Educational Needs for Information Literacy of University Freshmen in Hong Kong: Current Competencies, Perceptions, and Past Learning Experiences

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ABSTRACT

To cope with globalization and a knowledge-based society, the Education Commission (2000) of Hong Kong made "Learning for Life, Learning through Life" the aim of education for the 21st Century. In line with this aim, the university curriculum should be revised to accommodate the need for life-long learning. While universities around the world have put a great effort to integrate information literacy (IL) into their curricula, universities in Hong Kong should also review their curricula in light of this global trend. To provide IL learning experiences to the students, understanding of the educational needs of IL among incoming university students in Hong Kong is essential. In view of the wide research gap in this area, in the current study, the educational needs for IL of university freshmen in Hong Kong were investigated. The IL competencies of university freshmen in a comprehensive university were assessed while their IL perceptions and past IL learning experiences were explored in Fall 2010. Multiple methods were employed to gain an in-depth understanding of the students' needs, including (1) a survey of IL competency and investigation of the IL experiences and perceptions among undergraduate freshmen; (2) process analyses of an information task performed by these students in their natural educational settings, to throw light on how they think about information, where they seek and how they find information, and how they select and apply the information they found; and (3) semi-structured interviews for an in-depth holistic study of individual student participants' IL.

The findings of the current study reveal that the university freshmen of Hong Kong had very limited experiences in information use in their school years, and these past learning experiences had a strong impact on both their IL competency and perceptions. They were weak in using a variety of scholarly information sources and search tools, and had problems in developing and refining search strategies for complex research topics. They also lacked the awareness and capability to evaluate information and acknowledge the sources. Moreover, they had a tendency of heavy reliance on quick web information for their research tasks. Their scarce past experiences and inadequate competency in using scholarly search tools for more authoritative and reliable information sources prevented them from using these valuable resources for complex research.

University freshmen urgently need proper IL learning experiences to facilitate them to abandon the unhealthy habit of using brief and incomprehensive web information, and to use scholarly information effectively for in-depth research instead. Based on the findings of the current study, it is suggested that IL education should be incorporated into the school and university curricula with the following keys to implementation: distinguishing IL from IT in education, establishing close teacher and librarian collaboration, building individual and collective capacity that focuses on improving IL learning, changing the educational value to a learner-centered and process approach to teaching, providing adequate information resources, and aligning assessment with the IL learning outcomes. Lastly, ongoing research on the educational needs of IL among students is needed.

為面向全球化和發展以知識為基礎的社會,香港教育統籌委員會提出了 以《終身學習,全人發展》為面向21世紀的教育宗旨(教育統籌委員會,2000)。 大學課程亦需就此進行改革,以配合終身學習的需要。同時,世界各地的大學 均積極地將資訊素養融入其課程,香港的大學亦應以這個全球性的趨勢檢討其 課程,提供相關的學習經驗給學生。因此,就香港的大學新生對於資訊素養教 育的需求進行研究別具意義。然而,這方面的研究卻相當缺乏。這項研究探討 香港的大學新生對資訊素養的教育需求,評估其能力,探求其觀念與學習經驗。 此研究於2010年秋季採用多種形式收集數據,以深入瞭解學生的需要,包括: (1) 問卷調查 - 評估大學新生資訊素養的能力和瞭解其觀念與學習經驗; (2) 完成資訊課題的過程分析 - 瞭解學生在自然的學習環境中,如何理解、尋找、 選擇和應用資訊 ; (3) 半結構式訪談 - 深人及全面地研究學生的資訊素養。

這項研究顯示香港的大學新生過去在學校裡獲得的資訊素養學習經驗非常有限,而這些學習經驗對其資訊素養觀念及能力有很大的影響。大學新生使用各種學術資訊資源和搜索工具的能力較弱,在面對複雜的研究課題時未能掌握如何調整搜索策略,並缺乏評估和引用資訊的能力和意識。他們亦過分依賴簡便的網絡資訊,因而忽畧使用更權威的學術搜索工具及資訊,未能善用這些寶貴的資源進行深入的學術研究。大學新生迫切需要建構性的資訊素養學習經驗,從而改正他們不良的資訊使用習慣,更有效地利用各種學術資訊進行深入的研究。建基於本研究,建議資訊素養教育應納入學校和大學的課程,並注意下列實施重點:區分資訊素養及資訊科技教育;建立教師與圖書館館員密切的

夥伴關係;提升個人和集體的能力以改善教學及轉變教育觀念,並提供充足的

資訊資源;資訊素養的預期學習成果、學習活動與評估應保持一致;持續研究

學生對資訊素養教育的需要。

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Chapter One

INTRODUCTION

1.1 Background

Information is available to university students in various formats including print and electronic, through libraries, the media and the Internet. Increasingly, information comes in unfiltered formats, raising problems of reliability, validity, bias, timeliness and copyright. Students must be information literate to use information effectively. While information technology skills enable a student to use computers, software applications and the Internet, information literacy is essential for understanding, finding, evaluating and using information. In the digital era of rapid technological change and proliferation of information sources, information literacy becomes more and more important. It forms the basis for lifelong learning through developing abilities to use technologies but also look beyond the technologies (ACRL, 2000). In a world of knowledge-based economy and globalization, information literacy becomes part of the basic human right for lifelong learning and plays an important role in ensuring equities within and among peoples and countries. In view of the implication of information literacy, there is a recent trend worldwide to require students to demonstrate its mastery.

In Hong Kong, to cope with globalization and development of the knowledge-based society, the Education Commission (2000) made "Learning for Life, Learning through Life" the aim of education for the 21st Century. Students should be equipped with ability for self-learning and lifelong learning (p. 3). One of the

major moves is a reform to the academic structure of the existing seven year secondary education and three year higher education to a new academic structure ("3+3+4"): 3-year junior secondary, 3-year senior secondary and 4-year bachelor study. The new academic structure for senior secondary education has been implemented in September 2009 while the four year undergraduate programme will be implemented in 2012. According to Stone (2008), the Secretary-General of the University Grants Committee, one of the major issues crucial to the success of the four-year system is curriculum planning. The university curriculum has to be revised to accommodate the need for lifelong learning.

As Breivik (2000) noted in a keynote address to the International Lifelong Learning Conference, "Within today's information society, the most important learning outcome for all students is their being able to function as independent lifelong learners. The essential enabler to reaching that goal is information literacy" (Abstract section, para. 1). Information literacy, as a new liberal art for critical reflection on the nature of information and its social, cultural and philosophical impact, should become the educational goal of higher education in the Information Age (Shapiro & Hughes, 1996). While universities around the world have put a great effort to integrate information literacy into their curricula, universities in Hong Kong should also review their curricula in light of this global trend.

Schubert and Schubert (1980) assert that "We must come to know how students view their worlds if we want to teach them" (p. 249). However, very little research has placed student experience at the center of attention (Erickson & Shultz,

1992). Despite an increase in research in student experience over the last 15 years, many questions remain unanswered (Erickson, 2008). Without exception, there is not much research studying students' information literacy in higher education. Most of the research effort on information literacy is about its instruction and how librarians collaborate with teachers in incorporating information literacy into the curriculum. In Hong Kong, very little research effort has been vested on studying information literacy in higher education in all aspects, not to say those focusing on the students' perspectives. Not much is known about students' educational needs of information literacy in the universities in Hong Kong.

In the current study, the educational needs for information literacy (IL) of university freshmen in Hong Kong are investigated. The IL competencies of university freshmen are assessed while their IL perceptions and past IL learning experiences are explored. Knowledge of the educational needs for information literacy of incoming university students is significant to educators in providing the appropriate IL learning experiences in both secondary and tertiary educational institutions.

1.2 Definition of Information Literacy

As will be indicated in the literature review, the most widely cited definition of information literacy is that formulated by the American Library Association Presidential Committee on Information Literacy:

"To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (1989, p. 1).

In 2000, the US Association of College and Research Libraries (ACRL) issued the *Information Literacy Competency Standards for Higher Education* and defines information literacy with five key areas of desirable behavior, namely, that the information literate student:

- 1. determines the nature and extent of the information needed;
- 2. accesses needed information effectively and efficiently;
- evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system;
- 4. uses information effectively to accomplish a specific purpose;
- understands many of the economic, legal and social issues surrounding the use of information and accesses and uses information ethically and legally (ACRL, 2000, Information Literacy Definition section).

This Information Literacy Competency Standards for Higher Education was approved by the American Association for Higher Education in 2001 and the US Council of Independent Colleges in 2004 respectively. It also forms the basis of information literacy standards of many countries, such as those of Australia and Finland. In the current study, the above ACRL's definition of information literacy is adopted and IL competency is assessed according to the ACRL's standards.

1.3 The Research Problem

1.3.1 Purpose of the Study

The purpose of the current study is to investigate the information literacy competencies and perceptions of university freshmen in Hong Kong and their past learning experiences of information literacy, in order to get a better understanding of the educational needs for information literacy of incoming university students.

1.3.2 Research Questions

To meet the purpose of the current study, answers to the following research questions are sought.

- 1. How competent are university freshmen in Hong Kong in information literacy?
- 2. What are their perceptions of information literacy?
- 3. What are their past learning experiences of information literacy?
- 4. What are the relationships between the past information literacy learning experiences of university freshmen and their current information literacy competencies and perceptions?
- 5. What are the educational needs for information literacy of these students?

1.3.3 Significance of the Study

As will be indicated in the literature review, in the *Prague Declaration:*Towards an Information Literate Society, UNESCO (2003) positions information

literacy as the basic human right in an Information Society for lifelong learning, for building a competitive workforce, for closing the digital divide and reducing inequities among people and countries. Information Literacy should be an integral part of Education for All (UNESCO, 2003, para. 1). It is a basic right of students to have information literacy learning experiences in education. The literature review also indicates that universities in the US, UK, Australia and the Nordic countries have recognized the essential needs of developing information literacy among their students and embedding IL across their curricula. In the US, half of the regional accreditation organizations of higher education explicitly include information literacy in their accrediting criteria, while the other half refers to library instruction on information use in some capacity (Saunders, 2007). In Sweden, a national ordinance, the Swedish Higher Education Act (2006) requires universities to develop the ability to seek and evaluate knowledge at a scholarly level among students (section 8). In Finland, in their national development plan for education and research, the Finnish Ministry of Education requests universities to ensure that university and polytechnic graduates have good information literacy (Finland Ministry of Education, 2004, p. 55).

However, in Hong Kong, there is no territory wide stipulation on IL in higher education, and IL remains an unfamiliar concept in the tertiary education institutions. Out of the eight tertiary education institutions in Hong Kong, only one university offers an elective credit course solely on IL, two integrated IL with other IT components into a credit course, and two make IL a part of the IT proficiency graduation requirement and two are considering to do the same. IL is not much

integrated into the university curricula. In comparison with other developed countries, information literacy should play a more crucial role in the higher education of Hong Kong and more research effort should be spent on this.

The need for research on information literacy in higher education of Hong Kong is particularly important now. In the *Reform Proposals for the Education System in Hong Kong* released in 2000, the Education Commission of Hong Kong made "Learning for Life, Learning through Life" the aim of education for the 21st Century. The reform targets to equip students with a broad based knowledge, independent thinking, high adaptability and the ability for lifelong learning in a rapidly changing world. One of the measures is to reform the academic structure of the existing seven-year secondary education and three-year higher education to a new academic structure ("3+3+4"): three-year junior secondary, three-year senior secondary and four-year bachelor study. The new academic structure for senior secondary education has been implemented since September 2009 while the four-year undergraduate programme will be implemented in 2012. To ensure a successful educational reform, the university curriculum must be revised at the same time to accommodate this drastic reform catering for lifelong learning.

In addition to the 334 education reform, universities in Hong Kong face other challenges as well. According to Biggs and Tang (2007), there is a sharp increase in the need for better teaching at universities worldwide. This is because public funding for universities is much decreased which results in higher and higher student fees, assuming that education is a personal benefit, a commodity that should be paid for by the individual "consumer". At the same time, proportionally

more students are at university than ever before, pursuing professionally and vocationally oriented rather than the traditional academic programmes. As a result, there are a diverse range of students filling up the classrooms, all demanding quality teaching they believe they have paid for and should be receiving. In response, universities increasingly gear toward outcomes-based education (p. 12). Breivik (1998) also acknowledges that universities and accreditation agencies are moving towards a more comprehensive measure of student learning by adopting outcome-based assessments that emphasize inquiry-based learning, and he sees this move a strategic opportunity for the integration of information literacy as a learning outcome. In Hong Kong, one of the strong evidences of the move towards quality teaching and educational outcomes is the establishment of the Quality Assurance Council under the University Grant Council in Hong Kong in recent years. Quality assurance of student learning outcomes for lifelong learning has become more and more important among tertiary education institutions in Hong Kong.

To summarize, in Hong Kong, though with an education reform in universities emphasizing lifelong learning, outcomes-based education, and student-centered inquiry-based pedagogies, in contrast to a number of countries around the world, concepts of information literacy remain unfamiliar to the university community. To grasp the golden opportunity of the 334 educational reform for meeting the challenges of knowledge-based economy and globalization, information literacy, a prerequisite for lifelong learning (UNESCO, 2003), should be

integrated into the university learning experiences. In this regard, related research is urgently needed.

As will be indicated in the literature review, prior knowledge, attitudes and perceptions of information literacy are important factors influencing the acquisition of IL among students. Understanding the information literacy competencies, perceptions and learning experiences of incoming university students is significant for a better understanding of their educational needs of IL. However, there is not much research studying the extent to which students meet the IL standards, how they view information use, and how their past learning experiences influence their perceptions and competency level of IL.

To fill the gap of research, and to understand the IL educational needs of incoming university students in this crucial moment of 334 education reform, the current study focuses on examining the IL competencies, perceptions and learning experiences of university freshmen in Hong Kong. Understanding of the IL competency and perceptions of university freshmen, and how their past IL learning experiences affect these two aspects, is significant in providing the appropriate IL learning experiences in both secondary and tertiary educational institutions in the 334 education reform.

Chapter Two

LITERATURE REVIEW

2.1 Development of the Concept of Information Literacy

Paul Zurkowski (1974) first used the term information literacy in a report to the US National Commission on Libraries and Information Science entitled *The Information Service Environment, Relationships and Priorities.* He defines information literacy by noting: "People trained in the application of information resources to their work can be called information literates. They have learnt techniques and skills for utilizing the wide range of information tools as well as primary sources in molding information solutions to their problems" (p. 6). He asserts that while the population of the US is nearly 100 percent literate, only perhaps one-sixth can be characterized as information literate. The top priority of the US National Commission on Libraries and Information Science should be directed toward establishing a major national program to achieve universal information literacy by 1984.

A milestone in the development of the concept of information literacy was the establishment of the American Library Association (ALA) Presidential Committee on Information Literacy in 1987. The Committee consisted of seven US leaders from the field of education and six from the field of librarianship (Eisenberg, Lowe and Spitzer, 2004, p. 14). Their *Final Report*, released in January 1989, provides a definition of information literacy and stresses its importance in the Information Age:

How our country deals with the realities of the Information Age will have enormous impact on our democratic way of life and on our nation's ability to compete internationally. Within America's information society, there also exists the potential of addressing many long-standing social and economic inequities. To reap such benefits, people - as individuals and as a nation must be information literate. To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. Producing such a citizenry will require that schools and colleges appreciate and integrate the concept of information literacy into their learning programs and that they play a leadership role in equipping individuals and institutions to take advantage of the opportunities inherent within the information society. Ultimately, information literate people are those who have learnt how to learn. They know how to learn because they know how knowledge is organized, how to find information and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand (Introduction section, para. 3).

The Committee also makes the following six recommendations on information literacy:

 We all must reconsider the ways we have organized information institutionally, structured information access, and defined information's role in our lives at home in the community, and in the work place.

- A Coalition for Information Literacy should be formed under the leadership
 of the American Library Association, in coordination with other national
 organizations and agencies, to promote information literacy.
- Research and demonstration projects related to information and its use need to be undertaken.
- 4. State Departments of Education, Commissions on Higher Education, and Academic Governing Boards should be responsible to ensure that a climate conducive to students' becoming information literate exists in their states and on their campuses.
- Teacher education and performance expectations should be modified to include information literacy concerns.
- An understanding of the relationship of information literacy to the themes
 of the White House Conference on Library and Information Services should
 be promoted (Conclusion section, para. 3).

Based on these recommendations, the US National Forum on Information Literacy (NFIL) first met in November 1989. It was a coalition of more than 65 US national organizations from government, education and business sectors, including representatives from the American Association for Higher Education, American Association of Colleges for Teacher Education, American Association of School Administrators, Association for Supervision and Curriculum Development, EDUCAUSE, National Consumers League and US Small Business Administration. Though coming from different sectors of the society, these representatives shared

the common interest and concern in promoting information literacy (Eisenberg, Lowe & Spitzer, 2004, p. 16).

In 1992, at the request of the US National Forum on Information Literacy, Doyle conducted a study on information literacy in US with the Delphi research technique, through which a panel of 56 selected experts were assisted to reach consensus on the definition of information literacy and to develop outcome measures for the concept. Doyle (1992) defines information literacy as "the ability to access, evaluate and use information from a variety of sources" and lists ten discrete attributes of an information literate person as follows:

- 1. Recognizes the need for information
- Recognizes that accurate and complete information is the basis for intelligent decision making
- 3. Formulates questions based on information needs
- 4. Identifies potential sources of information
- 5. Develops successful search strategies
- Accesses sources of information, including computer-based and other technologies
- 7. Evaluates information
- 8. Organizes information for practical application
- 9. Integrates new information into an existing body of knowledge
- 10. Uses information in critical thinking and problem solving (p. 2).

Doyle expands the definition of information literacy by including the integration of new information into prior knowledge, critical thinking and problem solving.

Shapiro and Hughes (1996) further broaden the concept by defining information literacy as "a new liberal art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its technical infrastructure, and its social, cultural and even philosophical context and impact" (Information literacy as a new liberal art section, para. 1). The inclusion of critical reflection on the nature and context of information opens a new dimension of the conception of information literacy.

Rather than following the US trait, Webber and Johnston (2003) in the UK put forward their own definition of information literacy: "Information literacy is the adoption of appropriate information behavior to identify, through whatever channel or medium, information well fitted to information needs, leading to wise and ethical use of information in society" (Definition of information literacy section, para. 2). They view their definition carrying a more holistic nature, which "captures the more complex experiences of information literacy" and is "as essential to education, the economy and the community activity in a society as developed as the UK" (Definition of information literacy section, para. 3).

2.2 Models of Information Literacy

Various researchers have further developed the concepts of information literacy into systematic models. Two major models, the Big6TM and the *Seven Faces of Information Literacy* are introduced in the following discussion. Before getting into these models of information literacy, the models developed by Ellis (1989) and Kuhlthau (1991) are also highlighted, though these two only focus on the

information seeking process which is a major component but not the complete picture of information literacy.

Ellis (1989) describes different information seeking behaviors in terms of 'features', instead of stages. He asserts that these behaviors do not necessarily occur in sequence. Rather, the unique circumstances of the information seeking activities of the information seeker at that specific point in time influence the pattern followed. The features identified include:

- Starting: the means employed to start the search for information
- Chaining: following footnotes and citations in known material or 'forward'
 chaining from known items through citation indexes
- Browsing: semi-directed or semi-structured searching
- Differentiating: using known differences in information sources as a way of filtering the amount of information obtained
- Monitoring: keeping up-to-date or current awareness searching
- Extracting: selectively identifying relevant material in an information source
- Verifying: checking the accuracy of information
- Ending: tying up loose ends through a final search (Jarvelin & Wilson, 2003, Summary Framework section).

In contrast to Ellis, Kuhlthau (1991) identifies six sequential stages of the information seeking process of an individual: initiation, selection, exploration, formulation, collection and presentation. In addition to the mechanical search for information, her model includes the affective, cognitive and physical dimensions as well (Hayden, 1999). Kuhlthau postulates that information seeking is a process of

knowledge construction with different cognitive and affective stages. She asserts that in more complex information seeking tasks, feelings of uncertainty commonly increase in the exploratory stage of information seeking before diminishing with focus formulation and construction in later stages, i.e. the formulation stage. This rise in uncertainty is frequently unexpected and causes apprehension and confusion in some information searchers to the point of obstructing the task. Wilson (1999) describes this information seeking process as the "process of gradual refinement of the problem area, with information searching of one kind or another going on while refinement takes place" (p. 256). However, Hayden (1999) points out that this model does not cater for the manipulation of information, i.e. the analysis, digestion, organization, synthesis and evaluation of the retrieved information. Thus, it is a model of information search but not information literacy.

One of the most representative behavioural information literacy models is the Big6TM model developed by Eisenberg and Berkowitz (1990) which has become a commercial venture with fee-based workshops and publications. Its website indicates that the Big6TM model comprises of six stages:

- Task Definition Define the information problem and identify information needed
- Information Seeking Strategies Determine all possible sources and select the best sources
- 3. Location and Access Locate sources intellectually and physically and find information within sources

- 4. Use of Information Engage (e.g., read, hear, view, touch) and extract relevant information
- 5. Synthesis Organize from multiple sources and present the information
- Evaluation Judge the product (effectiveness) and the process (efficiency)
 (What is Big6 section).

According to Eisenberg, Lowe and Spitzer (2004, p. 19), the American Association of School Librarians (AASL) adopted the Big6[™] model to identify the steps of information problem-solving process as the key elements of information literacy curriculum in schools.

Instead of adding more behavioral components to define information literacy, Bruce (1997a) developed a relational model of information literacy, the Seven Faces of Information Literacy. She examined the varying experiences of information literacy among Australian higher educators with the phenomenographic method. A detailed picture of the ways in which information literacy was conceived among these experienced information users had been formed, as seven conceptions below:

1. The information technology conception - Information literacy is experienced as using information technology for information retrieval and communication. Information technology is at the heart of the experiences for accessing information, for allowing the users to stay informed, and for manipulation of the information that has been located. Hence, information literacy depends on the availability and usability of information technology.

- The information sources conception Information literacy is experienced as
 finding information located in the information sources. Information
 literacy means knowledge of information sources in various media, including
 the Internet and people.
- 3. The information process conception Information literacy is experienced as executing information processes the strategies of information users for finding and using information. The essential ability is to implement strategies in coping with novel situations in which the information users experience a lack of information. Effective action, problem-solving or decision-making is the outcome of the experience.
- 4. The information control conception Information literacy is experienced as controlling or organizing information, using either filing cabinets, or the brain or memory through links and associations, or computers to allow storage and retrieval. Information literacy is seen as the ability to use various media to bring the information under the controlling influence of the users, so that they can retrieve and manipulate it when necessary.
- 5. The knowledge construction conception Information literacy is experienced as building up a personal knowledge base in a new area of interest. Critical information use for the purpose of constructing knowledge in an unfamiliar area, with evaluation and analysis at the user end, plays a vital role in this conception. Information appears to individual users in unique ways and provides subjective meaning to the users. The idea of knowledge base

- goes beyond storage of information, and involves the adoption of personal perspectives.
- 6. The knowledge extension conception Information literacy is experienced as extending knowledge in such a way that novel insights are gained. Information use, involving intuition or creative insight, results in the development of novel ideas, creative solutions, or new knowledge. In this conception, the knowledge base includes knowledge gained through personal experience, intuition and creativity, rather than just knowledge construction as in category 5 above.
- 7. The wisdom conception Information literacy experienced as using information wisely for the benefit of others. Wise use of information involves exercising judgment, making decisions, adoption of personal values, beliefs, and ethics in relation to the information use. Information should be seen in a larger context, both historically, temporarily, and socio-culturally.

In light of the Seven Faces of Information Literacy listed above, Bruce (1997a) asserts that different information users experience and perceive information literacy differently, and the importance of information technology varies in each experience. While information literacy strongly relates to learning to learn, it is a social rather than an individual matter. Bruce's model provides an important relational model of information literacy, in contrast to other behavioral models widely used at that time. She conceptualizes three major changes in her model:

- Towards a relational view of information literacy. This involved a change
 from describing information literacy in terms of attributes (skills, knowledge
 and attitudes) to describing it in terms of varying conceptions or experiences
 which are defined in terms of relations between people and aspects of the
 world.
- Towards a relational view of information literacy education. This involved a
 change from viewing learning information literacy as the acquisition of
 attributes to viewing it in terms of changing conceptions or ways of
 experiencing aspects of the world.
- Towards researching relations between users of information and aspects of the world. This involves a change from researching the understandings of experts and information users to researching conceptions, or the varying relations between people and aspects of the world (Bruce, 1997a, p. 16).

Further, Bruce (2004) contrasts the Big6TM model developed by Eisenberg and Berkowitz with her model. The Big6TM model may be described as a systematic information behavioral model while her model of *Seven Faces of Information Literacy* is a relational one. Learning to be information literate in the Big6TM model involves practicing the six steps when engaged in learning tasks, while learning to be information literate in the Bruce's model involves becoming aware of different ways of experiencing information use through engaging in relevant information practices and reflection. Bruce's model throws light on the importance of a holistic research approach to study information literacy in real life situations, especially in understanding the self-reflection among learners during their IL learning processes.

2.3 Rights to Information Literacy in Education

In 2003, representatives of 23 countries met in a UNESCO meeting and made the *Prague Declaration: Towards an Information Literate Society*. They proposed the following basic information literacy principles:

- The creation of an Information Society is key to social, cultural and economic development of nations and communities, institutions and individuals in the 21st Century and beyond.
- Information Literacy encompasses knowledge of one's information concerns
 and needs, and the ability to identify, locate, evaluate, organize and
 effectively create, use and communicate information to address issues or
 problems at hand; it is a prerequisite for participating effectively in the
 Information Society, and is part of the basic human right of lifelong learning.
- Information Literacy, in conjunction with access to essential information and
 effective use of information and communication technologies, plays a
 leading role in reducing the inequities within and among countries and
 peoples, and in promoting tolerance and mutual understanding through
 information use in multicultural and multilingual contexts.
- Governments should develop strong interdisciplinary programs to promote
 Information Literacy nationwide as a necessary step in closing the digital
 divide through the creation of an information literate citizenry, an effective
 civil society and a competitive workforce.
- Information Literacy is a concern to all sectors of society and should be tailored by each to its specific needs and context.

Information Literacy should be an integral part of Education for All, which
can contribute critically to the achievement of the United Nations
Millennium Development Goals, and respect for the Universal Declaration of
Human Rights (para. 1).

The *Prague Declaration* positions information literacy as the basic human right in an Information Society, for lifelong learning, for building a competitive workforce, for closing the digital divide and reducing inequities among people and countries, and for promoting mutual understanding of cultural differences and specific needs of all sectors of society.

Apple (2008) asserts that educational institutions provide one of the major mechanisms through which power is maintained and challenged, by determining the kind of knowledge to be taught to students and how their learning is evaluated. In the Information Age with a globalized knowledge-based economy, information literacy plays a vital role for a nation to compete internationally, to address social and economic inequities, and to enhance democracy (ALA, 1989). Information literacy should be an important component in education.

Moreover, Bernstein (1990) indicates that working class students and many students of color are more disadvantaged in situations organized around weakly classified and weakly framed curricula and pedagogy such as interdisciplinary project-based learning, which emphasizes the "cognitive, linguistic, affective, and motivational" repertoire of the students and family support. In view of the world-wide trend of project-based learning in both schools and universities, information

literacy is particularly in need to enable such disadvantaged students to work independently, without much support from their less resourceful families.

2.4 Information Literacy in Higher Education around the World

The establishment of the US Information Literacy Competency Standards for Higher Education in 2000 opens a new page for information literacy curricula in higher education worldwide. Developed by the Association of College and Research Libraries (ACRL), it was endorsed by the American Association for Higher Education in 1999 and the Council of Independent Colleges in 2004. The Standards state that information literacy forms the basis for lifelong learning and it is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning. An information literate individual is able to:

- 1. determine the extent of information needed;
- 2. access the needed information effectively and efficiently;
- evaluate information and its sources critically and incorporate selected information into one's knowledge base and value system;
- 4. use information effectively to accomplish a specific purpose;
- understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally (ACRL, 2000, Information Literacy Definition section).

The report of the US Boyer Commission on Educating Undergraduates in the Research University (1998), Reinventing Undergraduate Education: A Blueprint for America's Research Universities recommends strategies requiring active engagement of students in "framing of a significant question or set of questions, the research or creative exploration to find answers, and the communications skills to convey the results" (p.27). According to ACRL, courses structured in that way create "student-centered learning environments where inquiry is the norm, problem solving becomes the focus, and thinking critically is part of the process" (Information literacy and pedagogy section, para. 1). Information literacy competencies are essential for these learning environments.

Accrediting criteria related to information literacy in higher education institutions have been introduced in the US in recent years. According to Saunders (2007), three regional accreditation organizations (the Middle States Commission of Higher Education, The New England Association of Schools and Colleges, and the Western Association of Schools and Colleges) include information literacy in their standards, while the other three (Southern Association of Colleges and Schools, the North Central Association of Colleges and Schools, and the North Western Commission of Colleges and Universities) do not use the term "information literacy" but refer to library instruction on using information in some capacity. In a more recent research, Saunders (2008) notes that the Middle States Commission on Higher Education stands out among the six regional accreditation organizations as it puts the heaviest emphasis on information literacy. In addition to providing the most detailed set of information literacy standards, its document *Developing*

Research and Communication Skills: Guidelines for Information Literacy in the Curriculum relates information literacy with critical thinking and the capacity for self-directed learning, and stresses the need for collaboration between faculty and librarians in the instruction and assessment of information literacy skills. Also, it offers a framework for the development of information literacy programs (Middle States Commission on Higher Education, 2003).

In Australia, information literacy is a well-developed and accepted concept among universities (Eisenberg, Lowe & Spitzer, 2004). The Council of Australian University Librarians (CAUL) developed their *Information Literacy Standards* in 2001 by adapting those of the US Association of College and Research Libraries (ACRL, 2000), but with more items added:

An information literate person is able to:

- 1. recognize a need for information;
- 2. determine the extent of information needed;
- 3. access the needed information efficiently;
- 4. evaluate the information and its sources;
- 5. incorporate selected information into their knowledge base;
- 6. use information effectively to accomplish a purpose;
- understand economic, legal, social and cultural issues in the use of information;
- 8. access and use information ethically and legally;
- 9. classify, store, manipulate and redraft information collected or generated;

 recognize information literacy as a prerequisite for lifelong learning (CAUL, 2001, p. 3).

In the National Board of Employment, Education and Training Report 28: Developing lifelong learners through undergraduate education, information literacy was listed as one of the five key elements in the profile of a lifelong learner. According to Johnston and Webber (2003), the Australian national report An education and training action plan for the information economy lists information literacy as one of the strategic priorities for higher education: "Encouragement of universities to ensure that their graduates enter the workforce with the competencies needed, including information literacy skills and lifelong learning skills." (Department of Education, Training and Youth Affairs, 2000, p. 82)

Information literacy strategies have been integrated into a number of Australian university curricula. For example, the Central Queensland University distance education information literacy programme received numerous grants and has been recognized as a flagship programme (Bruce & Candy, 2000); the University of Ballarat's policy documentation identifies information literacy as a key graduate outcome and as an integral part of an undergraduate curriculum model (Radomski, 2000); the University of Wollongong has reported integration of information literacy into the curriculum (Wright & McGurk, 2000; Virkus, 2004).

In the UK, the Society of Colleges, National and University Libraries (SCONUL) released its position paper entitled *Information Skills in Higher Education* in 1999, with an *Information Skills Model*. In 2004, five years after the model was first

introduced in the position paper, the model was redesigned and has been entitled

The Seven Pillars Model for Information Literacy. The seven pillars are:

- 1. The ability to recognize a need for information;
- The ability to distinguish ways in which the information 'gap' may be addressed;
- 3. The ability to construct strategies for locating information;
- 4. The ability to locate and access information;
- The ability to compare and evaluate information obtained from different sources;
- The ability to organize, apply and communicate information to others in ways appropriate;
- The ability to synthesize and build upon existing information, contributing to the creation of new knowledge (SCONUL, 2004).

However, Johnston and Webber (2003) comment that the UK undergraduate learning environment increasingly emphasizes the use of IT and the Internet to achieve a variety of subject-specific and generic skill learning objectives, including information skills. Information literacy is rarely mentioned explicitly as part of the UK "key skills' agenda. This is in contrast to the Australian approach which official reports have explicitly mentioned information literacy, rather than just IT literacy and generic personal skills. Such bias towards IT skills rather than IL may explain in part the limited progress in developing and implementing holistic and complex accounts of IL in the UK (Johnston & Webber, p. 339).

Webber (2006) summarizes the common features of the three information literacy frameworks of the US, Australia and the UK: identifying what information is needed, accessing, searching for, evaluating, and applying the information, and knowing about legal issues, in particular copyright. At the same time, Webber (2006) notes the different approaches to higher education in the three countries. Though there is a bias towards IT skills in the UK (Webber & Johnston, 2010), UK librarians take the opportunities of national audits of teaching quality to promote information literacy. Whereas in Australia, the demand for universities to identify Graduate Attributes (skills and knowledge that students graduate with) provide the opportunity for librarians to get information literacy listed as a graduate attribute. In the USA, there seems to be more of a focus on standardized tests, thus librarians put more effort with the Educational Testing Service on an ICT Literacy Assessment.

Recently, with strong government support, the Nordic countries have taken a strategic move in incorporating information literacy into the university curriculum. In Sweden, the Swedish *Higher Education Act* (2006) states that: "In the educational field concerned, in addition to knowledge and skills, students shall develop an ability to seek and evaluate knowledge at a scholarly level" (section 8). With such a national ordinance, universities in Sweden have to ensure all their graduates demonstrate these abilities of information literacy. For example, the strategic plan of the Stockholm University for 2007-2011 includes the following two goals related to information literacy (Tovote, 2008):

- Quality in education on basic and advanced levels: The ability to search,
 critically evaluate and handle scientific information should form a part of the
 education in scientific method.
- Quality in research and education at doctoral level: All postgraduate students should be offered education in scientific information handling (p. 4).

Among the Nordic countries, the political leaders in Finland place the highest importance on information literacy in higher education. The Finnish Ministry of Education's Education and Research 2003-2008: Development Plan stresses the importance of the libraries to ensure that university and polytechnic graduates are well information literate (2004, p. 55). In response, the Finnish university libraries launched a national project Curriculum Plan for Information Literacy for the creation of an information literacy curriculum for all Finnish universities. It was coordinated by the University of Helsinki and received funding from the Ministry of Education from 2004 to 2006. This project aimed to integrate information literacy in the academic curriculum; identify the central information literacy and management skills students need; draw up a curriculum plan for information literacy; develop online education for information seeking skills; and create a network among the universities. According to the Council for Finnish University Libraries, "The Finnish recommendation for information literacy is based on international standards for information literacy competency. The recommended scope of information literacy studies at all levels is one to two credits. It is also recommended that new students be taught the basics of information seeking and retrieval and other necessary

learning skills as part of compulsory general studies. ... Instruction in advanced systematic information seeking and the information literacy skills needed for the Master's thesis should be integrated as a compulsory component into the thesis seminar" (Finnish recommendation for information literacy section, para. 1).

2.5 University Students' Competencies, Perceptions and Learning Experiences of Information Literacy

Ausubel (1968) posits that the "most important single factor influencing learning is what the learner already knows. Ascertain this ... and teach him accordingly" (preface note). An awareness of students' prior knowledge in information literacy is essential for university educators to understand their students' educational needs and provide suitable learning experiences for them. According to Popham (2003), "the central mission of all...assessment is ... to help you make valid inferences about your students so that you can then ... make better decisions about how to instruct those students" (p. 69). Assessment of incoming students' IL competencies is important for knowing the students' prior IL knowledge before they enter the universities, thus crucial to a better understanding of students' educational needs and the provision of quality learning experiences for them. Also, IL competency assessment is needed in response to the calls for accountability of learning outcomes throughout higher educational institutions (Oakleaf, 2009; Radcliff, Jensen, Salem, Burhanna, & Gedon, 2007).

In addition to IL competencies, knowing the students' IL perceptions and learning experiences should be equally important. Schubert and Schubert (1980)

argue that "we must come to know how students view their worlds if we want to teach them" (p. 249). In a study of the sociological and psychological factors that affect university students' judgments in using information to solve problems, Neely (2002) posits that students' exposure, experience, relationship with faculty, performance and attitudinal aspects of information literacy affect their judgments. "Users (student) input is a valid indicator for the development and restructuring of information literacy and library skills research programs, curricula, and individualized courses. Student attitudes about these skills are an intricate part of the success of these programs and must be included in the development of programs with quantifiable outcomes, thus, contributing to a more efficient and effective program" (Neely, 2002, p. 152). Investigating incoming university students' IL perceptions and their past learning experiences is significant for a better understanding of their IL educational needs.

Though understanding students' educational needs is important, in a systematic literature review of students' experience of the curriculum, Erickson and Shultz (1992) note that "virtually no research has been done that places student experience at the center of attention" (p. 467). "Neither in conceptual work, nor in empirical research, nor in the conventional wisdom and discourse of practice does the subjective experience of students as they are engaged in learning figure in any central way" (p. 466). In a more recent publication, Erickson (2008) concludes that "despite the increase in research attention to student experience over the last 15 years many questions remain concerning it – those aspects of experience that students themselves report and those aspects of it that students do not report

directly" (p. 200). The lack of abundant research on students' experiences on learning is especially obvious in higher education. In Teaching for Quality Learning at University: What the Student Does, Biggs and Tang (2007) note that "it is only in comparatively recent years that researchers have studied learning as it takes place in institutions, by students" (p. 28). Unfortunately, this phenomenon is also reflected in research effort spent on IL. Though "much has been written on the concept of information literacy during the past twenty-five years", and "standards for information literacy have been developed and updated nationally by a variety of professional organizations", yet "little is known about the extent to which undergraduates meet these standards" (Maughan, 2001, p. 71). Most research focus on library instruction and how librarians collaborate with teachers in incorporating information literacy into the curriculum, and few studies examine students' educational needs and their competencies in detail (Caravello, Borah, Herschman, & Mitchell, 2001; Gross & Latham, 2011; Mittermeyer & Quirion, 2003; Whitehead & Quinlan, 2003). The following is a review of the limited studies on information literacy competencies, perceptions and learning experiences of university students around the world.

Several studies used large sample surveys to test the library research skills of students, at the same time investigate their prior library experiences, self-assessment of their competencies and confidence levels with various types of information tools (Caspers & Bernhisel, 2007; Geffert & Christiansen, 1998; Haglund & Herron, 2008; Maughan, 2001; Mittermeyer, 2005; O'Hanlon, 2002; Profeta & Kendrick, 2002). It was found that students who scored well on these skill tests

had a higher GPA (Caspers & Bernhisel, 2007; Geffert & Christiansen, 1998). Regarding the relationship between IL test score and the students' self-assessment of their abilities, there are contrasting findings among various studies. Some studies show that there was no statistically significant correlation between the test score and the self-assessment of their overall research skills (Geffert & Christiansen, 1998; Maughan, 2001; O'Hanlon, 2002; Profeta & Kendrick, 2002; Seamans, 2002), whereas some other studies (e.g. Haglund & Herron, 2008) indicate an association between IL scores and students' estimates of their IL skills. Students who demonstrate low-level skills hold even more inflated views of their abilities, and the very competent may tend to underestimate their performance. Regarding gender related differences, female students who reported higher grade point averages as a group than males, scored significantly higher on the IL skill tests. However, females did not self-assess their library skills any higher than males did (Caspers & Bernhisel, 2007; Geffert & Christiansen, 1998).

In the digital era, students who are confident about their computer skills assume they are competent with information literacy involving the use of computers. A survey of *Internet and American Life* conducted by the Pew Institute indicated that students of the US believed the Internet to be a functional tool that had greatly changed their lives. Nearly three-quarters of university students said they used the Internet more than libraries (Pew, 2002). A major study performed by the Online Computer Library Center (OCLC) found that one-third of the survey respondents reported their library use has decreased in the past three to five years. Less than 46 percent of university student survey respondents sought help from any

library staff on using library resources (OCLC, 2005). Students tend to use free Internet resources rather than research with information sources acquired by university libraries. However, research findings indicate that the assumption of higher IT skills leading to better IL does not stand. In a survey of 66 first year community college students in the US about their information and computer literacy, Profeta and Kendrick (2002) found that "students considered their basic computer skills to be average to excellent, but their skill in locating, evaluating, and using information via electronic resources revealed a great need for improvement" (p. 39). Kuh and Gonyea (2003) assessed how often students evaluate the information they located. One-fifth of all college seniors in their study indicated that they had never evaluated the information they got for their academic work. O'Hanlon (2002) tested 57 freshmen at Ohio State on Internet tools, search skills, and research techniques, and she made a similar conclusion: "only 9 percent of the 43 new freshmen taking the test at orientation achieved a passing score of 70 percent on the entire test. None achieved the level normally defined as proficient (80%)" (p. 63). She further remarked that university administrators "must not assume that new students arrive with acceptable computing and research skills simply because students tell us that they are competent" (p. 63).

In the studies reviewed above, objective tests with multiple-choice questions are commonly used to test the IL competency of students. Caspers and Bernhisel (2007) postulate given the limited resources of a small institution, their multiple-choice test is manageable and affordable for an assessment of the information literacy skills and attitudes of hundreds of students. Nevertheless,

they also highlight the limitation of their test as it cannot test students' skills in a real-world scenario: "The real abilities of neither the highest scoring students nor those who failed this test could be fully judged through a multiple-choice survey" (p. 465). Similarly, Geffert and Christiansen (1998) admitted that the multiple-choice test in their survey told them "almost nothing ... about a student's ability to gather information, evaluate literature, synthesize competing arguments, and formulate original theses" (p. 285). Standardized tests and multiple-choice questionnaires "are designed to test concrete knowledge," but "not the ability to use search skills in real life" (Avery, 2003, p. 2). Biggs (1999) posits that a quantitative assessment approach tends to encourage a surface approach to learning, in which students target solely at maximizing their potential score rather than embracing the nature and diversity of what they are learning (p. 150). Instead of focusing on the declarative knowledge, where "students say what they have learnt rather than show it performatively", students' "total performance" should be assessed and "contextualized assessment" should be encouraged (p. 161). Webber and Johnston (2003) also postulate that IL assessment should be recorded in a variety of formats, including transcripts of test results, portfolios and learning diaries, and should take into account the learner's conceptions and approach to learning (p. 107). According to Thomas (1999), there is a trend in divergence from an over-dependence on IL standardized testing to alternate modes of assessment which allow students to show what they have learnt in a variety of ways and to represent the effects of learning through student performance of what has been learnt in a "real world" context. These performance-based methods include

portfolios of a student's written and graphic work, student projects, student journals and 'learning logs' that record their responses, thought and activities (Andretta, 2005; Fourie & Van Niekerk, 1999, 2001; Mansourian, 2008; McGuinness & Brien, 2007). In the study by McGuinness and Brien (2007), reflective journals were used to assess students' research process. It was found that the most prevalent problem was the process of developing a unique and manageable research topic from the given broad areas, which is not required with essay writing at school where students are usually given specific topics. At the subsequent attempts to locate relevant information, students felt being lost in a sea of information at the same time worried overlooking a critical source, or unable to find anything relevant at all. In addition to information seeking problems, students found it hard to manage the time and sustain their motivation over a period of time for the course.

In addition to IL portfolio assessment which must be used in association with a course or as a component of university wide student portfolios (Radcliff et al., 2007), some researchers employ other performance-based assessment to explore students' IL competencies, perceptions and learning experiences (Bay Area Community Colleges Information Competency Assessment Project, 2003; Currie, Devlin, Emde, & Graves, 2010; Dunn, 2002; Emde, Graves, Devlin, & Currie, 2008). In these studies, students were asked to find information on specific topics and were requested to either write down or voice their thinking during the process. In the studies by Currie, Devlin, Emde and Graves (2010), Emde, Graves, Devlin and Currie (2008) and Dunn (2002), researchers observed the process and captured the

steps with screen capture software. In addition, after the search process, researchers interviewed the participants to clarify the process. In their process analysis study of students' search strategies and evaluation criteria, Currie et al. (2010) found that the evaluative criteria of information sources most students mentioned were "balance, content, scholarly/professional, currency, credible source, and references/bibliography". "Accessibility and convenience" were also noted by the students as important criteria in their selection of sources (p. 122). However, though asked to focus on scholarly sources by the researchers, only 32 percent of the sources selected were actually scholarly. Credentials of authors were not commonly looked at and some student "just liked the 'look' of the article or the fact that the keywords they searched were in the title" (p. 122). Also, some students viewed newspapers as reliable sources to be cited in research papers.

In addition to performance-based assessment and process analysis of an information task, a number of studies employ other qualitative methodologies including phenomenography, action research, focus group and in-depth interview to study students' information literacy.

