of plant?
4. Find ways and means of assembling and disseminating modern methods of economical construction for cold climates that are now in use successfully but little know, both domestic and foreign.
5. Find ways and means of checking present building laws to see if they have obsolete, faulty and unnecessary sections that increase cost of the plant unnecessarily.
6. Find some means of breaking construction cost down into detail units according to trades, materials and methods with a common unit of measure so that the various units of construction of different buildings can be compared for a net over-all saving on a composite building as a goal and theoretical low cost economical building for area considered.
7. See if there is a means of cutting foundation cost in cold climate by different methods of construction.
8. Considering school building heating and ventilating as one combined problem, analyze present known types to find most economical for life of system, taking into consideration initial cost, operating and maintenance expenses.

RESEARCH RECOMMENDED:

It was felt that research should be carried on along the following lines to try to solve the above-mentioned problems.

1. A thorough listing of past plants that are to be razed, have been, or expect to be, as to reasons for abandoning plant. Also, list plants that should be abandoned. In tabulating this material, give life of building and details as to reason for obsolescence, maintenance cost, safety, non-conformity to present curriculum, cost of replacement plant of same capacity. Having as a goal for this research an expected and prognosticated life of future school plants so as not to over-design for the future.
2. Have a research group composed of school operators, school designers, curriculum experts, architects and contractors study in detail school plans and ideas for economical use of space and materials - this to include such subjects as multi-use of space, integrated structures, multi-use of material, labor-saving methods, labor-saving materials, investigating domestic and foreign design and construction for now working ideas. Also, work out practical method of disseminating this material so that this reaches the interested people forcefully and clearly with cost factors or other saving means clearly explained.
3. Have a very progressive and understanding group who is familiar with building laws and present day construction beyond the field of building construction (by this we mean ship, automotive and airplane, metallurgy, plastics, etc.) investigate and make recommendations on existing building laws and re-structions. This group could point out changes that could and should be made in our present codes, due to improved materials, construction, changes in materials and advancements in the entire field of construction and science that are not permitted to be used because of outmoded laws.
4. In the field of building design, it was felt that there was need of research to cover the complete building including the load-bearing material on which it was built, with special emphasis on action and reaction of various types of material and conditions on each other, including heating, plumbing and electrical - all of these considered not as individual details but as part of a complete building and for the life of the building. Also conduct research into construction of buildings without deep foundations below frost but on frost-proof soils and fills.

• • • • • • • • • • • • • • • • • •

SUBJECT: DESIGN (Ceiling Heights, Flat vs. Pitched Roofs, Fenestration)

Discussion Leader: Mr. E. Smith

Sub-Group Members: Mr. Pohlman
Mr. Tuttle
Mr. Garrabrant

THE PROBLEMS:

A. CEILING HEIGHTS:

Some of the problems uncovered were a general reluctance on the part of state officials and administrators to relax present code requirements relating to ceiling heights, and a lack of concrete evidence as to adequacy of illumination, both

artificial and natural, where ceilings have been lowered.

B. FLAT VERSUS PITCHED ROOFS:

It was felt that if pitched roofs were used for aesthetic reasons alone and that nothing was added to the function of the building, then the additional cost was not justified. Structural designs which require pitched roofs for reasons of economy and honesty will justify their own form.

C. FENESTRATION:

All various arrangements of windows and glass block fenestration have been used under all conditions and circumstances, many times without proper evaluation being made of the problems involved.

RESEARCH RECOMMENDED:

In reference to A (above), a thorough examination of the effect of lowered ceiling heights on the level of illumination in a classroom was recommended.

Also a study was suggested on the feasibility of using artificial illumination as supplementary lighting for the interior parts of the classroom.

Referring to B (above), it was suggested that an evaluation of the many types of classroom cross sections to determine the effect of the roof shape on the quality of illumination should be made.

In reference to fenestration, it was felt that enough school buildings have been built to make possible a complete examination and compilation of the successes and failures of the various fenestration types.

Agencies suggested to conduct research: Non-commercial Research Agency or Laboratory working under the guidance and counsel of the A.I.A. and National Council on Schoolhouse Construction.

• • • • • • • • • • • • • • • • • •

CONFERENCE SUMMARY

by

William H. Scheick

This is the second time in two weeks that I have had an opportunity to summarize the conference with the time all gone. But I'm going to be a little bit stubborn today and get this one done. I'm going to try to do it in ten minutes. You know I began by saying I was going to give my interpretation of the question as a layman, and by now I realize how much of a layman I was. I'll have to admit that if it comes down to raising the assessment on my property, I'll take an entirely different look at school costs than I do in this room. I imagine that that is certainly one of the major problems within this whole question.

I don't know whether you realize it or not, but this group is engaged with an idea that is coming of age. It didn't start much until during the war. Essentially it's this: There is now an awareness of the complexity of building technology and of its disintegrated state. And there is an awareness that it is high time that we make a science out of it. We have three major sciences affecting human beings and the welfare of the country as a whole, and they are the sciences of health, food, and shelter. We've gone a long way with the programs on medicine and agriculture to make sciences out of the first two. We are just now coming to the idea that we must do it in building. Now some details stand out in this new line of thinking. One is the need for research; and there's one thing I hate to see people concern themselves about when they recognize this and begin talking about it. That is the question of what research is. It's very easy in the building field to find that you are asking yourself questions about things at which the pure research man would look down his nose. He might say here that we have indications of that same void in schoolhouse construction.