Following Bruce's seminal research of the seven faces of IL mentioned earlier, Maybee (2006, 2007) and Lupton (2004, 2008) took the phenomenographic approach to investigate undergraduates' perceptions of information literacy. To ensure that the student participants were familiar with the terms used in the questions, the term "information literacy" was replaced by the term "information use" in the final selection of questions. Interviewing questions included:

1. How do you use information to complete the class assignments?

- 2. How did you go about searching for and using information for your essay?
- 3. How do you use information outside of your coursework?
- 4. How did you decide when to stop searching?
- 5. Is there anything that you would do differently?
- 6. Tell a story of a time when you used information well.
- 7. Describe your view of someone who uses information well.
- Describe your experience using information (Lupton, 2008, p. 403; Maybee, 2006, p. 81; Maybee, 2007, p. 454).

Follow up questions such as "Can you think of an example of that?" or "Can you explain that more?" were asked to encourage participants to expand and clarify their answers. Based on the analysis of the data, Maybee (2006, 2007) identified four distinct categories reflecting the experiences of information use utilized by the undergraduate student participants:

- Sources Information use is seen as finding information located in information sources.
- 2. Processes Information use is seen as initiating a process.
- Knowledge base Information use is seen as building a personal knowledge base for various purposes.
- 4. Technology Information use is seen as finding information sources through the use of technology (Maybee, 2006, p. 81; Maybee, 2007, p. 455)

It is not difficult to note that Maybee's four categories of information use are very similar to four of the *Seven Faces of Information Literacy* categorized by Bruce (1997a) stated earlier, i.e. Face 1: The information technology conception;

Face 2: The information sources conception; Face 3: The information process conception; Face 5: The knowledge construction conception; and Face 6: The knowledge extension conception.

While Maybee's (2006, 2007) IL categories are similar to those of Bruce (1997a), Lupton (2004, 2008) identified three different hierarchical categories representing students' experiences of information literacy when researching an essay:

- Seeking evidence Information was seen as external to the person, as it was
 perceived as an object to be found. Information was associated with the
 essay task rather than with building a knowledge base. The essay was a
 primary focus of the students' awareness (p. 407).
- 2. Developing an argument Students developed their argument as they searched and learned more about the topic. Information was internalized as it was being used to develop a knowledge base. Students' primary focus of awareness was on learning about the topic. The essay was a secondary focus while information was in the background of awareness (p. 407).
- 3. Learning as a social responsibility Students transcended learning about the essay topic. They saw applying learning as their primary objective. They were concerned with being good communicators and they saw their essay as a way of communicating the issues. Their use of information in the essay and in the course was highly personal. They went beyond the topic and made links with other fields and disciplines. Students used contrasting perspectives to contribute to a personal understanding of the topic. They

developed an essay argument as they searched rather than seeking to backup an existing argument, as in category 1 (p. 408).

Lupton posits that "learning information literacy entails moving from experiencing it as seeking evidence to developing an argument and from developing an argument to learning as a social responsibility. One goal of information literacy education in first year could be to design teaching, learning and assessment activities that explicitly develop students from experiencing information literacy as seeking evidence to experiencing it as developing an argument" (p. 410).

Limberg (1999, 2000b) also applied phenomenographic method to study Year 12 Swedish students seeking and using information. Three categories of experiencing IL were posited. They are: (1) fact-finding (finding the right answer); (2) balancing information in order to choose the right side (finding enough information to form a personal standpoint on the topic); and (3) scrutinizing and analyzing (seeking and using information to understand the topic). She related students' learning processes to outcomes and identified a relationship between seeking and using information and learning outcomes of subject content. Those students who experienced scrutinizing and analyzing demonstrated a more sophisticated understanding of the subject matter, whereas those students who experienced fact-finding demonstrated a fragmented understanding (pp. 199–200).

Rather than taking a phenomenographic approach to look at Bruce's (1997a) seven IL conceptions, Webber and Johnston (2000) conducted an action research study of an undergraduate information literacy class for business students. It was found that students readily identified information seeking and sources in their

conception of information literacy. As the class progressed, the students referred less to information technology (IT) and increasingly described evaluation, application, and organization of information as being subjects distinctive to information literacy (p. 391).

Both studies of Lupton (2004, 2008) and Webber and Johnston (2000) indicate that there is a progression of IL perceptions: (1) from seeking evidence to developing an argument, then to learning as social responsibility; and (2) from emphasizing IT to focusing on information evaluation, application and organization. Limberg (1999, 2000b) further relates the hierarchical categories of IL perceptions to learning outcomes of the subject content. Students who experience IL as "fact finding", by assembling fragments of information in a discrete manner, take a surface learning approach to academic assignment. Rather, students who experience IL as "scrutinizing and analyzing", by comparing and synthesizing material and contributing their own viewpoints, adopt a deeper learning approach. Limberg (1999) suggests that educators who experience IL as biased towards IT or fact-finding may transmit this approach to their students which in turn reinforce surface learning approaches to academic assignments. In contrast, by adopting teaching methods which encourage students to experience IL in more complex ways, educators would be influencing learning outcomes in other subject areas that involve selection, evaluation and synthesis of information.

In addition to phenomenographic approach and action research, focus group interviewing has also been used to learn about the perceptions and attitudes of IL among students. The Project Information Literacy Team of the Information School,

University of Washington conducted eleven 90-minute student discussion group sessions with 86 students in total on seven university campuses in the US in 2008 (Head & Eisenberg, 2009). It was found that students' greatest challenges about conducting research in the digital age are "related to their perceived inability to find desired materials" (p. 1). Students reported that they had little or no idea how to choose, define and limit the scope of a topic, and to figure out how the topic might best fit into the course curriculum. As one student summed up, "The longest part of research is getting to the question to ask" (p. 5). Hanging around thinking what to work on, most students waited until course-related research assignments were nearly due to really spend effort on them. For those studying at research institutions with resourceful library collections, students were "sure to find something to cite" even at the last minute. Another problem encountered by students is the lack of sufficient knowledge in the technical terminology of a topic to make discerning decisions in the information search process. Also, students were unsure of the expectations of instructors, especially in large research institutions where contact with professors is less accessible. Lastly, students said they were "overwhelmed by all the choices ... lacked a necessary orientation to find things [and]... always have trouble finding what I am looking for", both online and physically in the library (p. 10). Regarding the coping strategies of students, students found libraries and librarians helpful in assisting them to retrieve "citable stuff" (p. 10). However, many participants considered formal library instruction of little value to them. They needed timely help. If they did not have the service at the moment they need it from the librarians, they would try to find the solution

online with self-taught techniques. In about three-quarters of the student discussions, participants indicated that they began their research process with Wikipedia. They used Wikipedia for locating brief overview and current information of a topic, as they saw scholarly journals too specific as a beginning step in the research process. Most students depended on Wikipedia for the references cited in their papers, though they never included the entry of Wikipedia itself in their reference list.

Rather than employing discrete quantitative or qualitative methodologies, some studies use a mix of these methodologies to explore students' IL competencies, perceptions and learning experiences. In the studies by Dunn (2002) and Bay Area Community Colleges Information Competency Assessment Project (2003), in addition to the performance-based assessment asking students to perform specific research tasks, a questionnaire-based quantitative study was also used to establish a baseline of student information competence skills. Similarly, Gross and Latham (2007, 2009, 2011) explored undergraduates' conceptions of and experience with information in a two-step process: (1) a semi-structured interview articulated the participants' perceptions of information literacy as a concept, their perceptions of how information literacy is attained, and their descriptions of their own information literacy skills; (2) participants were asked to complete the Information Literacy Test (ILT), the fee-based standardized multiple choice IL skill test developed and administered online by the James Madison University. The interviews provided data on student conceptions of and experiences with interacting with information while the ILT intended to provide a more objective

assessment of participants' skills to allow for an understanding of student perceptions as they might relate to their level of information literacy. Student scores on the Information Literacy Test provided data that allowed for comparison of student perceptions to their level of information literacy as measured by the standardized test. In another hybrid study, Lin (2008) used multiple methods: participatory observation, interviews, survey, IL tests and document analysis of students' work, to gather data on undergraduates' perception of information literacy and their performance during inquiry learning of a course. Lastly, Seamans (2002) surveyed then emailed first-year students on their understanding of the kinds of information they needed and how they acquired it during their first semester at college, and their experiences using library resources prior to arriving at the university. Later, she interviewed some of the students asking them to expand further on the information they had provided during the earlier email exchanges.

Several themes emerged from the study of Seamans (2002): (1) Participants indicated little need for information resources not provided by their faculty members during their first semester. (2) For what they did need, they were able to acquire electronically, usually using Internet search engines, as instructed by their high school teachers. All reported little use of encyclopedias, indexes and Library databases, and they found them difficult to use. (3) All students indicated that they consulted with others regarding their information needs, including peer, parents and teachers. None included library staff among those they consulted. (4) All students seemed to approach information gathering with a predetermined viewpoint they were looking to support, as opposed to broadly exploring a topic.

(5) Most students used one single word to search the Internet. They adjusted that word or change it to a phrase until they came up with the kind of information they were looking for. They did not use Boolean AND or OR to combine more than one word or phrase that represent different concepts. (6) In identification of useful websites, the students looked for information that supported their predetermined viewpoints, rather than any new ideas. "There was a sense that two Websites with the same information meant, for them, that the information was true" (p. 117).

In the studies of Gross and Latham (2007, 2009, 2011), the researchers attempted to relate IL skill level with self-estimates of skill and library anxiety. Findings revealed that the relationship between IL skills and self-assessments are evident in the domain of IL. The results were explained with the competency theory which posits that low-skilled individuals in some knowledge domains are often unable to recognize their deficiencies and therefore tend to overestimate their abilities, while students with a high level of information literacy skills are more likely to question their ability to perform. However, the study did not find an association between IL skill scores and total library anxiety scores. Despite this, a significant negative correlation between IL scores and the subscale "knowledge of the library" indicates that as IL scores rise, anxiety scores related to a lack of knowledge of the library fall. The findings indicate that traditional information literacy instruction may not be effective with non-proficient students, who are unlikely to see themselves as needing or benefiting from such instruction. Research results were also explained with the imposed query model for differentiating students' IL experience and perceptions in the processing of

self-generated (personal) and imposed (externally motivated) information tasks. Findings indicate that the first year students of the two US community college students are aware of the emphasis on "the use of multiple resources, the selection of credible resources, and the integration of knowledge gained into a tangible product" (2011, p. 181) in imposed information seeking and academic resources are seen as "safe" in this regard. However, students do not bother with all these "constraints" in self-generated information seeking. Imposed information seeking is seen as "constrained" while self-generated information seeking is seen as "open" (2011, p. 181).

Regarding Dunn's (2002) study in the California State University (CSU) which used quantitative method in phase I and qualitative performance-based assessment in phase II to examine IL competencies of their students, the researcher concludes that:

- Information literacy skills expressed as standards or competencies lack concrete variables that can be cleanly assessed;
- Current standards and competencies are cast in general language, and it is difficult to fit the concepts expressed to precise measures that can demonstrate competence; and
- Observing and recording what students do when searching for information and then comparing their actual behavior to existing standards may be the best way to judge competence. It is also the most time-consuming and costly (p. 34).

To summarize, while the reviewed research indicates that incoming students with a higher GPA usually are more information literate, there are conflicting results regarding relationship between students' self-assessment of their IL competencies and their skills in reality. No clear relationship can be established which implies that it is inappropriate to rely on students' declaration of their competencies as in the past studies using surveys. In view of the problem of self-assessment surveys and the limitation of objective tests, there is a trend in researching students' IL competencies with performance-based assessment which investigate students' performance in their real-life context. In addition, more and more studies use multiple methods including objective tests, performance-based assessment, process analysis of information task with computer screen capture and observation of the researcher, and in-depth interviews to collect a rich set of data in various perspectives of students' IL experiences.

Past research also reveals that students with good IT skills may not be information literate. The most challenging problem is to select their research topics properly. They find it difficult to choose, define and limit the scope of the topics and how to best fit them into the course curricula. In the search process, they tend to search a single word on the Internet and seldom use Boolean AND or OR to combine different concepts of their topics. Though they are able to name a few criteria for evaluating information sources, they might not know how to apply them in real life.

Further, it is indicated that there is a progression of IL perceptions, which is related to the hierarchy of learning outcomes of the subject matter. Students that

experience IL as IT skills and fact finding, tend to take a surface learning approach to academic assignments. Rather, students who conceive IL as scrutinizing and analyzing, information evaluation, application and organization, and social responsibility, adopt a deeper learning approach.

Finally, most research among the reviewed articles focus on the students' IL competencies and perceptions. Very few examine the factors affecting the competencies and perceptions and their relationship with academic performance.

2.6 Information Literacy Education in Hong Kong

In 1998, the Education and Manpower Bureau (EMB) of the Hong Kong SAR Government issued its first strategy document on IT in education - *Information Technology for Learning in a New Era:* 1998/99 to 2002/03, stating the following visions in promoting IT in education:

- Turn schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative learners;
- Link up students with the vast network of knowledge and information to enable them to acquire a broad knowledge base and a global outlook;
- Develop in students capabilities to process information effectively and efficiently; and
- Develop in students the attitude and capability for independent lifelong learning (EMB, 1998, Executive Summary)

The major strategies for the above include:

- Provide adequate IT facilities, including network facilities, for our students and teachers to enable them to access information
- Encourage key players in the school system to take up the challenges of their respective new roles, in particular teachers;
- Integrate IT into school education meaningfully through necessary curriculum and resource support; and
- Foster the emergence of a community-wide environment conducive to the culture change (EMB, 1998, Executive Summary).

Though "information literacy" was not named in this document, it shares the same group of visions stated above.

In 2000, the Education Commission of Hong Kong recommended reforming the education system of Hong Kong, with the objective of constructing a system conducive to lifelong learning and all-round development, so as to keep pace with the progress of a knowledge-based economy in Hong Kong in the 21st Century. Four key tasks should be used by schools as entry points for implementing the curriculum reform, namely "Moral and Civic Education", "Reading to Learn", "Project Learning", and "Information Technology for Interactive Learning" (Education Commission, 2000).

To promote information technology for interactive learning, the Education and Manpower Bureau (EMB) issued the second strategy document for IT in education - *Empowering Learning and Teaching with Information Technology* in 2004. As a review of its first strategy in IT in education, this second strategy document concluded that "all schools are connected to the Internet; teachers have

acquired at least basic skills and embraced IT as a teaching tool; students are using IT and the Internet in project-based learning" (EMB, 2004, Foreword). It proposed five "next strategies" of IT in education and one of them is to define information literacy levels to set targets for students to develop IT skills and use them for learning and communication. The following were stated as the general learning outcomes of information literacy:

- basic operations and concepts of IT, including when to use what tools and when not to use;
- social and ethical issues relating to the use of IT;
- use of IT as a productivity tool, a communication tool, a collaboration tool, a research tool and a decision-making tool;
- strategies and skills for information retrieval and critical evaluation of different information sources;
- use of IT tools for information management and data analysis; and
- knowledge management concepts and practices to support sustained work and collaboration (EMB, 2004, pp. 13-14).

A broad framework of "Information Literacy" for students would be developed to help teachers and students have a clearer picture on the learning targets of using IT in education. To help teachers assess students' attainment on the learning targets outlined under the Information Literacy framework, appropriate assessment tools for use by teachers would be developed, which should be performance-based and fully integrated with an IT-enriched pedagogy (EMB, 2004).

It should be cautiously noted that the concept of information literacy indicated in this EMB policy document mixed up IL with IT and saw IL equivalent to IT. It deviates a lot from the well-established IL definitions adopted across the world presented earlier in the literature review. It reveals that IL is considered as some sort of IT skills, and information is only available in digital format and accessible through information technology in the official curriculum.

2.6.1 Information Literacy Framework for Hong Kong

In 2005, EMB issued the *Information Literacy Framework for Hong Kong:*Building the Capacity of Learning to Learn in the Information Age drafted by academics from four higher education institutions in Hong Kong. In contrast to the IL definition given in the above section, it incorporates major views of IL around the world and presents eleven IL standards grouped under cognitive, meta-cognitive, affective and socio-cultural dimensions, as follows (EMB, 2005a, pp. 13-17):

Cognitive dimension

- An information literate person is able to determine the extent of and locate the information needed.
- An information literate person is able to apply information to problem-solving and decision making.
- An information literate person is able to analyze the collected information and construct new concepts or understandings.

 An information literate person is able to critically evaluate information and integrate new concepts with prior knowledge.

Meta-cognitive dimension

- An information literate person is able to be aware that information processing is iterative, time-consuming and demands effort.
- An information literate person is able to plan and monitor the process of inquiry.
- An information literate person is able to reflect upon and regulate the process of inquiry.

Affective dimension

- An information literate person is able to recognise that being an independent reader will contribute to personal enjoyment and lifelong learning.
- An information literate person is able to recognise that information processing skills and freedom of information access are pivotal to sustaining the development of a knowledge society.

Socio-cultural dimension

- An information literate person is able to contribute positively to the learning community in knowledge building.
- An information literate person is able to understand and respect the ethical,
 legal, political and cultural contexts in which information is being used.

2.6.2 Models of Articulating Information Literacy into the School Curriculum

In 2007, a report Provision of Consultation Service: Revamp of the Teachers' IT Training Framework: Final Report was submitted to the EMB by the Joint Consultation Service Team (JCST) composed of academics from four higher education institutions in Hong Kong. This training framework "aims to sustain teachers' professional development opportunities to advance teachers' information literacy and pedagogical integration of information and communication technologies (ICT), as well as to develop models of teacher education that will foster the establishment of teacher learning communities that will in turn generate, refine, consolidate and disseminate emerging pedagogies and professional competencies" (JCST, 2007, p. 4). The JCST conducted eleven focus group sessions and seven in-depth interviews with teachers, principals, curriculum development officers, and important stakeholders to collect views about the situation of ICT use in teaching and learning, their expectation of ICT competencies for teachers, professional development opportunities to advance teachers' information literacy and pedagogical integration of ICT, and the models of professional development appropriate for teachers. Respondents' views on information literacy were diverse. Some teachers associated IL with project-based learning in which students needed to search and process a lot of information, while some regarded it as use of the library, or education against computer crimes, plagiarism and infringement of intellectual property rights, or an embrace of both information and technology. Despite this, respondents generally agreed that IL and ICT in education are interwoven one with and the other. Regarding the integration of IL into the

curriculum, EMB officials claimed IL should be taught in every subject but most of the science and mathematics teachers indicated that it would be difficult to integrate IL into science and mathematics except the curriculum area on Science, Technology and Society. Rather, most Liberal Studies teachers and some principals regarded Liberal Studies and General Studies the most appropriate platforms (Li, Kong, Lee, & Henri, 2006).

Three models of articulating IL into the existing curriculum were proposed by JCST:

- Full Integration Model Information literacy should be fully integrated into
 or across subjects as it is the ultimate goal of IT in education. Without any
 connection to any subject matter, it is hard to teach the cognitive or
 meta-cognitive skills of the IL Framework.
- Hybrid Model While acknowledging the need to infuse IL into and across
 subjects, it would be more effective to have a separate subject to help
 students develop the basic knowledge and skills pertinent to information
 searching and retrieval skills, Chinese inputting methods, use of particular
 software applications and Internet tools, intellectual property rights,
 Internet crimes, etc.
- Separation Model Develop students' IL skills through library and IT lessons
 to ensure the delivery of a consistent and structured ICT curriculum and the
 allocation of resources for IT in education within a school, at the same time,
 minimize the "disturbance" to IT implementation.

Regarding improving teachers' ICT capability in the domains of information literacy and pedagogical integration of ICT, the JCST recommended integrating them with their teaching activities in every possible subject area in school and beyond. (JCST, 2007, pp. 4-8).

2.6.3 Assessment of School Students' Information Literacy

In addition to the teachers' IT training framework, the Education Bureau (EDB) had also invited local tertiary institutes to develop self-evaluation tools for assessing students' IL in major Key Learning Areas (KLAs) at the Primary 1 to Secondary 3 levels. In January 2011, the Education Bureau sent a circular memorandum (No. 13/2011) to all heads of primary and secondary schools informing them that the launch of the website Education Tools for Assessing Students' Information Literacy and Promoting Information Literacy among Students and its dissemination seminar. It noted that the EDB appointed the Centre for Information Technology in Education (CITE) of the University of Hong Kong in August 2009 to conduct a one year project Development of Evaluation tools for Assessing Students' Information Literacy and Promoting Information Literacy among students. Five primary and five secondary schools participated in the project and Science Education was selected as the Key Learning Area for the study in the project. The project has been completed and a dissemination seminar organized by CITE was held in February 2011, which aimed to introduce the curriculum design for integrating Information Literacy into the junior secondary Science and primary General Studies, the development and the use of the assessment rubrics and

evaluation checklists for self-assessment and peer-assessment to support assessment for learning in scientific Information Literacy as well as share school-based experiences in this project.

Yuen, Law, Lee, and Lee (2010) took up the CITE project Information Literacy Performance Assessment (ILPA) commissioned by the Education Bureau and developed a rubric modified from NCREL (2003) to assess the IL performance of Primary 5 (P5) and Secondary 2 (S2) students in Hong Kong. Mathematics and Chinese language were selected for IL assessment at P5 while Science and Chinese language were those for S2 students. The performance assessment (PA) tasks the technical proficiency tasks and the information literacy tasks for the two subjects, were delivered online. It was found that most of the students were equipped with the basic technical skills in operating a computer, using the basic functions in the Office suite of applications, and surfing the Web. In terms of IL skills, students were competent in "lower level IL skills like defining and assessing information" but were very weak in tackling complex tasks which involved "higher level IL skills including integration, evaluation, creation and communication" (p. 200). Students performed worst on the items that required them to use digital tools which were specific to the subject discipline such as simulation in science and exploratory geometry tools in mathematics. In addition, there was a wide range of IL performance between schools for such items. No correlation between the school achievement banding and the overall student achievement level in IL could be found. The wide variations in students' IL achievements within schools and between schools indicated that both student background and their learning

experience in school are the factors that determine the students' IL achievement. Lastly, while comparing students studying in international schools and local schools, it was found that those students in international schools had better technical skills and were more inclined to use online tools such as search engines and online translators to gather information through different sources, whereas those in local schools preferred seeking answers directly from websites such as "Yahoo Knowledge". It was concluded that learning experiences in school are critical in determining students' IL achievement and "there is still a long way to go with ICT use in classrooms and nurturing 21st Century skills in Hong Kong" (p. 201).

The project of CITE commissioned by the Education Bureau aimed to assess IL skills of Primary 6 (grade 5) and Secondary 2 (grade 8) students during the 2006/07 school year while the study of Van Aalst, Hing, May, and Yan (2007) focused on secondary school students. Van Aalst et al. (2007) explored information literacy in secondary schools in Hong Kong, in view of the current curriculum reforms emphasizing learning how to learn and project-based learning, and the most recent reform in implementing "Liberal Studies" as a mandatory school subject in senior secondary school. The researchers performed a case study of the information searching process (ISP) among Secondary 6 students in a Liberal Studies course to examine the information sources they used, their cognitive and emotional experience during the ISP, and the communication within the collaborative groups. Findings indicated that Internet-based sources were predominant but most students had difficulty completing the ISP. They concluded that the process of interpreting information requires effort and the students need

help in developing a theory of knowledge in which the meaning of information is contextual. Such work is important if collaborative inquiry projects in Liberal Studies courses are to lead to deep learning.

2.6.4 Information Literacy for Higher Education in Hong Kong

There is not any territory wide information literacy framework for higher education in Hong Kong. Out of the eight tertiary education institutions in Hong Kong, only one university offers an elective credit course solely on IL, two integrated IL with other IT components into a credit course, two make IL a part of the IT proficiency graduation requirement and two are considering to do the same for the purposes of quality assurance. There is no trend to have IL integrated into the university curricula.

2.6.5 Research Studies on Information Literacy of University Students in Hong Kong

Very little research effort has been spent on studying information literacy of undergraduate students in Hong Kong. The studies performed by Chu and Law (2007a, 2007b, 2008) examined the information search processes of postgraduate students, rather than information literacy as a whole. They examined the development of information search expertise of 12 beginning research students in Hong Kong who were provided with a set of systematic search training sessions over a period of one year. Six of the students were studying education and six were studying engineering. The inclusion of both education and engineering students

allowed the researchers to examine whether search expertise development is different for students in different domains. The study took a longitudinal approach, using surveys, interviews, think aloud protocols and direct observations of students' searching behavior over the course of one year. Both quantitative and qualitative methods of data collection were used. Growth and development data about the search capabilities of the students in five research meetings conducted over a period of one year were examined. Four kinds of data were used for analysis: (1) search statements used by students when searching various databases, (2) data transcribed from students' think-aloud protocol as they verbalized their thoughts and actions while performing database searches, (3) data collected from a questionnaire that asked students to assess their familiarity with (and the perceived importance of) various information searching skills, and (4) data transcribed from interviewing the students. According to Chu and Law (2008), this approach is regarded as a 'basic interpretive qualitative study' (Merriam, 1998, 2002). Findings of the study revealed that, in the beginning, students performed more questionable subject searches and fewer keyword searches; later, as they understood more about subject searching and the power of keyword searches, they performed fewer subject searches but with greater accuracy and more keyword searches. The study also found that education students tended to use more complex keyword searches and formed more sophisticated search queries than did engineering students. Students' perception of the importance of searching skills increased as these skills became more familiar, which in turn led to more frequent use of the skills.

In view of the scarcity of research effort in studying IL among students in Hong Kong, and with past studies focusing on Primary 5 and Secondary 2 students (Yuen et al., 2010), Secondary 6 students (Van Aalst et al., 2007) and university postgraduate students (Chu & Law, 2007a, 2007b, 2008) only, the current study investigates the educational needs of IL among university undergraduate freshmen in Hong Kong.

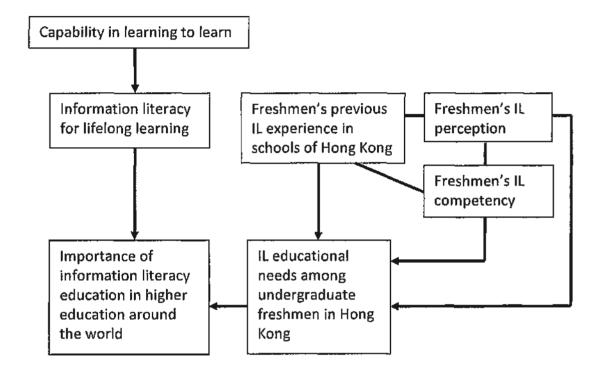
2.7 Research Framework of the Current Study

The following most cited and generally considered an authoritative description of an information literate person is adopted in the current study:

To be information literate an individual must recognise when information is needed and have the ability to locate, evaluate and use effectively the information needed. ... Ultimately information literate people are those who have learnt how to learn. They know how to learn because they know how information is organised, how to find information, and how to use information in such a way that others can learn from them (ALA Presidential Committee on Information Literacy 1989, p. 1).

To facilitate IL for lifelong learning among university students in Hong Kong, it is significant to understand the educational needs of the undergraduate freshmen. Figure 1 summarizes the educational context and the critical components of understanding the IL educational needs among Hong Kong university freshmen.

Figure 1. Information Literacy Educational Needs of University Freshmen in Hong Kong



Chapter Three

RESEARCH DESIGN

3.1 Research Methodology

There are two major strategies of carrying out educational research: quantitative and qualitative methodologies, inheriting diverse epistemological and ontological views (Creswell, 1994). The decision to adopt which methodology should closely relate to the nature of the research problem. In quantitative research, discrete quantitatively measured variables are identified and the relationships between these variables are investigated. Also, the relationships between the variables are generalized across all relevant circumstances to deduce universal laws (Hammersley & Atkinson, 1995). In contrast, qualitative research "is multi-method in focus, involving an interpretative, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 1994, p. 2). In other words, "qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world" (Merriam, 1998, p. 6). In such research, theory emerges "from the bottom up (rather than from the top down), from many disparate pieces of collected evidence that are interconnected" (Bogdan & Biklen, 1998, p. 6), in an inductive process (Wiersma, 1995).

This proposed study aims to understand the information literacy competencies and perceptions of university freshmen in Hong Kong and their past IL learning experiences, in order to get a better understanding of their educational needs. As "reality is constructed by individuals interacting with their social worlds" (Merriam, 1998, p. 6) and "human behavior is always bound to the context in which it occurs, ... social reality cannot be reduced to variables in the same manner as physical reality" (Ary, Jacob & Sorensen, 2010, p. 420), hence the past information literacy learning experiences of students, their current IL perceptions and competencies should not be studied outside their natural settings and dissected into measurable "variables". Dissecting the contexts into discrete factors will only distort the understanding of what is taking place (Carspecken, 1996). Instead, diverse forms of data collected by multiple methods are needed to "understand the behaviour, values, and meanings of any given individual (or group)" by taking account of their cultural context (Massey et. al. 1998, p. 5). Information literacy perceptions, competencies and learning experiences should be examined in a holistic manner under the natural environment, rather than relying solely on quantitative means for exploring interaction between discrete variables.

The current study adopts multiple methods to collect diverse forms of data with a strong emphasis on the cultural context, including (1) a survey for a quick baseline IL competency assessment and investigation of the IL experiences and perceptions among incoming undergraduate students; (2) observations and process analysis of an information task performed by these students in their natural educational settings, to throw light on how they think about information, where

they seek it and how they find it, and how they select and organize the information they find; and (3) in-depth semi-structured interviews for a holistic study of individual student participants' information literacy. The researcher observed what happened, listened to what was said, and asked questions to throw light on the issues that are the focus of the research (Hammersley & Atkinson, 1995, p. 1).

3.2 Data Collection

In view of the limitation of resources, the current study focused on the university freshmen of a large comprehensive university (University X), rather than all eight higher education institutions in Hong Kong. In the first week of the new academic year in September 2010, all university freshmen of this comprehensive university in Hong Kong (University X) were invited by email to complete an optional online survey for a quick baseline IL competency assessment and investigation of their IL experiences and perceptions. Students were told in the emails that three participants of the survey would be randomly picked to have a HK\$200 book coupon each. Participation of the survey ceased at the end of September 2010 to ensure that these students had not yet received much instruction on IL at the At the end of the survey, students were further invited to indicate university. their interest in participating in a two-hour follow-up session with a reward of HK\$100 at the end of that session, and to leave their email contact for such purpose. Students who indicated interest in the follow-up session were split into three groups by their scores of the competency items of the survey – high, medium and low score groups. Four students from each of the three groups, twelve in total,

were invited by email in early October 2010 to participate in the two-hour follow-up sessions, in which students were asked to perform an information task and attend an interview. Detailed arrangements of data collection are further elaborated in Sections 4.1 and 4.2 of Chapter 4 (Findings). The following is a full description of the survey, the information task and the interview.

3.2.1 Survey of IL Experience, Perception and Competency

For the current study, a number of instruments were examined for surveying the baseline data of students' information literacy. Two of them are multiple choice information literacy assessment tools based on the ACRL's *IL Competency Standards for Higher Education*: (1) the Information Literacy Test (ILT) developed by Cameron and Lottridge (2007) at James Madison University; (2) the Standardized Assessment of Information Literacy Skills (SAILS) developed by O'Connor, Radcliff, and Gedeon (2002) at Kent State University. Since both ILT and SAILS have been developed into standardized information literacy tests licensed for use by other organisations for a fee per student, and questions of both tests are not disclosed and can only be assessed on their computer servers during a charged test, neither tests were used in the current study in view of their high test fee and the strict restriction regarded accessibility to the test questions.

The third instrument that had been under consideration is the iSkills Assessment (the former ICT Literacy Assessment) developed by the Educational Testing Service (ETS). As indicated in the website of ETS, the iSkills Assessment was replaced by the one-hour outcome-based iCritical Thinking Certification

examination in 2009, which does not just assess information literacy but other skills as well. As the new iCritical Thinking Certification examination includes other students' competencies including computer skills and caters for final year students, it is not suitable to be used as the information literacy assessment tool for the current study.

The fourth instrument that had been looked into was developed by the Bay Area Community Colleges (BACC) Information Competency Assessment Project in 2000. It is a collaborative effort of faculty librarians in the San Francisco Bay Area. Its information competency assessment instrument is a blended test, made up of two parts: Part A is mainly an objective test, consisting 47 multiple-choice, matching, and short answer items; while Part B is made up of 12 performance-based exercises. Both tests are criterion-referenced to Standards 1, 2, 3 and 5 of the ACRL's Information Literacy Competency Standards for Higher Education and two field trials had been conducted (Rockman & Smith, 2005). In view of the fact that the questions have good coverage of the ACRL's IL Competency Standards for Higher Education, catering for introductory level of information literacy competency, being free and readily assessable on request by researchers, and with good documentation explaining how each question was scored (BACC Information Competency Assessment Project, 2003), seven of its objective test questions have been modified to form part of the IL competency assessment tool of the current study, with permission from one of its developers. Also, its performance-based exercises have been adapted for the worksheet of the process analysis information task for the current study.

Survey Used in the Current Study

Together with the ICritical Thinking tool of ETS, Information Literacy Test (ILT) of James Madison University and Project SAILS highlighted above, the Research Practices Survey (RPS) has been named by Jarson (2010) as one of the four multi-institutional standardized assessment projects for assessing IL in higher education.

After examining all the instruments named above, the RPS, a fifteen-minute online questionnaire which measures three dimensions of student information literacy: experience, perception and competency, has been found to be the most suitable instrument for the current study. RPS is a web-based assessment tool for measuring the information literacy of university freshmen, before they have had any university library instruction. It was developed by a group of librarians, faculty, assessment professionals, and information technology professionals from eight US institutions (Carleton College, St. Olaf College, Grinnell College, Macalester College, Lake Forest College, University of Chicago, Ohio Wesleyan University, and DePauw University) in 2004, with technical support and grant funding from the US National Institute for Technology and Liberal Education (NITLE). This grant-funded project was originally called the First Year Information Literacy in the Liberal Arts Assessment (FYILLAA) and has now known as the Research Practices Survey nationally administered by the Higher Education Data Sharing Consortium (HEDS) of the US. RPS aims to provide data about students' experiences, dispositions, and proficiencies in conducting effective academic research in a liberal arts setting (NITLE, 2007). According to its developers, RPS is a collaborative, holistic, and

"utilization-focused" model for assessing information literacy, and is a valid and reliable assessment tool to establish baseline data (Beld & Sweet, 2008; Sanford, Beld, & Millichap, 2007). After piloting and revision in 2005-06, RPS was administered to 4,400 incoming first-years in 2006-07 in twenty liberal art institutions in the US, with participation rates ranging from 28 to 89 percent (with 11 colleges greater than 44 percent). Half of the participating institutions used the RPS to gather baseline data about the research practices of incoming first-years, before they had received any instruction in university-level academic research; the other half used it as both a "pre-test" and a "post-test," administering the instrument to first-years at both the beginning and the end of their first year of university (NITLE, 2007). In Fall 2008, prior to the beginning of classes, RPS was further administered to 6,273 first-year students at 39 NITLE liberal art institutions. Similar to previous years, some institutions also used it as a "pre-test" and a "post-test" to first-years at both the beginning and the end of their first year of university.

The whole set of questions of RPS has been posted on the NITLE website and is licensed under Creative Commons. In the current study, it was adapted as the survey instrument for collecting baseline data of IL competency, perception and experience among university freshmen. In RPS, there are 36 questions on IL experience, 32 questions on IL perception, 24 questions on IL competency, and three questions on demographic information (college classification, gender and ethnicity). In the current study, in view that there are not many questions on competency in RPS, and participating institutions of RPS are permitted by HEDS to

add ten survey items specific to their institutions, one question (item 1.4) on IL experience, seven questions on IL competency (items 10.4 to 11.5) adopted from the objective test of the Bay Area Community Colleges (BACC) Information Competency Assessment Project have been added. The questions were slightly modified to fit in the culture and the language usage of Hong Kong students. For example, the English language was simplified. Question on students' belief about research (item 5.2) was rewritten to suit the local situation, whereas questions on demographic information (items 12.1 to 12.5) were customized to ask about the genre, faculty, student status, year of study, and the grade point average (GPA) for admission of the students. The modified instrument has been named the *Survey on Use of Information* in the current study. To improve its validity, the survey has been validated by two academic librarians in Hong Kong who are experienced in designing IL test questions.

In early September 2010, emails were sent to all new undergraduate students of a large comprehensive university in Hong Kong (University X), inviting them to participate in an online survey known as the *Survey on Use of Information* mounted in the secure e-survey server of that university. The invitation email message and the whole survey are attached as Appendix B and Appendix C respectively. In the email, the purposes of the survey were stated and it was emphasized that participation was completely voluntary and all responses would be kept strictly confidential.

3.2.2 Process Analysis of Information Task Performed by Individual Students

Twelve freshmen from University X were recruited in October and the first week of November 2010 to participate in a two-hour one-to-one follow-up session with the researcher, beginning with an information task to be performed by individual students and followed by the in-depth semi-structured interview. Individual students were asked to work alone on an assigned information task for around 1.25 hours, with the researcher as the observer. The students were encouraged to retrieve information in the ways they ordinarily would if this was a class assignment. During the process, the researcher did not provide any assistance but only prompted the students with general and open ended questions to understand the steps they took and the decisions made, including: Tell me about what you are doing now? How did you decide to select that keyword? How did you select that search engine or database? While observing the students, the researcher jotted down some field notes detailing the students' activities. In addition, the process taken online was captured with the screen capture software CamStudio to provide more information on the pattern of search practices, and the whole process was audio-taped.

In the current study, one of the information tasks administered to California State University (CSU) students in the CSU Information Competency Project by a team of researchers in 2001 was adapted. The topic was chosen because it can accommodate students from different background, and can be easily understood by them (Dunn, 2002). In addition, the student worksheets for this particular task developed by the CSU Information Competency Project were also adapted for the

current study, with the English language simplified. Both the task and its worksheets went through expert validation by two academic librarians with more than ten years of experience in IL instruction. Also, a pilot study with an undergraduate freshman of University X was conducted. The English language and the complexity of the task were then further simplified. After the necessary modification, the task was presented to the students as follows:

Your instructor mentioned in class that farm workers are routinely exposed to pesticides and suffer many health problems due to the practices of farming corporations. You are asked to write a 3-5 page research paper (with a reference list) on one or two aspects of this subject, including possible solutions to the problem.

All sessions of the information task were conducted in Cantonese, the mother tongue of both the students and the researcher, and took place in the library of University X, to provide a natural educational setting for the study. At the beginning of the follow-up session, individual students were asked if they agreed to have the session audio-recorded. They were then asked to complete and sign a research consent form (Appendix F), permitting computer screen capturing and audio-recording of the process, and use of their data for research. As indicated in the consent form, the students were assured that any data collected in the session would be used for research purposes only and be held strictly confidential and anonymous. Participation in the study was totally voluntary and they were free to withdraw from the study at any time.

Also, the students were reminded that they could use all the resources in and out of the library and could approach other people for help. The students were then asked to fill in page one of the Information Task Student Worksheet (Appendix G) for gathering some information on the students' subject knowledge and interest on pesticides, farm workers and agricultural business. Afterwards, the researcher passed page two of the Worksheet to the students and asked them to list as many possible ways as they could think of to do the research before starting. The students were then asked to start the research, and the screen capturing software was turned on.

At the end of the task, the students were requested to fill in page 3 of the Worksheet, to narrow down the topic to one or two aspects of the subject, and to select one information source he/she found useful for the research and to write a citation of it, in a format that academics commonly used. The students were also asked to name the citation format used. Lastly, the students were requested to note down other things they would do if given more time.

3.2.3 In-depth Semi-Structured Interview

The information task was followed by an interview conducted in Cantonese to clarify the information task process and to understand the students' IL perceptions and their past learning experiences. All interviews were audio-taped and then transcribed. The following interviewing questions, modified after a pilot study with an undergraduate freshman of University X, were asked in the session if the researcher found it appropriate:

- 1. How do you find the task you just worked on? Do the steps you took just now reveal your past practices?
- 2. In the past, what were the occasions that you needed to use information for school work? How often? Any example?
- 3. How about in your everyday life?
- 4. Did you enjoy the process in information use?
- 5. How would you rate your ability in using information?
- 6. Where and how did the ability develop?
- 7. You used computer and the Internet to look for information just now. Who taught you how to do so?
- 8. Have you sought any guidance from any teacher or librarian? Were they useful?
- 9. How about from parents? Peers?
- 10. Did you have any instruction on the evaluation of information sources?
- 11. How about intellectual property, rights and freedom of access to information, plagiarism and citation style?
- 12. This research is about the use of information. Do you think that the knowledge and skills in using information is important?
- 13. If there are courses on knowledge and skills in using information, would you attend?

A guide on both the information task and the interview in the face-to-face follow-up sessions (Appendix H) was prepared by the researcher as a reminder of all the steps and questions of the sessions.

3.3 Analysis and Interpretation of Data

A variety of data had been collected through multiple methods described above, including the baseline survey data on the students' IL experiences, perceptions and competencies; direct observation and screen capturing of the information tasks; audio recordings of the students' verbalization of their thoughts during the task; the students' worksheets, notepads and saved files for the task; and the audio-recordings of the interviews and their transcription. All these data were analyzed and triangulated to increase the validity of the study (Lam, 2000), following the guidelines proposed by LeCompte and Preissle (1993).

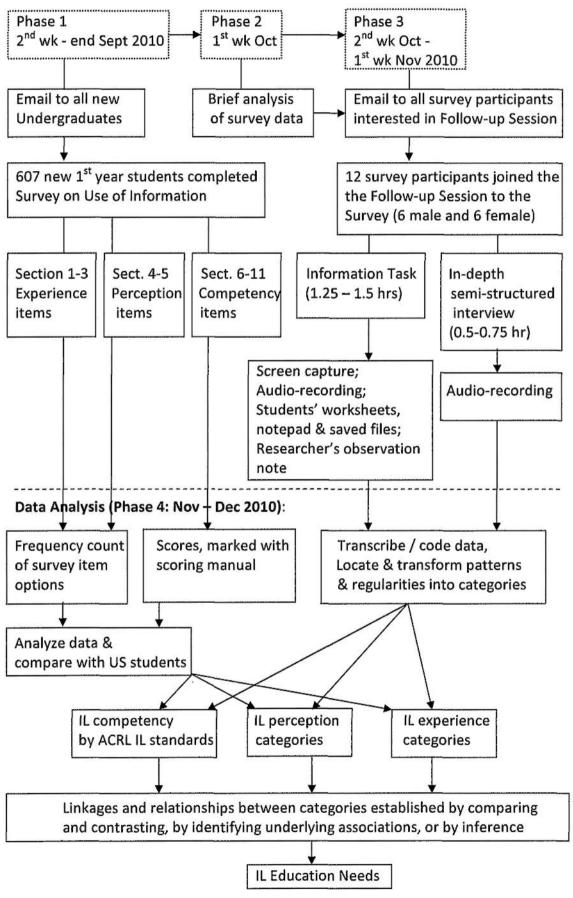
According to LeCompte and Preissle (1993), the first step is "tidying up". Researchers have to review the original research questions to decide how to retrieve the data, what to do with it, and what it all means. The second step involves "scanning" to re-read the collected data. The process checks the completeness of data on the one hand and locates and transforms patterns and regularities into categories on the other. While scanning the data, researchers should start theorizing as well. In the theorizing process, categories embedded in the data should be discovered, and the relationships among those categories will be established. There are four components of theorizing: (1) perception, (2) comparing, contrasting, aggregating, ordering, (3) establishing linkages and relationships, and (4) speculation. During the perception stage of theorizing, researchers should describe what they observe and divide the observed phenomena into units. Then, they have to compare and contrast the units by asking "Which things are like each other?" "Which things go together, and which do

not?" The next step is to determine which of the described items are associated with each other and how they can be aggregated into groups. This requires identifying the properties that the data units of a particular category share. Linkages and relationships between categories may be established "by simple comparing and contrasting, by identifying underlying associations, by inference, or by statistical manipulation" (LeCompte & Preissle, 1993, p. 246). The fourth component speculation involves the "informed guesswork" of what will happen in the future, based upon what has been learnt in the past about constructs and linkages among the data (LeCompte & Preissle, 1993, p. 247).

In the current study, the researcher established categories within which the data were organized and sorted all bits of data into the relevant categories. Regarding IL competency, the ACRL's *Information Literacy Competency Standards* for Higher Education was used to analysis the students' IL performance. Chunks of data were assembled so that they became a coherent whole. The researcher then wrote a narrative summary to summarize major issues discovered in the course of investigation. A whole phenomenon started to emerge afterwards.

A summary chart of the methods in data collection and analysis for the current study is provided on the next page (Figure 2. Data Collection and Analysis).





3.4 Strengths and Limitations

As learning is complex and multidimensional, the use of multiple instruments and methods is necessary to capture learning from various dimensions — cognitive, behavioral, and affective (Gratch-Lindauer, 2003, p. 26). The strength of the research method of the current study lies in the rich detail about the ways students actually think, feel and behave at every stage of using information in real-life situations, provided by the baseline data on the three dimensions of IL (experience, perception and competency) collected via the survey, observation and screen capture of information task performed by the students, audio recording of the students' verbalization of their thoughts in that process, and the in-depth semi-structured interview.

The multiple choice section of the IL competency assessment tool of the current study composes of objective test questions with good coverage of the IL Competency Standards for Higher Education (ACRL, 2000). It provides a relatively reliable and easy to manage baseline assessment of the student participants' IL knowledge. With reference to the score range of the student participants of the US NITLE institutions, the researcher can have a quick idea of the competency level of the student participants of the current study.

However, the limitations of these multiple-choice IL test items should not be overlooked. They are "less valid for testing higher-level cognitive skills such as analysis, synthesis, and evaluation, or to determine process learning and the acquisition of concepts" (Grassian & Kaplpwitz, 2001, p. 281). Also, they reveal only whether the student can recognize, recall or "plug in" what was learnt out of

context (Wiggins, 1990, para. 3), and cannot really test how the learner would react in a real-world situation (Oakleaf, 2008). "It is obviously one thing to acquire a concept and quite another to use it in ... learning related new meanings, and in solving problems" (Ausubel, 1968, p. 509).

To mitigate these shortcomings and to obtain more information on the performance-based process oriented data in the current study, student participants were invited to perform an information task similar to their coming university assignments in the presence of the researcher as both an observer and interviewer. Further, in-depth semi-structured interviews with the students allow deeper understanding of their subjective meaning.

Since the sophisticated information task takes about 1.25 hours to finish, student participants were asked to work on a common task only. To ensure that the task can be easily understood by the students, the selected one is multidiscipline oriented and can accommodate students from different background.

According to Ramsden (1992), students' perceptions of their experiences of the courses, teaching and assessment form their context of learning or educational environment. In the current study, understanding of the undergraduate freshmen's previous IL experience in school was based on their perceptions but not data collection in schools.

To conclude, the current study builds on the perspectives of the participants in their natural setting, employs multiple methods in data collection, and triangulates multiple sources of information to avoid bias and to ensure accuracy of the data. The test items of the IL competency assessment tool are structured

according to various standards of the *IL Competency Standards for Higher Education* (ACRL, 2000) (Appendix A). To enhance the validity and reliability respectively, expert validation of the instruments of the survey and the information task, as well as the interpretation of the collected data had been undertaken. In addition, pilot study of the information task and the interview had been performed to refine the task and the questions.

In the current study, data analysis is inductive, and interpretation of all data will be carried out within the context of the setting of data collection. However, the findings are limited because of the small sample size of student participants. The study was only based on one study site — a comprehensive research university in Hong Kong, and only 607 undergraduate freshmen of this university participated in the survey while just twelve students were invited to join the information task and the interview. It implies that the findings cannot be generalized with certainty to the larger population of university freshmen in Hong Kong. Notwithstanding the small sample size, the study reveals the educational needs of information literacy among university freshmen in their coming university study on the one hand, and throws light on keys to implementation of information literacy education for the education reform on the other. Theories built upon the current study might be adapted for use both locally and elsewhere (LeCompte & Schensul, 1999).

Chapter Four

FINDINGS

In this chapter, findings of the survey, information task and the in-depth interview are presented in Sections 4.1 to 4.3 respectively. In Section 4.4, results obtained by these three methods are triangulated, cross-referenced and summarized to provide an overview of the current IL competency and perceptions, and past IL experiences of the student participants. Throughout the analysis, findings of the current study are compared with the results of RPS administered to 6,273 undergraduate freshmen in 39 US NITLE institutions, based on the RPS reports of two of the participating institutions (Earlham College and Lafayette College) which have been released on their official websites. The RPS results of the 39 US NITLE institutions provide a convenient reference point of the IL competency of undergraduate freshmen. In particular, such data is not available in Hong Kong.

4.1 Survey on Information Literacy Experience, Perception and Competency

In early September 2010, 3,825 emails were sent to all new undergraduate students of University X, inviting them to participate in an optional online survey named as the *Survey on use of Information* mounted in the secured e-survey server of that university. 679 new undergraduate students completed the survey by the end of September 2010, after which the survey was cut off from further access (18 percent response rate). Out of the 679 participants, 72 of them indicated they

were year two to four students. As the current study focuses on university freshmen, responses of all these 72 participants have been excluded from the results. Survey results of the 607 new year-one undergraduates were listed in Appendix D.

4.1.1 Demographic Information

Demographic information of the 607 new year-one undergraduate students who participated in the online survey is listed below. As indicated in Tables 1a and 1b, there are rather balanced responses between male and female survey participants, and among undergraduate freshmen of the eight Faculties of University X. The ratio of male and female undergraduate students, and the number of first year undergraduates in each Faculty of University X is not publicly accessible. The number of undergraduates in each Faculty has been used to indicate the student distribution among Faculties in University X.

Table 1a. Gender of the Survey Participants

Gender	No. of Survey Participants	Percent	
Male	269	44.32	
Female	338	55.68	
Total	607	100.00	

Table 1b. Faculty of the Survey Participants

	% of students in each		
Faculty	Faculty against the total of	No. of	Percent
•		Participants	
	undergraduates of Univ. X		
Arts	13	101	16.64
Business Administration	21	117	19.28
Education	3	25	4.12
Engineering	14	90	14.83
Law	2	12	1.98
Medicine	14	58	9.56
Science	15	116	19.11
Social Science	13	88	14.50
Total	95*	607	100.00

^{*}The other undergraduates are in double degrees or interdisciplinary streams.

4.1.2 Information Literacy Experiences

Amount of Research

Seventy-four percent of the new undergraduate students needed to gather information for school assignments or projects monthly or more often in their last school year. Fifteen percent needed to complete five or more assignments, papers or projects requiring at least three information sources in their reference

lists, while 21 percent had to almost always or often use a specific citation format in their research assignments.

Use of Library

Forty-eight percent of the students indicated that they used the school library at least once a week or more. The most frequent reason for using the library was to do a variety of academic work (studying, doing homework, etc.). One fifth of the students used the library for conducting research for course assignments or projects while 30 percent used it for leisure reading, checking out music or videos, checking emails or other recreation purposes.

Use of Information Sources

In general, students preferred online sources to printed ones. Eleven percent of students did not use any print sources for research but only three percent did not use any online sources for research.

Regarding the use of print sources in their last year of secondary school, students mainly used library books, followed by newspapers and magazines. Less than one third of them used printed academic journals, encyclopedias and dictionaries.

In terms of online sources, 36% of students used Google, Yahoo or other internet search engines but only 18 percent used online indexes and twelve percent used Google Scholar to search for information.

Consultation with Instructors and Librarians

About one third of the students received instruction from an instructor or a librarian on how to use library and internet resources in their last school year. When they worked on research assignments, they almost always or often sought advice from friends, classmates or siblings (66 percent of students sought advice from friends, classmates or siblings, 49 percent from teachers, 32 percent from help screens or other e-resources, 27 percent from tutorial schools, 15 percent from parents or other adult family members, 13 percent from librarians). Over the course of their last school year, 38 percent talked with a librarian at least once about a research assignment (13 percent at least three times a year).

Organization of Information

Seventy-four percent of students used computer folders to organize the gathered information for research assignments while 73 percent used paper folders, 58 percent used email, 28 percent used online tools and four percent used bibliographic software. Three percent indicated that they did not use any tools for such purpose.

Pacing of Work on Research Assignment

Forty-three percent of the students usually did most or all of their work on or just before the due date.

Comparison with undergraduate freshmen of the US

Survey results of the current study were compared with 6,273 new undergraduate students of 39 NITLE institutions in the US. Table 2 highlights the comparison.

Table 2. Comparison in Freshmen's Past IL Experiences between University X in Hong Kong and 39 NITLE Institutions in the US

Experience in the Use of Information in the Last Year of	Percentage of			
Secondary / High School	Under	Undergraduate		
	Freshmen			
	Univ. X	39 US		
0 1.15	450/	Institutes		
Completed 5 or more papers requiring at least 3 sources	15%	45%		
Needed to almost always or often use specific citation	21%	82%		
format for sources in the reference lists				
Used a school library once a week or more	48%	26%		
Used a library for:		· · · · · · · · · · · · · · · · · · ·		
Conducting research for school assignments or projects	20%	40%		
Studying or doing homework etc.	46%	35%		
Leisure reading, checking out music or videos, checking	30%	22%		
emails, or other recreation purposes				
Other	2%	2%		
I did not use a library in the past year	1%	2%		
Print sources used:				
Library books	69%	84%		
Encyclopedias, yearbooks, dictionaries, etc	27%	72%		
Academic or research journals	32%	44%		
Newspapers or magazines	45%	55%		
Did not use print sources	11%	3%		

Online sources and search tools used:		
Google, Yahoo or other search engine	36%	92%
Online journals, magazines, newspapers	56%	81%
Online library catalog	35%	49%
Online indexes or databases	18%	50%
Online booksellers	14%	22%
Google Scholar	12%	14%
Did not use online sources	3%	0.4%
Information management tools used:		
Computer folders or files	74%	89%
Paper folders, files, note cards	73%	85%
E-mail	58%	59%
Online tools	28%	32%
Bibliographic management software	4%	13%
No tools	3%	1%
Received instruction on use of library and internet	33%	79%
resources		
Almost always or often sought advice on research assignme	nts from:	
Teachers	49%	61%
Librarians	13%	14%
Parents or other adult family members	15%	27%
Friends, classmates or siblings	66%	49%
Tutorial schools / classes or help groups	27%	8%
Help screens, online tutorials, or other e-resources	32%	7%
Talked with a librarian more than once about a research	38%	62%
assignment		
Pacing of work on research assignment:	43%	61%
Usually did most or all of their work on or just before the		
due date		

Though Hong Kong students had one more year in secondary school, in comparison with freshmen of the 39 US higher education institutions, freshmen of University X in Hong Kong were three times less experienced in writing papers requiring a reference list, and four times less experienced in writing the reference list in a specific citation format.

In the US, the most frequent reason for using the library in the senior form of high school was for conducting research for school assignments or projects. In contrast, University X students of Hong Kong mainly used the library for studying or doing homework.

Moreover, US students used information sources much more extensively than the students in Hong Kong, no matter what types of information sources, books or journals, print or online. In particular, they used more reference tools such as encyclopedias, dictionaries and yearbooks for searching background information (45 percent more), more online indexes for locating academic articles (32 percent more), and more internet search engines for free web resources (56 percent more). Eleven percent of University X students of Hong Kong had not used any print sources, in contrast to only three percent among the US students. In addition to more extensive use of information sources, US students used various information management tools more. In particular, three times more US students used bibliographic management software to organize the located information.

Regarding seeking help and advice in the research process, US students received more instruction on the use of library and internet resources (46 percent more). University X students of Hong Kong mostly turned to their friends and

classmates for help while US students mainly seek advice from their teachers.

Though both the US and HK students did not often enquire with librarians, more students in the US sought help from them.

Despite the fact that Hong Kong students were less experienced in doing research and received less instruction on how to do so, they usually started to do their work well before the due date.

4.1.3 Information Literacy Perceptions

Ninety-six percent of the students agreed or strongly agreed that information literacy (the ability to access, evaluate and use of information) was important to lifelong learning. Eighty-eight percent agreed or strongly agreed that a related course would be useful. Fifty-four percent indicated that they enjoyed gathering information for research "quite a bit" or "very much".

In terms of how challenging the different components of information use were, students found "writing papers" the most difficult (57 percent rated this very difficult or difficult), followed by "developing the main argument or research statement" (51 percent). The percentage of students indicating "revising search strategy" was easy (very easy or somewhat easy in the survey) (48 percent) is slightly more than that who rated it difficult (very difficult or somewhat difficult in the survey) (45 percent). This is similar in the case of "documenting and citing information sources" though the difference is a bit larger (49 percent easy and 42 percent difficult). Students found "developing a list of information sources to

investigate" the easiest (54 percent rated this easy), followed by "narrowing the topic" (52 percent easy).

Among all the steps in identifying and retrieving information sources, students found using an Internet search engine the easiest (81 percent rated this as easy), followed by using a library catalogue (60 percent), then physically locating information sources in a library (53 percent). On the other hand, students found using an electronic index the most difficult (55 percent rated this as difficult), followed by using a print index (53 percent), then obtaining materials through interlibrary loan (40 percent). Twenty eight percent of students indicated that they had no experience in obtaining materials through interlibrary loan, while 20 percent and 16 percent indicated no experience in using an electronic index and a print index respectively.

Regarding using the information sources, students found determining whether an information source is appropriate for an academic project the easiest (60 percent rated this as easy), followed by deciding what information to integrate into the project (50 percent). On the other hand, 56 percent and 51 percent of the students found "how to document a source" and "when to document a source" difficult respectively.

Comparison with undergraduate freshmen of the US

Survey results of the current study were compared with 6,273 new undergraduate students of 39 NITLE institutions in the US. Table 3 highlights the comparison in the freshmen's experiences and perceptions in difficulties of various

information processes. Students who rated the survey items as very difficult and somewhat difficult have been grouped as "difficult".

Table 3. Comparison in Freshmen's Experiences and Perceptions in Difficulties of Various Information Processes between University X in Hong Kong and 39 NITLE Institutions in the US

Information Processes	Perce	ntage of	Unde	rgraduat	e Fresh	men
	1	10	Diff	Perce	eived	Diff
	experience		ere	as dif	ficult	ere
	Univ	US	nce	Univ	US	nce
	Х	Inst.	l 	Х	lnst.	
Challenges of various IL components:						
Developing a list of source to	7	1	6	38	26	12
investigate						
Narrowing the topic	7	1	6	40	29	11
Documenting and citing information	8	1	7	42	27	15
sources	:					
Revising search strategy	8	2	6	45	32	13
Developing main argument or	7	0	7	51	42	9
research statement						
Writing the paper	8	0	8	57	31	26
Challenges of identifying & retrieving s	ources:					
Using an Internet search engine	3	0	3	16	5	11
Using a library catalogue	8	9	-1	32	22	10
Using an electronic index	20	6	12	35	1.9	16
Using a print index	16	27	-11	37	22	15
Obtaining materials through	28	47	-19	40	19	21
inter-library loan						
Physically locating information	6	2	4	41	22	19
sources in a library	:					:
Challenges of using sources:	<u></u>					
Determining whether a source is	5	0	5	35	11	24
appropriate						
Knowing when to document a source	10	1	9	41	30	11
Determining what information from	6	0	6	44	21	23
sources to integrate						
Knowing how to document a source	11	1	10	46	32	14

Compared to the US students, many more University X students in Hong Kong indicated that they had no experience in various components of information literacy. This is consistent to the findings of the IL experience section above. The difference is particularly large in using an electronic index, and knowing when and how to document a source. Ten to twenty percent of University X students in Hong Kong indicated that they had no experience in these three components. However, US students had much less experience in obtaining materials through inter-library loan. This is because Hong Kong students might have used the reserve service of public libraries which was relatively cheap and readily available in a densely populated place like Hong Kong.

In addition, many more University X students in Hong Kong found various IL components difficult. In particular, they found writing papers difficult (57 percent rated this as difficult) while US students found this easy (68 percent rated this as easy).

Though Hong Kong students perceived various IL components as more challenging than the US students, they indicated that they enjoyed the process more. Over half of University X students in Hong Kong indicated that they enjoyed gathering information for research "quite a bit" or "very much", while only 27.6 percent US students did so.

4.1.4 Information Literacy Competency

The scoring manual of the survey items on IL competency is attached as Appendix E. The total score of the 31 questions on IL competency is 34 (with three questions having two points as the maximum score). The mean score of IL competency questions among University X students is 13.11, with a standard deviation of 5.70. This is equivalent to 38.55 percent of the total possible points of the questions.

To have a more detailed look into the results of the IL competency test, Table 4 below entitled *Percentage of Students that Answered the Survey Items Correctly* lists the 31 questions on IL competency and ranks them by the percentage of students that answered the questions correctly. It indicates that University X students were generally unfamiliar with truncation and search strategies in identifying a comprehensive list of relevant sources, namely using the advanced search capabilities of electronic indexes, academic databases and journals. Students also had difficulty in identifying citation of book chapters. Almost three quarters of them could not distinguish between academic journals and popular magazines, and mistook popular magazines such as Time and Newsweek as scholarly sources. In addition, they did not recognize that personal web pages are inappropriate for academic research and the scholarly nature of a source is a more important criterion for source selection than other criteria such as currency and ease of retrieval.

Comparison with New Undergraduate Students in 39 NITLE Institutions in the US

The mean score of questions 6.1 to 10.3 (the same RPS questions applied to the 39 NITLE Institutions, excluding the added in questions 10.4, 10.5 and 11.1 to 11.5 for the current study) of students at University X is 9.69, equivalent to 36 percent of the total possible points of the items.

The percentage of the total possible points of the survey items among the 6,273 new undergraduate students participating in the RPS administered in 39 NITLE institutions in Fall 2008 was not published. Rather, the figure for the 4,363 students participating in the same RPS administered in Fall 2006 in the NITLE institutions was released, which is 53 percent (The College of Wooster, p. 2). Based on this figure, students in Hong Kong had a lower competency test score (36% of the total possible points) than the US students (53%), with a difference of 17 percent.

Table 4 below provides a detailed comparison of the percentage of 607 University X students who answered a particular competency survey item correctly with the corresponding percentage of the 6,273 new undergraduate students in the 39 US NITLE institutions participating in the RPS administered in Fall 2008. Since seven survey items (10.4, 10.5, 11.1 to 11.5) were adapted from the Bay Area Community Colleges Information Competency Assessment Project rather than from RPS, the scores of these questions cannot be compared directly with the RPS survey results of the US NITLE students in Table 4 below.

Table 4. Comparison between University X in Hong Kong and 39 US NITLE Institutions in the Percentage of Freshmen that Answered the Competency Survey Items Correctly

item No.	Description of Survey Item	% of Freshmen Answered the Items		
110.		Correctly		
		Univ. X	US	Diff
			Inst.	
11.3	Identified keywords of an assignment topic	61	NA	NA
8.1	Distinguished between primary and secondary sources	57	75	18
10.5	Realized that copyright protection covers works	56	NA	NΑ
	that represent an original idea in any format			
9.3.5	Recognized it is not able to distinguish between	54	72	18
	scholarly and non-scholarly just because the	!		
	source is recently published			
11.5	Realized that access to databases such as	53	NA	NA
	WiseNews usually requires a password			
7.3.2	Correctly identified a given citation as a book	49	73	24
10.4	Determined the best approach to research on a	49	NA	NA
	topic			
11.2	Formulated an appropriate question based on	49	NA	NA
i	information need or research topic			
9.3.1	Recognized it is not able to distinguish between	48	77	29
	scholarly and non-scholarly just because the			
	source is available online			
9.3.7	Determined that a source is scholarly if it is	47	77	30
	published by a university press			
9.3.2	Recognized it is not able to distinguish between	46	72	26
	scholarly and non-scholarly just because the			
	source is translated from another language			
7.2	Correctly identified the issue number in a	44	85	41
	reference			
9.2	Recognized that a citation is not required when	39	68	29
	you are describing your own findings or			
	analysis.			
9.3.3	Determined that a source is scholarly if it is	39	64	25
	published in a peer reviewed journal			

9.3.6	Determined that a source is scholarly if it has a lengthy list of references	39	63	24
11.1	Selected an appropriate database for a research topic based on the information need	34	NA	NA
6.1	Used Boolean logic terms correctly	31	28	-3
7.3.1	Correctly identified a given citation as a journal article	31	27	-4
9.3.4	Determined that a source is non-scholarly if it is posted on a political blog	31	57	26
9.1	Correctly defined citation as "Source information for any ideas or text from someone else's written work."	30	54	24
6.3	Identified the use of subject headings as the most efficient library catalog search strategy	29	40	11
8.3	Defined a peer-reviewed/refereed journal correctly as, "A journal that publishes articles that have been approved by other scholars"	28	47	19
10.2	Gave priority to the scholarly nature of a source in determining its appropriateness for a research project	27	44	17
10.3	Treated the scholarly nature of a source as a more important criterion for source selection than other criteria, such as currency and ease of retrieval	27	38	11
9.3.8	Determined that a source is non-scholarly if it is published in Time or Newsweek	25	21	-4
7.1	Distinguished between academic journals and popular magazines	24	33	9
8.2	Identified electronic indexes, databases, and academic journals as tools that would yield a comprehensive list of relevant sources.	23	43	20
10.1	Recognized a personal webpage as the least appropriate source for an academic research project	20	53	33
7.3.3	Correctly identified a given citation as a portion of a book	19	20	1
6.2	Identified the correct way to truncate a search word	11	9	-2

Among the 24 questions on IL competency that were administered to both students of University X and the US NITLE institutions, only four were better answered by the students of University X. More US students answered the other 20 questions correctly. This indicates that US students were more competent in IL than the Hong Kong students.

There are some common problems shared by students in Hong Kong and the US. Both were unfamiliar with truncation and had difficulty in identifying the citation of a book chapter. They also made the same mistake in categorizing popular magazines such as Time and Newsweek as scholarly sources.

Table 5 below maps all the survey items on IL competency (questions 6.1 to 11.5) to the *Information Literacy Competency Standards for Higher Education* (ACRL, 2000). Since seven survey items (10.4, 10.5, 11.1 to 11.5) were adapted from the Bay Area Community Colleges Information Competency Assessment Project rather than from RPS, no score is available for these questions for the US NITLE students in Table 5.

Based on Table 5, the mean percentages of students who correctly answered the items grouped under the ACRL IL Competency Standards for Higher Education have been calculated and the percentages are listed in Table 6 below.

Table 5. Comparison between University X in Hong Kong and 39 US NITLE Institutions in the Percentage of Freshmen that Correctly Answered the IL Competency Survey Items Grouped by ACRL IL Competency Standards for Higher Education

ACRL Information Literacy Item No.		% of freshmen answered the			
Competency Standard /		items corr	items correctly		
Performance Indicators		Univ. X	US Inst.	% Diff.	
Standard 1: The information literate	student det	ermines the	e nature and	dextent	
of the information needed.					
The information literate student	11.2	49	NA	NA	
defines and articulates the need for	11.3	61	NA	NA	
information.					
The information literate student	7.1	24	33	9	
identifies a variety of types and	8.1	57	75	18	
formats of potential sources for	8.3	28	47	19	
information.	9.3.1	48	77	29	
	9.3.2	46	72	26	
	9.3.3	39	64	25	
	9.3.4	31	57	26	
	9.3.5	54	72	18	
	9.3.6	39	63	24	
	9.3.7	47	77	30	
	9.3.8	25	22	-3	
Standard 2: The information literate student accesses needed information					
effectively and efficiently.					
The information literate student	8.2	23	43	20	
selects the most appropriate	11.1	34	NA	NA	
investigative methods or	11.4	41	NA	NA	
information retrieval systems for					
accessing the needed information.					
The information literate student	6.1	31	28	-3	
constructs and implements	6.2	11	9	-2	
effectively designed search	6.3	29	40	11	
strategies.	10.4	49	NA	NA	
	11.3	61	NA	NA	
The information literate student	7.2	44	85	41	

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retrieves information online or in	7.3.1	31	27	-4
person using a variety of methods.	7.3.2	49	73	24
	7.3.3	19	20	1
The information literate student	7.2	44	85	41
extracts, records, and manages the	7.3.1	31	27	-4
information and its sources.	7.3.2	49	73	24
	7.3.3	19	20	1
	9.1	30	54	24
Standard 3: The information literate	student eva	luates infor	mation and	its
sources critically and incorporates se	lected infor	mation into	his or her	
knowledge base and value system.				
The information literate student	8.3	28	47	19
articulates and applies initial criteria	9.3.1	48	77	29
for evaluating both the information	9.3.2	46	72	26
and its sources.	9.3.3	39	64	25
	9.3.4	31	57	26
	9.3.5	54	72	18
	9.3.6	39	63	24
	9.3.7	47	77	30
	9.3.8	25	22	-3
	10.1	20	53	33
	10.2	27	44	17
	10.3	27	38	11
Standard 5: The information literate student understands many of the				
economic, legal, and social issues sur	rounding th	e use of inf	ormation and	d
accesses and uses information ethica	lly and lega	lly.		
The information literate student	10.5	56	NA	NA
understands many of the ethical,	11.5	53	NA	NA
legal and socio-economic issues				
surrounding information and		-		
information technology.				
The information literate student	7.3.1	31	27	-4
acknowledges the use of	7.3.2	49	73	24
information sources in	7.3.3	19	20	1
communicating the product or	9.1	30	54	24
performance.	9.2	39	68	29

Table 6: Difference in mean percentage of freshmen correctly answering the IL competency survey questions grouped by ACRL IL Competency Standards for Higher Education

	Mean % of Fi	reshmen	
	Answered the Competency Survey Questions Correctly		ency
			ectly
ACRL Information Literacy Competency Standard	Univ. X	39 US	Diff.
/ Performance Indicators	(excluding	NITLE	
	additional	Inst.	
	items		
	10.4-11.5)		
Standard 1: Identify a variety of types and	40	60	20
formats of potential sources for information			
Standard 2: Access the needed information	33	36	3
effectively and efficiently			
Standard 3: Evaluate both the information and its	36	57	21
sources critically			
Standard 5: Acknowledge the use of information	34	48	14
sources			

Compared with US NITLE students, University X students in Hong Kong were weakest in evaluating information and its sources critically, and in identifying a variety of types and formats of potential sources for information. University X students were also weaker in acknowledging the use of information sources than the US students. In terms of accessing the needed information effectively and efficiently, University X students were comparable to the US students, though the mean percent stated above is slightly smaller.

4.1.5 Relationship between Information Literacy Competency, Experiences and Perceptions

To summarize the above findings, compared to the US students, Hong Kong students had less experience in the access, evaluation and proper use of information and received less instruction on these aspects. If they needed any help, they mostly turned to their friends and classmates, rather than to their teachers. In particular, they seldom consulted the librarians. They perceived various components of information literacy as challenging and difficult, whereas US students found them relatively easy. However, Hong Kong students planned their work better and started working on a research assignment well ahead of the due date. In addition, they enjoyed the process more than the US students.

Hong Kong students were less competent in accessing, evaluating and properly using information, except that they had better skills in Boolean logic and truncation that are related to IT competency. The inadequacy of research experiences and instruction may explain their lower IL competency and why they perceived various IL components as more difficult, even though they might have better IT skills in using Boolean logic and truncation.

4.2 Information Task

Two hundred and nineteen student participants of the survey indicated interest in participating in the follow-up session. They were split into three groups by their scores of the competency items of the survey - high, medium and low score groups. Four students from each group were invited by email to participate in a

two-hour follow-up sessions, with the first 1.25 to 1.5 hours on the information task and the rest of the time on the interview. Among the high scorers, those with the highest scores were invited first until all four places were filled. For the low score group, students with total scores below 6 were not invited because they might not provide useful responses in the interview. Students with total scores starting from 6 were invited until all four places were filled. For the medium score group, students were invited to balance the Faculty and gender distribution of the twelve student participants of the follow-up session. Demographic information of the twelve students is listed in Table 7 below.

Table 7. Demographic Information of Student Participants of the Information Task and Interview (Key: Bus. Admin.= Business Administration)

Student	Score of Survey	Gender	Faculty	Secondary
Code	Competency Items			School Subjects
	(Full score = 34)			
L1	8	М	Bus. Admin.	F.5: Sci. F.6: Business
L2	8	F	Bus. Admin.	Science
L3	9	M	Soc. Science	Arts
L4	11	М	Soc. Science	Science
M1	15	F	Education	F.5: Arts F.6: Business
M2	15	М	Soc. Science	Science
M3	16	F	Bus. Admin.	Science
M4	17	F	Bus. Admin.	Science
H1	25	F	Arts	Arts
H2	25	М	Science	Science
Н3	27	F	Science	Science
H4	28	М	Soc. Science	Science

Half of the twelve student participants are female and half are male. Though students from the Faculties of Medicine, Law and Engineering who indicated interest in participating in the follow-up sessions were invited, all of them could not find the time to attend any sessions. Finally, four students of the Faculty of Business Administration, four of the Faculty of Social Science, two of the Faculty of Science, one of the Faculty of Arts and one of the Faculty of Education participated in the follow-up sessions, which were one-to-one face-to-face sessions between individual students and the researcher.

With reference to the ACRL IL Competency Standards, the screen capture data, the audio-recording of the conversation between individual students and the researcher, the students' worksheets, notepads and saved files, and the researcher's observation notes of the information task sessions were analyzed to throw light on the students' procedural and conceptual strategies in information searching, evaluation and use for their academic work, in a natural educational setting. Common patterns of information seeking, evaluation and use were identified among the students, with details as follows.

4.2.1 Access the Needed Information

4.2.1.1 Select the most appropriate information retrieval systems

The following is a review of the students' capability in selecting the most appropriate information retrieval systems for accessing the needed information for

the information task, based on the *IL Competency Standards for Higher Education* (ACRL, 2000).

Table 8. Information Retrieval Systems used by Student Participants in the Information Task

Information retrieval systems	
Wikipedia, Google, Yahoo	
Wikipedia, Yahoo	
Wikipedia, Yahoo, Univ. X Library Catalogue	
Wikipedia, Yahoo, Univ. X Library Catalogue	
Google, Yahoo	
Yahoo, Wikipedia, Univ. X Library Electronic Databases	
Yahoo, Univ. X Library Catalogue	
Google, Univ. X Library Catalogue	
Univ. X Library Catalogue, Google	
Google, Univ. X Library Catalogue	
Google, Univ. X Library Catalogue	
Wikipedia, Google, Univ. X Library Article Search Function, Univ. X	
Library Catalogue, Google Scholar	

All student participants used Internet search engines to search for web resources. Some of them completely relied on these search engines while some used the library catalogue and databases as well. On the one hand, heavy use of Wikipedia and complete reliance on Internet search engines for information search

were more common among students with a lower IL competency score in the Survey than those with a higher score. On the other hand, students with a higher score used Google rather than Yahoo to retrieve web resources and they all searched for library books using the library catalogue.

Only one student (M2) used the library subject specific databases to search for journal articles directly, while another student (H4) used the "Article Search" function (a one-off search at multiple databases) at the Library Homepage to search for articles. Actually, it was the first time that Student M2 used the databases. It was not common among University X undergraduate freshmen to use journal article search tools.

Undergraduate freshmen of University X mainly followed their past experiences in using Wikipedia and Internet search engines to retrieve information. More IL competent ones used the library catalogues to find library books as well. Most of them missed out important information search tools such as indexes to search for scholarly journal articles which could provide research-based information on specific research topics.

4.2.1.2 Identify key terms that describe the information need and construct a search strategy using appropriate commands

The following looks into the students' ability in constructing and implementing effectively-designed search strategies, based on the *IL Competency Standards for Higher Education* (ACRL, 2000). Search strategies used by the student participants during the information task are listed in Table 9.

Table 9. Search strategies used by Student Participants in the Information Task

Student	Search strategies (search statements input for searching are stated in			
	italic; translations are put within square brackets)			
L1	Search at Wikipedia:			
	farming corporation pesticide			
	。 farm worker health			
	o pesticide			
	Search at Google: farm worker health			
	Search at Yahoo:			
	。 <i>農藥中毒</i> [pesticide poisoning]			
	。 <i>香港農藥中毒</i> [Hong Kong pesticide poisoning]			
	。 農藥影响 [pesticide effect]			
	。 news farm workers			
	。 news pesticide			
	The student spent only 39 minutes on the task. He stopped			
	searching and claimed obtaining sufficient information much sooner			
	than other participants.			
L2	Mainly used Wikipedia. Spent a lot of time in reading the Pesticide			
	Poisoning Wikipedia. Based on its contents, derived three headings			
	for the assignment: background, health effects and solutions.			
:	Added in the three headings into a Microsoft Word file and copied a			
	few lines here and there from Wikipedia under the headings.			
	 Intended to use Yahoo to find more information on two aspects: 			
	health effects and solutions. At Yahoo, typed in pesticide+.			
	Intended to type in and search for <i>pesticide+health</i> . Once saw the			
	phrase pesticide poisoning appearing at the input pane automatically,			
	searched for pesticide poisoning instead. Did a broader search first			
	with the search term <i>pesticide poisoning</i> . Then applied + to			
	combine keywords in the following search statement:			
	。 pesticide poisoning + farm workers			

	pesticide poisoning + farm workers+ reduce (the student did not)			
	insert a space between workers and +)			
L3	Mainly used the Pesticide Wikipedia. Selected two articles from			
	the reference list. Could not identify the citations of journal			
	articles. Tried to search the journal article title at the Library			
	Catalogue 2.0 version, at the eBook platform, and at the Article			
	Search function of the Homepage of University X Library.			
	Used Yahoo to search for Oxfam and Greenpeace websites which the			
	student had been familiar with. Searched pesticides within the two			
	websites and browsed for relevant information. Did not search for			
!	other NGOs that might be useful as well.			
	Searched pesticides at the University X Library Catalogue 2.0 (Looks			
	like Internet search engines) and browsed the book records.			
	Mainly searched on a single concept and browsed through the results			
	for relevant information.			
L4	Mainly used Wikipedia. The student remarked that single concept			
	searching should be more appropriate at Wikipedia, because			
	Wikipedia worked like a catalogue, detailing one topic after another.			
<u> </u>	In view of this, there was no need to combine keywords with "and".			
	Searched the following terms at Wikipedia:			
	。 farming corporation			
	 framer (a recurrent typo, which should be spelt as farmer) 			
	At the University X Library Catalogue 2.0 version, searched:			
	 Pesticide and framer (a recurrent typo, which should be spelt as 			
	farmer) (the student indicated that it was his first time to use the			
	Boolean AND at the library catalog)			
M1	Searched at Google:			
	。 pesticide poisoning			
	。 pesticides in agriculture			
	o farmer workers pesticides			

- o pesticide poisoning+cure
- "pesticide substitute"
- 。 農藥替代 [pesticide substitute]
- Searched at Yahoo China 有机农药 [organic pesticide]

M2

- · Searched at Yahoo briefly: pesticides
- At University X Homepage, clicked on Libraries. At the library homepage, clicked on E-Resources, then Databases by Subject, then Science (General), then selected "Academic Search Premier" because the student found it was stated as multi-disciplinary. Searched for:
 - pesticide
 - pesticide AND health problem
- Returned to Yahoo, searched for practices of farming corporation (too long to be searched at the library databases).
- Returned to Academic Search Premier, searched for:
 - Farming
 - Farming practice
 - Farming practice AND health problem
- · Returned to Yahoo, searched for farming practice.
- At Univ. X library homepage, clicked on E-Resources, then Databases by Subject, then Social Science (General), then selected Academic Search Premier. Searched for farming practice.
- Returned to Social Science (General) database list, selected Conference Proceeding Citation Index (indicated did not know what is conference proceeding). Searched for farming practice.
- Returned to Social Science (General) database list, selected
 ProQuest 5000 as the student found it covered many aspects.
 Searched for farming practice.
- At Yahoo, searched for organic farming.
- At Academic Search Premier, searched for organic farming.

- Switched to library's Database by Subject list. Selected Biology, then Biological Abstracts (1989-2000) (overlooked the 2001-present edition). Searched for organic farming.
- · At Yahoo, searched for:
 - o organic farming advantage
 - overuse of pesticide

Spent only an hour on the information task and noted he could not find more information. He did not want to search the library catalogue even though he had some time left.

M3

- At Yahoo, used natural language and did not exclude stop words including related to, in. Searched for:
 - health problem related to pesticides
 - o health problem related to pesticides in farming
 - acute ill-defined symptoms (copied the phrase from a retrieved information source)
- At the Full Catalogue Search of Univ. X library, searched for:
 - Title search A consumer's guide to do it yourself pest inspections (copied this subtitle of a book in the recommended reading of a retrieved information source)
 - ISBN search 0646109413 (copied this ISBN of the above book)
 - Title search pesticides
 - Title search pesticides health problem
 - Title search farming corporation at title search
 - Title search farmers at title search
 - Title search farmers health at title search
- At Yahoo, searched for:
 - farming corporation, pesticides (copied text from a website and its URL into the Word file)
 - substitutes of pesticides
 - illness from pesticides
 - illness from exposure to pesticides

	Combined more and more concepts, up to 3 concepts for searching			
	Used reference list in sources for further reading			
M4	At Univ. X Library Homepage, chose Full Catalogue Search. At th			
l	catalogue, used Title search for:			
	o pesticide health problems			
	o farm workers health problems			
	。 farming health problems			
	o agricultural health problems			
	At Google, searched for:			
	o agriculture health problems			
	o occupational diseases farmers (copied the term "occupational"			
	from another retrieved source)			
	o pesticide health			
	o pesticide health problems			
	o pesticide farmers health problems			
	o solution health problems farmer			
	。 solution health problems agriculture			
	o practices of farming health problems			
	o practices of farming health problems solution			
	。 agriculture health problems			
H1	- At the Univ. X Library Catalogue 2.0 version (looks like Internet			
	search engines), searched for pesticides.			
	At Google, searched for:			
	o pesticides			
	o pesticides health problems			
H2	Planned to find information indicating how employers exploit the			
	farm workers e.g. did not provide sufficient protection and insurance			
ı	but to get the maximum profit only.			
	At Google, searched for:			
	。 exploited farmer			
	<u></u>			

	o pesticide farmer
	o pesticide affect farmers
	。 farmer exploited
	o farmer sweat shop
	。 farmer health exploited
	o farmer health insurance
	 At Univ. X Library Catalogue 2.0 version, searched for:
	。 farmer
	 farmer pesticide (Limited by format – book)
	。 farmer health
	 agriculture health (spotted the terms from the result record)
	 Had problem in searching for one book on the shelf as the student
	did not know that books with call number 951.1 should be shelved
	after books with call number 951.
НЗ	Search at Google:
	o pesticide health
	 pesticide health developing countries
	 pesticide health developing countries alternatives
	o At Pesticide Wikipedia that shown up as the first result, searched
	in text for alternatives. Spotted the term: least toxic chemical
	pesticide.
	o least toxic chemical pesticide
	o non-toxic pest control
	o nontoxic pest control
	 At the Univ. X Library Catalogue 2.0 version, searched for:
	o pest control
	o pesticide
H4	At Wikipedia, searched for <i>pesticide</i> . At Pesticide Wikipedia,
	searched for farm.
	At Google, searched for:
	o farm worker, pesticide, health problem, corporation (the student

did not know what the comma symbol stands for)

- farming cooperation, farm worker (typo of corporation)
- At Univ. X Library Article Search function, limited the search to Business & Economics, Social Science, and Medicine, and searched for:
 - farm worker, pesticide, health, corporation. At the result list, limited the results to the subtopic: Agriculture – Exposure, studies. Tried all means to get the full text of an article but could not do so.
- After 35 minutes on searching at the Article Search, he searched
 Wikipedia again and read its reference list and spotted an article.
- At Univ. X Library Catalogue 2.0 version, searched for:
 - o agricultural labour, pesticide
 - o agricultural worker, pesticide
- At Google Scholar, searched for:
 - farm worker pesticide exposure reduction
 - farm worker pesticide exposure protection

Most students typed in one to two search terms/phrases representing one to two different key concepts of the research topic as the search statement. They then browsed through the retrieved sources to select the appropriate ones. Students with higher IL competency survey score such as students H4, H3, H2, M4 and M3 tended to combine more than two key terms representing different key concepts in their search statements. For example, student H4 searched for farm worker, pesticide, health problem, corporation, while student H3 searched for pesticide health developing countries alternative. Both of them combined up to four key terms representing four different key concepts in the search statements to refine the searches.

There were two library catalogue versions at University X: an Internet search engine like Library Catalogue 2.0 version and the more traditional Full Catalogue Search version offering field specific search. For those students who used the Full Catalogue Search, they used Title Search rather than Keyword Search to search for key terms, resulting in no matches found. For example, students M3 and M4 typed in pesticides health problem and agricultural health problem at the Title Search of the Full Catalogue respectively. In general, for title search at the library catalogues of higher educational institutions around the world, users have to type in the exact title or the first few words of the titles of the information sources. As it is unlikely to have source titles beginning with pesticides health problem or agricultural health problems, thus these title searches resulted in no matches. Instead, these key terms should be searched at the Keyword Search of the library catalogue. Though instruction for Title Search had been stated on the screen for inputting search terms, students still overlooked it and just employed their usual practices in using the Internet search engines to search the library catalogue. They did not realize that the search mechanism of the Full Catalogue is field specific, and title search seeks for exact match rather than keywords in the title. Students had no idea that field specific searching for more precise and refined searches is a common requirement for in-depth research in universities.

Student M2, the only student who used the databases provided by the University X library on the information task, demonstrated a number of problems in using these databases. Student M2 only typed in one or two key terms as his search statements, resulting in a large number of retrieved records of highly

subject-specific journal articles. For example, when he searched for *pesticide*, over 30,000 journal articles were located. These journal articles were listed by their publication dates by default, and all of them focused on a specific aspect related to pesticides. As a result, the student was overwhelmed by all the retrieved articles and could not cope with 30,000 articles at a time. Being frustrated, the student swapped databases continuously and repeated the same simple searches in several databases within a short period of time. He even repeated the same search at the same database without realizing the repetition. Without refining the searches with more key terms representing different key concepts, he only performed simple single key term/phrase searches such as *farming practice* at these databases which led to unfruitful search results. This indicates that the student did not understand the nature and scope of these indexes, which expected multiple key terms searching to retrieve highly specific journal articles on multiple key concepts.

In contrast, the more IL competent student H4 performed more specific searches using the *Article Search* function provided by the University X library. In this function which provides one-off search at all library databases, firstly, he limited the search to three subjects: Business & Economics, Social Science, and Medicine. Then he typed in a search statement which consisted of four key terms or phrases representing four different concepts: *farm worker*, *pesticide*, *health*, *corporation*. Further, at the result list, he limited the results to the subtopic: *Agriculture – Exposure*, *studies*. With all these steps, the refined search led to a more specific search result. Unfortunately, the student did not know how to get

the full text of a retrieved article and got frustrated. Then he swapped to the free Google Scholar which brought him a few full text articles.

Student L3 could not identify the citations of journal articles that he located at the reference list of Wikipedia. He tried to search the journal article title at the library catalogue 2.0 version, at the eBook platform, and at the *Article Search* function of the Homepage of the University X library. He could not distinguish citations of journal articles from books and the different roles of library catalogues and indexes. Similarly, student M3 could not identify a journal article.

Online search skills that could be useful in the information task are listed in Table 10. Students who attempted to use these skills are listed on the right column of the table. Throughout the information task, most of the students employed simple online searching skill for searching the Internet search engines that they learned in their junior school years – mainly inserting more than one key word or phrase into the search box. They did not demonstrate other useful online searching skills for searching academic databases commonly subscribed by university libraries, including Boolean operators, truncation, wildcard, proximity search and subject-heading search. Student M2 was the only student who used an article index database to search for articles. While searching the index database, he employed the Boolean Operator AND to combine key terms or phrases. However, during the process, he kept on checking if the search terms he entered appeared in the retrieved article. This reveals that he did not understand the mechanism of keyword search at the index database, which he used for his very first time.

Table 10. Online Search Skills used in the Information Task

Online search skills	Student(s)
Multiple keywords (more than one key	L1, L2, L4, M1, M2, M3, M4, H1, H2,
word/phrase)	Н3, Н4
Synonyms (alternative terms), broader/	M1, M3, M4, H2, H3, H4
narrower terms, and related terms	
Truncation / Wildcard	None
Boolean operator AND	L4 (at the Library Catalogue), M2 (at
	Academic Search Premier)
+ (plus symbol)	L2 (wrongly added a space between
	the + and the word); M1
Wrongly used comma	M3, H4
Boolean operator OR	None
Boolean operator NOT	None
– (minus symbol)	None
Parentheses	None
Proximity search	M1
Subject heading search	None
Title search	M3 and M4 (both for searching
	keywords)
Material type search	H2
Year/Date/Time search	None
ISBN search	M3
Used reference list	M3, H3
Used help screen	None

Only one student (M1) demonstrated the use of quotation marks for exact phrase searching, and only two used reference lists to locate more information.

Two students (M3 and H4) wrongly used the comma symbol as a Boolean operator.

Though they were not sure what the comma symbol stood for, none of them checked the online help for confirmation. Similarly, student L2 did not realize that she should not insert a space after the plus symbol and she did not check the online help for the correct syntax. Lastly, student M3 inserted redundant terms and stop words such as "related to" and "in" into the search statement, resulting in less refined searches.

4.2.2 Types of Information Sources Selected by Student Participants in the Information Task

The following is a review of the students' capability in identifying a variety of types and formats of potential information sources for the information task, based on the *IL Competency Standards for Higher Education* (ACRL, 2000).

Table 11. Types of Information Sources selected in the Information Task

Student	Types of information sources selected					
L1	Mainly from Wikipedia. Also, from two websites retrieved at Google.					
	Did not purposefully distinguish types of information sources.					
L2	Mainly from Wikipedia. Also, from five websites retrieved at Yahoo.					
	Did not purposefully distinguish types of information sources.					
L3	From (1) Wikipedia, (2) two articles listed in the reference list of					
	Wikipedia, (3) the Oxfam and Greenpeace websites, and (4) five library					
	books retrieved at the library catalogue.					
	Could not distinguish journal article from book. Tried to search for					
:	journal article title at the library catalogue and e-book platform.					
L4	From Wikipedia and two full text e-dissertations retrieved at the library					
	catalogue. Found the two dissertations particularly useful.					