In two days we have looked at a long list of problems. We say that research must be done on them. To me they seem to boil down essentially to three major considerations. I am thinking of these strictly in relation to economy. One, economy must start in design. It starts on the drafting board. This, in turn, depends on knowledge and data from research which becomes programming data for the architect, for the school board and for the people who work together on the origin of

the school design. In this matter of programming data, this beginning which accomplishes economy, the use of space and the efficiency of the use of that space is paramount. Now, this of course involves not only the human angles, but the technical angles of framing and construction as well. A second point is the cost of the building dollar. This, I imagine, applies to almost all types of construction, but because of the public nature of school building construction, we see that the whole question involves political economics and community financing up to national levels.

A third point is that obviously knowledge is necessary at the local level. Anything groups like this do or anything that comes out of research must reach the local level. Those people need information to avoid wasteful processes in planning, in professional services, in contracts, and in financing. I think that Mr. Rogers' Consultant idea was a very appropriate one in that regard.

So we come to the question of what to do next. Well, first off, we have the conclusions of this group. I presume you would like to have these made into a public record. I would like to request, from the organizations here, a statement of fifty to a hundred words to be included in this publication which will tell about your organization and what responsibilities it has in the field of school building research.

I agree with Dr. Cocking that it is certainly much too early, and it would be unwise, to try at this meeting to allocate research problems. I don't think that we have really enough perspective on the whole matter raised by this conference yet.

Of course, all of this raises the basic question in research, and that is: Who has a stake in it? The organizations represented here -- AIA, the National Council on Schoolhouse Construction, the various State Education Departments, the National Schoolboard Association, the U. S. Office of Education, The American Association of School Administrators, the Associated General Contractors of America -- all, I should judge, have a stake in it. Magazines, not only Dr. Cocking's, but also those in the professional building field, can be helpful in these matters. I know that the Magazine of Building, Architectural Record and others have schoolhouse issues. Apparently, though, there is not yet the clearing house Mr. Colbert asked for. There is no machinery there with which magazines could be helpful in distributing

the kind.

I always take a very hard-boiled attitude on funds when people talk about research. First, as I said, we have to ask who has a stake in it. It's quite easy when it's a manufacturer who wants to make something to sell. But you know we haven't talked about that kind of problem at all.

There are many research problems which are not the direct concern of manufacturers, and I feel that organizations in the building industry other than manufacturers should accept the responsibility for forwarding research. In the past, I suggested to the NAHB that if every member of their organization put up a dollar toward research, they would have over a half million dollars a year for a research program; and I'm gratified to see that the NAHB is now beginning to put such a program into operation.

Now, along the same line of thought, I would like to ask the school architects at this meeting if they feel they could assess themselves in this way for a research program of their own.

I hear no resounding answers to this; but time is short and we can consider that I merely asked an academic question.

The idea of a percentage of appropriation seemed remote to this group. To Dr. Hamon it didn't seem so remote because he had heard a fairly promising response to it at one time.

There's a question of philanthropic funds. Here again throughout the building industry I hear people talking of appealing to the big philanthropic sources for funds. But we don't sell that job; we don't sell that need to them. People in the humanities and social sciences get money right and left. So we get to a point, though, where this next little step, and the next bigger step after that is what we are concerned with in the next year. We need only a few organizations. This means just a few people who are dedicated to taking the next step to guarantee that something happens. And, incidentally, research doesn't happen just because somebody writes down a sentence and says "We need thus and so." I have long since learned that to get support for research you have to make a very careful practical analysis. You have to make the problem sound practical and show that you have some idea of what's in it and what it takes to get it done. That in itself is a good job for any group that is tackling a thing

like this. The subgroup which worked here on the citizen as an investor did an outstanding job in thinking through the problems. They reached the point necessary to establish a general year's work on the whole subject.

The only thing BRAB can do now is to get together this report. We have no money for this sort of research. We are not fund-raisers. The responsibility appears to lie with the organizations who are concerned with this conference; and we would be glad to assist to the extent of continuing this type of effort until the needed research is under way. It would seem to me that you are very strong for correlation, collaboration, and cooperation between certain key organizations which have made a start on these problems and that you could continue very easily and very profitably. Possibly you might end with something which we could temporarily call a School Research Foundation.

MR. PAWLEY: I think we owe considerable gratitude to Bill Scheick for that summary and his suggestions for our future. The meeting is adjourned and thank you all.

STATEMENTS OF FUNCTIONS AND INTEREST IN THE SCHOOL BUILDING FIELD

THE AMERICAN INSTITUTE OF ARCHITECTS

As the national professional society of architects of the United States, the AIA has long had keen interest in this important building type -- the school. In recent years, this has been expressed through its Committee on School Buildings, a group of 12 top-flight architects selected in rotation from Institute membership to study the principles of planning up-to-date school buildings.