M1	Mainly from websites retrieved at Google, and some from websites						
	retrieved at Yahoo China. Claimed seldom read books because Internet						
	search is much more convenient. Used books as a last resort only.						
	Did not want to search for library books for the task. Found too many						
	libraries in University X and the libraries are so large. Did not k						
	how to look up books in them.						
M2	Mainly from journal articles searched at online indexes provided by						
	University X Library, and some from Yahoo and Wikipedia.						
M3	From three websites and two library books.						
	Could not distinguish a journal article. Just recognized its format						
	PDF (remarked that did not know how to "quote" a PDF).						
M4	Selected various sources from Google by relevance and avoided those						
	too academic and technical. Took two books from shelves and only						
	found one of them useful.						
H1	Conscious of the types of information sources. Commented that						
	Wikipedia is less reliable as everyone can edit it but indicated that she						
	would use its definition of pesticide for the introduction of her essay.						
	Used websites and articles retrieved at Google. Conscious of their						
	publication dates and nature. Searched for three books on shelf and						
!	only found one of them useful.						
H2	Used websites and library books. Did not distinguish information						
	sources. The most important criterion is relevance to the topic.						
H3	Scholarly articles, a government website, an UN organization website,						
	an organization website and library books. Did not get the library						
	books as this process is time consuming and inconvenient.						
	soons as this process is time consuming and inconvenient.						

A number of students heavily relied on Wikipedia for locating background information for the information task. While working on the task, though student H1 expressed the problem of reliability of Wikipedia, she still copied the definition

of pesticide there as the introduction of her paper. None of the twelve students used any scholarly encyclopedias, dictionaries or other reference tools to look for background information. A number of them did not distinguish the types of information sources and used whatever that looked relevant. Two of them demonstrated problems in identifying the citations of journal articles. Student L3 could not identify the citations of journal articles that he located at the reference list of Wikipedia. He tried to search for the title of the journal article at the library catalogue. Similarly, when student M3 found a full text journal article in a PDF file, she could not tell that it was a journal article but just recognized its PDF format. All these reveal that the students had not been taught the variety of information sources, their characteristics and particular roles.

Student M1 indicated that she seldom read books because surfing the web was much more convenient. Similarly, student L4 said that he found it much more efficient to search on the web than to read a whole book.

4.2.3 Evaluating Sources

The following examines the students' competencies in evaluating information and its sources critically by their reliability, validity, accuracy, authority, timeliness and point of view of bias; and in recognizing prejudice, deception or manipulation, and the cultural, physical or other context within which the information was created and the impact of context on interpreting the information, based on the *IL Competency Standards for Higher Education* (ACRL, 2000).

Table 12. Information Source Evaluation during the Information Task

Student	Evaluation of information sources						
L1	Mainly by relevance of contents.						
L2	Mainly by relevance to the topic and the level of details. Avoided very						
	technical and detailed information.						
L3	Student's remarks:						
	 Web searching is fast but the retrieved information is less reliable. 						
	Need to evaluate the organizations that wrote the websites.						
	Books are more reliable. Intended to use both for the assignment.						
	 Wikipedia has less authority as it can be edited by anyone 						
	o Government websites have more authority						
	Websites with a properly looking logo look more authoritative						
:	Websites with contents containing research findings look more						
	authoritative						
	Websites may be false						
	 Books are more reliable as their publishing needs review 						
L4	Did not distinguish types of information sources. Did not evaluate by						
	authority, reliability, biased view point and timeliness etc. Could not tell						
	which source was relevant and which was irrelevant.						
M1	Did not distinguish types of information sources. Though claimed that						
	government source was more reliable, used whatever sources sound						
	interesting throughout the task.						
	When browsing through various Chinese websites, the student mostly						
	focused on the contents and did not pay attention to the reliability of						
	sources. Considered a blog listing various traditional Chinese methods						
	in pest control particularly useful.						
M2	When searched for overuse of pesticide at Yahoo, selected a website on						
	pesticide policy reform to reduce overuse of insecticide. Did not find						
	it useful and dropped it in less than one minute. Actually, this website						
	is provided by the Food and Agriculture Organization of the United						

	Nations. It contains useful guidelines and provides an informative link						
	for pesticide use, which can be one of the solutions to the problem.						
	Instead, the student spent quite some time on a retrieved web page at						
	www.familycorner.com, a website on childcare targeting for parents,						
	which is not suitable for the task.						
M3	Selection mainly based on the keywords appearing in the brief						
	information of the Yahoo result list and the book titles at the library						
	catalogue. Did not care what type of information sources. Mainly						
	looked at the relevance, especially if related keywords appeared in						
	brief information appearing in the result list.						
M4	Selected sources by relevance and avoided those too academic and						
	technical.						
H1	Looked at the currency of sources. Conscious of the reliability of						
	sources. Commented that Wikipedia is less reliable while Government						
	sites contain information written by professionals. Remarked that						
	Greenpeace may provide biased viewpoints on the use of pesticides a						
	it aims to help the poor.						
H2	The most important criterion is relevance to the topic.						
нз	Critical about the reliability of information sources. Selected scholarly						
	articles and government websites as they are more reliable. When						
	came across non-governmental websites, checked their credential and						
	authority (clicked onto About Us and search at Google to double check)						
	before started to gather information from them.						
Н4	Spent most of the time on academic search tools including Article						
	Search of Univ. X library and Google Scholar. Indicated the problem of						
	Wikipedia and blogs but still used them.						

Most of the students did not demonstrate competency in critical evaluation of information and its sources for their reliability, validity, accuracy, authority, timeliness, and point of view or bias, as indicated in Standard three of the ACRL IL

Competency Standards. Only students H3 and H1 consistently evaluated the information sources to check against these criteria. Though students H4, M1 and L3 showed their awareness of the reliability and biased viewpoint problem of Wikipedia and blogs, in practice, they still used information from them for their papers.

Student L4 had problems in discriminating relevant sources from irrelevant ones. In his notepad, he noted low back pain as one of the health problems of farmers but did not realize that this problem is not related to the use of pesticide. In addition, he copied text from the *Factory Farming Wikipedia* which is also irrelevant to the topic. This may reflect his problem in comprehending English information as he repeatedly admitted his poor English capability and said that he used to read Chinese websites only.

4.2.4 Organization of Information from Sources

Students have to use information effectively to accomplish a specific purpose (ACRL, 2000). In the information task, the students were asked to gather information for writing a three to five page research paper on a specific topic, with a reference list. Table 13 below summarises their ability in organizing the located information.

Most of the students copied information directly from the online sources into Microsoft Notepad or Word files. However, a number of them did not copy any information about the sources for citing them later, even though the information task required a reference list for the assignment.

Table 13. Organization of Information from Sources by Student Participants in the Information Task

Student	Copied	Copied	Added in	Copied information	
	information	information	headings &	about the	
	onto print	into Word /	organize	information	
	notepad	Notepad	contents	sources	
L1	No	Yes	Partially	No	
L2	No	Yes	Yes	No	
L3	Yes	Partly	Yes	URLs	
L4	Yes	Yes	Partially	No	
M1	No	Yes	No	No	
M2	No	No	No	URLs	
M3	Yes	Yes	Partially	1 citation & URLs	
M4	Yes	Yes	Yes	URLs	
H1	Yes	No	Partially	URLs	
H2	Yes	No	Yes	No	
Н3	No	Yes	Yes	URLs	
H4	No	No	No	URLs	

4.2.5 Acknowledging the Use of Information Sources

Students have to demonstrate an understanding of many economic, legal and social issues surrounding the use of information ethically and legally. They have to follow laws, regulations, institutional policies and etiquette related to the access and use of information resources. They need to acknowledge the use of information sources in communicating their works (ACRL, 2000). The following is a summary of the practices of students in acknowledging the use of information sources.

Table 14. Acknowledgement of the Use of Information Sources by Student Participants in the Information Task

Student	Copied	Able to write a citation in a format that	Able to
	information about	academics commonly used	name the
j	the information		citation
	sources		format
L1	No	Just wrote down the URL	No
L2	No	Just wrote down the URL	No
L3	URLs	Attempted to write one but in the wrong way	No
L4	No	Attempted to write one but in the wrong way	No
M1	No	Wrote a citation in MLA citation style, after checking the format of the style on the web.	Yes
M2	URLs	Tried to write a citation in APA format but omitted a few parts.	Yes
M3	1 citation & URLs	Just wrote down the URL	No
M4	URLs	Attempted to write one but in the wrong way	No
H1	URLs	By referring to the format of a reference list of a saved PDF file, wrote a citation which was almost correct.	No
H2	No	Gave up and did not attempt as did not know how to do so.	No
Н3	URLs	Wrote a citation in Chicago citation style, after checking the format of the style on the web.	Yes
Н4	URLs	Clicked on the citation link at a website to copy the citation directly.	No

Most of the students could not write a citation properly, nor name any citation format. This indicates their lack of guidance in citation writing.

Students H3 and M1 are among those very few that could name and write a citation. It seems that student H3 was familiar with citation writing as she was required to do so for her secondary school statistics project for inter-school competition. Her instructor at University X also mentioned citation style to her, though she was not sure which citation style she should use for her discipline. Student M1 learned to write citation in her first month at University X. However, though she had acquired the skill, she did not copy any information about the sources she used throughout the information task. Even though she had the skill, she had not yet established the habit in noting down the bibliographic information of the sources for acknowledgement of the sources. This may reflect the lack of awareness of the importance of acknowledgement deep in her mind.

4.3 In-depth Semi-structured Interviews

4.3.1 Perceptions of the Information Task

During the interviews, the researcher asked the student participants how they found the information task. The following is an analysis of how they perceived the task, in particular, by comparing the task with their past information literacy experiences.

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4.3.1.1 Perceived Difficulty level of the Information Task

Most student participants (all twelve except students L1 and M1) indicated that they were anxious at the beginning of the task because they were unfamiliar with the topic. Student M3 stated that "The task is very difficult as I am not familiar with the topic. I have not learnt anything about this. I studied Geography and Biology up to F.5 only" (Interviews, p. 24). Student L2 said "I was a little bit nervous. The located information is not expected and the issue is complicated" (Interviews, p. 6).

Almost half of the students (L3, L4, M2, M4 and H4) indicated that though the task looked difficult at the beginning, it became more manageable after they gathered more information on it. Student L3 said "Because I was unfamiliar with the topic, I felt very anxious at the beginning. I was less anxious after searching for more information and knowing the structure" (Interviews, p. 10).

Student M4 noted "At first, after reading the topic, I found the task very difficult. Afterwards, I did not find it too difficult" (Interviews, p.27). Similarly, student H4 stated "At first I did not know how to work on the topic. Now, it is clear how to do so" (Interviews, p.39). After finishing the task, during the interview, student M2 was confident enough to voice his interpretation of the topic. He said "I did not grasp the topic of the Information Task at first and needed some time to understand the topic, which I think should be: How the farming practices affect the health problem and the possible solutions" (Interviews, p. 21).

4.3.1.2 Information Task as a New Information Literacy Experience

More than half of the student participants (L3, L4, M1, H1, H2, H3 and H4), mostly the high IL competency scorers of the survey, indicated that it was their first time to search and use information in such a serious and systematic way when they worked on the information task. Student H4, who got the highest IL competency score, said "It was my first time to do research in this way" (Interviews, p. 39).

Students H3, H2, H1 and L4 indicated that they had to adopt new strategies of information use to work on the information task, which was more demanding than their past information literacy experiences. Student H3, confident and skillful in using Google and Evernote, pointed out that the most significant difference between her past IL experiences and the information task is not the topic of the task, but the intensity in information use. She said, "I felt a bit lost. This is not just related to the familiarity of the topic. I was not used to this kind of research even if it was a familiar topic. I seldom did a task like this in the past. ... There was only one exception which was a bit similar to this task, and a bit more formal. ... Other than this ... the rest were just pretending ... very small scale, and the teacher just taught us briefly" (Interviews, p. 37). The information task was a new experience to student H3 because it required much more "formal" information use.

Student H1, a student with good communication skill, worked calmly throughout the information task. She remarked, "This task was quite difficult. It was my first time to find information in this way. In the past, it was sufficient if I just read textbook or lecture notes" (Interviews, p.30). She found the task difficult as she had not any similar information literacy experiences in the past.

Student H2, a life science student, stated, "I could find the data for the chemistry lab report very fast and I knew right away if I got the right data or not. This is because the information needed is very factual. In contrast, the task I did just now was much more difficult. I was not sure if I got all the necessary information. Just now, I could not find how the practices of farming corporations affected the health problems of farm workers, because I could not find the right terms for 'practices of farming corporations'. So, I just focused on the 'insurance' aspect" (Interviews, p. 35). Student H2 was used to finding quick and factual scientific information in school. He felt uneasy in dealing with an information search which involved fuzzy relationships involving multiple concepts.

Student L4 said, "At first, I thought the task was easy. But only started to work on it, I could not find much research about it. In my past experiences, Wikipedia was very useful, but it could not help much this time. This task is about a relationship among several issues and Wikipedia cannot address the relationship. Wikipedia is too brief for this in-depth research task. ... I found the located information from Wikipedia very fragmented and I could not find the relationship among issues. Until I found the two dissertations, I started to know how to go ahead. The two dissertations should be sufficient" (Interviews, p. 13).

Student L4, a former school debate team member, indicated that the information task was a new experience to him not just because of the demand in rigorous information use, but also due to a different working style. He said "It is my first time to search for information so systematically, and only by myself. I often surf the web in a free way and work in a group" (Interviews, p. 15). He used

to find information with other debate team members. He said "In the past, my teammates gathered the information while I mostly summarized the information and made the presentation in the debate competition" (Interviews, p. 15).

Similarly, students M1 and L3 remarked that they seldom concentrated on a search process but worked on a number of tasks simultaneously. Student L3 stated "I seldom did this at home because I often multi-tasked all the time. It was a new experience just now, focusing on information searching for two hours. The process was interesting and I learned something new" (Interviews, p.13). Student M1 said, "This is my first time to work on a task so seriously. ... I often work on a number of tasks at the same time rather than focusing on one job ... In my usual practice, I would need to spend more than half a day to achieve what I did just now" (Interviews, p. 18).

Over half of the student participants, mostly the high information literacy competency scorers, found the information task a new experience as they had not performed a serious search requiring rigorous information use in their secondary school years. This reveals a lack of in-depth information literacy experiences in school which in turn did not prepare them adequately for independent research in their university study.

4.3.1.3 Past Practices of Information Use employed during the Information Task

Though most of the students found the information task demanding, while working on the task, they indicated that they applied their usual practices of information use to work on the task:

- Student L1: "I used my usual practices for the task. Previously, if I did not go
 out for surveys and interviews, I also used Wikipedia, Yahoo and Google to
 search for information" (Interviews, p. 1).
- Student L2: "I used the same process that I used in the past ... I copied and
 pasted the information into a Word file ... However, this task required essay
 writing while I only needed to provide PowerPoint presentations in the past"
 (Interviews, p. 6).
- Student M2: "The process was similar to my past practices ... I used to start with Yahoo first. If I could not find anything, I searched at Google which I find a bit too broad" (Interviews, p. 21).
- Student M4: "The steps I took just now revealed my past practices. I used to
 copy and paste the website contents and URLs into a file then added in
 appropriate headings. I used Yahoo if I found too much information.
 Otherwise, I used Google" (Interviews, p. 28).
- While working on the information task, student L3 remarked "I often used Wikipedia for locating background information ... and copied the located information into a Microsoft Word file" and student M3 noted "Just like my usual practice, I copied the located information into a Microsoft Word file then

added in a heading to organize the copied contents." Student H2 said "I started the search with Google, which is my usual practice" while student H3 remarked "It is my usual practice to use Google to check the nature of an organization when I use an organizational website."

The remarks of the students above confirm that they employed their usual information literacy practices to work on the information task.

4.3.1.4 New Information Use Strategies employed during the Information Task

A few students indicated that they did not only repeat their past information practices while working on the information task, they also attempted some new information use processes ad hoc to cope with the task which they found much more demanding than their past IL experiences. As indicated in a previous section, Student L4 said, "In my past experiences, Wikipedia was very useful, but it could not help much this time. This task is about a relationship among several issues and Wikipedia cannot address the relationship. Wikipedia is too brief for this in-depth research task. ... At the beginning, I found the located information from Wikipedia very fragmented and I could not find the relationship among issues. Until I found the two dissertations, I started to know how to go ahead. The two dissertations should be sufficient" (Interviews, p. 13). In the process of locating the two dissertations at the library catalogue of University X, student L4 indicated that it was his first time to use the Boolean Operator AND at a library catalogue. In the past, he only searched the catalogue by title for those books appearing in the reading

lists given by teachers. Also, it was his first time to access electronic resources at the library catalogue of University X and he did not know how to get the full text of the two dissertations that he needed online. Though he did not like to ask the librarian as he had never done that in the past, he was stuck and he went to ask the reference librarian at a counter nearby for advice on accessing the full text of the two dissertations. It was also his first time to ask a librarian in University X. After watching the short demonstration provided by the librarian, he knew how to do so fast. The student grasped the technique quickly with a brief guidance from the librarian.

While working on the information task, student M2 made his first attempt to use the *Academic Search Premier* database accessible at the University X library homepage. He also noted "It was my first time to use the function AND [at the *Academic Search Premier* database search form]. I used it because it was available in the search form. I just guessed how to use it as I was not taught about this in the past and I had not done that before."

Student H1 also noted "It was my first time to search the library catalogue [of University X]. ... It was my first time to use Google Scholar just now" (Interviews, p.31). Similarly, student H4, the highest IL competency scorer said, "Just now, I found it very difficult to search at the *Article Search* [provided by the library of University X]" (Interviews, p. 40). Again, it was the first time for this serious student to use the *Article Search* feature provided by the library.

All these students had not used the types of information sources, the search tools and techniques named above in the past. To cope with the information task

in 1.5 hours, they attempted to employ new information use strategies to cope with this new information literacy experience which they had never faced in the past. The information task, as a new information literacy experience, pushed them to modify their past information use practices and try some new information source types and search tools, and acquire new information literacy concepts and skills. The information task, which requires research on multiple concepts, looks challenging to these students, and thus provides an in-depth information literacy learning experience for them. Without any instruction and guidance but by trial and error only, though these students might not use the unfamiliar information search tools properly, they were put in a situation that "forced" them to try some new strategies. If an instructor can provide prompt and handy instruction during this new information literacy experience, these students with good academic ability, just like student L4 who was "forced" to ask a librarian, should be able to learn fast and acquire new information use strategies quickly for future independent research in their university study.

4.3.2 Past Information Literacy Experiences

The findings of the previous section indicate that the student participants were not used to serious information use for researching on multiple concept topics. During the interview, they were further asked about their past experiences of information use, to triangulate with these findings. They talked about their past experiences for academic purposes and for everyday life use respectively, in particular, those similar to the information task.

4.3.2.1 Major Previous Information Literacy Experience in School

Most of the student participants could only name one or two past information literacy experiences in their school years that were similar to the information task to some extent. These experiences were mainly related to school-based assessment in public examinations, inter-school competitions and presentations to junior form students, as follows:

- For school-based assessment (SBA) in public examinations Chinese Language (student H1), Chinese Language and Culture (students L3, M2), Integrated Humanities (student H2), Science subjects (students L2, M3, M4, H2)
- For interschool competitions debate team (student L4) and statistics
 project competition (student H3)
- For presentations to junior form students (student L4 and H1)

Previous information literacy experience related to school-based assessment

According to the Hong Kong Examinations and Assessment Authority, school-based assessment (SBA) has been implemented in a number of subjects (Appendix I), including those mentioned by the student participants listed below:

- HKCEE Chinese Language (student H1)
- HKALE Chinese Language and Culture (students L3 and M2)
- HKCEE Integrated Humanities (student H2)
- HKALE Science subjects (students L2, M3, M4 and H2)

Student L3 noted, "In F.6 to 7, only public examination results were counted so there was no need to do any project. The only exception was the Chinese Language and Culture subject of which internal assessment was included as part of the Advanced Level examination score, so that we needed to do a project for this subject" (Interviews, p. 11). The major reason for the school teachers in providing information literacy experience for their students was for assessment in the public examination. However, they provided very little guidance in the information use processes. Student L3 further elaborated: "The [Chinese Language and Culture] teacher did not provide any instruction as students were expected to know how to do so, ... I worked on the history of Chinese Eunuchs for the Chinese Language and Culture project. I mostly used books in the school library as there was very little information on this topic on the web. The teacher librarian did not provide any instruction. I only received training as a student librarian" (Interviews, p. 11). Both the school subject teacher and the teacher librarian did not provide any information literacy guidance to student L3 but just asked him to work on the project by himself.

Similarly, student M2 needed to work on a project for HKALE Chinese Language and Culture. He said, "The longest time I spent was on a project about religion for the Chinese Language and Culture subject. I set the topic and I mainly searched at Yahoo and Wikipedia for the needed information. I copied a bit from here and a bit from there and paraphrased the text. ... A reference list was needed but just a list of URLs was okay. No special citation format was required. ... No guidance was provided by the Chinese Language and Culture teacher" (Interviews, p.

22). When the researcher further asked student M2 who taught him to paraphrase, he elaborated, "A school teacher, not the Chinese Language and Culture teacher, told me that I needed to paraphrase rather than copying the whole passage, because some students just copied all the contents from a website and submitted the work" (Interviews, p. 22). Just like the subject teacher of student L3, the Chinese Language and Culture teacher of student M2 did not provide any information literacy instruction for the HKALE school-based assessment project. The student was left to decide on the topic and to search at Wikipedia and Yahoo for information on the web on his own, without any proper citation to the sources. The teacher did not demand the student to do a thorough research and evaluation of the information sources. No citation to sources was needed. In contrast, during the information task of the current study, to face the challenges of the task, student M2 made his first attempt to use a few article indexes provided by University X, in addition to Wikipedia and Yahoo that he used to use. This is because the information task of the current study cannot be satisfactorily fulfilled just by searching Wikipedia and Yahoo. Only with a learning experience that requires intensive information use, will students sharpen their information literacy competency, and experience the satisfaction in the information search and use processes.

Student M3 said, "For Physics, I needed to set up some experiments for TSA [should be SBA] but the lab manuals were not detailed enough. I had to search on the web to find some techniques before I did the experiments. There was no need to quote the sources. ... The Physics teacher did not teach us how to search for

information. He just asked us to do so. Since TSA [should be SBA] was part of the AL examination, the teacher was worried that we did not perform well" (Interviews, p. 24).

Similarly, student L2 searched for information on the web to supplement her laboratory reports. "I searched for information for writing the lab reports. All required information for the lab report could be found from the web including errors and applications. The information is very comprehensive and completed and includes some aspects that I have never thought of. ... I used Wikipedia to search for 3-D chemical structures and copied the images for the report" (Interviews, p. 8). In addition, she had worked on a Physics project. She stated, "I needed to prepare a PowerPoint presentation for Physics. My group chose the topic 'microwave oven'. We used Wikipedia and Yahoo to search for information. We also searched the library catalogue of the school library. ... The teacher mainly checked if the located information was okay and if the length of the PowerPoint presentation was alright but did not teach us how to use Wikipedia and Yahoo. ... The Physics teacher introduced a useful website *Howstuffworks* to us. ... The teacher librarian did not provide any help" (Interviews, p. 7).

Both students M3 and L2 needed to search for information on particular experiments when they worked on their Physics laboratory reports as part of the school-based assessment. Student M3's teacher did not provide any guidance on information literacy but just asked her to look up the information herself to supplement the laboratory report. The Physics teacher of student L2 only named

a website for her reference when she worked on the project and the teacher mainly looked at the presentation side rather than the information use processes.

Student H2 had similar past IL experiences. He also searched for information for his lab reports and science project in school. In addition, he did a project for HKCEE Integrated Humanities. He said, "I had worked on a project about the exploitation of farmers' rights e.g. coffee farmers. It was done in F.5 for Integrated Humanities and was about the advantages and disadvantage of globalization. ... The Integrated Humanities teacher had recommended some video titles to us but did not teach us how to search for them" (Interviews, p. 34).

Further, student H2 named another school project. He said, "I worked on a project for science in F.6 but I can't recall if it was for Biology or Chemistry. It was about the use of antibodies in detecting diseases. I used the *PubMed* website to search for information on specific technology for fighting disease. At that time, I did not know how to play around 'regulations' [should be syntax] like AND OR but I knew this website could provide scientific information. ... My Biology teacher introduced *PubMed* to us. He mainly told us that we could enter keywords at *PubMed* though we might not understand its contents. ... He did not teach us how to use AND, OR, NOT. ... My IT teacher taught me how to use AND OR NOT. ... My IT teacher did so while teaching us search engines. He introduced various search engines but did not specify which should be better. ... Other than the Biology and the IT teacher, no more guidance on information use was received from my school" (Interviews, p.33). Like the teachers of other students noted above, student H2's

teachers mainly introduced some information sources to him but did not teach him their characteristics, or how to use or look up them.

When the researcher asked student H2 how often he needed to work on these projects, he noted "There was about a project a term, all with low score weighting ... a taste of project work (叫做做過) ... All these were PowerPoint presentations. We made the oral presentation and submitted the hard copy later. ... Reference list was required but just URLs or book titles were okay" (Interviews, p. 34).

Student L1 said "I needed to work on a project in F.4 for Liberal Studies." According to the Hong Kong Examinations and Assessment Authority (HKEAA), there is not a HKCEE Liberal Studies subject. However, some schools provided Liberal Studies in F.4-5, though not as a HKCEE subject. In view of this, the researcher sent an email to the student to confirm this but no reply was received. Nevertheless, the student's comment is stated here for reference as well. Regarding his Liberal Studies project taken place in F.4, student L1 said, "My topic was about the impact of the opening of the Disneyland on the Ocean Park. ... We developed a survey and conducted it in the streets of Tsim Sha Tsui. ... We searched on the web for the entrance statistics of the Ocean Park and how Ocean Park handled the issue. ... We chose the topic and refined it, and it should be approved by the teacher. ... Our teacher mainly asked us to go out and work on a survey and helped us in revising it. ... The information searching was all performed by students and the teacher did not provide any guidance" (Interviews, p. 1). Student L1's Liberal Studies teacher only helped him in designing the survey but not on other

aspects of information literacy. Just like the information task, student L1 only used free web information for his project.

Summary

According to the student participants, the major reason for most of the school teachers in providing the information literacy experiences for their students in the senior secondary school years was for assessment in public examinations. They did not demand a rigorous information use process but only some kinds of projects for assessment, as student H2 commented "all with low score weight ... a taste of project work" and student H3 remarked "just pretending". Most of the students' submitted works are PowerPoint presentations or laboratory reports. The students seldom needed to write an essay to organize and integrate newly found information and their prior knowledge. Also, they did not need to cite or write a proper reference list but just provided a list of URLs or book titles.

While working on school work, the student participants indicated that they mainly used Yahoo, Google, Wikipedia and the school library to search for the needed information. They did not mention using any scholarly reference tools such as encyclopedias or dictionaries to look up the background information, nor indexes like *WiseNews* subscribed by a number of secondary schools to search for news articles. No students mentioned searching for articles, except student H2. He noted that his Biology teacher introduced *PubMed* to them. However, though *PubMed* is a publicly accessible web-based biomedical journal article index provided by the National Library of Medicine of US, most of its full-text articles might not be

accessible by non-subscribers and these research journal articles might be too detailed and specific for school students.

For the laboratory reports, as student H2 rightly pointed out, "I could find the data for the chemistry lab report very fast and I knew right away if I got the right data or not. This is because the information needed is very factual" (Interviews, p.35). The supplementary information for setting up a secondary school scientific experiment is very factual, thus a quick search at the internet search engines can easily fulfill the need.

Regarding the role of teachers, student L2 stated, "The teacher mainly checked if the located information was okay and if the length of the PowerPoint presentation was alright but did not teach us how to use Wikipedia and Yahoo" (Interviews, p.6). Similarly, student H4 remarked that "My secondary school teachers only provided guidance on the layout and time duration for PowerPoint presentations, but not how to use Google" (Interviews, p.41). School subject teachers seldom provided guidance on information use but mostly looked at the length and display of the presentations. Presentation skills, rather than information literacy, seems to be a more important component of these past learning experiences.

Previous information literacy experience in inter-school competitions

In addition to the formal curriculum, students had been exposed to other experiences in the non-formal curriculum. Two students named their past IL

experiences in inter-competitions as their major experiences similar to the information task to some extent.

Student L4 said, "I was in the debating team of my secondary school. We needed to search for a lot of news and current issues at the Internet search engines. We mainly cut and pasted the located information into note cards. ... My teammates gathered the information while I mostly made the presentation in the debate competition. ... I know AND can combine two issues. I am not sure if the school debate team taught me how to use AND. I recalled that the debate team coach had talked about limiting the searches at Yahoo and Google by formats e.g. by PDF or video. However, I seldom use this function" (Interviews, p. 14).

Student H3 remarked: "I seldom did research like the information task just now. There was only one exception, which was a bit similar, a bit more formal experience in school. It was a statistical project for local interschool competition. The topic we chose was District Board election and we wanted to research on the factors that affected its voting rate. I used Google to search for the information and looked up the websites of the District Board and the Government's Statistics Department. Actually we could not make a clear conclusion. For that project, my teacher directed us to a citation style guide on the web. It was very clear, with different colors representing authors and different parts. ... Other than this statistics project, the rest were just pretending ... very small scale, and the teacher just taught us briefly. In a summer English course, I was given 5 to 6 sheets of text on a social issue and was asked to summarize and cite the information and wrote an essay about it. It was actually not about information search" (Interviews, p.37).

Both students L4 and H3 saw their interschool competition projects in the non-formal curriculum as more "formal" in information literacy than the subject projects they did in the formal curriculum. On the one hand, this is because both the teachers and students took the information use of these projects more seriously as they were for inter-school competitions. On the other hand, they received more information literacy instructions in these inter-school competitions than in subject classes. The debating team coach taught student L4 some search techniques that he had not learnt in class. Also, the teacher responsible for the statistics interschool competition taught student H3 how to cite in an academic format. Out of the twelve student participants, student H3 is the only one who had learnt how to cite in her secondary school years. It is interesting to note that the demand in information literacy in these non-formal educational activities is much higher than in the formal curriculum.

Previous information literacy experience for open presentation in school

Student H1 worked on a project on Chinese Language. She stated, "There was not much need to use information in my secondary school years. While preparing for the Chinese Language project, I used Yahoo to search for information, then copied and pasted the information as bullet points for the PowerPoint presentation. Actually, I mainly searched for images as my teacher had already provided the needed information in class. I guessed the project aimed to train our oral presentation skill while presenting it to the junior form students. I mainly wanted to make the presentation more colorful, hence less boring for the juniors.

There was no need to cite any sources but just needed to acknowledge Yahoo at the end. The teacher did not teach us how to search for information." (Interviews, p.31)

Student L4 also needed to search for information and made a presentation to junior form students. He said, "My teacher asked us to make presentations to the junior forms on 'Functional Constituencies". We needed to search at Wikipedia for factual information such as its history. We also searched its definition at the Legislative Council website, and the notables' comments at Yahoo" (Interviews, p. 31).

Similar to the projects and laboratory reports for various school subjects mentioned earlier, these presentations did not demand extensive information literacy. Students H1 and L4 just used Yahoo and Wikipedia to search for the needed information. Student H1 mainly searched for images to make the presentation "more colorful hence less boring". She was not required to cite any information sources but just named the search tool Yahoo at the end of her PowerPoint presentation. Also, her school teachers did not provide any guidance on information search. She speculated that the project mainly aimed to train her oral presentation skill. Though student H1 did not indicate if this project for Chinese Language was for SBA, it must be noted that SBA has been required for Chinese Language and the project might actually be part of the SBA of the subject. Nevertheless, similar to the academic work for SBA, presentation skill but not information literacy seems to be a more important component of these past experiences.

4.3.2.2 Other Previous Information Literacy Experience in School

The above indicates that students' major past IL experiences in school are mostly project works and laboratory reports for school-based assessment, inter-school competitions or presentations to junior form students. Other than the named ones, the other IL experiences are very small scale projects which required very little effort in information use. The student participants indicated that there was little need for serious information use in their school years.

- Student H4 said "In the past, just using Google, Wikipedia and Google Image was sufficient. There was no need to use any journal articles. In the senior forms, there was almost no project. In the junior forms, the projects were mainly on science and languages. There was not much need to find information for the language projects. For the science ones, I just needed to refer to the textbooks" (Interviews, pp. 39-40).
- Student H3 remarked "I seldom did a task like this [the information task] in the past. ... There was only one exception which was a bit similar to this task, and a bit more formal. ... Other than this statistics project [the only project named as a bit similar to the information task], the rest were just pretending ... very small scale, and the teacher just taught us briefly" (Interviews, p. 37).
- Student H2 stated "There was about a project a term, with low mark weighting, as a taste of project work. All these were PowerPoint presentations only. Reference list was required but just URLs or book titles were okay" (Interviews, p. 34).

- Student L4: "In the sixth form, there was no need to do any project or make any presentation. In F.1 to 3, I only needed to search the web and the first one to two pages of search results should be sufficient. I also visited the places and took some photos. For example, when I worked on a project on a museum, I searched its factual information at Yahoo and went there to take some photos. More photos would do." He also noted "For the lower form school projects, half of them were surveys and I mostly surveyed my parents, neighbours and friends not in my school. I just needed to go to the web to find one or two pieces of information sources to explain the phenomenon. They were all PowerPoint works and there was no need to quote the sources" (Interviews, p. 17).
- Student L3: "There was little need to search for information for academic work, just 2 to 3 times in 2 years. This is because in F.6 to 7, only public examination results were counted so there was no need to do any project. The only exception was the Chinese Language and Culture subject of which the internal assessment was included as part of the Advanced Level Examination score, so that we needed to do a project for this subject. ... In addition to the Chinese Language and Culture project, in lower forms, I needed to use examples to support my Geography essays for the examinations. Since only one to two points for supplementing the school text should be enough, I just searched Yahoo" (Interviews, p. 11).
- Student L1: "I only needed to work on some very small-scale presentations.
 Other than the Ocean Park project, there was no need to find much

information. I just needed to spend one to two hours to search for the needed information and could finish the work. ... All of them were PowerPoint presentations ... in about one to two times a year" (Interviews, p. 2).

Student participants gathered information for these small scale projects in one to two hours of Internet search, or by reading the first one to two pages of search results at Yahoo, or just getting one to two points from the web to supplement the school textbooks. Students were "trained" by these undemanding information literacy experiences to just pick one or two pieces of information from the web and get the job done.

4.3.2.3 Previous Information Literacy Experience in Everyday Life

Among the student participants, there is a wide range of information literacy experiences in their everyday life. Some students (L2, L4, M1, H1 and H3) indicated that they often used information in their everyday life while some (L1, L3, M2, M4 and H2) used information for a few specific purposes only.

Extensive use of information in everyday life

Student L2: "In my everyday life, if I did not know anything, I searched the web. The search was very handy, convenient and resulted in a lot of information" (Interviews, p. 7).

Student L4: "In my everyday life, if there was something I wanted to know about, I searched at Wikipedia and visited the public libraries"

(Interviews, p. 14).

Student M1: "In whatever situations and for whatever reasons, no matter for school work or not, I will search for information on the web.

Once I wake up, the first thing I do is to switch on the computer. ... I search for information on the web everyday" (Interviews, p. 18).

Student H1: "My successful experiences were for my everyday life use. My best experience was using Yahoo to search for information of a company that offered me a summer job" (Interviews, p. 32).

Student H3: "Other than these [the projects in school], my use of information is all for my everyday life" (Interviews, p. 37).

"I am very interested in information search. For example, I searched the blog and learned from there in using Evernote. For example, for assignments or for supplementing classes, though actually the assignments did not require us to search for any information. If I did not understand the topic or the subject matter, I would search the web to find the needed information, not just for supplementary information, but the answers to the questions, or for similar assignments done by others that were available on the web. For example, in Chemistry, regarding the Periodic Table, why is the electronic configuration of calcium 2882 followed by 2892? The explanation was not given [by teachers] in F.3 but only in F.6. I had this question when I was in

F.3 and I found the answer by myself on the web in that form.

When I was in F.6, it was amazed that a F.3 junior in my school also asked me the same question" (Interviews, pp. 37-38).

Occasional use of information in everyday life

- Student L1: "Not much. Mainly for working on school assignments" (Interviews, p. 2).
- Student L3: "In my everyday life, I read the Times and the National Geographic.

 I seldom search the web, except I wanted to search for interesting places mentioned in History" (Interviews, p. 12).
- Student M2: "In my everyday life, I only searched for the bus route information and seldom search for other purposes" (Interviews, p. 22).
- Student M4: "I mainly read online news and did not surf the web otherwise" (Interviews, p. 28).
- Student H2: "In everyday life, I mainly browse news and purchase things on the web. I seldom search for information" (Interviews, p. 34).

In contrast to their past experiences in school, almost half of the student participants (L2, L4, M1, H1 and H3) searched for information more extensively in their everyday life than for the projects or laboratory reports assigned by their school teachers. Most of these students were enthusiastic information users. Their past information literacy experiences for school work did not provide a challenging learning environment for them to enhance their information literacy

competency. Rather, they acquired some kinds of information search tips in their everyday life use by themselves and tried to apply these techniques while finding information for their school projects, as student L4 noted "I employed the information search methods I used in my everyday life for my school projects" (Interviews, p. 14).

4.3.3 Past Information Literacy Instruction Received

During the interview, student participants were asked to talk about the instruction on information use that they had received. The information literacy instruction or guidance provided respectively by their school subject teachers, school IT teachers, teacher-librarians, family members and friends for these students are stated in the following.

4.3.3.1 Information Literacy Instruction provided by School Subject Teachers

In their secondary school years, the student participants were asked by their subject teachers to work on various projects or assignments that required information literacy. However, all of these subject teachers did not provide any systematic and in-depth information literacy instruction. Actually, some of them did not provide any information literacy instructions to their students, and just asked their students to search for information on their own. Student M4 said, "My school teachers just informed us the topics of the projects but did not provide any guidance on searching for information" (Interviews, p. 29). Student M2 stated,

"[Regarding the Chinese Language and Culture project], no guidance was provided by the Chinese Language and Culture teacher. ... The IT teacher did not teach me how to search for information" (Interviews, p. 22). Similarly, student M3 stated "[Regarding the Physics lab reports], the Physics teacher did not teach us how to search for information. He just asked us to do so. Since TSA [should be SBA] was part of the AL examination, the teacher was worried that we did not perform well" (Interviews, p. 25).

Rather than just asking students to work on the assigned work all on their own, some subject teachers did provide some hints. The following lists the kinds of hints given to these students.

Asked the students to search on the web and go to the library

 Student L3 said "The teachers just told us to search on the web and go to the library" (Interviews, p. 12).

Commented on the length of PowerPoint presentation, the wording used and content adequacy

• Student L2 said, "[For my Physics project], I asked the teacher if the located information was okay and if the length of the PowerPoint presentation was alright." When the researcher asked if the [Physics] teacher taught her how to use Yahoo, she said "No, I mainly asked the teacher if the located information was sufficient and if the terms I used were too difficult" (Interviews, p. 6).

 Similarly, student H4 stated, "My secondary school teachers only provided guidance on the layout and time duration for PowerPoint presentations, but not how to use Google" (Interviews, p. 41).

Revised the survey

Student L1 said "[Regarding the project,] our teacher mainly asked us to go out
and work on a survey and helped us revising it, but did not guide us on how to
search for the related information on the web" (Interviews, p. 1).

Introduced specific websites

- Student L2 said "The Physics teacher introduced a useful website
 Howstuffworks to us" (Interviews, p. 9).
- Student H2 said "My Biology teacher introduced PubMed to us. He mainly
 told us that we could enter keyword at PubMed though we might not
 understand its contents." He also mentioned that "The Integrated Humanities
 teacher had recommended some titles of videos, but did not tell us the way to
 search for them" (Interviews, p. 34).
- Student M1 said "Some school teachers gave us some websites but my classmates and I usually did not like to use them. Rather, we preferred searching by ourselves" (Interviews, p. 18).

Introduced specific information literacy skills

Student L4 said "I am not sure if the school debate team taught me how to use AND. I recalled that the debate team coach had talked about limiting the searches at Yahoo and Google by formats e.g. by PDF or videos. ... I seldom use these functions" (Interviews, p. 15).

Student H3 stated "For that project [the statistics project for interschool competition], my teacher directed us to a citation style guide on the web. It is very clear, with different colors representing the authors and titles etc."

Summary

Student H3 remarked "Other than this statistics project, the rest were just pretending, very small scale, and the teacher just taught us briefly" (Interviews, p. 37). With very limited information literacy instructions provided by the subject teachers, the student participants had to rely on themselves to search for and use information for their school work. They had various explanations on the scarce provision of information literacy instruction. Student L3 noted "The teacher did not provide any instruction as students were expected to know how to do so" Student M1 remarked "I think school teachers considered the (Interviews, p. 11). students more capable than themselves, except the IT teacher who provided us websites for software downloading" (Interviews, p. 18). She also noted that she did not like to ask school teachers for help on information use: "I think I should solve the problems by myself. I prefer asking friends or even strangers on the web, rather than asking the teachers" (Interviews, p. 19). On the one hand, the students speculated that their teachers found the students more capable than the teachers in information literacy, thus avoiding provision of any information literacy instruction to them. On the other hand, the students might also consider their teachers incompetent in information literacy and did not want to ask them for advice. Instead, they sought "experts" on the Internet. Student H3 said "I searched the blog and learned from there in using Evernote" (Interviews, p. 37).

Both students M1 and H3 often participated in blogs to seek for advice in information literacy.

4.3.3.2 IT Skill Instructions provided by School IT Teachers

The above section indicated that school subject teachers of the student participants did not provide systematic and in-depth information literacy instruction. Some of them did not provide any information literacy instructions to their students, and just asked their students to search for information on their own. Relatively, school IT teachers had more impact on the students' information search. However, their instructions mainly focused on IT skills rather than comprehensive information literacy. Also, only very few of them provided training on search engines while the rest just focused on using application software.

Only three student participants (L2, H1 and H2) mentioned that their IT teachers taught them how to use search engines and their search syntaxes in their junior secondary school years. Student H2 described his personal experience, "My Biology teacher introduced *PubMed* to us. ... The Biology teacher did not teach us how to use AND, OR, NOT. Rather, my IT teacher taught me to use AND, OR, NOT while teaching about search engines. However, the teacher did not specify which search engines are good or better. ... Other than the Biology and IT teachers, no teachers taught me how to use information" (Interviews, p. 34). Student H1 stated "The IT teacher taught about Yahoo in F.1-2, and taught putting two keywords together at the searches" (Interviews, p. 32) while Student L2 said "My IT teacher taught us to use search engines ... + and ? ... and type in a question to

search at the search engines ... the only teacher taught about these" (Interviews, p. 8).

In contrast, three students (M2, M3 and H4) indicated that their IT teachers did not provide any instruction on information search. Student M3 said "I had IT classes in F.1-3. It was mainly about web page design, input of Chinese characters but not about information search" (Interviews, p. 25). Student M2 noted "Both the IT teacher and the teacher librarian did not teach me how to search for information" (Interviews, p. 22). Student H4, the highest IL competency scorer, indicated "I did not learn IT skills in school. I learned to use information all by myself, by trial and error. All my classmates learned in this way" (Interviews, p. 41).

When the researcher asked student H1 if her teachers other than the IT one taught her how to search and use information, she said "No, they [the subject teachers] might think the skills taught by the IT teacher should be sufficient" (Interviews, p. 32). Unfortunately, this might not be what students M2, M3 and H4 thought, as they claimed they did not have such IT instruction in school.

4.3.3.3 Information Literacy Guidance provided by Teacher-librarians

According to the Curriculum Development Council (2002), teacher-librarians should not just be the manager of the school library, but also an information specialist, partner of curriculum development and teaching, and promoter of reading to learn. However, the interviews reveal that teacher-librarians of the student participants had very little role in the students' past information literacy

experiences. Students did not mention the teacher-librarians until asked by the researcher.

Student L4 did not use the school library. He explained "I did not go to the school library because it was small and did not have many books. Also, the library regulations were very strict, e.g. beware not to crumple the book pages. The teacher librarian was very troublesome" (Interviews, p. 14). Student L1 had a low regard for his teacher-librarians as well. He remarked "The two teacher-librarians in my sixth forms were new and they had no idea what they were doing. ... I seldom sought help from any librarian" (Interviews, p. 3).

For those students who used the school libraries, they had not received any help from the teacher-librarians. Student L2 said, "[While working on the project], we also searched the catalogue of the school library and found some books such as Hundred Thousand Whys (十萬個為什麼). The teacher-librarian did not provide any help" (Interviews, p. 7). Student M2 remarked, "The teacher-librarian did not teach me how to use information. … I have never asked a librarian in the school library and the public libraries" (Interviews, p. 22).

Some students expounded on the issue of why they did not ask help from the teacher-librarians. Student H3 explained, "I have no need to ask the teacher-librarian as the library is so small. Regarding those in the public libraries, I seldom needed to ask them as well because I often had a specific title in mind already" (Interviews, p. 39). Similarly, student H2 said, "In class, my school teachers provided us a reading list. I just needed to get the books from the shelves of the school library and left right away. In the public libraries, I also just

got the books from the shelves and left" (Interviews, p. 35). Student H1 noted. "The teacher-librarian did not teach how to search for information. We just searched the library catalogue by book titles" (Interviews, p. 32). Students did not ask help from the teacher-librarians because the libraries were so small that they could find the required books easily. Also, they only did title search for books in the reading list given by the subject teachers and they did not have difficulty in locating books in such a way.

A more fundamental reason may be reflected in student H4's perception of teacher-librarians. He said, "No one has ever thought of asking the teacher-librarian. The librarian was seen as an administrator of the library only" (Interviews, p. 41). This line of perception prevented the students from seeking help from the teacher-librarians on information use.

Lastly, some students just did not like to seek help from others. Student M2 noted he seldom asked help from teachers, librarians, classmates and parents. He did not like asking for help on information use from anybody.

Even if the students asked their teacher-librarians, they only asked about directional questions. Student H2 said "I had asked the teacher librarian in the past but only where the photocopier was. I had never asked questions about where the books by subject are. The library was so small and there was no need to ask" (Interviews, p. 35). Student M1 noted "I only asked the librarians why I could not find a particular book. I did not want to waste their time" (Interviews, p. 19).

Though students L3 and M4 were student librarians, they only received training as student librarians but not on general information use or library use. Student L3 said "The teacher-librarian did not provide any instruction. I only received training as a student librarian" (Interviews, p.11). Student M4 noted "I was the student librarian in my school but I mainly helped to wrap and shelve books for the library" (Interviews, p. 29).

Student M3, also a student librarian, seems to have a teacher-librarian playing a more active role in information literacy. She said "The teacher-librarian trained me as student librarian and I helped other students" (Interviews, p. 25). Student M3 is also the only student among all twelve student participants that had library classes on how to use the school library in school. She said "I had never asked the teacher-librarian. In F.1, there were five classes on how to use the school library including the Dewey classification system and how to find books there" (Interviews, p. 25). Another exception is student M4, who indicated that she got personal help from the teacher-librarian once. She said "The teacher librarian helped me once, recommending the books useful for writing my personal statement for overseas university applications" (interviews, p. 29).

The teacher-librarian was seen as an administrator only, training student helpers to run the library, such as wrapping and shelving books (student M4) and inputting data (student M3), but not for helping students in any information use. They are only supposed to tell where the books are and where the photocopiers are. Only one out of twelve schools of the student participants had provided a library orientation to new comers of the school for instruction in using the library. No

subject teachers involved the teacher-librarians in their classes, nor referred their students to seek guidance on their projects from the teacher-librarians.

4.3.3.4 Past Information Literacy Guidance outside the School Setting

None of the students receive any guidance of information use from their parents. Student H4 said "I did not learn from my parents. They do not know any IT" (Interviews, p. 41) while student H2 pointed out "I helped my mum and dad instead" (Interviews, p. 36). The only exception is student M4, who mentioned that she might have learnt from her sister by observing how her sister searched for information. She stated "My parents did not teach me, but I observed my sister searching for information and might have learnt some skills from her" (Interviews, p. 29).

Many people perceive young people learn information literacy from their friends or peer groups. The interview of the current study reveals a different picture. Friends and classmates played a range of role in the past information literacy experiences of different student participants. Student L4 heavily relied on his school debate team members to gather information for his presentation in the inter-school debate competitions. He expressed his desire to work in group for the information task and for future IL tasks in his university study. He said, "I may not search as fast as my debate team teammates. ... In my debate team, my teammates gathered the information while I mostly made the presentation in debate competition. ... It would be nice if I can work with others to search for the information. ... Each member can search for a particular part then we group the

information together. ... If I am just responsible for a smaller portion of information search, I have the motivation (有心機) to pay more attention to the located information" (Interviews, p. 15).

Other students did rely on friends and classmates as much as student L4. Student M3 observed what her friends did and tried to copy. She said "I learned how to use information by myself and I observed my classmates how they searched at Yahoo" (Interviews, p. 27). Student L3 recalled "My friends ... pointed out my problems, e.g. my friends reminded me that professors do not like students using Wikipedia" (Interviews, p. 12). Lastly, student M1, an outspoken and enthusiastic person, likes helping her friends in fixing computers and searching for information. She remarked, "I fixed computers for my friends. I learned all IT and information searching skills by myself. I also helped my classmates to search for information" (Interviews, p. 19).

In contrast to the above students, some student participants did not seek help from their friends and classmates for any IL advice. Student H2 said "My friends and classmates did not talk about this" (Interviews, p. 36). When the researcher asked student M2 if he had sought advice on information use from his classmates, he said "No, they just search like me" (Interviews, p. 23). He did not ask his friends for help as they all searched for information in a similar way.

4.3.3.5 Information Literacy Instruction on Evaluation of Information and its Sources

In addition to questions on general information literacy, the researcher asked the student participants in particular if they had received any instruction on evaluation of information and its sources. Nine out of the twelve student participants said no one taught them how to do so. Student M3 stated "No one taught me how to evaluate information so far" while student H2 said "No one taught me how to do so." Students L1, L2, L4, M1, M2 and M4 all indicated that they had not received any instruction on evaluation of information sources and they selected information sources for their work only by the relevance of their contents.

- Student L2: "No one taught me how to evaluate information sources. I have to judge by myself. I will see if it is relevant to the topic. ... I never consider who wrote the websites" (Interviews, p. 8).
- Student L4: "No one taught me how to evaluate sources. I select sources by the relevance of the text" (Interviews, p. 16).
- Student M1: "No one taught me how to evaluate sources. I mostly judge by the relevance of the contents" (Interviews, p. 20).
- Student M2: "No one taught me this. I only look at the relevance to the topic" (Interviews, p. 24).
- Student M4: "No one taught me how to do so. If the sources look very 'pro' and are very difficult to understand, I prefer not to use them and will find more general ones instead. Just like many people, I use Wikipedia because it is very general. The main selection criterion is the

relevance of the contents to the assignment topic" (Interviews, p. 30).

Student M4 regarded relevance of contents as the major criteria for selecting information sources for her school work. In addition, she avoided detailed information and any sources looked very "professional" (the student used the term "pro" to stand for "professional"). When she worked on the information task of the current study, the scholarly information sources looked "professional" to her and she preferred not to use them.

When being asked if anyone taught him how to select websites, student L1 said "no". He further elaborated the reasons for not looking into the reliability of the information but just the relevance. He said "I select websites by looking if their contents and headings are related to the topic. ... I seldom consider if the information is reliable. This is because others had commented that Wikipedia contains wrong information. If even Wikipedia is not reliable, a lot of websites may be wrong as well. It is impossible to avoid this. If I open a website and it looks reliable, does not look like primary school students' group presentations, looks professional, looks beautiful, contains many details, and it looks okay once I look at it, I will use it. If it does not look okay, I won't use it" (Interviews, p. 4).

Though student H1 also indicated that no instruction on evaluation of information sources was received, she had been very alert of the reliability of information and its sources. While working on the information task, she remarked, "Government websites are more reliable and their authors are mostly professionals. In contrast, authors of the Green Peace web pages may not be professionals. ... I

think because governments are more resourceful and can provide better information. Also, these websites cater to different people so that biased viewpoints are prevented." She further elaborated in the interview, "In the past, I only used Yahoo and I only started to use Google at the university. Yahoo finds more forums which mostly consist of personal viewpoints and their use of language is not proper. ... The viewpoints in blog are more biased. ... Google can find more scholarly and reliable results e.g. websites of governments and big organizations like Green Peace." When the researcher asked her how she acquired this awareness, she replied "No one taught me these. I observe the biased problems in my everyday life use" (Interviews, p. 31).

Only two students (L3, H3) mentioned that their school teachers had reminded them the reliability of websites. Student L3 stated "The [F.4–5 History] teacher had reminded us to use information from the web cautiously as web information might not be reliable while books can provide more comprehensive information" (Interviews, p. 12). Student H3, confident in her IL skills, said "I often review the background of an organization or the author of a website very cautiously since I need to convince others. After the appearance of Wikipedia, I have been more cautious and become more alert to the reliability of information on the web." When the researcher asked her if the teacher taught about this, she replied "My teacher must have talked about the reliability" (Interviews, p. 38).

4.3.3.6 Information Literacy Instruction on Ethical Use of Information

In general, school teachers of the student participants just required their students to provide a list of URLs or book titles of the information sources as the reference list. Student M2 said "A reference list was needed [for the Chinese Language and Culture project], but just a list of URLs was okay. No special citation format was required" (Interviews, p. 22). Student L2 noted "For my Physics report, I just needed to provide a list of URLs, book titles, or just stating 'notes from school" (Interviews, p. 8).

The teachers did not teach their students how to avoid plagiarism and how to cite the sources both in text and in the reference list. Student M3 said "I have no idea how to write a citation at all. ... No one taught me how to cite" (Interviews, p. 27). Student M4 stated "till now, I do not need to write any reference list and I do not know how to do so" (Interviews, p. 30). Student L2 said "No one taught me how to quote sources. I did not have the need to write this kind of essay [in the past]" (Interviews, p. 8).

At best, teachers of students L4, M3, L1 and H4 only asked their students not to copy the entire work from others.

Student L4: "Teachers just mentioned not to copy an entire work from others.

We could copy some from here and some from there" (Interviews, p. 16).

Student M3: "I was told by my school teachers that we should not copy assignments. ... There was not any need to quote sources for my school work" (Interviews, p. 26).

Student L1: "For our school project, the teacher had reminded us not to copy the whole PowerPoint presentation from the web. We could copy information from the web but should insert our own ideas as well. It was not required to provide a reference list of the information sources" (Interviews, p. 4).

Student H4 made a remark questioning if his teachers could identify plagiarism in students' work: "I think this is common sense. My school teachers just asked us not to copy the work of classmates but I think the teachers could not identify the plagiarized work" (Interviews, p. 41).

The teacher of student M2 took a further step and reminded him to paraphrase. Student M2 said "A school teacher, not the Chinese Language and Culture teacher [for his major school project], had informed me that I needed to paraphrase rather than copying the whole passage, because some students just copied all the contents from a website and submitted the work. Since then, I have established the practice of paraphrasing" (Interviews, p. 22).

Only two teachers made more effort in raising the concerns of ethical use of information among their students. The computer teacher of student M4 talked about the Copyright Ordinance. Student M4 noted "The computer teacher in my secondary school had talked about this because the Copyright Ordinance was a very hot topic at that time" (Interviews, p. 30). Student H3's teacher responsible for the interschool statistics competition introduced a web-based instruction guide on how to write a citation in an academic citation style to her. Student H3 found this particularly useful. She remarked "For that project, my teacher directed us to a

citation style guide on the web. It was very clear, with different colors representing authors and different parts" (Interviews, p. 37). Student H3 is the only student who was taught how to write a proper citation in school.

4.3.3.7 Self-taught Information Literacy

When the researcher asked the student participants how they acquired the ability of information use, all of them except student H3 replied self-taught and indicated that they learned to search and use information by themselves. Student M1 said "Mainly self-taught. No one taught me how to search for information such as using Google and Wikipedia. I always use these few websites. Using more will know the techniques. ... I learned to use the quotation marks ("") for searching by myself, from the Google Help. ... I learned all IT and information searching skills by myself" (Interviews, p. 18). Student H4 noted "I did not learn IT skills at school. I learned to use information all by myself, by trial and error. All my classmates learned in this way" (Interviews, p.41). Student M4 also said "! learned how to use information by myself, by trial and error." When the researcher further asked her: "Just now, I observed that you have used different search terms for the same concept, and have identified various synonyms in the retrieved records for refined searching. How did you acquire these skills?" She replied: "I learned these skills by myself, from my past searching experiences" (Interviews, p. 28).

The student with most previous IL instructions in school

Student H3 was the only student who did not indicate her information literacy was mainly self-taught, though she also noted "Knowing which keyword to use must be learnt by experience. It can't be taught" (Interviews, p.38). Out of all twelve student participants, she is the only one who was taught how to cite in school. Also, among all student participants, she is one of only two students who had been told by teachers to beware of the reliability of web resources.

4.3.4 Perceptions of Information Literacy

4.3.4.1 Perceptions of One's Own IL Competency

Student participants were asked how they perceived their ability in information use. On the one hand, none of them indicated that they had poor ability in information use. On the other hand, no one admitted a complete satisfaction with one's ability.

Five students indicated that they were not satisfied with their own IL competency:

Student L1: "I think my own ability may not be classified as good. ... The websites I found [for the information task] are easy to locate.

There should be some useful websites that I just did not know" (Interviews, p. 3).

Student M3: "I only use Yahoo and at most use Google. Actually, I am not familiar with Google and I do not know other methods" (Interview,

p. 26).

Student M4: "Not particularly good. ... Other committee members found more comprehensive information and searched faster than I did" (Interviews, p. 28).

Student H1: "I am not quite good in this. Firstly, I did not know how to find the whole article on Google Scholar just now. Secondly, when I tried to find the information at the website of this university on where to buy the PE uniform, I spent a lot of time in searching but still could not find it" (Interviews, p. 32).

In particular, student M2 said, "My ability for information use is not particularly strong. I just use Yahoo and Google and only read the first 2-3 pages of search results." He realized that just reading the first two to three pages of search results could not make a comprehensive information search. He further noted, "In the past, this is ok but will not be sufficient for studying at the university" (Interviews, p. 23). He is worried that his IL competency may not cope with the information need of university study.

For the other student participants, while they pointed out their strengths, they indicated their weaknesses at the same time. Student L2 said "My classmates seldom use the + and " " symbols, I can search faster than them. However, I think there must be other search engines or databases for searching but I only use Yahoo" (Interviews, p. 8). Student L3 stated "I cannot screen information to select the appropriate one quickly, but I can organize them systematically" (Interviews, p. 12).

Some students noted that their IL competency was sufficient though with some shortcomings. Student M1 said "My ability should be sufficient. I often find the information I want." However, she also noted her shortcomings, "When I looked at the assignments of my classmates, I think they read more and their work are more comprehensive" (Interviews, p. 19). Similarly, student L4 said "I can still cope with the information use, though may not be fast. ... My summarization techniques are better than others but my searching technique is not particularly good. With my experiences, I know what will happen in an information search process and I can eliminate irrelevant information faster than others, by looking at the introduction" (Interviews, p. 16). Also, student H2 said "My ability is okay and I often can find the needed information, though I may not be the fastest." Actually, being a competent student, he was dissatisfied with his performance in the information task of the current study. He remarked when the researcher asked him to self-assess his own IL competency, "I may use the wrong words for a particular idea. Different terms can be used for the same idea in the task [for the current study] just now" (Interviews, p. 35).

Only two out of the twelve student participants perceived their competency to be "good", and they were the two with the highest IL competency scores in the survey of the current study. Student H3 noted "My ability in using Google is good, but not in Bing, which the library here has added in its web browser. ... I mostly use Google. In the past, Google is much better than Yahoo as image search is only available at Google. If I use the same search terms, I cannot find the information

at Yahoo and Bing" (Interviews, p. 38). Actually, she did not consider Bing a good search engine and doubted why the library added it into its computers.

Student H4, the highest IL competency scorer, was proud of his IT skills. He confidently said that: "My IT skills are good." However, at the same time, he expressed his worry if his skills were sufficient for the university study. He said "I do not know how to deal with all the databases [accessible at the library of University X], how to phrase proper search terms because different terms lead to very different search results. ... Just now [during the Information Task], I found it very difficult to search with the Article Search function [provided by the library of University X]." He further elaborated, "I found a gap (落差). In the past, the information use was not demanding. ... There was no need to locate academic information and to write the references. It is much more demanding now. We must prepare the reference list now. Otherwise, we will plagiarize. Also, in the past, the demand was very clear with the teachers providing instruction on how to work on it. In contrast, we are only provided with a topic now and need to find the information all by ourselves. I do not know how to handle this. I am afraid my classmates in my department do not know how to do so. There is an anxiety of long chain of text and data, just like some people are afraid of numbers. However, I must use information. I must get use to use information. Though I have not yet been asked to cite in the APA format, I think I must get used to it as soon as possible." He also reflected on his first assignment he submitted recently at University X. He noted "In my last assignment, I only based on one article. I just checked through my work to prevent myself from copying directly from this article.

I have heard of a saying that if copying from one article only, it leads to plagiarism; but if copying from ten articles, it is referencing" (Interviews, p. 40). As a freshman, he was worried that he might accidentally commit plagiarism in his very first assignment at University X. Even a high IL competency scorer is worried about whether he can manage the information needs of his university study.

Lastly, it must be noted that the above is the students' self-assessment of their abilities. The self-assessment was done right after the information task and the students might refer to the self-evaluation of their performance in the information task when they made the self-assessment of their general IL competency. This might hinder any overestimation of their ability. However, there is one exception spotted by the researcher. Student M1, the most outspoken student participant, said "Some information may be wrong thus I must evaluate the information. I can spot any wrong information very quickly. It is a very subjective judgment. I look at the writing style as well" (Interviews, p.20). Though she claimed she often evaluated information sources, she used whatever sources looked interesting throughout the information task. She even considered a blog listing various traditional Chinese methods for pest control particularly useful. Actually, all the methods listed in that blog are not research based but mainly based on Chinese traditions.

4.3.4.2 Perceptions of the Importance of IL Competency

Student participants were asked how they perceived the importance of the ability in information use. Half of the student participants (students L1, M1, M2,

M3, H1 and H4) indicated that the ability was important. Student M1 said "The ability to use information is important because there is so much information and the university study requires the use. Some information may be wrong, thus I must evaluate the information" (Interviews, p. 20). She perceived information literacy important because of both the need in evaluation of information and university study. Student M2 stated "I think the ability to use information is important because I need to find information for projects" (Interviews, p.24). Similarly, student L1 said "I think it [the ability to use information] is important, because I need to do a lot of presentations by myself in the future" (Interviews, p.5). Both students M2 and L1 saw the needs in working on projects and independent presentation for the university study.

Students M3 and H1 noted that they did not consider the ability important when they were in secondary schools but not so after they entered the university. Student M3 said "In the past, I did not think the ability to use information important. I think it is important now as I need to find a lot of information to support my arguments and need much background information to start any academic work" (Interviews, p. 26). Student H1 remarked "The ability was not needed much in secondary school years. Now, it is important as I need to find much information both for revision and assignments" (Interviews, p. 33).

Student H4 described a past scenario to indicate the importance of information literacy. He said "I recalled an incident in the public library. When I was looking for a book at the shelves, another user quickly fetched it. Finding fast is important." He also noted "I want to learn as soon as possible. Just now, I found it

very difficult to search with the Article Search function [provided by the library of University X]. ... I must use information. I must get use to use information. Though I have not yet been asked to cite in the APA format, I think I must get used to it as soon as possible" (Interviews, p. 40). Student H4 expressed repeatedly his urgent need to acquire information literacy fast to cope with the new demand in university study.

4.3.4.3 Enjoyment in Information Use

Student participants were asked if they enjoyed information use. There were diversified responses. Some students did not enjoy the process and tried to avoid it and some were fond of it and used information as a habit in everyday life.

Do not enjoy information use

Student L4 does not enjoy the information use process. He said "I do not enjoy searching for information. It is like finding a needle in a haystack. There is so much information on the web and I do not know which is relevant. Different sources may provide different information. It is very time consuming and needs much effort to go through all of them but finally only get a few paragraphs or a few lines that are useful. It is not effective at all." Also, he remarked "I do not have any particularly successful experience in information use." He found his way out by working in group. He noted "In my debate team, my teammates gathered the information while I mostly made the presentation in debate competitions" (Interviews, p. 15).

Similarly, student M4 does not want to use information unless he is required to. He said "I do not reject it but I do not enjoy the process. I search for information only when I need it for my assignments" (Interviews, p. 30).

Often enjoy information use

Student M1 said "In whatever situations and for whatever reasons, no matter for school work or not, I will search for information on the web. Once I wake up, the first thing I do is to switch on the computer. ... I search for information on the web every day." She further elaborated "I enjoy information use. I like making a broad search first and I often spent some time reading other information which was not for the planned search. Though I got side-tracked, I learned some things new which I did not plan beforehand" (Interviews, p. 19).

Student H3 stated "Yes, I am very interested to find information. For example, I searched at the blogs and learned from there how to use *Evernote*. I often searched for information, e.g. for assignments or for supplementing classes. Actually the assignments did not require us to search for information. If I did not understand the topic or the subject matter, I would search the web to find the needed information, not just for supplementary information, but the answers to the questions, or similar assignments done by others that were available on the web" (Interviews, p. 37).

Enjoyed the information task of the current study

At the beginning of the follow up session of the current study, student L2 looked very tired as she had very little sleep the night before but needed to

participate in the follow up session in the early morning. However, while working on the task, she looked amazed and interested in the newly found information that she was unfamiliar with. This was consistent with her usual information use practices. She often used information in her everyday life. She said "If I did not know anything, I searched the web. The search was very handy, convenient and resulted in a lot of information" (Interviews, p. 7).

At the end of the follow up session, student L3 remarked that "It was a new experience just now [working on the information task], focusing on information search for two hours. The process was interesting and I learned something new" (Interviews, p. 13). In contrast to student L2, student L3 is not an enthusiastic information user. When the researcher asked if he used information much in his everyday life, he replied "I only read the Times and the National Geographic. I seldom search the web, except I wanted to search for interesting places mentioned in History" (Interviews, p. 12). Also, he indicated that "Because I was unfamiliar with the topic [of the information task of the current study], I felt very anxious at the beginning. I was less anxious after searching for more information and knowing the structure" (Interviews, p. 10). It is interesting to note that he even found the process interesting as a concluding remark of the interview. It seems that the information task of the current study has brought student L3 a new information literacy learning experience which aroused his interest in information use. Students might find a complex information use task challenging at the beginning but would enjoy the learning process and acquired both new skills and perception of information literacy by accomplishing the challenging task.

4.3.4.4 Preferences in Types of Information Sources

The student participants were asked how they found various types of information sources and search tools. The following lists the findings in this aspect.

Web information was preferred

Four student participants, mostly the lower IL competency scorers, expressed their strong preference in using web information than reading a book. They found searching web information much more convenient than finishing reading a book. Student M2 said "It is difficult to find a book in the library. It is troublesome to find and read a book. Unless I cannot find anything on the web, I will not search at the library to find a book to read" (Interviews, p.22). Similarly, student L1 stated "Because I don't know which book is good and it takes a long time to read a book. I prefer to search at a computer first unless I know which book is exceptionally good" (Interviews, p. 2). Also, student L4 said "There is so much information on the web and I do not know which is relevant. Different sources may provide different information. It is very time consuming and needs much effort to go through all of them but finally only get a few paragraphs or a few lines that are useful. It is not effective at all. That's why I did not like to read books but search the web. Searching the web is much more efficient" (Interviews, p. 15). Both student L1 and L4 would read a book only if they were certain that the book was exceptionally useful.

Student M1 considered web searching not just convenient but also comprehensive. She thought searching on the web should be sufficient as the

information accessible there was very comprehensive. While working on the information Task, she remarked "I seldom read books because using the Internet is much more convenient. ... Nowadays, it is very convenient to search for information. Information on every issue is readily available. ... The information on the web is very comprehensive."

Students' awareness of the problems of web information

Three student participants, mostly high IL competency scorers, promptly point out the limitations of web information and search engines. Student H1 made a general remark on information on the web. She said "Some information is not available on the web e.g. information of small companies, or works of students. Only works of prominent scholars can be found on the web" (Interviews, p. 31). She also compared Yahoo with Google "In the past, I only used Yahoo and I only started to use Google at the university. Yahoo finds more forums which mostly consist of personal viewpoints and their use of language is not proper. ... The viewpoints in blog are more biased. ... Google can find more scholarly and reliable results e.g. websites of governments and big organizations like Green Peace" (Interviews, p. 31).

Student H2 also made a comparison between Google and Yahoo. She remarked "I use Google because it is convenient, broader, more international, not just Chinese, more accurate, while Yahoo is more localized" (Interviews, p.34). Similarly, student H3 said "In the past, Google is much better than Yahoo as image search is only available at Google. If I use the same search terms, I cannot find the information at Yahoo and Bing." She also commented on the problem of web

information, "I often review the background of an organization or the author of a website very cautiously since I need to convince others. After the appearance of Wikipedia, I have been more cautious and more alert to the reliability of information on the web" (Interviews, p. 38).

A dilemma in types of information sources to use

Student L3 faced a dilemma in which types of information sources to use. On the one hand, he was aware of the problem of web information. He said "For research, books are more reliable as their publishing has gone through review process while everyone can edit Wikipedia. Wikipedia cannot convince others for research purposes. ... Using Wikipedia would mean not putting in much effort, like eating instant noodles (即食麵)" (Interviews, p. 12). On the other hand, he liked the convenience of web searching. He noted "Since web searching is more convenient and fast, I will use both the web and books for assignment in practice. When I use websites, I will look up the government ones and major organizational websites e.g. Oxfam. I will check if the organizations are real" (Interviews, p. 10). Actually, in the information task of the current study, though student L3 searched the library catalogue to find some books and located the websites of Oxfam and Greenpeace via Yahoo, he mainly used Wikipedia to find the information for the task. The information task reveals his dilemma more truly. Student L3 found eating instant noodles (using Wikipedia) unhealthy, but he still had a big bowl of it as it was a convenient option. During the information task of the current study, though he noticed that there was problem in using Wikipedia, he still used it extensively to fulfill the task. Though some students realize the problems in

information on the web, it is tempting to rely on it extensively as it is a fast and easy way out.

<u>Problems in changing the preference in types of information sources from</u>
the popular to scholarly ones

Not only students with higher IL competency score realized the problem of web information. Student M2, one of the four students indicated above that preferred web searching than reading a book, also indicated the limitations of web searching. On the one hand, he said "It is difficult to find a book in the library. It is troublesome to find and read a book. Unless I cannot find anything on the web, I will not search the library to find book to read" (Interviews, p. 22). On the other hand, while working on the information task, he noted "Yahoo is more popular (坊 間) while journal articles are mostly written by experts and are more reliable. ... Wikipedia can be edited by everyone." In the interview, he further elaborated, "I just use Yahoo and Google and only read the first 2-3 pages of search results. ... In the past, this is ok but will not be sufficient for studying at the university. I started to read articles only after studying in University X" (Interviews, p. 23). During the information task of the current study, he did make his first attempt to search for journal articles with the electronic indexes. However, he was not familiar with the index search and he switched from index searching back to Yahoo after some time. When working on the information task, he explained "It is difficult to search for a long search statement like 'practices of farming corporation' while I search for articles, so I searched at Yahoo instead." Actually, he did not realize that he needed to combine various key terms or phrases representing multiple concepts of the topic with Boolean operators while searching at the article indexes. Though student M2 wanted to try a new type of information search tool, without proper guidance or instruction, he was stuck and gave up further exploring new ways and went back for his old search practices that he realized was problematic. Students need proper information literacy instruction to guide them towards dropping the unhealthy habit of using quick web information to scholarly research based information. They definitely need a lift to overcome this.

4.3.4.5 Perceptions of Librarians' Role in Information Literacy

As indicated in section 4.3.3.3 "Information Literacy Instruction or Guidance provided by Teacher-librarians" above, teacher-librarians should not be just the manager of the school library, but also an information specialist, a partner of curriculum development and teaching, and promoter of reading to learn (former Curriculum Development Council, 2002). However, all student participants except students M3 and M4 indicated that they received very little guidance from their teacher-librarians in school. Student M2 said "The teacher librarian did not teach me how to use information. ... I have never asked a librarian in the school library and the public libraries" (Interviews, p. 22). Student L2 noted "[For the project], we also searched the library catalogue of the school library. ... The teacher librarian did not provide any help" (Interviews, p.7). Student H2 remarked "In class, my school teachers provided us a reading list. I just needed to get the books from the shelves of the school library right away. ... I have asked the teacher librarian in the past but it was only where the photocopier was. I had never asked questions on

where the books are by subject. The library was so small and there was no need to ask" (Interviews, p. 35).

Among the student participants, in particular, students L4 and L1 had a low regard for their teacher-librarians. Student L4 said: "I did not go to the school library because it was small and did not have many books. Also, the library regulations were very strict, e.g. beware not to crumple the book pages. The teacher-librarian was very troublesome" (Interviews, p. 14). Student L1 stated "The two teacher-librarians in my sixth forms were new and they had no idea what they were doing" (Interviews, p. 3). Actually, he had a low regard for librarians in the public libraries as well. He remarked "I seldom seek help from any librarian. The librarians in the public libraries have not read all the books in the libraries and can only tell me where a particular book is. My classmates also work part-time in the public libraries and I don't think they know and read much" (Interviews, p. 3).

The student participants' past encounters with librarians in their school years had been reflected in their perceptions of librarians described in the following.

Librarians are just administrators managing the library and are not supposed to teach information use

Most of the students considered librarians performing administrative duties only, rather than teaching them how to use information. They indicated that librarians' duties did not include teaching students how to use information effectively.

When the researcher asked student L1 if he would ask librarians for help in research in the university, he replied "No. It is because the librarians' duties do

not include helping me to do research. I will only ask them how to borrow, hold or find a particular book, and how to reserve a room. I don't think they have the responsibility in teaching me how to do research" (Interviews, p. 5). Student £1 regarded librarians as "circulation counter staff" for book check-in and check-out, and estate managers overseeing room booking. At most, librarians could only direct students where to find a particular book.

Student M3 also considered librarians mainly as circulation counter staff. She stated "At this university, I had asked the staff at the library circulation counter a few times, on the book location and how to add value for printing. ... I think the librarians' duties do not include teaching students how to find information on a topic. They are busy and we should not bother them on issues which are not their duties" (Interviews, p. 26).

Rather than seeing librarians as circulation counter staff, student M1 considered librarians as cataloguers or book-shelvers. She stated "I think librarians are mainly for organizing information. ... I think they are administrators rather than for teaching students. ... I only asked the librarians why I could not find a particular book. I did not want to waste their time. ... Unless there is a librarian stating clearly that his/her sole responsibility is for teaching students how to search information" (Interviews, p. 21).

There are a lot of computer workstations in the libraries of University X, and most of them need a login. Student M2 noted "I will only ask them [the librarians] technical questions such as how to login. This is because they should just answer

technical questions" (Interviews, p. 23). He regarded librarians as computer technicians.

Student H4 indicated his perception of librarians flatly and remarked "No one has ever thought of asking the teacher librarian. The librarian was seen as an administrator of the library only" (Interviews, p. 41). Among the student participants, the most prominent role of librarians is the administrator managing the library.

Librarians are not capable to teach information use

Student L1 noted "It is difficult for any library courses [in this university] teaching me how to use information. I don't know what these courses can offer. If they just teach about how to search for a book, I can manage to do so by trial and error. Rather, I want to know what information is useful for my programmes" (Interviews, p. 6). Student L1 considered librarians could only teach students how to do a title search at the library catalogue to find a particular book, but not in-depth information literacy knowledge and skills.

Student M1 said "I think that they [the librarians] may not know how to do so [teach students how to use information]. I can't ask them if they know how to do so." She doubted if librarians had the capability in teaching students how to use information. Similarly, student M2 stated: "I have never considered asking the librarians in this university. It is very odd to ask librarians how to search for information. ... Answering how to find information is not their responsibilities. I prefer to ask TAs or instructors. I will not ask the professors as I have less chance to ask them. If I ask them, I will only ask them issues about the subject matter. ... I

don't think the library can help students in searching and using information" (Interviews, p. 24). Student M2 also considered librarians not able to help students in effective information use. Instead, he would ask TAs or instructors of his major for such matter.

Student L3 said "I do not realize that the duties of the librarians (at this university) include answering enquiries. ... I do not realize that librarians can teach how to search for information. Librarians' duties are not for teaching students. This is because teaching is not a quick process. If librarians just teach how to click here and there, I will forget quickly especially if my IT skill is not good. Also, I will look lazy for not doing my own job" (Interviews, p. 11). Student L3 thought that instruction on information use should not be just conveying quick tips of using a particular search tool, i.e. "clicking here or there". Rather, he expected an on-going teaching process, thus doubting if librarians could provide this kind of instruction. He could not imagine librarians teaching in classes as he had not experienced this in the past. He did not realize that this had been a common practice in many developed countries worldwide.

An exception

Out of the twelve student participants, only one student indicated that she had sought help from the librarians in University X in using information. Student M4 said, "I have asked the librarian at the counter on 1/F of this [university] library [the reference counter]. The experience was okay. ... I will ask them [the reference librarians] again" (Interviews, p. 28). Not just in University X, student M4 was also the only student that indicated she got help from the teacher-librarian

in her school years. She said "I was the student librarian in my school but I mainly helped to wrap and shelve books for the library. The teacher-librarian helped me once, recommending the books useful for writing my personal statement for overseas university applications." Her perception that librarians were capable to help her in using information might be related to her past experience in school.

4.3.4.6 Perceptions of Information Literacy Instruction

Needs in information literacy instruction

Though almost all student participants claimed they self-taught themselves how to use information in their past school years, five of them explicitly indicated a need in information literacy instruction for their university studies.

Student L4 said "It will be better if someone teaches me how to use information. If just using trial and error and the native methods, I might have missed the most efficient way. In my past experiences in using the school library, I didn't need to search for the books as I knew where they were. The school library was so small. However, the library in this university is too large and I don't know what 'pattern' it uses to shelve books. I have spent much time to find the books I wanted. Now, I become smarter and start to memorize some of the book locations e.g. the books on history. I also search the 'category' [should be the library catalogue] by topic beforehand" (Interviews, p.16). Student L4 indicated the huge difference in size between his previous school library and the university library that he needs to get familiar with. Also, he wants someone to help him to use information efficiently.

When the researcher asked student M3 about her future plan to acquire skills in using information for her university study, she replied "I don't know how to acquire the skills of using information. I may spend more time in the library if I have no lessons. I want someone to help but do not want to bother others. I am scared to enter the Reference Room [of this university library] as it looks very 'serious'. I don't know the role of the reference librarians. I don't know students can ask the reference librarians questions on searching for information. I don't know what is meant by 'reference'" (Interviews, p. 27). Student M3 indicated her needs in acquiring information literacy but was scared to seek help from others.

Student H4 voiced his gap in information literacy. He said: "I found a gap. In the past, the information use was not demanding. There was no need to locate academic information and to write the references. It is much more demanding now. We must prepare the reference list now. Otherwise, we will plagiarize. Also, in the past, the demand was very clear with the teachers providing instruction on how to work on it. In contrast, we are only provided with a topic now and need to find the information all by ourselves. I do not know how to handle this. I am afraid my classmates in my department do not know how to do so. There is an anxiety of long chain of text and data, just like some people are afraid of numbers. However, I must use information. I must get use to use information. Though I have not yet been asked to cite in the APA format, I think I must get used to it as soon as possible." He further elaborated the need: "In my last assignment, I only based on one article. I just checked through my work to prevent myself from copying directly from this article. I have heard of a saying that if copying from one

article only, it leads to plagiarism; but if copying from ten articles, it is referencing. I want to have a sample article for illustrating what is plagiarism, so that I can compare the references with the contents" (Interviews, p. 40). Student H4 noted his needs in information literacy to cope with independent information searching by topic, to avoid plagiarism, and to cite information sources in an academic format.

Student L2 also stated her needs in knowing more about subject specific databases and search engines. She said "I want to know more databases and search engines. I have such a need. I attended the UGE class on the Basic Law and the class introduced some websites on law. Then I realized that I missed out some subject specific websites and databases" (Interviews, p. 9).

Lastly, student L3 wanted to know how to use the university library, "I am not familiar with the university library. I need to know how to search for book. I should know more about the library and have considered applying for a student helper job of the library" (interviews, p. 12).

Seeking help in information literacy from friends, classmates or seniors

When the researcher asked the student participants who they would approach for help in information use for their university studies, four of them indicated that they would seek help from their friends, classmates or seniors. Student L4 said "I will not ask the librarians unless as a last resort. I don't want to bother them. Instead, I will ask my seniors or classmates. ... I am more used to ask the seniors. ... They will teach me how to find library books" (Interviews, p. 16).

Student L1 indicated that he would ask both his classmates and professors. He said "I will seek help from the professors or my classmates because professors should have more experiences in doing research" (Interviews, p. 5).

Student M2 also mentioned classmates, TAs and professors for help in information use. When the researcher asked student M2 who he would ask if he did not know how to find information for his study in University X, he replied "I will ask my classmates." When the researcher further asked if he would approach his TAs, he said "I may ask the TA if I don't know the requirement of the assignment topic." When the researcher asked him if he would ask the librarians here, he replied "I have never considered asking the librarians in this university. ... I prefer to ask TAs or instructors. I will not ask the professors as I have less chance to ask them. If I ask them, I will only ask them issues about the subject matter." the end of the interview, the researcher wanted to clarify his view and asked student M2 how he would acquire the ability in information use. He replied "I will learn the ability to use information by asking my friends. I have quite a lot of group projects. The group members' ability is similar to mine" (Interviews, p. 24). It is confirmed that student M2 preferred asking his classmates rather than librarians, TAs and professors. He would ask his friends or classmates how to search and use information, and ask his TAs to clarify the assignment topic and his professors for subject matter issues.

Lastly, student M1 said "I did not ask my school teachers for advice. I did so in lower forms only. In higher forms, I think I should solve the problems by myself. I prefer asking friends or even strangers on the web, rather than asking

the teachers" (Interviews, p. 19). Student M1 definitely preferred friends and "friends on the web" than instructors in guidance of information use.

Future plan for acquiring IL during university study

In the interviews, only one student participant indicated that he would seek help from professors on information use. Student L1 said "I will seek help from the professors or my classmates because professors should have more experiences in doing research" (Interviews, p. 5).

When the researcher asked the student participants if they would attend non-credit bearing library courses on information use, or if they preferred subject specific information use courses embedded in their major or minor teaching programmes, a few student participants indicated that they might attend the non-credit bearing library courses. Student M4 said "I may attend [the non-credit bearing courses on information use] because I find this skill very useful. This is because I may need to find information for the projects" (Interviews, p. 30). Student H1 noted "If there are useful library courses on how to find information, I will try to participate in them as much as possible." Student H2 remarked "It is okay to join an optional non-credit-bearing library course, because I don't know how to get research papers. ... If there is an urgent need and if I cannot find the information needed, I may join these courses" (Interviews, p. 36). Student H4 indicated that he might attend library courses on information use only if he had to hang around in the campus a few hours. He said "I may attend library courses if I have the time, if I only need to attend the 8:30 am class and the late evening class and have several hours with nothing to do. However, my existing course selection is not like this so I may not be able to attend the library courses" (Interviews, p.41). Student L2 did not clearly indicate if she would join any such courses but she shown her preference in general library courses on information literacy. She said "I need to see the contents, length of time and schedule of the library courses before I can decide if attending a library course or not. ... I prefer general information use classes rather than subject specific ones held in teaching programme classes. This is because I need to search for information in all aspects and a general class can cover more subjects. I want to know more databases and search engines. I have such a need" (Interviews, p. 9).

In contrast to student L2, two students indicated that they would not join any library courses. Student L4 said "I do not particularly want to enroll for any library courses. It seems a waste of time in doing so. I should know how to do so if I try out. ... I am okay with using books and videos in the library, but I don't know how to find e-services [should be e-resources] and microfilms, I don't know how to find them yet." However, when the researcher asked his view if the courses were parts of his degree programme, he replied "If the course falls within programme classes, I have no problem with it" (Interviews, p. 17). He does not want to spend extra time to attend non-credit bearing courses on information literacy. Similarly, student M1 stated "I won't attend courses on information use. It is a waste of time. This university provides many seminars which are mostly a waste of time. If I encounter a problem, I will try to find the solution myself. Only a professor who knows my problem and specific need can be helpful. ... I did not attend any library orientation nor login the library Moodle course. I noticed their

announcements and had clicked to take a very quick look. I decided not to further read them as I can solve my problem anyway" (Interviews, p. 20).

Similarly, though student H4 mentioned a gap between his past information use experiences and the information needs for university study, he attempted to overcome this gap by trial and error and self-taught, just liked what he did in his school years. When the researcher asked him how he would cope with the gap, he replied: "I think I have all the basic skills. I need to try out more and do more assignments to be more experienced. I know my classmates will ask guidance from our seniors. But I may not know them and they may be too busy to help me" (Interviews, p. 40).

4.4 Information Literacy of University Freshmen in Hong Kong: Current Competencies, Perceptions, and Past Learning Experiences

The current study aims to investigate the current IL competency and perceptions, and the past IL experiences of university freshmen of Hong Kong so as to find out their educational needs of information literacy for their coming university study. In the following, findings of the survey, information task and in-depth interview are triangulated and cross-referenced to get a complete picture of the current IL competency and perceptions, and the past IL experiences among the university freshmen of the University X in Hong Kong. More importantly, the impact of the past IL experiences on the students' IL competency and perceptions will be examined in particular.

4.4.1 Information Literacy Competency

4.4.1.1 IL Competency Scores of the Survey

The survey reveals that university freshmen of Hong Kong had lower information literacy competency scores than the US students, even though they had one more year in secondary school. Working on the same set of IL competency survey questions, freshmen of University X in Hong Kong got 36% of the total score while freshmen of the US NITLE institutions got 53%. In other words, Hong Kong student scored 17% less than the US students. Moreover, after grouping the questions by the IL Competency Standards for Higher Education (ACRL, 2000) and comparing the scores, US students performed better in all IL standards. As indicated in Figure 3, Hong Kong students were weaker in acknowledging the use of information sources (ACRL IL Competency Standard 5) and obviously much poorer than the US students in evaluating information and its sources (ACRL IL Competency Standard 3) and identifying a variety of types and formats of potential sources for information (ARCL IL Competency Standard 1). They were only comparable to the US students in accessing the needed information (ACRL IL Competency Standard 2) as the US students were particularly weak in this aspect. Compared with the US students, they were slightly more skillful in using IT skills such as Boolean logic and truncation for information search.

¿ Univ. X ■U\$ Instit. 70 Mean % of freshmen correctly 60 answered the competency 50 survey questions grouped by ACRL IL40 standards 30 20 10 0 Standard 1 Standard 2 Standard 3 Standard 5

Figure 3. Comparison of Freshmen's IL Competency Scores between University X of HK and US NITLE Institutions

ACRL IL Competency Standards for Higher Education

4.4.1.2 Self-assessment of One's Own Information Literacy

Data on self-assessment of one's own IL competency can be obtained from both the survey and the interview. The students' self-assessment of their IL matched well with their competency. With lower IL score in most of the IL standards than the US students, many more of the Hong Kong students than the US students found various parts of the information processes difficult, as indicated in Figure 4. Hong Kong students found developing a list of sources to investigate and using an Internet search engines least difficult. This may be explained by their usual practices in taking information from the first one to two pages of the search results at Yahoo or Google. They found higher level IL such as developing research statement and revising search strategy, using electronic indexes, determining what information from sources to integrate, and acknowledging the sources more difficult. In particular, they found writing papers the most difficult

(57% rated this as difficult) while US students found this easy (68% rated this as easy).

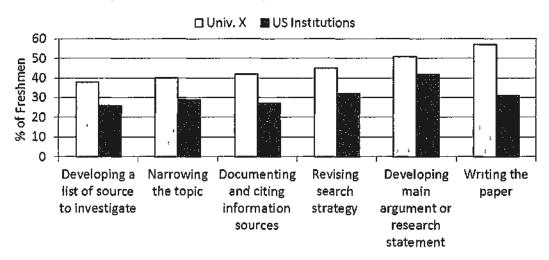


Figure 4. Perceived Difficulty Level of an Information Process

In the interview, student participants were also asked how they perceived their ability in information use. The results echo that of the survey indicated above. Only two out of the twelve student participants perceived their competency as "good", and they were the two with the highest IL competency scores in the survey. The rest were not particularly satisfied with their competency and were prompt to point out their own shortcomings.

4.4.1.3 Coping with the Information Task

While working on the information task, the students demonstrated shortfalls in the areas in which they had low IL competency score and poor self-assessment. They had difficulties in identifying scholarly information sources and using research tools such as library catalogues and journal article indexes. Also, they had

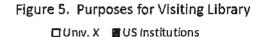
problems in identifying the key terms that describe the information needs, and constructing a search strategy with appropriate commands for complex topics containing multiple concepts. A large proportion of them did not evaluate the information and did not know how to cite the sources properly.

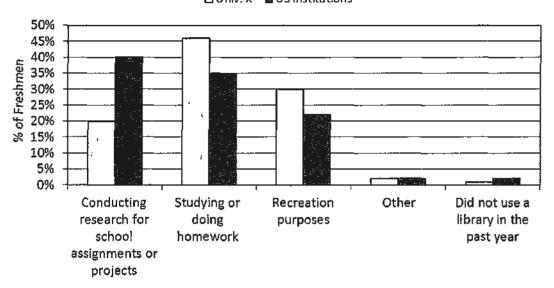
4.4.1.4 Summary

The competency scores of the survey, the students' self-assessment both in the survey and the interview, and their performance in the information task suggest that university freshmen of Hong Kong have inadequate information literacy. They were better in accessing information but weak in identifying a variety of types and formats of potential sources of information, especially scholarly ones. Also, they seldom evaluated information and acknowledged the sources.