Emergency assignments: On request, this Committee assisted the U. S. Office of Education by surveying use of critical steel, copper and aluminum in American schools and effectively supported claims for materials before DPA-NPA. It also surveyed history of and current use and discard of stock-plans in all forty-eight states.

Conferences: With the AIA Department of Education and Research, to which it reports, it has called and co-sponsored several important meetings, among others a conservation round-table and a meeting on financing large-scale research projects. Finally, it conceived and helped organize the meeting reported in these proceedings. Other meetings are scheduled, in particular one with the IES on school lighting to start updating the ASA's 1948 Standard (which the AIA also co-sponsored).

Publications: In 1947, the AIA Bulletin published a 25-page building type study on school buildings with extensive bibliography(now out of print). After other articles on educational facilities, in 1952 the Committee began publication of a series of 4-page studies addressed to laymen and educators on various factors of school design and planning. These are called School Plant Studies and appear first in the AIA Bulletin and thus go to more than 9300 architects throughout the country. They are then reprinted, with the help of the American Architectural Foundation, and are distributed on request to nearly 5000 other individuals and organizations in the U. S. Recently, the Ontario Association of Architects ordered 1000 copies of each issue for distribution in Canada. Subjects have included structure, natural ventilation, space relationships, critical materials and will continue with acoustics, maintenance, color, stock-plans, cost reporting, etc., for at least two years of bi-monthly publication.

THE NATIONAL COUNCIL ON SCHOOLHOUSE CONSTRUCTION

The primary objective of the National Council is to engage in school building studies and to kepp up-to-date the "Guide for Planning School Plants." The Council's general purpose is stated in its By-laws: "...to identify and sponsor research, to evaluate and disseminate research findings, to cooperate with other national organizations interested in school facilities, and direct the preparation of manuscripts in the school plant area and submit the same to the Executive Committee and the Council for discussions and publication." Currently this Committee on School Plant Research and Publications is attempting to prepare bulletins dealing with such topics as possible economies in construction, site utilization, and new types of school furniture.

U. S. OFFICE OF EDUCATION

The School Housing Section of the U. S. Office of Education has an obligation to provide leadership in the school plant field. This Section attempts to carry out this obligation through consultative services and by providing information and guidance for State and local school officials, architects, organizations, and others interested in the school plant field. The Section directs its

activities towards various problems such as those connected with need, costs and economies, long-range and program planning, functional layouts, arrangements, protection, utilization, equipment, maintenance and daily operation, but does not enter the construction or architectural design areas. The Section does not have sub-sections, but has special people assigned for work in surveys, program planning, school building planning, school plant management, equipment, etc. The Section does practically no experimental research. While it is not staffed to carry on each of these studies, it does maintain liaison with and provides consultative services for other units of the Office of Education, State and local school systems, and other organizations relative to studies which they are conducting. For instance, one individual in the office is cooperating with manufacturers, various organizations and others in a detailed study of school plant equipment dimensions; another is working with teacher groups on layouts of classrooms and other elements of school plants, etc.

AMERICAN ASSOCIATION OF SCHOOL ADMINISTRATORS

The American Association of School Administrators is the professional organization of school superintendents. As such, it attempts to deal constructively with professional problems of concern to school superintendents. School building construction has been a particularly acute problem for the past several years and probably will continue to be for several years to come. Some of the ways in which the AASA has tried in the past and is continuing to try to assist school superintendents and others with the solution of school building problems are:

1. Publication of the Year Book, American School Buildings, in 1949. This Year Book continues to be an outstanding reference for school plant planning.
2. Special pamphlet, School Plant Maintenance, published in 1951.
3. Special pamphlet, Cutting Costs in Schoolhouse Construction, published in 1952.
4. A school building architectural exhibit, sponsored jointly by the American Institute of Architects and the AASA has been an important feature of the programs for the National and Regional Conventions of the American Association of School Administrators for the past three years. An exhibit is being planned for the 1953 Convention.
5. Filmstrips based on the exhibits have been developed and are used in work shops, summer school classes in educational administration, and by local community study groups interested in school building planning.
6. Discussion groups on school building construction has been held as part of the programs for the National and Regional Conventions of School Administrators.

MOTION PICTURE ASSOCIATION OF AMERICA, INC.

The function of the Educational Department of the Motion Picture Association of America as written in 1922 is namely that of "Developing the educational as well as the entertainment values and general usefulness of the motion picture." The program of the department concerns itself with the following:

1. Excerpting single feature films to fit specific educational needs.
2. Combining excerpts from several feature films into one educational motion picture.
3. Producing "tailor-made" teaching films on specific subjects.
4. Selecting "teacher-tested" short subjects from the entertainment motion picture industry sources.
5. Assisting in research programs on the use of motion pictures in education.

The program is planned and carried out in close cooperation with leading educators and national education groups, and Teaching Film Custodians, Inc., a non-profit affiliate of the Association through which some 500 classroom motion picture subjects are available.