4.4.2 Previous IL Experience in School

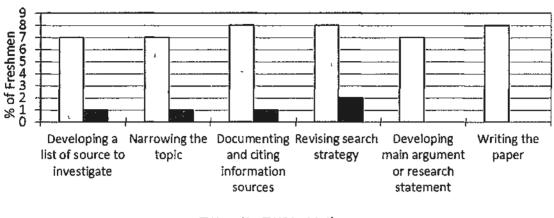
The low IL competency and self-assessment among Hong Kong students described above can be well explained by their limited past IL experiences in school as revealed by the survey and the interview. The survey asked about all dimensions of IL, including the students' past IL experiences. It reveals that university freshmen in Hong Kong used the libraries mainly for studying or doing homework in their school years while their US counterparts used it for conducting research for school assignments or projects (Figure 5). It reflects that the need to use information for school work in Hong Kong was much lower than the US.





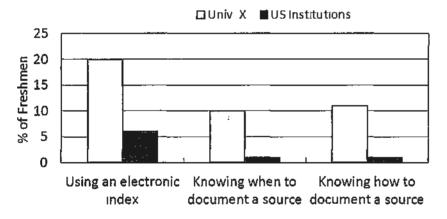
This finding is also confirmed by the results of other survey items. Compared with the freshmen of the US NITLE institutions, many more freshmen of University X in Hong Kong indicated that they had no experience in various information processes (Figure 6), particularly in using an electronic index and knowing when and how to document a source (Figure 7). Ten to 20 percent of the University X students indicated that they had no experience in these three aspects whereas only one to six percent of the US students indicated so.

Figure 6. Freshmen Having No Experience in Various IL Components



□Univ.X ■US Institutions

Figure 7. Freshmen Having No Experience in Using E-Index, Knowing When and How to Document a Source



In addition, though Hong Kong students had one more year in secondary school, they had much less previous experience in writing papers and citations than the US students (three times less experience in writing papers and four times less experience in writing reference lists in a specific citation format), as indicated in Figure 8 below.

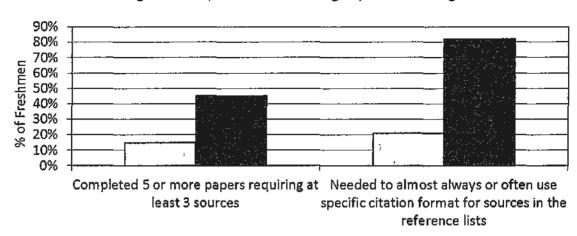


Figure 8. Experiences in Writing Papers and Citing Sources

□ Univ. X ■ US Institutions

Results of the interviews fully echo the above findings. More than half of the student participants in the information task, mostly the high IL competency scorers of the survey, indicated in the interview that it was their first time to search and use information in such a serious and systematic way while working on the information task. They regarded the information task much more demanding than their past information literacy experiences in school. Student H3, the second highest IL competency scorer of the survey, remarked that the most significant difference between her past IL experiences in school and the information task of the current study was not the topic of the task, but the intensity in information use. She said "I felt a bit lost [during the information task]. This is not just related to the familiarity of the topic. I was not used to this kind of research even if it was a familiar topic. I seldom did a task like this in the past. ... There was only one exception which was a bit similar to this task, and a bit more formal. ... Other than this ... the rest were just pretending ... very small scale, and the teacher just taught us briefly" (Interviews, p. 37).

In particular, the students indicated that in their school years, they did not need to perform serious research on complex topics with multiple concepts relating to one another, like that of the information task. Student H2 noted that he used to find factual information for his laboratory report very fast and he knew right away if he got the right data or not. He found it difficult to handle an information task with a research topic that involves multiple concepts and complicated relationship.

Most of the students could only name one or two past information literacy experiences in their school years similar to the information task to some extent, but still much less demanding. The majority of these were mainly related to school-based assessment in public examinations and all the submitted works were PowerPoint presentations or laboratory reports. The students seldom needed to write an essay to organize and integrate newly found information and their prior knowledge. Also, they were only expected to provide a list of URLs or book titles and were not required to cite or write a proper reference list. They perceived that the projects aimed at training their presentation skills rather than IL.

Other than the past IL experiences named above, the student participants indicated that the rest of their learning experiences only involved very small scale PowerPoint presentations which were done once or twice a year. As these PowerPoint projects carried low mark weighting, the students said they just spent a couple of hours of Internet search to gather the needed information, or only read the first one to two pages of search results at Yahoo, or just took one to two points from the web to supplement their school textbooks when working on the projects.

They were used to picking one or two pieces of information from the web to get the job done. Three students also remarked that images played an important role in their projects, as one of them said "More photos will do" (Interviews, p. 14). It seems that their past IL experiences put too much emphasis on the presentation skills rather than on the research processes.

4.4.3 Impact of Previous School Information Literacy Experience on University Freshmen's IL Competency

The above sections reveal that students' low IL competency is well accounted for by their lack of in-depth IL experiences. In school, the students mostly worked on small-scale projects involving simple topics. There was no need to perform serious research on complex issues containing multiple concepts relating to one another. Students could easily fulfill the project requirements with simple single keyword search on the web without any reflection and refinement of their search strategies. They were also not required to use scholarly sources such as academic encyclopedia, dictionaries and journals, and none of the student participants had ever used indexes in school. They were allowed to rely almost completely on Wikipedia and one to two pages of search results of Yahoo and Google. All their submitted works that needed IL were PowerPoint presentations or laboratory reports. No evaluation or acknowledgement of sources was needed. They were only expected to provide a list of URLs or book titles and were not required to cite or write a proper reference list. They perceived these experiences as mainly for school-based assessment in

public examination and training of their presentation skills, but not IL. Without any effective IL learning experiences in school, the students had developed a habit to rely heavily on quick and incomprehensive information on the Internet rather than deep research.

To further illustrate the close relationship between students' limited past IL experiences and their low IL competency, the impact of specific students' past experiences on the following four shortfalls in IL, as identified in an earlier section on students' IL competency, are discussed:

- Identifying and using various types of information sources and search tools, especially scholarly ones;
- Identifying the key terms that describe the information needs and constructing a search strategy using appropriate commands for complex topics with multiple concepts;
- 3. Critical evaluation of information and its sources; and
- 4 Acknowledging information sources and writing citations.

4.4.3.1 Identifying and Using Various Types of Information Sources and Search Tools

In the survey, many more freshmen of University X in Hong Kong than their US counterparts found identifying and using various types of information sources and search tools difficult (Figure 9).

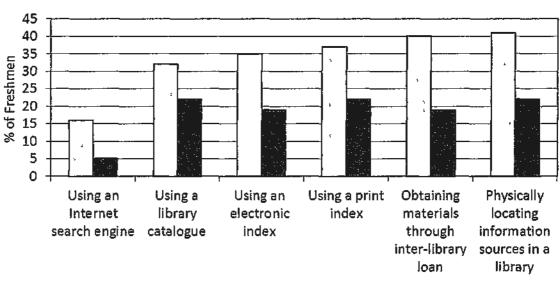


Figure 9. Perceived Difficulty Level in Identifying & Retrieving Sources

□ Univ. X ■ US Institutions

While working on the information task, two student participants revealed their ignorance in different types of information sources. Student L3 could not identify the citation of a journal article that he located at the reference list of Wikipedia. He thought that the citation was about a book and he tried to search the journal article title at the Library Catalogue and got no search result. Similarly, student M3 just recognized a file as a PDF and failed to realize that it was a journal article. Student M4 demonstrated another problem in the information task. She avoided using any information sources that looked very "pro" (professional). Unfortunately, she skipped all those "pro" looking scholarly information sources that she should focus on for her university study. The ignorance of these students indicates that they had not been taught the variety of information sources, their characteristics and their particular roles (ACRL IL Competency Standard 1) in school.

Also, the student participants relied heavily on Wikipedia, Yahoo and Google to locate information on the web while working on the information task. Only

seven out of the twelve student participants (mainly those with higher IL competency scores in the survey) tried to use the "Library Catalogue" to find some library books, and just two students attempted to use the indexes provided by the University X library to look for some journal articles. However, both attempts reflected their inadequacy in using these search tools. For those students who used the traditional "Full Catalogue Search" at the Library Catalogue, they all used "Title Search" rather than "Keyword Search" to search for keywords, thus they could not find any matching records. For the two students who attempted to use the indexes, they just employed their usual practices in using Internet search engines for these highly specific databases. For example, student M2 only typed in "farming practice" as the search statement at these indexes and tried to browse through more than 30,000 highly specific research papers in the result list. This indicates that the students did not realize that these academic indexes require multiple key term searching for highly specific journal articles on multiple concepts.

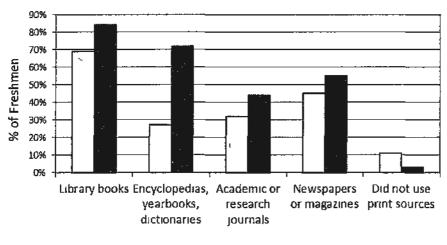
Furthermore, other than Wikipedia which could be edited by anybody, none of the student participants of the information task used any scholarly encyclopedias and dictionaries to locate authoritative background information on the information task. This further reveals the student participants' limited knowledge in locating quality information retrieval systems for accessing the needed scholarly information sources, and their problems in implementing search strategies in scholarly information retrieval systems using different user interfaces and search engines, with different command languages, protocols, and search parameters, as required in ACRL IL Standard 2.

Much less experience in using various types of information sources and search tools in school

The survey indicates that freshmen of the US NITLE institutions used information sources and search tools much more extensively than the undergraduate freshmen of University X in Hong Kong (Figures 10 and 11). The US students used more internet search engines for free web resources (56% more), more reference tools such as encyclopedias, dictionaries and yearbooks for searching background information (45% more), and more online indexes for locating academic articles (32% more). Moreover, compared with Hong Kong students, three times more US students used bibliographic management software to organize the located information.

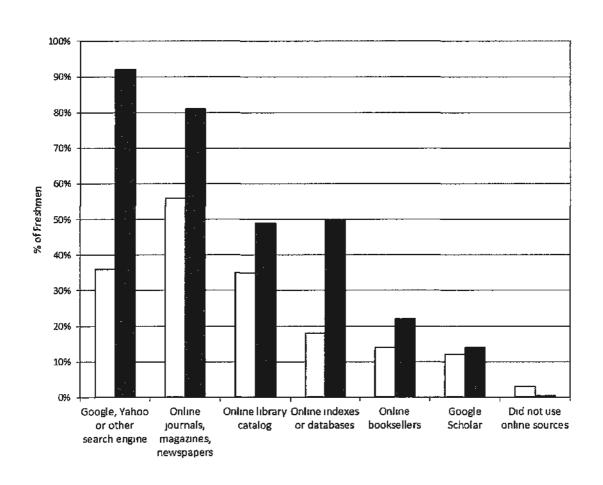
These survey results are well supported by the findings of the interviews of the current study. In the interviews, the student participants indicated that while working on the school projects, they mainly used Yahoo, Google, Wikipedia and the school library to search for the needed information. They did not mention using any scholarly reference tools such as encyclopedias or dictionaries to look for the background information, nor indexes like *WiseNews* subscribed by a number of secondary schools to search for news articles. No students mentioned searching for articles, except for student H2 who noted that his Biology teacher introduced *PubMed* to him.

Figure 10. Use of Printed Information Sources



☐ Univ. X ■ US Institutions

Figure 11. Use of Online Information Sources & Search Tools



□ Univ X ■US Institutions

4.4.3.2 Identifying Key Terms and Constructing Search Strategies for Complex Topics

While working on the information task, more than half of the student participants simply typed in one to two words or phrases in the search box and scanned through the search results, trying to spot some information sources covering the complex research topic on a number of concepts related to one another. For example, student L3 just searched using a single keyword "pesticides" and browsed through the search results attempting to come across any information sources about the impact of pesticides on the health of farmers, particularly those due to the practices of farming corporations. This indicates that a number of students could not properly identify the key terms that described the information need (ACRL IL Competency Standard 1).

Also, most of the students just employed simple search skills using Internet search engines which they learned in their junior school years, i.e. inserting one or more key words or phrases into the search box. They did not demonstrate other useful online search skills for searching academic databases commonly subscribed by university libraries, including Boolean operators, truncation, wildcard, proximity search and subject-heading search. The students did not demonstrate strong capability in properly constructing a search strategy using appropriate commands (ACRL IL Competency Standard 2).

Lack of previous IL experience in in-depth research on topics with multiple concepts

In the interview, the student participants indicated that they had not performed serious research on topics with multiple concepts relating to one another, like that of the information task. For example, student H2 noted that he used to find factual information for his laboratory report very fast and he knew right away if he got the right data or not. He found it difficult to handle an information task with a research topic which involves multiple concepts and complicated relationships. It is interesting to note that student H2 claimed that his IT teacher had taught him Boolean Operators AND, OR, NOT, but he did not apply them to refine his search strategies in the information task. This may indicate that he had never used these skills in searching information on multiple concepts and he had no idea on how to use them for refining search strategy. It also reveals that simple IT skills such as Boolean searches are not sufficient for an effective search strategy.

4.4.3.3 Critical Evaluation of Information and its Sources

In the information task, ten out of all the twelve student participants did not demonstrate awareness and capability in critical evaluation of information and its sources. They selected information sources mainly according to whether the sources looked relevant to the topic, but not for their reliability, validity, accuracy, authority, timeliness, and point of view or bias, as required by ACRL IL Competency Standard 3.

Student M1, the most outspoken student participant, claimed during the information task that "Some information may be wrong thus I must evaluate the information. I can spot any wrong information very quickly. It is a very subjective judgment. I look at the writing style as well." In reality, throughout the information task, she just used whatever sources which looked interesting. She even considered a Chinese blog listing various traditional Chinese pest control methods without any research support particularly useful.

Lack of instruction on the evaluation of information in school

The lack of critical review of the information sources can be well explained by their school experiences. In the interview, all except two of the student participants indicated that no one taught them how to evaluate information sources in school, and they selected information for their work only by the relevance of the contents. For the two exceptions, the guidance was just reminders on using web information cautiously but not any criteria on how to evaluate information sources critically.

4.4.3.4 Acknowledging Information Sources and Writing Citations

Lack of awareness and capability in acknowledging information sources and writing citations

All the student participants, except students H3 and M1, could not write a citation properly, nor name any citation format, as required by Standard Five of the

Information Literacy Competency Standards for Higher Education (ACRL, 2000). Though student M1 could write a citation properly, she did not copy any bibliographic information about the sources she used throughout the information task, as in the cases of students L1, L2 and L4. This further reveals a lack of awareness of the importance of acknowledging the information sources among the students, i.e. ACRL IL Competency Standard 4.

Much less experience in acknowledging information sources and writing citations than the US

The survey indicates that freshmen in Hong Kong had much less previous experience in acknowledging information sources and writing citations. Figures 7 and 8 in Section 4.4.2 clearly illustrate these shortfalls.

In the interview, most of the student participants indicated that they were just expected to provide a list of URLs or book titles of the information sources as the reference list in school projects and assignments. Also, all except one of them had not been taught in school how to cite the sources in text and how to write a proper citation in the reference list, not to say using bibliographic management software. Student M3 said "I have no idea how to write a citation at all. ... No one taught me how to cite" (Interviews, p. 27). Student H3 is the only student who was taught how to cite by her teacher responsible for an interschool statistics competition. Her teacher introduced a web-based instruction guide on how to write a citation in an academic citation style to her.

Minimal instruction on ethical use of information

Regarding avoidance of plagiarism and copyright infringement, teachers of students L4, M3, L1 and H4 just asked their students not to copy the entire work from others while the history teacher of student M2 asked him to paraphrase and not to copy the whole passage. Lastly, the computer teacher of student M4 was the only teacher of the student participants who talked about the Copyright Ordinance in class.

4.4.4 Impact of Previous School Information Literacy Experience on University Freshmen's IL Perceptions

The current study reveals that university freshmen in Hong Kong had very limited IL learning experiences and IL guidance in school. In terms of the use of information, they preferred to ask friends or classmates rather than seek help from their school teachers. Actually, they mainly learned IL by themselves. The following gives an account of the impact of these experiences on their IL perceptions.

4.4.4.1 Role of School Teachers in Information Literacy

Hong Kong students received much less IL guidance in school than their US counterparts. The survey indicates that US university freshmen received much more instruction from schools on the use of library and internet resources (46% more), as indicated by Figure 12 below. When being asked from whom they would seek help, freshmen of Hong Kong indicated that they mostly turned to their friends

and classmates for advice on research assignments (66 percent) while the US students mainly sought advice from their teachers (61 percent).

Again, the findings of the interview support the survey results regarding IL instruction received by the students in Hong Kong. The students indicated that their subject teachers only asked them to work on various projects or assignments that required information use but did not provide any systematic and in-depth information literacy instruction. Thus, they had to search for the needed information on their own. While reviewing their works, their teachers mainly paid attention to the length and display of the project presentations. Presentation skills, rather than information literacy, seem to be a more important component of their project work. Student H1 remarked "They [the subject teachers] might think the skills taught by the IT teacher should be sufficient" (Interviews, p. 32). The students perceived that their subject teachers were reluctant to take up the role in providing IL guidance.

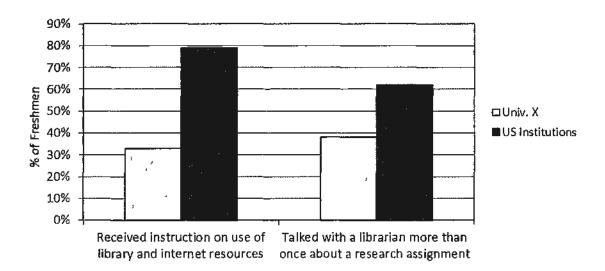


Figure 12. IL Instruction Received in School

Compared to the school subject teachers, according to the student participants of the interview, the IT teachers had relatively more impact on their information search processes, though their instructions mainly focused on searching the Internet with search engines rather than comprehensive information literacy. Actually, according to the student participants, only a few IT teachers provided training on search engines and the rest mainly taught students how to use application software instead. Only three student participants mentioned that their IT teachers taught them how to use search engines and their search syntaxes in their junior secondary school years. In contrast, the other three student participants indicated that their IT teachers did not provide any instruction on information search. Student M3 said "I had IT classes in F.1-3. It was mainly about web page design, input of Chinese characters but not about information search" (Interviews, p. 25). Student H4, the highest IL competency scorer, indicated "I did not learn IT skills in school. I learned to use information all by myself, by trial and error. All my classmates learned in this way" (Interviews, p. 41).

Low Regard for School Teachers in Teaching IL

Most students indicated that they thought their school teachers were not able to provide much guidance on IL as the students were actually more capable than their teachers in information use. In the interview, student L3 noted "The teacher did not provide any instruction as students were expected to know how to do so", while student M1 remarked "I think school teachers considered the students

more capable than themselves, except the IT teacher who provided us websites for software downloading" (Interviews, p. 18). Student H4 doubted if his teachers could identify plagiarism in students' work and said "My school teachers just asked us not to copy the works of classmates but I think the teachers could not identify the plagiarized works" (Interviews, p. 41). Students had strong doubt about their school teachers' willingness and capabilities in improving their information literacy.

4.4.4.2 Role of Librarians in Information Literacy

Teacher-librarians as Administrators and Not Teachers

The survey indicated that though both the US and Hong Kong students did not often enquire with librarians, 24% more students in the US sought help from them (Figure 11). The interviews reveal that teacher-librarians of the student participants had only a very minor role to play in the students' previous information literacy experiences. Students did not mention librarians in the interview until asked by the researcher. All except two of the student participants indicated that they received very little guidance from their teacher-librarians in school.

Most of the students considered the jobs of librarians as performing administrative duties only, rather than having the professional responsibility of teaching them how to search and use information. They indicated that librarians' duties do not include teaching students how to use information effectively. They regarded librarians as "circulation counter staff" for book check-in and check-out, as estate managers overseeing room booking, or cataloguers and book-shelvers. At

most, librarians can direct students where to find a particular book or how to login a computer. As student H4 remarked "No one has ever thought of asking the teacher librarian ... The librarian was seen as an administrator of the library only" (Interviews, p.41), the most prominent role of librarians among the students is an administrator managing the library.

Students' Perceptions of Academic Librarians in the University

Carrying on the perceptions that school librarians cannot help students in information literacy, university freshmen are reluctant to seek help from the academic librarians during their university study, even though they want someone to help them to use the abundant information sources provided by the university library that they have never come across or have difficulty to cope with.

In the interview of the current study, student L4, who found his secondary school teacher-librarian "troublesome", as indicated earlier, remarked: "It will be better if someone teaches me how to use information. If just using trial and error and the native methods, I might have missed the most efficient way. In my past experiences in using the school library, I didn't need to search the books as I knew where they were. The school library was so small. However, the library in this university is too large and I don't know what 'pattern' it uses to shelve books. I have spent much time to find the books I wanted" (Interviews, p. 16). Student L4 indicated the huge difference between his previous school library and the university library. He needed to get familiar with the university library and wanted

someone to help him to use the information sources provided by the library efficiently.

In the interview, when the researcher asked student M3 how she would become information literate to cope with her university study, she replied "I don't know how to acquire the skills of using information. I may spend more time in the library if I have no lessons. I want someone to help but do not want to bother others. I am scared to enter the Reference Room [of this university library] as it looks very 'serious'. I don't know the role of the reference librarians. I don't know students can ask the reference librarians questions on searching for information. I don't know what is meant by 'reference'" (Interviews, p. 27). Student M3 indicated her needs in acquiring information literacy but was reluctant to seek help from the librarians in the university library.

4.4.4.3 Perceptions of the Importance of Information Literacy

In the survey, 96 percent of the student participants indicated they found the ability to access, evaluate and use of information important to lifelong learning. In the interview, most of the students indicated that IL was important for their university study. However, some of them noted that they did not consider IL important until they entered the university. Student M3 said "In the past, I did not think the ability to use information is important. I think it is important now as I need to find a lot of information to support my arguments and need much background information to start any academic work" (Interviews, p. 26). Similarly, student M2 said, "My ability for information use is not particularly strong.

I just use Yahoo and Google and only read the first two to three pages of the search results." He realized that such practices could not make a comprehensive information search and noted "In the past, this is okay but will not be sufficient for studying at the university" (Interviews, p. 23).

The freshmen perceived IL as not critical in their school years but important for their university study. This reveals that the past learning experiences in school did not demand much IL, thus students consider IL not a critical capacity in school.

The strongest expression on the perceived gap of requirement in IL between school and university study was voiced by student H4, the highest IL competency scorer in the survey. Though student H4 considered his IT skills good, he was worried that such skills would not be sufficient for university study. As indicated earlier, he remarked: "I do not know how to deal with all the databases [accessible at the library of University X], how to phrase proper search terms because different terms lead to very different search results. ... Just now [during the Information task], I found it very difficult to search with the Article Search function [provided by the library of University X]. ... I found a gap". He further elaborated his urgent need in improving his IL: "In my last assignment, I only based on one article. I just checked through my work to prevent myself from copying directly from this article. I have heard of a saying that if copying from one article only, it leads to plagiarism; but if copying from ten articles, it is referencing. I want to have a sample article for illustrating what is plagiarism, so that I can compare the references with the contents" (Interviews, p. 40). Student H4 expressed repeatedly in the interview his need to acquire information literacy to cope with independent information

search by topic, to avoid plagiarism, and to cite information sources in an academic format as demanded in his university study. The gap indicated by student H4 further confirms the insufficiency of the students' past IL experience in school to help them cope with their university study. This supports the findings of Gross and Latham (2007, 2009) which predict that students with a high level of information literacy skills are more likely to question their ability to perform while students with a low level of skills are more likely to overestimate their ability, as indicated in the literature review.

4.4.4.4 Enjoyment in Information Use

In the survey, though Hong Kong students perceived various IL components as more challenging than the US students, they enjoyed the process more. 54% of University X students in Hong Kong indicated that they enjoyed gathering information for research, while only 27.6% US students did so. In the interview, student participants were also asked if they enjoyed information use. There were diversified responses. Some students did not enjoy the process and tried to avoid it and some were fond of it and used information as a habit in everyday life.

4.4.4.5 Bias towards Web Information

Students L1, L4, M1 and M2 considered the formats of information sources the most critical factor in determining their information use. They only used quick web-based information. Student M1 said "I seldom read books because using the Internet is much more convenient," while student M2 noted "It is difficult to find a

book in the library. It is troublesome to find and read a book. ... Unless I cannot find anything on the web, I will not search the library to find a book to read" (Interviews, p.22). Similarly, student L1 said "Because I don't know which book is good and it takes a long time to read a book. I prefer to search at a computer first unless I know which book is exceptional good" (Interviews, p. 2).

Student L4 thought that web searching is more efficient in locating the needed information than reading a whole book. He remarked "That is why I like searching for information on the web. It is more efficient. I just type in some words and can find the relevant information. In contrast, I need to read the whole book to find useful information. It takes too long to do so. ... That was why I did not search for books [for the Information task] just now. ... I mostly use the Internet and just read the abstracts. I do not scan through a number of books to spot for useful information. I only read a particular book that I think should be useful" (Interviews, p. 15).

Student M1 considered web searching not just convenient but also provides comprehensive information - a common misconception among students. While working on the information task, she remarked "I seldom read books because using the Internet is much more convenient. Nowadays, it is very convenient to search for information. Information on every issue is readily available. ... The information on the web is very comprehensive."

The above perceptions are the most prevalent ones among the student participants and have great impact on their IL.

4.4.4.6 Perceptions of Critical Factors in Developing IL

As indicated in the literature review, Bruce (1997a) developed a rational model of information literacy framing it in terms of seven different ways of seeing and experiencing information use. "Each of these reveals one of seven facets of the information literacy experience: information technology for retrieval and communication, information sources, information process, information control, knowledge construction, knowledge extension and wisdom. Many of these ways of seeing information literacy involve recognizing interdependency between groups and individuals in the information literacy experience. Learning to be information literate, in this model, involves becoming aware of different ways of experiencing information use through engaging in relevant information practices and reflection" (Bruce, 2004, p. 3). In the interviews of the current study, the student participants expressed their views on what the critical factors were for being information literate, which coincide with Bruce's Seven Faces of Information Literacy (1997a). These critical factors are listed below.

Knowledge of the subject matter

Student L1 considered knowledge of the subject matter crucial to information literacy. More knowledgeable persons can search information faster. He said "I know some friends who know a number of useful websites. They are intelligent, read many books and magazines. ... e.g. Times and Newsweek, and have a certain level of knowledge. ... They can search information fast because they know more. ... If people read more, they know which items are useful. Once they read the topic [of the information task], they realize the types of pesticides and some

pieces of news on pesticides. ... If they know more about the subject matter, they know which websites are useful" (Interviews, p. 3). When the researcher asked him if he had sought information guidance from librarians, he replied "The librarians have not read all books and can only tell me where a particular book is ... the librarians' duties do not include helping me to do research. I will only ask them how to borrow, hold or find a particular book, and how to reserve a room. I don't think they have the responsibility in teaching me how to do research" (Interviews, p.5). While being asked if he thought there were general skills for information use that he might learn, he replied "Yes, I think so. I guess there are general skills. The websites I found [for the information task] are easy to locate. There should be some useful websites that I just did not know" (Interviews, p. 4).

This IL perception is similar to the "Information Sources Conception" of Bruce's Seven Faces of Information Literacy where IL means knowledge of information sources.

Information technology skills

Student L2 considered IT skills crucial to information literacy. One could search information fast if one knew more search syntaxes. When asked to assess her own IL competency, student L2 said "Because my classmates seldom use the + and " " symbols, I can search faster than them" (Interviews, p. 8).

This IL perception is similar to the "Information Technology Conception" of Bruce's Seven Faces of Information Literacy where IL is seen as using information technology for information retrieval and communication.

Use of proper search terms for unfamiliar concepts and skills to search using new search tools

Student H2 thought that using the right search terms for the key concepts was crucial in a successful information search. He remarked "My ability is okay and I often can find the needed information, though I may not be the fastest. I may use the wrong words for a particular idea – different terms can be used for the same idea in the task just now. ... Regarding an example of skillful use of information, I could find the data for the chemistry lab report very fast and I knew right away if I got the right data or not. This is because the information needed is very factual. In contrast, the task I did just now is more difficult. I was not sure if I got all the necessary information. Just now, I could not find how the practices of farming corporation affect the health problems of farm workers, because I could not find the right terms for 'practices of farming corporation'. So, I just focused on the insurance aspect" (Interviews, p. 35).

Similarly, student H4 indicated that though his IT skills were good, his lack of knowledge of all the databases and use of proper search terms hindered his information use. He said "My IT skills are good. However, I do not know how to deal with all the databases, how to phrase proper search terms because different terms lead to very different search results. ... I want to learn as soon as possible. Just now, I found it very difficult to search using the Article Search function [provided by the library of University X]" (Interviews, p. 40).

This IL perception is similar to the "Information Process Conception" of Bruce's Seven Faces of Information Literacy where IL is seen as the ability to execute strategies in a novel situation in which the users experience a lack of knowledge.

Knowing how to cite and write a reference list

Student H4 said "In the past, the information use was not demanding. ...

There was no need to locate academic information and to write the references. It is much more demanding now. We must prepare the reference list now.

Otherwise, we will plagiarize" (Interviews, p.40).

To some extent, this IL perception can be grouped under the "Wisdom Conception" of Bruce's Seven Faces of Information Literacy where IL is seen as using information wisely for the benefit of others, though Bruce's conception is much broader.

Generalization of information versus original idea

While working on the information task, student M1 remarked "Nowadays, it is very convenient to search for information. Information on every issue is readily available and there is no need to think about an original idea for oneself. The information on the web is very comprehensive. I become more and more lazy. I just need to generalize the located information and there is no need to think about anything." At the end of the information task, she further elaborated, "Nowadays, students must submit an assignment different from others. This is because if everyone copies from the web, it will be boring to mark them. However, it will be risky to use special information as well. So, just being average will do. There is no need to be too outstanding."

To some extent, student M1's remark touches on the "Knowledge Construction Conception" and "Knowledge Extension Conception" of Bruce's Seven Faces of Information Literacy. The student's generalization process is similar to the "Knowledge Construction Conception" where IL is seen as internalizing information, whereas building an original idea might fall under the category of "Knowledge Extension Conception" where IL is seen as "working with knowledge and personal perspectives adopted in such a way that novel insights are gained" (Bruce, 1997a, p. 143).

4.4.5 Information Literacy Experience outside the School Settings

In the survey, when prompted to choose between teachers, librarians, tutorial schools, parents, friends and classmates, and help screens for advice on research assignments, 15% of the students indicated that they sought advice on research assignments from their parents, compared to 27% of their US counterparts. In the interview, none of the student participants indicated that they had received any guidance of information use from their parents. Student H4 explained "I did not learn from my parents. They do not know any IT" (Interviews, p. 41). Student H2 also pointed out "I helped my mum and dad instead" (Interviews, p. 36). It seems that parents provide very little IL guidance to their children in Hong Kong.

With limited IL instruction in school and most parents being inadequate in IL, students in Hong Kong indicated in the survey that they mostly turned to their friends and classmates for help (66%) while US students mainly sought advice from their teachers (61%). In Hong Kong, friends and classmates seem to play a much

more important role in IL guidance than the school teachers. However, in the interview, most of the student participants pointed out that they would not rely on their friends and classmates for in-depth IL guidance but just some small tips, as they "all searched like one another".

In the interview, almost half of the students indicated that they used information more extensively in their everyday life than working on projects or laboratory reports assigned by their school teachers. As they did not learn much IL in school, they learned by themselves how to use Internet search engines for information needed in their everyday life through trial and error and online help of the search engines. As student H4 noted "I did not learn IT skills at school. I learned to use information all by myself, by trial and error. All my classmates learned in this way" (Interviews, p. 41). The students even applied these self-taught skills to find information for their school assignments, as student L4 remarked "I employed the information search methods I used in my everyday life for my school projects." (Interviews, p. 14)

The self-taught mode of acquiring information literacy as revealed by the interview is further supported by the findings of the survey, which indicated that 32% of students of Hong Kong often sought advice on research assignments from help screens and online tutorials while only 7% of the US students did so.

Chapter Five

DISCUSSION

In this chapter, the educational needs of information literacy among university freshmen in Hong Kong are discussed. To identify such needs, their past IL experiences in school are examined to reveal the underlying problems of implementing IL education in Hong Kong. Based on such review, key measures for institutionalizing IL into the curricula of both schools and universities are proposed.

5.1 Educational Needs of IL among University Freshmen in Hong Kong

As indicated in the literature review, "we must come to know how students view their worlds if we want to teach them" (Schubert & Schubert, 1980, p. 249). Ausubel (1968) has also posited that the "most important single factor influencing learning is what the learner already knows. Ascertain this ... and teach him accordingly" (preface note). In terms of information literacy, Neely (2002) points out that "Users' (students') input is a valid indicator for the development and restructuring of information literacy and library skills research programs, curricula, and individualized courses. Student attitudes about these skills are an intricate part of the success of these programs and must be included in the development of programs with quantifiable outcomes, thus, contributing to a more efficient and effective program" (p. 152). An understanding of the students' current IL competency and perceptions, and their past IL experiences is essential for educators

to understand their students' educational needs and provide suitable learning experiences for them.

The current study reveals that the university freshmen of Hong Kong had a lower IL competency than their US counterparts, even though they had one more year in secondary schooling. Compared with the US students, they were weaker in acknowledging the use of information sources, and were much poorer in identifying a variety of types and formats of potential sources for information and evaluating the sources critically. Similar problems are evident when they performed the information task. They had difficulties in identifying and using various types of information sources and search tools, especially scholarly ones. Also, they had problems in identifying the key terms that describe the information needs and constructing a search strategy using appropriate commands for a complex topic containing multiple concepts. A large proportion of them did not evaluate the information and did not know how to cite the sources properly. Moreover, they had a tendency of heavy reliance on quick web information for their research tasks. The only skills for which Hong Kong students were better at than their US counterparts are Boolean logic and truncation, and these were related to IT fluency which was taught in school. Hong Kong students were also comparable to the US students in accessing information.

The university freshmen's perceived difficulty level of various IL components matched well with their IL competence scores. With lower IL scores in most of the *IL Competency Standards for Higher Education* (ACRL, 2000) than the US students, many more of them than the US students found various parts of the

information processes difficult. To them, using Internet search engines to develop a list of sources to investigate looked manageable, but this was not the case for higher level IL skills such as developing research statement, revising search strategies, using electronic indexes, determining what information from sources to integrate, and acknowledging the sources. In particular, they found writing papers the most challenging.

This is in line with the findings of the CITE project *Information Literacy Performance Assessment (ILPA)*. Yuen et al. (2010) of CITE pointed out that Primary 5 and Secondary 2 students of Hong Kong were equipped with the basic technical skills in operating a computer, using the basic functions in the Office suite of applications, and surfing the web. Regarding IL skills, the students were competent in "lower level IL skills like defining and assessing information" but very weak in tackling complex tasks which involved "higher level IL skills including integration, evaluation, create and communicate" (p. 200).

Though Hong Kong students perceived various IL components as more challenging than the US students, they indicated that they enjoyed the process more. Over half of the survey participants in Hong Kong indicated that they enjoyed gathering information while only 27.6 percent US students did so. In the interview, though some students indicated that they did not enjoy information use, some others noted that they liked the processes and had developed information use as a habit in their everyday life. Almost half of the student participants indicated that they searched for information more extensively in their everyday life than for school assignments. In view of the inadequate IL guidance and learning

experiences in school, the students indicated that they acquired some information search tips in their everyday life use by themselves and tried to apply these techniques for their school work instead.

The current study also indicates that Hong Kong students paced their work on research assignments better than their US counterparts. More than 60 percent of the US students indicated that they did most or all of their work on or just before the due date whereas only 43 percent of Hong Kong students did so.

Furthermore, 96 percent of the survey participants in Hong Kong indicated that they found IL important to lifelong learning. In the interview, most of the students indicated that IL is crucial for their university study, though some of them also remarked that they did not consider IL important until they entered the university. In addition, undergraduate freshmen in Hong Kong perceived the following as critical factors for acquiring IL in their university study: knowledge of the subject matter; IT skills; skills in using proper search terms for unfamiliar concepts; skills in searching with new search tools; knowledge in acknowledging information sources; and ability to internalize information.

5.2 Impact of Previous IL Experience on Current IL Competency and Perceptions

The university freshmen's low IL competency scores and high perceived difficulty level of various IL components are found to be closely related to their limited past IL experiences and education. In their school years, they mostly worked on small-scale projects on simple topics. Many of them had not

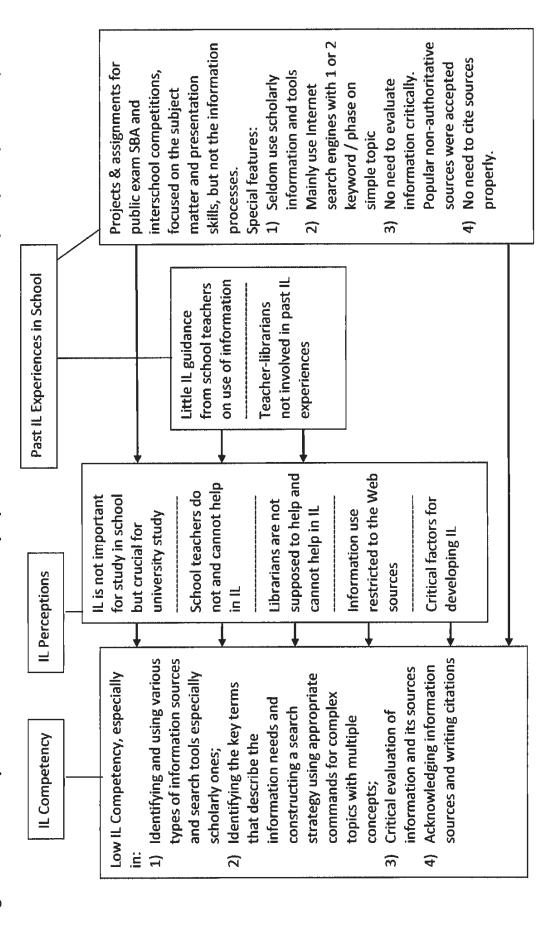
performed serious research on more complex issues containing multiple concepts related to one another. Students could easily fulfill the project requirements with simple single keyword search on the web without any reflection or refinement of their search strategies. They were also not required to use scholarly sources such as academic encyclopedias, dictionaries and journals, and none of the student participants had ever used indexes in school. Instead, they were allowed to rely almost completely on Wikipedia and one to two pages of search results of Yahoo and Google. More often than not, their submitted work that needed IL was in the form of PowerPoint presentations or laboratory reports rather than academic No evaluation and acknowledge of sources was needed. Students writing. perceived these learning experiences as mainly for school-based assessment in public examination and training of their presentation skills, but not IL. Without any effective IL learning experiences in school, the students had developed a habit to rely heavily on quick and incomprehensive information on the Internet rather than deep research.

The students' inadequacy in IL competency is also related to the very limited IL guidance from both the subject and IT teachers. Teacher-librarians were almost absent from the scene. The lack of effective IL experiences in school, the very limited IL guidance from both the subject and IT teachers, as well as the teacher-librarians' absence from the scene, all help to explain the university freshmen's inadequacy in IL competency. Without adequate support, students mainly rely on self-taught IL strategies to cope with their information needs. In addition, the students' limited IL experiences in school are closely related to their

low regard for the capability of teachers and librarians in facilitating IL. Such perceptions may further hinder them from approaching instructors and academic librarians for any IL guidance during their university study.

The current study indicates that university freshmen's past IL learning experiences have a strong impact on both their IL competency and perceptions. Figure 13 summarizes such impact. As indicated in the literature review, in their study of assessing P5 and S2 students' IL, Yuen et al. (2010) also concluded that learning experiences in school are most critical in determining students' IL achievement. In view of the significant impact of learning experiences on students' IL achievement, effective IL learning experiences should be incorporated into both the school and university curricula to cope with the information needs in the 21st Century living as indicated in the education reform in Hong Kong. In the following, the university freshmen's past IL experiences in school are further reviewed to explore the underlying problems of curriculum design and implementation of IL education in Hong Kong. Based on such review, essential measures to effective implementation of IL education in both school and university sectors are proposed.

Figure 13: Relationship between Past Information Literacy Experiences and Current Information Literacy Competency and Perceptions



5.3 Problematic School Information Literacy Learning Experiences

As indicated in the literature review, the Education Commission in its reform proposal made "Learning for Life, Learning through Life" the aim of education so as to keep pace with the progress of a knowledge-based economy in Hong Kong in the 21st Century. One of the "Four Key Tasks" for the education reform in school is to promote "Information Technology for Interactive Learning" (Education Commission, 2000). In 2004, the Education and Manpower Bureau (EMB) introduced information literacy as one of the key strategies to achieve "Information Technology for Interactive Learning". In 2005, EMB further issued the *Information Literacy Framework for Hong Kong: Building the Capacity of Learning to Learn in the Information Age*, to define the information literacy levels that students should attain.

However, the current study reveals that the IL competency of the undergraduate freshmen of University X, who were supposedly the elite of secondary school graduates in Hong Kong, was much lower than those of the 39 US liberal arts institutions. Also, the students in Hong Kong did not perceive IL as important in their school study as they did not see the need of IL in their school work. They did not see any problem in limiting their research for academic work entirely to non-authoritative popular web information. Only when they entered the university, they started to realize the importance of IL for their university study.

As indicated in the literature review, in their study of US first year community college students' IL experience and perceptions in both academic and everyday life use context, Gross and Latham (2011) point out that these students are aware of

the emphasis on "the use of multiple resources" and "the selection of credible resources" in "imposed information seeking" for academic work. However, the students are not bothered by all these "constraints" in "self-generated information seeking" in their everyday life use. To these students, "imposed information seeking" is seen as "constrained" while self-generated information seeking is seen as "open" (p. 181).

In contrast, in the current study, in view of the very limited IL experiences and guidance in school, students in Hong Kong did not differentiate between the information needs for academic purposes and their everyday life use. They did not see the importance of the use of multiple resources and the selection of credible resources for academic research, in contrast to the US first year community college students in the study described above. Instead, students in Hong Kong acquired some kinds of information search tips in their everyday use by themselves and tried to apply these techniques while finding information for their school work. As student L4 noted "I employed the information search methods I used in my everyday life for my school projects" (Interviews, p. 14). Thus, as revealed both by the information task and the interview of the current study, students in Hong Kong relied heavily on Yahoo, Google and Wikipedia to search for free information on the Internet for their academic work, and they just used whatever information that looked relevant to the assignment topic.

In the following, the students' past IL experiences in school are examined to review their underlying problems, so as to throw light on the possible ways for effective implementation of IL education at both school and university levels.

5.4 Lack of Constructive Alignment

As Biggs (2003a) posits, in a good teaching system, all its components – the curriculum and its intended outcomes, the teaching methods used, the assessment tasks – should be aligned to each other and tuned to learning activities addressed in the desirable learning outcomes. The learners can thus construct their own learning through these relevant learning activities. The teacher's role is to create a learning environment that supports these learning activities appropriate to accomplishing the desired learning outcomes. "Constructive alignment" is such a system. In contrast, in a poor teaching system, not all aspects of teaching and assessment are integrated or tuned to support high-order learning processes. In such a system, only the 'academic' students use high-order learning processes.

While reviewing the IL competency and perceptions among the university freshmen and their past IL experiences in school from the constructive alignment perspective stated above, it is not difficult to notice that various components - the learning outcomes of information literacy as denoted in the Government policy documents for the education reform targeting towards lifelong learning in the 21st Century, the school curriculum, the teaching methods used, the assessment tasks – are not aligned with each other. In other words, the current plan of developing students' IL has not been implemented.

In the current study, the survey responded to by over 600 university freshmen in Hong Kong reveals that they had much less information use experiences in school than the US students. The twelve student participants of the in-depth interviews indicated that there was little need for serious use of

information in their school years and their teachers did not demand a rigorous information process. Most of the students could only name one or two past information literacy experiences in their school years that were similar to the information task of the current study to some extent, but much less demanding in information literacy. The majority of these major information literacy learning activities were mainly related to school-based assessment in public examinations and inter-school competitions, and they were not aligned to developing information literacy. Students' submitted works were mainly PowerPoint presentations or laboratory reports, and the students seldom needed to write an essay to organize and integrate newly found information and their prior knowledge. The past IL experiences in school reveal that the classroom practices did not aim at enhancing IL but only knowledge of the subject matter and presentation skills. Students were left to acquire IL by themselves through trial and error or reading online help of the websites. Therefore, it is difficult for them to achieve high order IL learning outcomes.

Biggs (2003a) asserts that in a poor teaching system, "only the 'academic' students use higher-order learning processes" (p. 1). Student H4 of the current study is one of those exceptional "academic" students. In the interview, he remarked "In the past, just using Google, Wikipedia and Google Image was sufficient. There was no need to use any journal articles. In the senior forms, there was almost no project. In the junior forms, the projects were mainly on science and languages. There was not much need to find information for the language projects. For the science ones, I just needed to refer to the textbooks"

(Interviews, p. 40). He taught himself IL with ongoing reflection. Though he got the highest score in the IL competency questions of the survey and demonstrated more sophisticated IL skills in the information task, he was the only student who expressed his deep worry of the gap between his existing IL knowledge and skills and the requirement in IL for his university study.

Biggs (2003a) further elaborates that there are two aspects of 'constructive alignment'. The 'constructive' aspect refers to the construction of meaning by the students themselves through relevant learning activities, rather than by transmission from the teachers to the learners. The most important role of teachers is to engage students in learning activities which are likely to result in their achieving those desired outcomes effectively. One should note that 'what the student does is actually more important in determining what is learned than what the teacher does' (Shuell, 1986, p. 429). The 'alignment' aspect refers to what the teacher does for setting up a learning environment that supports the learning activities appropriate to achieving the desired learning outcomes. It is essential that the components in the teaching system, especially the teaching methods used and the assessment tasks, be aligned with the learning activities designed for the intended outcomes. The learners will consequently find it difficult to escape without learning what they are intended to learn. In setting up an aligned system, the desired outcomes of the teaching should not just be specified by the topic content, but also the level of understanding the students have to achieve. Educators should then create a learning environment that can effectively engage the students in the activities designed to achieve the intended outcomes, and to

choose the assessment tasks that can effectively inform them how well individual students have attained these outcomes (Biggs, 2003a). In contrast to the previous IL experiences of the student participants which were mainly composed of PowerPoint projects and laboratory reports that did not demand serious research but mainly assessed presentation skills and subject matter knowledge, the information task of the current study exposed the students to a new IL experience which required intensive information use and assessed their level of IL competency according to the IL Competency Standards for Higher Education (ACRL, 2000) in an authentic way. To cope with the new challenge, some students were "forced" to try out new ways of information use that they had never attempted in the past. Both students M2 and H4 demonstrated these first attempts while working on the Information task. Student M2 remarked on his past IL experiences in school, "The longest time I spent was on a project about religion for the Chinese Language and Culture subject. I set the topic and I mainly searched at Yahoo and Wikipedia for the needed information. I copied a bit from here and a bit from there and paraphrased the text" (Interviews, p. 21). In contrast, during the Information task of the current study, to face the challenges of the task, student M2 made his first attempt to use a few article indexes provided by the library, in addition to Wikipedia and Yahoo that he used to rely on. Similarly, student H4 tried to use the Article Search function to search for more journal articles though he indicated that he did not use any journal articles in school as there was not much need to use information at that time. Since the information task of the current study cannot be satisfactorily fulfilled just by simple searches at Wikipedia and Yahoo, the

students were "forced" to use new search tools and search modes. Only with a learning activity that requires intensive information use, can the students sharpen their information literacy competency through repeated refinement of the strategies and reflection on the processes. Through these challenging processes, they can experience satisfaction and fun. To facilitate students in acquiring IL, educators should set up an environment that can really engage students in the learning activities designed to achieve the intended IL outcomes, and to choose tasks that can effectively assess these outcomes.

5.5 Underlying Problems in Implementing Information Literacy Education in Hong Kong

The current study reveals a lack of constructive alignment in the IL learning experiences in school, which in turn reflects the underlying problems in implementing IL as an educational change in the education reform for lifelong learning in Hong Kong. There are three broad phases to the educational change process: initiation, implementation and institutionalization (Fullan, 2007, p. 65). The Education Bureau's (EDB) official webpage on information literacy is a good starting point to review these phases for institutionalizing information literacy education to achieve the goals of lifelong learning. The EDB webpage on information literacy is very brief and only provides a link to the document Information Literacy Framework for Hong Kong, and states:

"With a view to further enhance teachers' knowledge and skills in cultivating students' IL, Education Bureau will invite local tertiary institutes to provide

teachers with Professional Development Programmes (PDP) related to IL. Local tertiary institutes will also be invited to develop self-evaluation tools for assessing students' IL in major Key Learning Areas (KLAs) in the Primary 1 to Secondary 3 level. It is expected that the said PDP will be available within the 2008/2009 school year while the self-evaluation tools for assessing students' IL will be available within the 2009-2010 school year."

The issuance of the EMB's IT strategy documents in the 2000s and the Information literacy Framework for Hong Kong in 2005 can be seen as the initiation processes leading up to the implementation of IL. The release of the EDB report Provision of consultation service: Revamp of the teachers' IT training framework: Final report, submitted by the Joint Consultation Service Team (JCST) with academics from four higher education institutions in 2007, should have formed an important step in IL implementation, as stated on the EDB webpage. The launch of the website Education Tools for Assessing Students' Information Literacy and Promoting Information Literacy among Students developed and hosted by the Centre for Information Technology in Education (CITE) of the University of Hong Kong in January 2011 marked another major step. Launching this IL assessment tool website implies all the IL implementation steps stated on the EDB IL web page are seen as having been completed.

Fullan (2007) points out that implementation of educational change should consist of the process of putting into practice an idea, program, or set of activities and structures new to the people attempting or expected to change (p.84). Just providing an academic standards framework, an assessment system, and

professional development for standards-based instruction do not guarantee successful implementation of an educational change (Fullan, 2006, p.5). In Hong Kong, an Information Literacy Framework for Hong Kong has been issued, as well as the professional development proposal and assessment tool on IL. However, impact of these implementation steps was not detected in the findings of the current study. In the Information literacy Framework for Hong Kong issued in 2005, three school-based implementation options were listed, which are (1) using existing IT/library lesson, (2) infusing IL in all curricula in basic education, (3) project-based learning (PBL) across the curricula (EMB, 2005a, p. 19). More detailed suggestions on the implementation of IL into the curriculum were recommended in the report Provision of Consultation Service: Revamp of the Teachers' IT Training Framework: Final Report issued by EDB in 2007, based on the findings of eleven focus group sessions as well as seven in-depth interviews with teachers, principals, curriculum development officers, and other important stakeholders. Three models of articulating IL into the existing curriculum were proposed: full integration model, hybrid model and separation model. In addition, the report indicated that both Liberal Studies in senior secondary and General Studies in senior primary level should be the suitable platforms for building information literacy (JCST, 2007, pp. 25-27).

However, as revealed in the current study, the IL implementation models described above cannot be traced in the students' previous IL experiences in school. Rather, the students did not think that their previous IL experiences helped them much to be more information literate. The current study further indicates that the

students had low regard for the role of their teachers in facilitating IL, whereas their teacher-librarians were almost absent from the scene in providing IL guidance in school.

On paper, IL has been implemented by fulfilling the steps indicated in the EDB IL webpage. In reality, the current study supports that IL education has not taken any major step from the initiation stage since the issuance of the IL Framework in 2005. Yuen et al. (2010) also point out that there is a long way to go in changing the pedagogical orientation of classroom practices for developing students' capacity as lifelong learners, after reviewing the implementation of ICT education including IL in the past decades and their study in accessing IL of Primary 5 and Secondary 2 students of Hong Kong (p. 209).

In the following, specific underlying problems of implementing IL are examined to throw light on the key measures to implement IL education in Hong Kong.

5.5.1 Identity in IL Guidance among Teachers and Teacher-Librarians

Fullan (2006) points out that individual and collective motivation is the most essential factor for successful implementation of educational change. Some of the key aspects of motivation are identity among teachers, capacity building and availability of resources. In the following, these three key aspects are discussed respectively.

Teachers are the ultimate arbiters of educational change. No plan for sustainable educational change can bypass the teacher (Hargreaves & Shirley, 2009).

Educational changes will not be achieved unless all teachers are engaged in the changes (Fullan, 2007). In the current study, students indicated that their subject teachers did not see themselves as facilitators of IL. When the researcher asked student H1 if the subject teachers taught her how to search and use information, she said, "No, they [the subject teachers] might think that the skills taught by the IT teacher should be sufficient" (Interviews, p. 32). However, the current study reveals that the IT teachers mainly focused on teaching IT skills and at most using internet search engines, instead of teaching IL skills and concepts. Unfortunately, some students in the current study claimed they did not even have such IT instruction in school. In the case of teacher-librarians, most of them did not take up any teaching role but mainly worked as managers of libraries. This fundamental problem is fully reflected in student H4's perception of teacher-librarians. He said, "No one has ever thought of asking the teacher-librarian. The librarian was seen as an administrator of the library only" (Interviews, p. 41). On paper, it seems that every school teacher has to share the responsibility of providing guidance on IL. In reality, none of them see themselves as having a role in IL education. If neither teachers nor librarians see their roles as facilitating IL, it will be a long way to achieve the education reform for preparing students for lifelong learning in Hong Kong.

5.5.2 IL Guidance Provided by Teachers

The lack of identity in providing IL guidance among teachers is closely related to their inadequacy in concepts and skills of IL guidance. The secondary school teachers of Hong Kong in the study of Yuen et al. indicated that they were proficient in using basic software and hardware, in particular, in using software for word processing, online communication, presentation and online information searching (2010). The current study have revealed that school subject teachers mainly focused on presentation skills and techniques in using PowerPoint software, whereas IT teachers targeted teaching Chinese character input and Internet search engines. However, proper use of all these software is only a basic IT skill but not information literacy. IL is not just using Internet search engines and making PowerPoint presentations, but an effective use of information in a variety of formats.

School teachers in the 2006 Second Information Technology in Education Study (SITES) reported that the number of professional development courses on general ICT skills was much higher than the number of courses on pedagogical use of ICT, and teachers indicated they were less confident in the pedagogical use of ICT (Yuen et al., 2010). Since IL has been put under IT in education by the Hong Kong SAR Government, pedagogical training in developing IL has also been neglected.

If teachers are only equipped with basic IT skills, it is difficult to institutionalize IL in the education reform. If teachers do not have clear conceptions of IL and do not share the vision of developing IL among their students, full scale IL education will remain an illusory goal. There is a great need in capacity

building for teachers to incorporate the information literacy framework into their teaching and assessment practices. Otherwise, as indicated in the current study, students are left to acquire IL through trial and error, and do not see the importance of developing IL as a critical literacy in the 21st Century.

5.5.3 Status of Teacher-Librarians

After studying twenty-five of the world's school systems, McKinsey & Company (2007) assert that the three most important matters for improving student outcomes among high-performing school systems are: (1) getting the right people to become teachers, (2) developing them into effective instructors and, (3) ensuring that the system is able to deliver the best possible instruction for every child. The top-performing school systems consistently attract more able people into the teaching profession, leading to better student outcomes. "The quality of an education system cannot exceed the quality of its teachers" (p. 13). The status of the teaching profession is very important in recruiting capable graduates. Once teaching became a high-status profession, more talented people became teachers, lifting the status of the profession even higher. This is particularly apparent in According to Hargreaves and Shirley (2009), Finnish teachers are Finland. attracted by their country's inspiring vision that teachers are builders of their nation's future. Though they are only paid at the OECD average, they treasure the intrinsic qualities in their work and the high status in the society.

In contrast, teacher-librarians in Hong Kong have much concern about their perceived low status. Citing the newsletters of the Hong Kong Teacher-Librarians'

Association from 1998 to 2000, Sit (2003) asserts that many teacher-librarians have constantly expressed concern in: "Others' perceptions of the image of teacher-librarians; the lack of understanding by others of the role; perceived low status of the position" (p. 10). They disliked being used as supply teachers to fill gaps in staffing levels.

In his survey study on teacher-librarians, Wong (1992) points out that one third of the questionnaire respondents were dissatisfied with their present job as teacher-librarians and decided to have a change in their working environment in the near future because of insufficient recognition and poor promotion prospects.

The website of the Hong Kong Teacher-Librarians' Association (2001) also stated that all teacher-librarians, irrespective of whether they possessed a graduate qualification or not, were in the Certificate Master/Mistress (CM) grade before 1993. Only since 1993, the Education Department permits graduate teacher-librarians to take up a Graduate Master (GM) post. However, not many school principals would like to offer such a post to teacher-librarians.

According to the Curriculum Development Council (2002) and EDB (2007), teacher-librarians should not just be the managers of the school libraries, but also information specialists, partners of curriculum development and teaching, and promoters of reading to learn. However, the current study reveals that students had an exceptionally low regard for the teacher-librarians in their schools. In the eyes of all student participants of the interview in the current study, the teacher-librarian was nothing more than the administrator of an insufficiently

resourced school library. They played no part in the scene of information literacy education in school.

In a comparative study of school librarians from selected developing countries, Lee, Brown, Mekis, and Singh (2003) posit that the lack of an instructional role among teacher-librarians in developing countries is also apparent in Hong Kong, even in the context of the recent education reform in Hong Kong targeting towards "learning to learn". The only explicit role of teacher-librarians is about the key learning area "Learning to read and reading to learn" of the education reform. "A shift from a public library model to one combining the information profession with an instructional and collaborative responsibility remains a stumbling block for those working in and studying teacher librarianship" (p. 10). If teacher-librarians do not have a respectable instructional status in school, they will not have a major impact on IL education, unlike the situation in a number of well developed countries across the world.

5.5.4 Resources biased to ICT Infrastructure but not IL

In the implementation of IL education in Hong Kong, resources had been mainly used for upgrading ICT-related infrastructure and providing basic computer skill training to teachers. Since 1998 when the first IT strategy policy document Information Technology for Learning in a New Era: Five-year Strategy was issued by EMB, access to computers, location of computers and the availability of software packages for teachers and students to use have been much improved. According to Yuen et al. (2010), the student-computer ratio improved from 35.7:1 to 6.09:1,

with the variation across schools also reduced. Also, the locations for placing purchased computers have been changed from dedicated computer rooms in 1998 to a substantial proportion of them being placed in classrooms and school libraries. From 1998 to 2003, the Hong Kong SAR Government spent HK\$3.17 billion non-recurrent funding to support IT in education, with 40.7 percent on site preparation, 39.3 percent on computer equipment, and 16.8 percent on IT training for teachers (Yuen et al., 2010). In 2006, the Education Bureau reported on the progress of the Education Reform in the *Progress Report of the Education Reform* (4). This document did not touch on the progress of "IT for Interactive Learning", but indicated that the largest number of projects supported by the Government's Quality Education Fund (QEF) were on Information Technology: 1,971 projects out of a total of 6,357 QEF projects (EDB, 2006). According to Yuen et al. (2010), QEF had spent a total of HK\$1.11 billion to support IT-related projects from 1999 to 2001 in which 55 percent was on access-related projects.

The significant improvement of ICT infrastructure of schools has been seen as a major success of implementation of IT in education. With a biased resource allocation to ICT infrastructure, it seems that little resources had been spent on capacity building of IL knowledge and IL pedagogy among teachers and librarians, and on providing abundant scholarly information resources to students to develop their IL. In the current study, the students found their teachers and teacher-librarians lacked the confidence and knowledge to give them any in-depth IL guidance. Also, a number of the students indicated that their school libraries were very small. They did not rely on these small school libraries but turned to

popular non-authoritative web information. Despite the great success in ICT infrastructure improvement, professional development for teachers and teacher-librarians in IL and provision of information resources for students were neglected.

5.5.5 Positioning of IL under IT in Education

The Education Commission (2000, p. 30) summarizes the overall aims of education for the 21st Century in Hong Kong as follows:

To enable every person to attain all-round development in the domains of ethics, intellect, physique, social skills and aesthetics according to his/her own attributes so that he/she is capable of lifelong learning, critical and exploratory thinking, innovating and adapting to change; filled with self-confidence and a team spirit; willing to put forward continuing effort for the prosperity, progress, freedom and democracy of their society, and contribute to the future well-being of the nation and the world at large.

Our priority should be accorded to enabling our students to enjoy learning, enhancing their effectiveness in communication and developing their creativity and sense of commitment.

To achieve the above aims, the education reform in Hong Kong targets the following two visions that echo the outcomes of information literacy (Education Commission, 2000, pp.35-36):

 To build a lifelong learning society - Everyone in Hong Kong will have the attitude and ability for lifelong learning and a willingness to advance further beyond the existing knowledge level, and to continuously consolidate and upgrade their knowledge and ability. Diversified learning channels and opportunities should be available to meet their learning needs.

To create an inspiring learning environment - There will be a learning
environment that will induce students to be curious, to question and to
explore; it will give students the opportunity to exhibit their abilities in
independent thinking and creativity, and thus nurture more creative talents.

However, in Hong Kong, rather than positioning information literacy as a critical literacy for lifelong learning in the 21st Century, IL has been put under "IT in Education" since its introduction to the Government IT strategies. The EMB's second IT strategy policy document Empowering Learning and Teaching with Information Technology issued in 2004, targeting to promote the use of ICT in teaching and learning, introduced information literacy as one of its five IT strategies. indicated in the literature review, the concept of information literacy indicated in this EMB policy document stresses IT heavily and deviates much from the well established IL definitions around the world. It reveals that IL has been considered as some sort of IT skills, and information is only available in digital format and accessible through ICT in the official curriculum. Even after the issuance of the Information Literacy Framework for Hong Kong drafted by academics from different higher education institutions in 2005, the Education Bureau of the Government has not positioned IL as a critical literacy for the 21st Century in itself, but consistently puts it under the umbrella of "Information Technology in Education", as indicated in the hierarchy of IL under "IT in Education" on the EDB website.

It is doubtful whether the concept of IL in the Information Literacy Framework for Hong Kong prepared by academics in 2005 have been fully adopted by the Government officials to enforce the implementation of IL in school. Fullan (2007) asserts that clarity about the goals and means of an educational change is crucial. Diffuse goals and unspecified means of implementation represent a major problem at the implementation stage (p. 89). If IL is only seen as a subset of IT by the Government officials, it will be very difficult for other education stakeholders, especially the teachers, to see the importance of IL, what IL should really achieve and how IL can be attained. Also, teacher-librarians cannot see their unique role in facilitating IL, unlike the situation in other developed countries around the world. The current study reveals that both the school subject teachers and the teacher-librarians did not see their important roles in providing IL guidance in school. In view that IL is only positioned as part of IT, it is doubtful if teachers and teacher-librarians are aware of the IL Framework for Hong Kong and if they have any motivation to incorporate the IL framework in their teaching activities with students both in class and in the library settings.

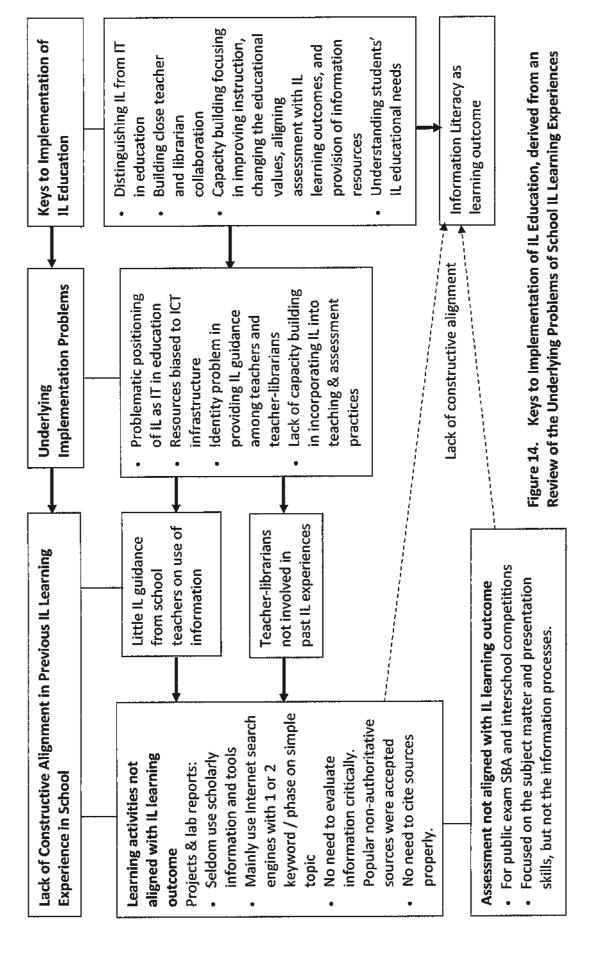
Seeing IL as one of the IT skills also has a direct impact on students, and leads to the undesirable restriction of information use to online format only. The current study indicates that the most prevalent perception on information use among students is the strong preference to web information. Since school IT teachers only taught their students how to use search engines to search for free web information, students intend to rely fully on the search engines for retrieving

non-authoritative popular information sources on the Internet and omit the wealth of scholarly information in all sorts of formats.

To summarize, the problematic positioning of IL under IT in Education leads to the lack of identity of IL guidance among teachers and teacher-librarians, the inadequate IL knowledge and IL pedagogy among teachers and teacher-librarians, biased resource allocation towards ICT infrastructure but not IL, and the undesirable restriction of information use to digital sources among students. To achieve the goal of "Learning for Life, Learning through Life" of the education reform, IL should be re-positioned as a critical literacy in the 21st Century in itself, but not under the umbrella of IT in Education.

5.6 Keys to the Implementation of Information Literacy Education

Section 5.1 above provides a summary of the educational needs of IL among university freshmen in Hong Kong as revealed in the current study. To fulfill these educational needs, it is crucial to implement IL education effectively. The implementation problems revealed in sections 5.3 to 5.5 throw light on the key measures for implementing IL education in both school and university levels. Figure 14 on the following page provides an overview of this flow of ideas — Past IL experiences reveal the implementation problems of IL education which in turn reflect the key measures for successful implementation of IL education in Hong Kong. Details of these key measures are discussed after Figure 14.



5.6.1 Distinguishing IL from IT in Education

The Association of College and Research Libraries (ACRL) of the US points out that information literacy relates to IT skills but with broader implications. IT skills enable an individual to use computers, software applications, databases, and other technologies to achieve a wide variety of academic, work-related, and personal goals. While an information literate individual should have developed these technology skills, a 1999 report from the US National Research Council distinguishes IL from IT. It notes that information literacy focuses on content, communication, analysis, information search and evaluation. IL is an intellectual framework for understanding, finding, evaluating, and using information which may be accomplished in part by fluency with information technology, in part by sound investigative methods, but particularly important through critical discernment and reasoning. "IL initiates, sustains, and extends lifelong learning through abilities which may use technologies but are ultimately independent of them" (ACRL, 2000, Information Literacy and Information Technology, para. 3).

As indicated in the literature review, Shapiro and Hughes (1996) define information literacy as "a new liberal art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its technical infrastructure, and its social, cultural and even philosophical context and impact." IL is not just some kind of IT skills, but something well beyond these skills.

In her white paper prepared for the UNESCO, Bruce (2004) also emphasizes the differences between IL and IT: "The concepts of IL and IT literacy are usually

distinguished to demonstrate the difference between the intellectual capabilities involved in using information, and the capabilities required for using technologies that deliver or contain 'information'. This distinction is also made to convey the idea that provision of ICTs and associated training in the use of hardware and software, the focus of many government, corporate and educational programs, is only a starting point in achieving desired reforms [for teaching IL]. In practice, the information literacy agenda may be advanced as a consequence of new information technologies, or in the absence of an appropriate IT infrastructure. In the latter case, promoting the information literacy agenda may point towards the need for planned technological advancement in learning communities" (p. 2). Bruce (2004) further points out that information literacy is a "catalyst for educational change" and forms the "foundation for learning in our contemporary environment of continuous technological change. ... Across the world, educators in primary, secondary, tertiary and professional education contexts have been developing strategies and policies for designing learning opportunities that will enable learners to take advantage of the information and communication infrastructures available to them. Learning opportunities that enhance information literacy not only make use of information and communication infrastructures, but are designed to bring the information practices, that are effective in professional, civic and personal life into curriculum. Such opportunities make it possible for learners of all ages to experience the power of effective information practices" (p. 1).

Moreover, Johnston and Webber (2003) point out the problematic outcome of positioning IL under IT skills in the United Kingdom. They note that UK official

reports only put IT skills but not IL as part of the UK "key skills" agenda. Such bias towards IT skills rather than IL may explain in part the limited progress in developing and implementing IL in the UK (p. 339). In the case of Hong Kong, IT skills rather than IL have been emphasized in 1998 when the Government saw the importance of promoting lifelong learning skills. Such conceptualization has limited the reform initiative to teaching and learning of skills in using computers and the web only. Even though the EDB adopted the concept of IL in the review of IT in education in 2005, it is by no means clearly spelt out to teachers. It is important to rectify the present situation by clearing the common misconception of IL being a subset of IT skills. Otherwise, there will be a long way to go for a full scale promotion of IL among students to achieve the lifelong learning goals in the education reform.

5.6.2 Establishing Teacher and Librarian Collaboration in IL Education

In great contrast to the Hong Kong students' perception of librarians as administrators only, librarians play a crucial role in information literacy across the world. As indicated in the literature review, librarians have been seen as leaders in promoting information literacy in many countries. In the US, the Association of College and Research Libraries developed the *Information Literacy Competency Standards for Higher Education*, which lays the foundation for almost all IL standards around the world. In the UK, the National and University Libraries set up the *Seven Pillars Model for Information Literacy*. In Australia, the Council of Australian University Libraries establishes the *Australian Information Literacy Standards* for the country. Similarly, in Finland, the Council for Finnish University

libraries takes up a leading role in implementing the national project "Curriculum Plan for Information Literacy" in all Finnish universities. Across the world, librarians have taken a more active role in student learning (Montiel-Overall, 2008). In her white paper prepared for UNESCO, Bruce (2004) asserts that "In schools in particular, the role of the teacher-librarian has been shown to be very important for building information literacy into curriculum, and the education and placement of such personnel must be endorsed in both developed and underdeveloped regions" (p. 12). She also notes the importance of partnerships between key personnel of IL education, including students, teachers, information specialists, IT specialists, curriculum designers and educational leaders such as principals and deans in providing learning experiences that facilitate IL. In particular, she stresses that the most fundamental of these partnerships at all levels of education, from primary schools to doctoral studies, is the collaborative relationship between the teachers, information specialists and students.

In recent years, a number of research studies have shown the importance of teacher and librarian collaboration for developing IL among students (see for example, Konzal, 2001; Mokhtar & Majid, 2006; Montiel-Overall, 2005a, 2005b, 2006, 2007, 2008; Russell, 2002; Todd, 1995). Professional guidelines such as the *Information Power: Building Partnerships for Learning* (AASL & AECT, 1998) of the US also place teacher and librarian collaboration at a critical position in IL education.

In higher education, collaborations between faculty and librarians have been institutionalized in many higher education institutions in the Middle States of the US.

The Commission on Higher Education, Middle States Association of Colleges and

Schools of the US (1995) has proposed that IL should be incorporated into the higher education curriculum by a collaborative effort of faculty, librarians and administrative staff for IL to become an integral part of the objectives of every course on campus. Administrative staff, especially the "chief academic officers", should provide central support for effective implementation. To integrate IL into the academic curriculum, librarians and classroom faculty complement each other in the delivery of IL instruction. Librarians can facilitate students to acquire generic IL skills such as information retrieval and source evaluation skills while faculty members impart those IL skills that are embedded within the research paradigms and procedures of their disciplines, such as assessing the validity of evidence, evaluating the content of arguments, and proposing original solutions (Grafstein, 2002).

However, as has been found in the present study, in the case of Hong Kong, university freshmen have an exceptionally low regard for librarians in providing IL guidance. In view of these prevalent perceptions among the freshmen, as indicated by Bundy (2004) in the Australian and New Zealand Information Literacy Framework, institutions in Hong Kong should develop strategies and create opportunities to promote the educative role of librarians with greater clarity and force so that faculty and librarian collaboration is not viewed as unusual but a valued norm, in order to facilitate librarians to perform their roles as in other countries around the world.

5.6.3 Changing the Educational Values and Culture

Vygotsky (1987) asserts that learners develop new concepts and skills under the guidance of a more knowledgeable person through scaffolding. The scaffolds facilitate students to build on prior knowledge and internalize new information. In an information process, assistance of a more capable other should only be provided when an information user is incapable to complete a task alone or do it with great difficulty (Kuhlthau, 2004). Information literacy education should bring real life experiences of information use into the classroom and create opportunities for critical reflection on the learning process so as to foster the awareness in the learner. The adoption of IL education is most likely to take place where there is a change in educational values as well as organization culture, from a content orientation to a process orientation to teaching, from a teacher-centered to a learner-centered view of learning, and an increased emphasis on understanding the perceptions of students and the pedagogical implications. Such a paradigm shift can facilitate, at the same time being facilitated by, guided movement towards information literacy education (Bruce, 2004).

Fullan (2006) posits that if theories of educational change do not include the hard questions of "Under what conditions will continuous improvement happen?" and correspondingly "How do we change culture?", they are bound to fail. Educators must learn to do new things in "the setting in which they work" (Elmore, 2004). Standards-based reform such as introducing an *Information Literacy Framework for Hong Kong* in itself does not address the issue of changing the setting in which people work. Focusing on what needs to change in instructional

practice and what it will take to bring about these changes in classrooms is the key to successful educational change. Implementation of IL education must ensure that classrooms and institutional culture embraces the importance of IL in learning, the critical components of IL programmes, and the paradigm shift of educational value from a content to process approach to teaching. Both teachers and librarians should understand the implications of all these for their provision of learning experiences to their students.

5.6.4 Capacity Building Focusing on Improvement in Instruction

"Capacity building concerns the knowledge, skills, and disposition of people individually but especially collectively. It is the group with shared purpose and skills that get things done" (Fullan, 2010, p. 45). To ensure teachers and librarians embrace their critical roles in IL education and the paradigm shift from content to process approach to IL teaching, capacity building focusing on improvement in instruction is essential. However, in Hong Kong, the HKSAR Government essentially spent billions of dollars to upgrade the ICT infrastructure in schools of Hong Kong, which is far from adequate to ensure a high level of IL. As McKinsey & Company (2009) point out, the top-performing school systems recognize the only way to improve outcomes is to improve instruction. Since learning occurs when students and teachers interact, it is essential to achieve coaching classroom practices, moving teachers training to the classroom, developing stronger school leaders and enabling teachers to learn from each other. A good school system should "ensure that when a teacher enters the classroom, he or she has the

materials available, along with the knowledge, the capability and the ambition to take one more child up to the standard today than she did yesterday" (McKinsey & Company, 2009, p. 26). Hammond (2000) asserts that teacher quality is strongly related to student achievement than overall spending levels, teacher salaries, class sizes, or the proportion of staff who are teachers. To improve student achievement, the preparation and qualifications of the teachers being hired and retained in the profession must be attended to. Student learning should be enhanced by the efforts of teachers who are more knowledgeable in their field and are skillful at teaching it to others (p. 39).

In the current study, students perceived that their teachers and teacher-librarians did not have the capability in IL guidance, so they tried to learn IL by themselves. The most important key to implement IL education in Hong Kong is to improve IL instruction based on a teacher and librarian partnership. Professional development for both the teachers and librarians should be much enhanced to ensure that both of them fully grasp the concepts and skills of IL on the one hand, and know how to incorporate IL into the students' learning experiences innovatively on the other. Both the teachers and librarians should be able to see the implications of IL in their provisions of learning experiences to students. In particular, as indicated above, the educational value emphasizing learner-centered process approach to teaching should become a common value and shared culture of classroom practices for promoting IL. Otherwise, the school learning experiences cannot be aligned with the IL learning outcomes, hampering the implementation of IL education in Hong Kong.

Yuen et al. (2010) also point out that ICT-related professional development for teachers should ensure that teachers know how to incorporate the *Information Literacy Framework for Hong Kong* into their teaching and assessment practices, and focus on the development of pedagogical rather than technical ICT competence. "The pedagogical practices should stress designs that integrate the development of high-order information literacy competences within the curriculum of specific subjects at different levels" (p. 212).

5.6.5 Providing Essential Information Resources

To implement IL education in Hong Kong effectively, capacity building focusing on improvement of instruction by teachers and librarians is essential. In addition, students need sufficient information resources in school for developing their IL. The current study indicates that students found their school libraries only provided a small collection of printed books. The students could not rely on these far-from-adequate information resources, and had to heavily use free information on the web. Rather than just adding more computers into the school libraries for accessing the Internet, the Hong Kong SAR Government should equip school libraries with a rich collection of information resources. In his update report on school libraries in Hong Kong, Hung (1998) points out that schools in Hong Kong did not receive any separate grant for library use. It was up to the school principal to allocate funding for developing information resources in the school library. There was a wide range in such allocation, from several thousand to 100,000 Hong Kong dollars a year. An unofficial estimate of the library expenditure per student in

Hong Kong was only about US\$6 (p. 61). In contrast, school students in the US have much more government funding for building information resources in their school libraries. The official website of the American Library Association indicates that US\$23.37 was allocated for library/media materials per public school student in 1999-2000 (US\$29.02 for each private school student).

To provide a wealth of scholarly information sources to school students in a cost-effective way in a small place like Hong Kong, the world wide trend of establishing school library consortia for resource sharing should be followed.

5.6.6 Aligning Assessment with IL Learning Outcomes

Lastly, the core concern of students in learning should be taken into account while implementing IL education. "To the teacher, assessment is at the end of the teaching-learning sequence of events, but to the student it is at the beginning" (Biggs, 2003a, p.3). Students always perceive assessment as the most important: assessment is the curriculum (Ramsden, 1992). They will learn what they think they will be assessed on, and not on what the curriculum is about or what has been taught in class. This is particularly important in places like Hong Kong where examination results are taken very seriously. Educators must ensure that the assessment tasks align with the intended learning outcomes. The teaching activities of the teachers and the learning activities of the students should be both directed towards preparing for the assessments. Only with such an alignment will students be learning the curriculum (Biggs, 2003a).

As indicated in the current study, even though the university freshmen found IL important for their university study, they would not spend much effort in equipping themselves with IL if IL was not explicitly required. Most probably, they would fall back to their undesirable past IL practices they had acquired in their school years. Only when IL is incorporated into the university curriculum, and more importantly, integrated into the assessment tasks, will the students be motivated to use information effectively and be highly information literate. Indeed, as has been stated in the literature review, accrediting criteria related to information literacy in higher education institutions have been introduced in the US by all six regional accreditation organizations in recent years (Saunders, 2007). IL should be deliberately incorporated into the assessment tasks for all school subjects and degree programmes of higher education institutions. Otherwise, IL education will remain as an implementation plan on paper only, as revealed in the current study.

5.6.7 Essential Components of Information Literacy Education

The sections above indicate the importance of aligning assessment with IL learning outcomes, the provision of information resources to students, close teacher-and-librarian collaboration, and capacity building for both teachers and librarians in providing IL education, especially of the change in educational values from content-orientation to process-orientation to teaching. In the following, essential components in providing IL programmes at both school and university levels are discussed.

Bruce (2004) points out that in any educational sector, there are several critical components of an information literacy programme:

- Resource base that supports learning skills underpinning information literacy
 e.g. web-based information skill enhancement packages.
- Curriculum that provides the opportunity to learn specific skills, either early
 in a course or at point of need, in form of curriculum integration.
- 3. Curriculum that engages in learning activities with ongoing interaction with the information environment, and provides opportunities for reflection and documentation of learning about effective information practices, in form of 'embedded' information literacy education.

Successful IL programmes do not only rely on teaching information skills, but focus on designing learning experiences that require the use of information skills. Learning to be information literate should have the following three critical elements:

- 1. Experiencing information literacy (learning),
- Reflection on experience (being aware of learning), and
- Application of experience to novel contexts (transfer of learning).

When students reflect on their learning experiences to be information literate, they start to recognize the transferability of the processes to everyday life, community and workplace contexts. Reflecting on the concept of information literacy itself allows it to be more easily transferred to novel situations (pp. 13-14).

In the current study, the information task provided the student participants with a new IL learning experience. The interview offered them an opportunity to

reflect on what they did in the information task. For example, student L3 found the whole process enlightening. At the end of the interview, he remarked, "It was a new experience just now ... The process was interesting and I learned something new" (Interviews, p. 13). Similar reflective learning experiences should be provided in school, via courses such as Liberal Studies of the New Senior Secondary (NSS) curriculum and other subjects' SBA tasks.

Regarding IL programmes in the higher education sector, on the one hand, ACRL's Characteristics of Programs of Information Literacy that Illustrate Best Practices: A Guideline (2003) offers one of the most complete sets of best practice characteristics of IL programmes, covering mission, goals and objectives, planning, institutional support, articulation with the curriculum, collaboration between disciplinary faculty and librarians, pedagogy, assessment, outreach and staffing. On the other hand, Kasowitz-Scheer and Pasqualoni (2002) posit that since higher education institutions vary widely in mission and student body, IL programmes should be designed to meet specific needs rather than following a prescribed set of criteria. Adoption of a particular approach depends on many institutional factors including purpose, audience, budget, staffing, facilities, and time (Grassian & Depending on the particular needs of the institution, IL Kaplowitz, 2001). programmes can be offered as: (1) web-based information literacy tutorials; (2) standalone information literacy courses ranging from for-credit to non-credit, from required to elective, and from distance to face-to-face; (3) as IL across the curriculum. According to Jacobson and Mark (2000), IL instruction is most effective when offered in context with content-based courses and assignments. An "across

the curriculum approach" is the most preferred because it ties information literacy into all students' experiences (Orr, Appleton, & Wallin, 2001; Snavely & Cooper, 1997). However, this approach requires deep collaboration between disciplinary faculty, librarians, and administrative staff. The university management must take the initiative to ensure its smooth functioning.

In Hong Kong, different approaches have been adopted among the eight government-funded higher education institutions in incorporating IL into their curricula. As indicated in the literature review, one university offers an elective general education credit course solely on IL. Two integrates IL with other IT components into a credit course, two make IL a part of the IT proficiency graduation requirement. Regarding the two institutions which provide credit courses with IL integrated with other IT components, one of them offers the course as part of its general education programme, with learning outcomes as follows:

- Describe the importance of information technology and information literacy;
- Describe and explain fundamental concepts of different areas of information technology;
- Describe and explain the fundamental concepts of information management cycle;
- Use IT tools to search, store, organize, process and maintain information;
- Evaluate sources of information;
- Communicate and present information effectively in electronic formats;
- Describe and explain the issues of legality and ethics in searching, sharing and using information;

 Describe the major trends in and social impacts of information technology (Wong & Cheung, 2011, p. 59).

Though IL has been incorporated into the course, it focuses on IT tools in information searching and electronic means for communicating the information.

To achieve the educational goals of the 334 education reform for lifelong learning in Hong Kong, IL education with the essential components described above should be incorporated into the university curricula more extensively. As indicated earlier, the most effective "across the curriculum approach" should be promoted, and deep collaboration between faculty members and librarians should be facilitated by the university management to implement such approach.

Chapter Six

CONCLUSION

At the turn of the millennium, the Education Commission (2000) of Hong Kong made "Learning for Life, Learning through Life" the aim of education for the 21st Century as a response to the development of a knowledge-based society and the challenge of globalization. To accommodate the need for lifelong learning, the university curriculum should be updated and revised. While universities around the world have put great effort to integrate information literacy into their curricula, universities in Hong Kong should also review their curricula in the light of this global trend. To provide information literacy learning experiences to students, understanding the educational needs of IL among undergraduate freshmen in Hong Kong is an important step.

The current study reveals that the undergraduate freshmen of Hong Kong had a lower IL competency than their US counterparts, even though they had one more year in secondary school. They were weaker in using a variety of scholarly information sources and search tools, and had problems in developing and refining search strategies for complex research topics. Compared to the US students, they also lacked the awareness and capability to evaluate information and to acknowledge the sources of information. Moreover, they had a tendency of heavy reliance on quick web information for their research tasks. Their inadequate competency in using scholarly search tools for more authoritative and reliable information sources prevented them from using these valuable resources for

complex research. Undergraduate freshmen in Hong Kong were only comparable to their US counterparts in accessing information and had slightly better IT skills in using Boolean logic and truncation.

Though having lower IL competency than the US students, Hong Kong students paced their academic assignments better and tried to work well ahead of the assignment due dates. Also, they enjoyed the use of information more than their US counterparts. They used information more extensively in their everyday life than in school and they enjoyed the information processes in these contexts. In contrast to the US students who mainly used scholarly information for academic work in a "constraint" way and used information much more freely in everyday life setting (Gross & Latham, 2010), Hong Kong students did not demonstrate such differences. Rather, they tried to transfer some sorts of IL skills that they learned by themselves in everyday life use to work on their school assignments which were not demanding in terms of IL.

Ninety-six percent of the undergraduate freshmen in Hong Kong found IL important to lifelong learning. Though they did not perceive IL as crucial in school, they all considered it important for their coming university study. Their perceptions of the critical factors for acquiring IL also coincide with many of Bruce's (1997a) IL conceptions, well known as *The Seven Faces of Information Literacy*.

Hong Kong undergraduate freshmen's inadequate IL competency and their strong preference for using non-authoritative and incomprehensive web information are closely related to their limited IL learning experiences and guidance in school. According to the students, both the subject teachers and

teacher-librarians did not provide any in-depth IL guidance and learning experiences to them. The IT teachers mainly taught them basic IT skills and at most search tips in using Internet search engines such as Boolean logic and truncation. In their school years, no one taught them the characteristics of various information sources, when and how to use them for different information use settings, concepts in refining information search strategies, the importance of reflection in the refinement process, and the necessity in observing the intellectual properties of others, intellectual freedom and the right to access information. Students perceived that their school projects were assessed mainly by their presentation skills, but not IL. They only used Yahoo, Google and Wikipedia to search for free web information and copied some words here and there to form the bullet points of their PowerPoint slides. No formal acknowledgement of the information sources was expected. Since students in Hong Kong were only provided with these school learning experiences which were not conducive to facilitating IL, it is not surprising to find them having a lower IL competency than the US students.

In view of the findings of the current study, university freshmen urgently need constructive information literacy learning experiences to facilitate them to abandon the problematic habit of using brief and incomprehensive web information, and to use scholarly information effectively for in-depth research instead. To "transform the information society of today into the learning society of tomorrow" (Bruce, 2004, p.1), IL education should be promoted in both school and higher education sectors in Hong Kong. The following measures will facilitate and support its implementation:

- 1. Distinguish IL from IT in education.
- Establish close teacher and librarian collaboration to facilitate IL among students.
- Provide IL programmes that facilitate students in experiencing information literacy, reflecting on the experience, and applying the experience to novel contexts.
- 4. Embrace the educational value that takes on a change from a content orientation to a process orientation to teaching, from a teacher-centered to a learner-centered view of learning, and an increased emphasis on understanding the perceptions of students and the pedagogical implications.
- 5. Align assessment to information literacy learning outcomes.
- 6. Strengthen capacity building, focusing on improving IL instruction.
 Facilitate both the teachers and librarians to understand the characteristics of IL, the importance of IL to students' development, the significance of learner-centered and process approach to teaching, and know how to incorporate IL into students' learning experiences innovatively.
- 7. Provide adequate information resources to the students.
- 8. Conduct ongoing research on the educational needs of IL among students.

6.1 Concluding Remarks

Information literacy is considered an indispensible element for life in the 21st Century, both worldwide and by the Hong Kong SAR Government. As such, the low IL competency of Hong Kong undergraduate freshmen found in the current study is disturbing. The findings are a great contrast to the image of Hong Kong being very successful in its education. In the website of the Education Bureau, the superior performance of Hong Kong school students in TIMSS and PISA is cited as evidence of success of education in Hong Kong (EDB, 2008b). Yet the current study shows that beneath this apparent success, Hong Kong students are actually rather weak in the more essential skill for the 21st Century - information literacy. This may be due to an over-emphasis of the curriculum content in Hong Kong. As pointed out in this dissertation, there is a stress in the Hong Kong classroom on public examinations and a content orientation to teaching. The test-driven culture produces students who are good in tackling paper and pencil work which can be sharpened through repeated practice, but the findings of the current study show that this may have been achieved at the expense of developing meta-cognitive skills such as IL. Test-oriented skills may facilitate students to do well in paper and pencil tasks tested in TIMSS and PISA. But when it comes to meta-cognitive IL skills, the current study shows that Hong Kong students are grossly inadequate when compared to their US counterparts. An inadequate preparation in IL among students graduate from secondary schools hampers their university study, as well as their lifelong development.

Though the Hong Kong SAR Government sets the target of education reform as "Learning for Life, Learning through Life", no effective measure in implementing IL education is evident. Billions of Hong Kong dollars have been essentially spent on upgrading the ICT infrastructure and equipping teachers with basic IT skills in using common computer software. Teachers and librarians have not, however, had adequate professional development in enhancing their understanding of IL and improving their IL pedagogy. If the Hong Kong SAR Government still holds the problematic idea of perceiving IL as part of IT skills, students will continually be deprived of the opportunity of enhancing their IL in school. They may be proficient in IT skills, but as pointed out in the discussions above, IT skills are just one component contributing to IL. IT skills are necessary but definitely not sufficient for preparing our students for the information rich world they will be facing in the future. Developing IL among students will only remain as an implementation plan on paper.

In his Presidential Proclamation for the National Information Literacy

Awareness Month in October 2009, President Obama of the US posited:

Every day, we are inundated with vast amounts of information. ... Rather than merely possessing data, we must also learn the skills necessary to acquire, collate, and evaluate information for any situation. ... National Information Literacy Awareness Month highlights the need for all Americans to be adept in the skills necessary to effectively navigate the Information Age. Though we may know how to find the information we need, we must also know how to evaluate it. ... Our Nation's educators and institutions of

learning must be aware of - and adjust to - these new realities. In addition to the basic skills of reading, writing, and arithmetic, it is equally important that our students are given the tools required to take advantage of the information available to them. This month, we dedicate ourselves to increasing information literacy awareness so that all citizens understand its vital importance. An informed and educated citizenry is essential to the functioning of our modern democratic society, and I encourage educational and community institutions across the country to help Americans find and evaluate the information they seek, in all its forms.

Hopefully, in Hong Kong, the Government will also see the vital importance of information literacy and urge all educational establishments to equip students with the skills in searching for and evaluating information that they need, in all different forms. Also, effective measures should be put in place to institutionalize IL into the curricula of both schools and universities. Developing students' IL must begin in school, but should not end there. Leaving it to university education will be too late. Only 19.2 percent of our students study in tertiary education institutions (University Grants Committee, 2011), but IL is the need of every citizen. All Hong Kong young people should have the right to have IL education to ensure an equal opportunity in using information effectively to cope with the development of a knowledge-based society and the challenge of globalization in the 21st Century.

6.2 Suggestions for Further Research

Based on the findings of the current study, the following aspects may require further research:

- Liberal Studies, a new compulsory subject of the New Senior Secondary (NSS)
 curriculum, adopts an issue-enquiry approach and requires each student to
 conduct an "Independent Enquiry Study" (IES). According to the Liberal
 Studies: Curriculum and Assessment Guide (Curriculum Development Council
 and Hong Kong Examinations and Assessment Authority, 2007), the learning
 experiences in IES should help students to:
 - set goals, plan, implement the plans and solve problems;
 - reflect on and evaluate their learning progress;
 - collect data, evidence and information through means appropriate to their enquiry;
 - analyse and evaluate information in order to construct knowledge,
 propose solutions to real issues, and make decisions;
 - appreciate the complexities and cross-disciplinary nature of real issues,
 and identify the various perspectives applicable to the understanding of these issues;
 - communicate, articulate and present their thoughts and ideas effectively through appropriate means and media; and
 - become motivated and responsible learners (p.57).

Since the learning outcomes of IES coincide substantially with those of IL, learning experiences of Liberal Studies may help to develop students' IL.

Repeating the current study in Fall 2012 can throw light on the effectiveness of Liberal Studies in promoting IL among students. The current study which was conducted in Fall 2010 examining IL among university freshmen can act as a baseline of students' IL before the commencement of Liberal Studies of the NSS in September 2009. The whole study can be repeated in Fall 2012 again to examine the IL among university freshmen to investigate the impact of Liberal Studies on students' IL.

- The current study investigated university freshmen's IL and examined the impact of their past learning experiences in school on their IL competency and perceptions. To investigate the impact of university learning experiences on the students' IL, differences in the three dimensions of IL (competency, perceptions and experiences) throughout the university study should be examined. Survey of the current study can be used as a pre-test for university freshmen and as a post -test for the same batch of students in the final year of their undergraduate study, similar to the implementation of the Research Practices Survey (RPS) in the US NITLE institutions.
- 3. With limited resources, the current study has researched the IL of the freshmen of one university in Hong Kong only. To have a full picture of the scene in Hong Kong, the current study can be adapted as a benchmarking surveying tool for assessing IL across all higher education institutions in Hong Kong, as in the case of the implementation of RPS across 39 liberal arts institutions in the US. Such a benchmarking exercise can also motivate

individual universities to implement concrete strategies for boosting up their students' IL.

4. The current study investigated the IL educational needs of university undergraduate freshmen. It can be adapted to study the IL educational needs of senior secondary school students in Hong Kong. Student participants from different schools can be recruited to examine the impact of student background on their IL educational needs.

APPENDICES

Appendix A

Information Literacy Competency Standards for Higher Education: Standards, Performance Indicators, and Outcomes

Standard One

The information literate student determines the nature and extent of the information needed.

Performance Indicators:

- 1. The information literate student defines and articulates the need for information.

 Outcomes Include:
- a. Confers with instructors and participates in class discussions, peer workgroups, and electronic discussions to identify a research topic, or other information need
- b. Develops a thesis statement and formulates questions based on the information need
- c. Explores general information sources to increase familiarity with the topic
- d. Defines or modifies the information need to achieve a manageable focus
- e. Identifies key concepts and terms that describe the information need
- f. Recognizes that existing information can be combined with original thought, experimentation, and/or analysis to produce new information
- 2. The information literate student identifies a variety of types and formats of potential sources for information.

- a. Knows how information is formally and informally produced, organized, and disseminated
- b. Recognizes that knowledge can be organized into disciplines that influence the way information is accessed

- c. Identifies the value and differences of potential resources in a variety of formats (e.g., multimedia, database, website, data set, audio/visual, book)
- d. Identifies the purpose and audience of potential resources (e.g., popular vs. scholarly, current vs. historical)
- e. Differentiates between primary and secondary sources, recognizing how their use and importance vary with each discipline
- f. Realizes that information may need to be constructed with raw data from primary sources
- 3. The information literate student considers the costs and benefits of acquiring the needed information.

Outcomes Include:

- a. Determines the availability of needed information and makes decisions on broadening the information seeking process beyond local resources (e.g., interlibrary loan; using resources at other locations; obtaining images, videos, text, or sound)
- b. Considers the feasibility of acquiring a new language or skill (e.g., foreign or discipline-based) in order to gather needed information and to understand its context
- c. Defines a realistic overall plan and timeline to acquire the needed information
- 4. The information literate student reevaluates the nature and extent of the information need.

Outcomes Include:

- a. Reviews the initial information need to clarify, revise, or refine the question
- b. Describes criteria used to make information decisions and choices

Standard Two

The information literate student accesses needed information effectively and efficiently.

Performance Indicators:

- 1. The information literate student selects the most appropriate investigative methods or information retrieval systems for accessing the needed information. Outcomes include:
- a. Identifies appropriate investigative methods (e.g., laboratory experiment, simulation, fieldwork)
- b. Investigates benefits and applicability of various investigative methods
- c. Investigates the scope, content, and organization of information retrieval systems
- d. Selects efficient and effective approaches for accessing the information needed from the investigative method or information retrieval system
- 2. The information literate student constructs and implements effectively designed search strategies.

Outcomes Include:

- Develops a research plan appropriate to the investigative method
- b. Identifies keywords, synonyms and related terms for the information needed
- c. Selects controlled vocabulary specific to the discipline or information retrieval source d. Constructs a search strategy using appropriate commands for the information retrieval system selected (e.g., Boolean operators, truncation, and proximity for search engines; internal organizers such as indexes for books)
- e. Implements the search strategy in various information retrieval systems using different user interfaces and search engines, with different command languages, protocols, and search parameters
- f. Implements the search using investigative protocols appropriate to the discipline
- The information literate student retrieves information online or in person using a variety of methods.

Outcomes Include:

a. Uses various search systems to retrieve information in a variety of formats

- b. Uses various classification schemes and other systems (e.g., call number systems or indexes) to locate information resources within the library or to identify specific sites for physical exploration
- c. Uses specialized online or in person services available at the institution to retrieve information needed (e.g., interlibrary loan/document delivery, professional associations, institutional research offices, community resources, experts and practitioners)
- d. Uses surveys, letters, interviews, and other forms of inquiry to retrieve primary information
- 4. The information literate student refines the search strategy if necessary.
 Outcomes Include:
- a. Assesses the quantity, quality, and relevance of the search results to determine whether alternative information retrieval systems or investigative methods should be utilized
- b. Identifies gaps in the information retrieved and determines if the search strategy should be revised
- c. Repeats the search using the revised strategy as necessary
- 5. The information literate student extracts, records, and manages the information and its sources.

- a. Selects among various technologies the most appropriate one for the task of extracting the needed information (e.g., copy/paste software functions, photocopier, scanner, audio/visual equipment, or exploratory instruments)
- b. Creates a system for organizing the information
- c. Differentiates between the types of sources cited and understands the elements
 and correct syntax of a citation for a wide range of resources
- d. Records all pertinent citation information for future reference
- e. Uses various technologies to manage the information selected and organized

Standard Three

The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.

Performance Indicators:

 The information literate student summarizes the main ideas to be extracted from the information gathered.

Outcomes Include:

- a. Reads the text and selects main ideas
- b. Restates textual concepts in his/her own words and selects data accurately
- c. Identifies verbatim material that can be then appropriately quoted
- The information literate student articulates and applies initial criteria for evaluating both the information and its sources.

Outcomes Include:

- a. Examines and compares information from various sources in order to evaluate reliability, validity, accuracy, authority, timeliness, and point of view or bias
- b. Analyzes the structure and logic of supporting arguments or methods
- c. Recognizes prejudice, deception, or manipulation
- d. Recognizes the cultural, physical, or other context within which the information was created and understands the impact of context on interpreting the information
- The information literate student synthesizes main ideas to construct new concepts.

- a. Recognizes interrelationships among concepts and combines them into potentially useful primary statements with supporting evidence
- b. Extends initial synthesis, when possible, at a higher level of abstraction to construct new hypotheses that may require additional information

- c. Utilizes computer and other technologies (e.g. spreadsheets, databases, multimedia, and audio or visual equipment) for studying the interaction of ideas and other phenomena
- 4. The information literate student compares new knowledge with prior knowledge to determine the value added, contradictions, or other unique characteristics of the information.

Outcomes Include:

- a. Determines whether information satisfies the research or other information need
- b. Uses consciously selected criteria to determine whether the information contradicts or verifies information used from other sources
- c. Draws conclusions based upon information gathered
- d. Tests theories with discipline-appropriate techniques (e.g., simulators, experiments)
- e. Determines probable accuracy by questioning the source of the data, the limitations of the information gathering tools or strategies, and the reasonableness of the conclusions
- f. Integrates new information with previous information or knowledge
- g. Selects information that provides evidence for the topic
- 5. The information literate student determines whether the new knowledge has an impact on the individual's value system and takes steps to reconcile differences.

 Outcomes Include:
- a. Investigates differing viewpoints encountered in the literature
- b. Determines whether to incorporate or reject viewpoints encountered
- 6. The information literate student validates understanding and interpretation of the information through discourse with other individuals, subject-area experts, and/or practitioners.

Outcomes Include:

a. Participates in classroom and other discussions

- b. Participates in class-sponsored electronic communication forums designed to encourage discourse on the topic (e.g., e-mail, bulletin boards, chat rooms)
- c. Seeks expert opinion through a variety of mechanisms (e.g., interviews, e-mail, listservs)
- 7. The information literate student determines whether the initial query should be revised.

Outcomes Include:

- a. Determines if original information need has been satisfied or if additional information is needed
- b. Reviews search strategy and incorporates additional concepts as necessary
- c. Reviews information retrieval sources used and expands to include others as needed

Standard Four

The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

Performance Indicators:

1. The information literate student applies new and prior information to the planning and creation of a particular product or performance.

- a. Organizes the content in a manner that supports the purposes and format of the product or performance (e.g. outlines, drafts, storyboards)
- b. Articulates knowledge and skills transferred from prior experiences to planning and creating the product or performance
- c. Integrates the new and prior information, including quotations and paraphrasings,
 in a manner that supports the purposes of the product or performance
- d. Manipulates digital text, images, and data, as needed, transferring them from their original locations and formats to a new context

The information literate student revises the development process for the product or performance.

Outcomes Include:

- a. Maintains a journal or log of activities related to the information seeking,
 evaluating, and communicating process
- b. Reflects on past successes, failures, and alternative strategies
- 3. The information literate student communicates the product or performance effectively to others.

Outcomes Include:

- a. Chooses a communication medium and format that best supports the purposes of the product or performance and the intended audience
- b. Uses a range of information technology applications in creating the product or performance
- c. Incorporates principles of design and communication
- d. Communicates clearly and with a style that supports the purposes of the intended audience

Standard Five

The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Performance Indicators:

 The information literate student understands many of the ethical, legal and socio-economic issues surrounding information and information technology.

- a. Identifies and discusses issues related to privacy and security in both the print and electronic environments
- b. Identifies and discusses issues related to free vs. fee-based access to information
- c. Identifies and discusses issues related to censorship and freedom of speech

- d. Demonstrates an understanding of intellectual property, copyright, and fair use of copyrighted material
- 2. The information literate student follows laws, regulations, institutional policies, and etiquette related to the access and use of information resources.

Outcomes Include:

- a. Participates in electronic discussions following accepted practices (e.g. "Netiquette")
- b. Uses approved passwords and other forms of ID for access to information resources
- c. Complies with institutional policies on access to information resources
- d. Preserves the integrity of information resources, equipment, systems and facilities
- e. Legally obtains, stores, and disseminates text, data, images, or sounds
- f. Demonstrates an understanding of what constitutes plagiarism and does not represent work attributable to others as his/her own
- g. Demonstrates an understanding of institutional policies related to human subjects research
- 3. The information literate student acknowledges the use of information sources in communicating the product or performance.

- a. Selects an appropriate documentation style and uses it consistently to cite sources
- b. Posts permission granted notices, as needed, for copyrighted material

Appendix B

Survey Invitation Email Message

Please kindly spend around 10-15 minutes to fill in the Survey on Use of Information at [the URL of this survey at the e-survey server of University X].

This survey explores the experiences, perceptions and proficiency of university freshmen in the use of information. Its purposes are to (1) study students' educational needs in effective use of information, (2) use these findings to improve the ways we help students develop the capabilities to use information effectively.

Your participation is completely voluntary and all of your responses will be kept strictly confidential. At the end of September 2010, three respondents to this survey will be picked randomly to receive a book coupon of HK\$200 each, as a token of appreciation. Please fill in your email address at the end of the survey to participate in the lucky draw.

Thank you very much for your time and cooperation!

Appendix C

SURVEY ON USE OF INFORMATION

Your Experiences about Use of Information

For most of the questions below, you will be asked to select the response that BEST represents your experiences or opinions. A few questions will ask you to "check as many as apply."

1.1 How often in the past academic year did you use resources from each of the following kinds of libraries (whether in person or on the Internet) for course assignments, research projects, or other academic purposes?

	Once a week or more	Once or twice a month	A few times a year	Never
1. Public or community library	0	0	0	0
2. School library	0	0	0	0
3. University library	0	0	0	0

- 1.2 People use libraries for many reasons. In the past academic year, which of the following was your MOST FREQUENT reason for using a library?
- O Recreation or other non-academic purposes (leisure reading, checking out music or videos, checking e-mail, etc.)
- O Conducting research for course assignments or projects
- O Doing other academic work (studying, doing homework, etc.)
- O Other
- O I did not use a library in the past two academic years

1.3	In the past academic year, did an instructor or librarian talk with one or more of
your	classes about how to use library resources, including free Internet resources?
O Yes	

O No

- 0 110
- 1.4 How often did you need to gather information for school assignments or research projects in the past academic year?
- O Daily
- O Weekly
- O Monthly
- O Less than monthly
- O Not at all

2.1 How many assignments, papers, or research projects have you completed in the past academic year that required you to include at least three information sources in a reference list?
O Five or more
O Three or four
O One or two
O None
2.2 Which of the following PRINT sources have you used in the past academic year? Check as many as apply.
□ Library books
□ Encyclopedias, yearbooks, ddictionaries, etc.
□ Acemic or rsearchjournals
□ Newspapers or magazines for the general public
□ Other
□ I did not use any print sources for research in the past academic year
2.3 Which of the following ONLINE sources have you used in the past academic year? Check as many as apply.
□ Google, Yahoo Search or other general Internet search engines
□ Online journals, magazines, newspapers or encyclopedias
□ Online library catalogue
☐ Online booksellers (such as Amazon.com, BarnesandNoblecom, etc.)
☐ Online indexes or databases (such as OmniFile Full Text Mega, WiseNews, etc.)
□ Google Scholar
□Other
☐ I did not use any online sources for research in the past academic year
2.4 Which of the following have you used in the past academic year to organize or manage the information you gathered for your assignment or research projects? Check as many as apply.
□ Paper folders, files, or note cards
□ Computer folders or files (My Documents, Microsoft Word iles, etc.)
□ Online tools (bookmarks, blogs, MySpace, etc.)
□ E-mail
☐ Bibliographic management software (Endnote, RefWorks, ProCite, etc.)
□ Other

O Almost always					
O Often					
O Sometimes					
O Rarely					
O Never / Not applicable					
3.2 In the past two academic years, when how often did you seek help or advice from	-		_		signments,
	Almost always	Often	Some times	Rarely	Never / Not applicable
1. Teachers	0	0	0	0	0
2. Librarians	0	0	0	0	0
3. Parents or other adult family members	0	0	0	0	0
4. Friends, classmates, or siblings	0	0	0	0	0
Tutorial schools / classes or help groups	0	0	o	0	0
Help screens, online tutorials, or other electronic resources	0	0	0	0	0
3.3 Over the course of the past academic year, how often did you talk with a librarian					
about a research project you were doing? O Five or more times					
O Three or four times					
O Once or twice					
O Never					
3.4 Which of the following best describe assignment?	s the way	you pa	ce your	work on	a research
O I do most of the work soon after an assig	nment is g	iven.			
O I divide the work pretty equally across the	e available	time.			
O I do a little work soon after the assignme	nt is given	, but do	most o	f it towar	d the end.
O I do all of the work just before or on the	due date.				

3.1 In the past two academic years, when you were given research project

assignments, how often were you required to use a specific format (such as APA, MLA, Chicago, or some other style) to cite the information sources in your reference list?

Your Attitudes and Beliefs about Use of Information

Descriptions of the scales for the three questions below:

- Very easy ("I can usually do this easily without assistance from a teacher, librarian, or peer tutor")
- Somewhat easy ("I can usually do this with some initial assistance")
- Somewhat difficult ("I need a fair amount of help to do this, but I can manage")
- Very difficult ("This is hard for me even when I've received help")
- No experience ("I have not had any assignments requiring this kind of activity")

4.1 How challenging are different components of effective use of information for you? Please rate the difficulty of each of the following activities in your experience as a researcher.

	Very easy	Somewhat easy	Somewhat difficult	Very difficult	No experience
1. Narrowing your topic	0	0	0	0	0
Developing a list of information sources to investigate	0	0	0	0	O
 Revising your strategy in searching information as necessary 	0	0	0	0	0
Developing your main argument or research statement	0	0	0	0	o
5. Writing the paper	0	0	0	0	0
Documenting and citing your information sources	0	0	0	0	О

4.2 How challenging is it for you to IDENTIFY and RETRIEVE information sources? Please rate the difficulty of each of the following activities:

	Very easy	Somewhat easy	Somewhat difficult	Very difficult	No experience
1. Using a library catalogue	0	0	0	О	0
Using an electronic index (e.g. Academic Search Premier, etc)	0	0	0	0	0
3. Using a print index	0	0	О	0	0
Using an Internet search engine	o	o	0	Ó	o
5. Physically locating information sources in a	О	0	0	О	0

library						
6. Obtaining materials through inter-library loan	0	0	o	c)	o
4.3 How challenging is it for you difficulty of each of the following			ation sou	rces? Plea	ise rate	the
	Very easy	Somewhat easy	Somew diffici		ery ficult	No experience
Determining whether an information source is appropriate for an academic project	O	0	0	ı	0	0
2. Deciding what information from your sources to integrate into your project	e O	0	0	ı	0	o
3. Knowing WHEN to document source	a O	0	0	(0	0
4. Knowing HOW to document a source	0	0	0	ı	0	o
5.1 In general, how much doO Very muchO Quite a bitO SomeO Very little	you enjo	/ gathering	informati	ion for res	search?	•
5.2 People have different believentent of your agreement or disastatements:						te the
			Strongly Agree	Agree Di	sagree	Strongly Disagree
Skillful users of information kn way to approach research que		est	0	0	0	0
A course on access, evaluation information would be useful.	and use	of	0	0	0	0
When two researchers disagree, one of them must be wrong.		them	0	0	0	0

 Free Internet resources can provide all information needed for research projects and assignments. 	0	0	O	0
5. Good research yields clear results; poor research yields ambiguous and not clearly defined results.	0	O	О	0
6. Ability to access, evaluate and use of information is important to life-long learning.	0	0	0	0

Your Familiarity with Concepts and Strategies in Use of Information

In the following portion of this survey, some of the terms and concepts may be familiar to you, but others may not. Please respond as accurately as you can, and feel free to use the "don't know" response wherever appropriate.

6.1 Which of the fo	ollowing searches	would retrieve	the MOST re	esults in an -	online search?
---------------------	-------------------	----------------	-------------	----------------	----------------

O movies OR films

O movies AND films

O movies NOT films

O movies INSTEAD OF films

O Don't know

6.2 Which of the following is the correct way to TRUNCATE a search word?

O Typing in only the first syllable of the word as a keyword

O Combining search words with "and," "or," or "not"

O Using the * or ! symbol in place of the last few letters of the word

O None of the above

O Don't know

6.3 You retrieve the following information from a library catalog search:

Gothic modernisms / edited by Andrew Smith and Jeff Wallace. New York, N.Y.: Palgrave, 2001.

BOOK COLLECTION

PR888.M63 G67 2001

AVAILABLE

xii, 232 p.; 23 cm.

Includes bibliographical references and index.
English fiction -- 20th century -- History and criticism.

Modernism (Literature) -- Great Britain.

Modernism (Literature) -- United States.

Gothic revival (Literature)

Smith, Andrew, 1964-

Wallace, Jeff, 1958-

Which of the following would be the MOST efficient way to find a comprehensive listing of other books in the catalog of this topic?

- O Identifying other books written by the same authors
- O Examining the bibliography in the book
- O Scanning the shelves where the book is located to see what books are nearby
- O Searching again using the subject headings that most closely match your research topic
- O Don't know

7.1 Researchers must distinguish between academic journals and popular magazines. Which of the following statements is LEAST ACCURATE?

O Academic journal articles provide objective facts; popular magazine articles do not.

- O Articles in academic journals usually include a list of references to other scholarly works; articles in popular magazines usually do not.
- O The intended audience for academic journals is mainly other scholars; the intended audience for popular magazines is the general public.

Authors and editors for academic journals are usually employed in higher education; ithors and editors for popular magazines are usually employed by the for-profit media. O Don't know

7.2 You find the following entry in the References section of a recent article:

Erisman, H.M. (2002). The Cuban Revolution's evolving identity. Latin American Politics and Society 44(1), 145-153.

In what issue of "Latin American Politics and Society" will you find this article?

- O Volume 2002, Number 44
- O Volume 44, Number 1
- O Volume 1, Number 145-153
- O The issue cannot be determined

7.3 For each of the following, indicate whether the item is an entire book, a journal article, or a portion of a book.

	Entire book	Journal article	Portion of a book	Don't know
1. Jorgenson, Lars W. "Reinterpreting Navajo Rites," Navajo Culture 6(1946): 469-78.	0	О	0	0
 Allem, Glover Morrill. Bats. Cambridge: Harvard University Press, 1939. 	0	o	o	0
3. Tanaka, Kazuko, "The New Feminist Movement in Japan, 1970-1990." In Japanese Women, edited by Kumiko	0	o	0	0

Fujimura-Fanselow. New York: Feminist Press, 1995.

8.1 Researchers must distinguish between primary and secondary sources. Which of the following statements is MOST ACCURATE?

- O Primary sources are more scholarly than secondary sources.
- O Primary sources are old; secondary sources are new.
- O Primary sources examine subjects first-hand; secondary sources examine the findings of other scholars.
- O Primary sources are more appropriate for academic projects than are secondary sources.
- O All of the above are equally accurate.
- O Don't know

8.2 Which of the following is likely to result in the most comprehensive list of relevant scholarly articles for a research project?

- O Searching an electronic index or database in a specific academic field (History, Biology, Music, etc.)
- O Using a general Internet search like Google or Yahoo
- O Paging through print volumes of an academic journal in a specific academic field
- O Searching the library catalog
- O All of the above are equally effective
- O Don't know

8.3 A peer-reviewed or refereed journal is BEST described as:

- O A journal that publishes reviews of other articles
- O A journal that publishes articles that have been approved by other scholars
- O A journal that includes only articles written collaboratively by peers
- O A journal that includes references for each article it publishes
- O Don't know

9.1 In a scholarly article or research paper, a CITATION is:

- O A direct quotation from someone else's written work
- O Source information for any ideas or text from someone else's written work
- O The physical location of a source (book, journal, etc.)
- O All of the above
- O Don't know

9.2 A citation is NOT required when:

O You are paraphrasing, rather than quoting, a source

- O More than one source says the same thing
- O You are describing your own findings or analysis
- O All of the above
- O Don't know
- 9.3 Among the challenges of research is determining whether a source is scholarly. Below is a list of source characteristics. For each characteristic, if this were the only information you had about a source, what conclusion would you draw about whether the source is likely to be scholarly? If a source...

	Scholarly N	on-scholarly	Cannot be determined	Don't know
1. Is available online	0	0	0	0
2. Is translated from another language	0	0	0	0
Is published in a peer-reviewed journal	0	0	0	0
4. Is posted on a political blog	0	0	0	0
5. Was recently published	0	0	0	0
6. Has a lengthy list of references	0	0	0	0
7. Was published by a university press	0	0	0	0
8. Was published in "Time" or "Newsweek"	0	O	0	O

10.1 You are required to write a research paper for your American History class examining the roles of women in the American Civil War. An initial search turns up the following sources. Which one is LEAST likely to be appropriate for your paper?

O Whites, L. & Long, A. P. (2009). Occupied women: Gender, military occupation, and the American Civil War. Baton Rouge: Louisiana State University Press.

O Heidler, D. S., & Heidler, J. T. (Eds.). (2000). Encyclopedia of the American Civil War: A political, social and military history (Vols. 1-5). Santa Barbara, CA: ABC-CLIO.

O Schultz, J. E. (2002). Seldom thanked, never praised, and scarcely recognized: Gender and racism in Civil War hospitals. Civil War History 48, 220-236.

O Wilson, B. A. (2006). Women in the Civil War. Retrieved July 1, 2006, from http://userpages.aug.com/captbarb/femvets2.html

10.2 On what basis did you select your response to the above question?

- O Whether the source is likely to be scholarly
- O How recently the source was published
- O Whether the source was a print or Internet source

- O The number of pages with information about this topic
- O All of the above equally influenced my response to the preceding question

10.3 Suppose you have more relevant sources than you can use in a short research assignment. Which of the following is the BEST way to determine whether to use a particular source?

- O Whether the source is a print or Internet source
- O How recently the source was published
- O How easily you can get the source
- O Whether the source is scholarly
- O Whether the author is highly respected
- O All of the above are equally valid criteria for choosing among sources

10.4 For your health class, you are writing a five page paper on the BENEFITS OF AEROBIC EXERCISE. What would be the BEST approach to research on this topic?

- O Get an overview about the topic from a commercial Web site, then get recent/more specific information from magazine articles.
- O Get scholarly journal articles for recent/very specific information about the topic.
- O Get an overview of the topic from a current encyclopedia on exercise and health, then get more recent/more specific information from scholarly journal articles.
- O Get an overview of the topic from a health encyclopedia.

10.5 Copyright protection covers works:

- O as long as the author or creator is still alive.
- O only if an explicit copyright notice (Copyright by ...) is displayed.
- O that represent an original idea, in any format (text, music, drawing, video, ...).
- O only if they have been published.

11.1 You want to help your father understand a medical diagnosis. You need to find good information written for the non-expert. Look at the database descriptions below and select the BEST source to search for this information need.

- (1) NEWSBANK NEWSFILE: A comprehensive, full-text news resource consisting of regional, national and international sources. Its regional articles offer a valuable benefit to researchers and students by providing coverage of current issues and events. Updated daily.
- (2) HEALTH REFERENCE CENTER (ACADEMIC): Articles from a variety of consumer oriented and professional health periodicals, plus excerpts from health related reference books. Material includes a medical dictionary; medical directories and reference books; and pamphlets issued by leading health organizations. Updated weekly.
- (3) BIOMEDICAL REFERENCE COLLECTION (BASIC): Provides health professionals access to 100 full-text journals covering such disciplines as clinical medicine, nursing, dentistry,

veterinary medicine, the health care system and the pre-clinical sciences. Updated weekly.

Which of the following would be the most efficient way to find a comprehensive listing of other books in the catalog on this topic?

- O NewsBank NewsFile
- O Health Reference Center (Academic)
- O BioMedical Reference Collections (Basic)
- O All of the above

11.2 You need to research an aspect of the topic ASSESSMENT OF STUDENTS' ACADEMIC PERFORMANCE IN SCHOOLS. Which one of the following would be an appropriate research question?

- O Should school-based assessment replace standardized test?
- O Should all school children receive subsidy for internet access?
- O Should English become the medium of instruction in all schools?
- O Do teacher unions help teachers keep their jobs?

11.3 Which group of keywords best describes the information need for the following assignment: "Prepare a presentation about the gains achieved by women in the 1980s."

- O presentation, women, gains
- O women, gains, achieved
- O women, gains, 1980s
- O gains, achieved, 1980s

11.4 Typically a library's online catalog contains:

- O information about books, videos and other non-print items in the library.
- O the complete text of all journal articles in the library
- O information about courses provided by your institution.
- O all of the above.

11.5 Which of the following usually requires a password because it does not allow free access for all Web users?

- O Library online catalog
- O Databases such as WiseNews
- O Yahoo! Web directories
- O Bookstores' Web sites

Demographic Information

O 3.41-3.90 O 3.91-4.40

12.1 What is your gender?
O Male
O Female
12.2 Which Faculty do you belong to?
O Arts
O Business Administration
O Education
O Engineering
O Law
O Medicine
O Science
O Social Science
12.3 Your student status:
O Undergraduate student
O Postgraduate student
12.4 Your year of study in this institution:
O Year 1
O Year 2
O Year 3
O > Year 3
12.5 What was your grade point average (GPA) formulated as follows for admission to this institution?
 GPA = 1/3 HKCEE score + 2/3 HKALE score, where HKCEE Score = GPA of the best 7 CE subjects including 2 language subjects in a single sitting of HKCEE, and HKALE Score = GPA of AS Use of English + AS Chinese Lang. & Culture + 2AL (or 1AL plus 2AS) subjects in a single sitting or combined sittings of HKALE Grade Point Conversion Scale: A/5* = 5; B/5 = 4; C/4 = 3; D/3 = 2; E/2 = 1; F/U/1 = 0
O < 2.41
O 2.41-2.90
O 2.91-3.40

0 4.41-4.90

0 > 4.90

12.6 Please fill in your email address in the space below for the lucky draw of book coupon (HK\$200 each to 3 respondents to this Survey) as a token of appreciation for filling this Survey.

- 12.7 There will be a follow-up session to this Survey on Use of Information. HK\$100 will be provided to each student recruited for the two-hour follow-up session, as a token of appreciation. Please click the box below to indicate your interest in participating this follow-up session.
 - O I am interested to participate the follow-up session.
 - O I am not interested to participate the follow-up session.

Thank you for your time and cooperation!

Appendix D

Results of Survey on Use of Information

Key: Cum. = Cumulative

YOUR EXPERIENCES ABOUT USE OF INFORMATION

1.1 How often in the past academic year did you use resources from each of the following kinds of libraries (whether in person or on the Internet) for course assignments, research projects, or other academic purposes?

1.1.1 Public or community library

		Freq.	%	Valid %	Cum. %
Valid	Once a week or more	133	21.91	22.20	22.20
	Once or twice a month	261	43.00	43.57	65.78
	A few times a year	169	27.84	28.21	93.99
	Never	36	5.93	6.01	100
	Total	599	98.68	100	
Missing		8	1.32		
Total		607	100		

1.1.2 School library

		Freq.	%	Valid %	Cum. %
Valid	Once a week or more	286	47.12	47.91	47.91
	Once or twice a month	180	29.65	30.15	78.06
	A few times a year	110	18.12	18.43	96.48
	Never	21	3,46	3.52	100
	Total	597	98.35	100	
Missing		10	1.65		
Total		607	100		

1.1.3 University library

		Freq.	%	Valid %	Cum. %
Valid	Once a week or more	257	42.34	43.05	43.05
	Once or twice a month	91	14.99	15.24	58.29
	A few times a year	55	9.06	9.21	67.50
	Never	194	31.96	32.50	100
	Total	597	98.35	100	
Missing		10	1.65		
Total		607	100		

1.2 People use libraries for many reasons. In the past academic year, which of the following was your MOST FREQUENT reason for using a library?

		Freq.	%	Valid %	Cum. %
Valid	Recreation or other non-academic purposes (leisure reading, checking out music or videos, checking e-mail, etc.)	181	29.82	30.07	30.07
	Conducting research for course assignments or projects	121	19.93	20.10	50.17
	Doing other academic work (studying, doing homework, etc.)	277	45.63	46.01	96.18
	Other	15	2.47	2.49	98.67
	I did not use a library in the past two academic years	8	1.32	1.33	100
	Total	602	99.18	100	· <u> </u>
Missing		5	0.82		
Total		607	100		

1.3 In the past academic year, did an instructor or librarian talk with one or more of your classes about how to use library resources, including free Internet resources?

		Freq.	%	Valid %	Cum. %
Valid	Yes	196	32.29	32.56	32.56
	No	406	66.89	67.44	100
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

1.4 How often did you need to gather information for school assignments or research projects in the past academic year?

		Freq.	%	Valid %	Cum. %
Valid	Daily	61	10.05	10.13	10.13
	Weekly	230	37.89	38.21	48.34
	Monthly	157	25.86	26.08	74.42
	Less than monthly	121	19.93	20.10	94.52
	Not at all	33	5.44	5.48	100
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

2.1 How many assignments, papers, or research projects have you completed in the past academic year that required you to include at least three information sources in a reference list?

		Freq.	%	Valid %	Cum. %
Valid	Five or more	91	14.99	15.12	15.12
	Three or four	142	23.39	23.59	38.70
	One or two	221	36.41	36.71	75.42
	None	148	24.38	24.58	100
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

2.2 Which of the following PRINT sources have you used in the past academic year? Check as many as apply.

2.2.1 Library books

		Freq.	%	Valid %	Cum. %
Valid	Not checked	190	31.30	31.30	31.30
	Checked	417	68.70	68.70	100
	Total	607	100	100	

2.2.2 Encyclopedias, yearbooks, dictionaries, etc.

		Freq.	%	Valid %	Cum. %
Valid	Not checked	444	73.15	73.15	73.15
	Checked	163	26.85	26.85	100
	Total	607	100	100	

2.2.3 Academic or research journals

		Freq.	%	Valid %	Cum. %
Valid	Not checked	413	68.04	68.04	68.04
	Checked	194	31.96	31.96	100
	Total	607	100	100	

2.2.4 Newspapers or magazines for the general public

		Freq.	%	Valid %	Cum. %
Valid	Not checked	334	55.02	55.02	55.02
	Checked	273	44.98	44.98	100
	Total	607	100	100	

2.2.5 Other

		Freq.	%	Valid %	Cum. %
Valid	Not checked	552	90.94	90.94	90.94
	Checked	55	9.06	9.06	100
	Total	607	100	100	

2.2.6 I did not use any print sources for research

		Freq.	%	Valid %	Cum. %
Valid	Not checked	541	89,13	89.13	89.13
	Checked	66	10.87	10.87	100
	Total	607	100	100	

2.3 Which of the following ONLINE sources have you used in the past academic year? Check as many as apply.

2.3.1 Google, Yahoo Search or other general Internet search engines

		Freq.	%	Valid %	Cum. %
Valid	Not checked	83	13.67	13.67	13.67
	Checked	524	86.33	86.33	100
	Total	607	100	100	

2.3.2 Online journals, magazines, newspapers or encyclopedias

		Freq.	%	Valid %	Cum. %
Valid	Not checked	268	44.15	44.15	44.15
	Checked	339	55,85	55.85	100
	Total	607	100	100	

2.3.3 Online library catalogue

		Freq.	%	Valid %	Cum. %
Valid	Not checked	396	65.24	65.24	65.24
	Checked	211	34.76	34.76	100
	Total	607	100	100	

2.3.4 Online booksellers (such as Amazon.com, BarnesandNoble.com, etc.)

		Freq.	%	Valid %	Cum. %
Valid	Not checked	523	86.16	86.16	86.16
}	Checked	84	13.84	13.84	100
	Total	607	100	100	

2.3.5 Online indexes or databases (such as OmniFile Full Text Mega, WiseNews, etc.)

		Freq.	%	Valid %	Cum. %
Valid	Not checked	495	81.55	81.55	81.55
	Checked	112	18.45	18.45	100
	Total	607	100	100	

2.3.6 Google Scholar

		Freq.	%	Valid %	Cum. %
Valid	Not checked	532	87.64	87.64	87.64
	Checked	75	12.36	12.36	100
	Total	607	100	100	

2.3.7 Other

		Freq.	%	Valid %	Cum. %
Valid	Not checked	559	92.09	92.09	92.09
	Checked	48	7.91	7.91	100
	Total	607	100	100	

2.3.8 I did not use any online sources for research

		Freq.	%	Valid %	Cum. %
Valid	Not checked	586	96.54	96.54	96.54
	Checked	21	3.46	3.46	100
1	Total	607	100	100	

2.4 Which of the following have you used in the past academic year to organize or manage the information you gathered for your assignment or research projects? Check as many as apply.

2.4.1 Paper folders, files, or note cards

		Freq.	%	Valid %	Cum. %
Valid	Not checked	165	27.18	27.18	27.18
	Checked	442	72.82	72.82	100
	Total	607	100	100	

2.4.2 Computer folders or files (My Documents, Microsoft Word files, etc.)

		Freq.	%	Valid %	Cum. %
Valid	Not checked	156	25.70	25.70	25.70
	Checked	451	74.30	74.30	100
	Total	607	100	100	

2.4.3 Online tools (bookmarks, blogs, MySpace, etc.)

		Freq.	%	Valid %	Cum. %
Valid	Not checked	439	72.32	72.32	72.32
	Checked	168	27.68	27.68	100
	Total	607	100	100	

2.4.4 E-mail

		Freq.	%	Valid %	Cum. %
Valid	Not checked	255	42.01	42.01	42.01
	Checked	352	57.99	57.99	100
	Total	607	100	100	

2.4.5 Bibliographic management software (Endnote, RefWorks, ProCite, etc.)

		Freq.	%	Valid %	Cum. %
Valid	Not checked	584	96.21	96.21	96.21
	Checked	23	3.79	3.79	100
,	Total	607	100	100	

2.4.6 Other

		Freq.	%	Valid %	Cum. %
Valid	Not checked	568	93.57	93.57	93.57
}	Checked	39	6.43	6.43	100
	Total	607	100	100	

2.4.7 I did not use any tools for organizing or managing research information

		Freq.	%	Valid %	Cum. %
Valid	Not checked	588	96.87	96.87	96.87
	Checked	19	3.13	3.13	100
	Total	607	100	100	

3.1 In the past two academic years, when you were given research project assignments, how often were you required to use a specific format (such as APA, MLA, Chicago, or some other style) to cite the information sources in your reference list?

		Freq.	%	Valid %	Cum. %
Valid	Almost always	58	9.56	9.63	9.63
	Often	70	11.53	11.63	21.26
	Sometimes	106	17.46	17.61	38.87
	Rarely	147	24.22	24.42	63.29
	Never/not applicable	221	36.41	36.71	100
	Total	602	99.18	100	
Missing	System	5	0.82		
Total		607	100		

3.2 In the past two academic years, when you were working on research assignments, how often did you seek help or advice from each of the following?

3.2.1 Teachers

		Freq.	%	Valid %	Cum. %
Valid	Almost always	100	16.47	16.61	16.61
	Often	196	32.29	32.56	49.17
	Sometimes	177	29.16	29.40	78.57
	Rarely	78	12.85	12.96	91.53
	Never/not applicable	51	8.40	8.47	100
	Total	602	99.18	100	
Missing	System	5	0.82		
Total		607	100		

3.2.2 Librarians

		Freq.	%	Valid %	Cum. %
Valid	Almost always	25	4.12	4.19	4.19
	Often	51	8.40	8.54	12.73
	Sometimes	115	18.95	19.26	31.99
	Rarely	210	34.60	35.18	67.17
	Never/not applicable	196	32.29	32.83	100
	Total	597	98.35	100	
Missing	System	10	1.65		
Total		607	100		

3.2.3 Parents or other adult family members

		Freq.	%	Valid %	Cum. %
Valid	Almost always	15	2.47	2.52	2.52
	Often	75	12.36	12.58	15.10
	Sometimes	131	21.58	21.98	37.08
	Rarely	200	32.95	33.56	70.64
	Never/not applicable	175	28.83	29.36	100
	Total	596	98.19	100	
Missing	System	11	1.81		
Total	• "	607	100		

3.2.4 Friends, classmates, or siblings

		Freq.	%	Valid %	Cum. %
Valid	Almost always	150	24.71	24.96	24.96
	Often	244	40.20	40.60	65.56
	Sometimes	136	22.41	22.63	88.19
	Rarely	33	5.44	5.49	93.68
	Never/not applicable	38	6.26	6.32	100
	Total	601	99.01	100	

Missing	System	6	0.99	
Total		607	100	

3.2.5 Tutorial schools / classes or help groups

		Freq.	%	Valid %	Cum. %
Valid	Almost always	28	4.61	4.70	4.70
	Often	130	21.42	21.81	26.51
	Sometimes	160	26.36	26.85	53.36
	Rarely	119	19.60	19.97	73.32
	Never/not applicable	159	26.19	26.68	100
	Total	596	98.19	100	
Missing	System	11	1.81		
Total		607	100		

3.2.6 Help screens, online tutorials, or other electronic resources

		Freq.	%	Valid %	Cum. %
Valid	Almost always	54	8.90	9.08	9.08
	Often	134	22.08	22.52	31.60
	Sometimes	163	26.85	27.39	58.99
	Rarely	118	19.44	19.83	78.82
	Never/not applicable	126	20.76	21.18	100
	Total	595	98.02	100	
Missing	System	12	1.98		
Total		607	100		

3.3 Over the course of the past academic year, how often did you talk with a librarian about a research project you were doing?

		Freq.	% [Valid %	Cum. %
Valid	Five or more times	12	1.98	1.99	1.99
	Three or four times	64	10.54	10.63	12.62
	Once or twice	153	25.21	25.42	38.04
	Never	373	61.45	61.96	100
	Total	602	99.18	100	
Missing	System	5	0.82		
Total		607	100		

3.4 Which of the following best describes the way you pace your work on a research assignment?

		Freq.	%	Valid %	Cum. %
Valid	Do most of the work soon after an assignment is given.	112	18.45	18.60	18.60
	Divide the work pretty equally across the available time.	233	38.39	38.70	57.31
	Do a little work soon after the assignment is given, but do most of it toward the end.	213	35.09	35.38	92.69
	Do all of the work just before or on the due date.	44	7.25	7.31	100
	Total	602	99.18	100	
Missing	System	5	0.82		
Total		607	100	_	

YOUR ATTITUDES AND BELIEFS ABOUT USE OF INFORMATION

Descriptions of the scales for the three questions below:

- Very easy ("I can usually do this easily without assistance from a teacher, librarian, or peer tutor")
- Somewhat easy ("I can usually do this with some initial assistance")
- Somewhat difficult ("I need a fair amount of help to do this, but I can manage")
- Very difficult ("This is hard for me even when I've received help")
- No experience ("I have not had any assignments requiring this kind of activity")

4.1 How challenging are different components of effective use of information for you? Please rate the difficulty of each of the following activities in your experience as a researcher.

4.1.1 Narrowing your topic

		Freq.	%	Valid %	Cum. %
Valid	Very easy	30	4.94	5.02	5.02
	Somewhat easy	283	46.62	47.32	52.34
	Somewhat difficult	213	35.09	35.62	87.96
	Very difficult	29	4.78	4.85	92.81
	No experience	43	7.08	7.19	100
	Total	598	98.52	100	
Missing		9	1.48		
Total		607	100		

4.1.2 Developing a list of information sources to investigate

		Freq.	%	Valid %	Cum. %
Valid	Very easy	37	6.10	6.18	6.18
	Somewhat easy	289	47.61	48.25	54.42
	Somewhat difficult	203	33.44	33.89	88.31
	Very difficult	26	4.28	4.34	92.65
· ·	No experience	44	7.25	7.35	100
	Total	599	98.68	100	
Missing		8	1.32		
Total		607	100		

4.1.3 Revising your strategy in searching information as necessary

		Freq.	%	Valid %	Cum. %
Valid	Very easy	31	5.11	5.17	5.17
	Somewhat easy	254	41.85	42.33	47.50
	Somewhat difficult	227	37.40	37.83	85.33
	Very difficult	40	6.59	6.67	92.00
	No experience	48	7.91	8	100
	Total	600	98.85	100	
Missing		7	1.15		
Total		607	100		

4.1.4 Developing your main argument or research statement

		Freq.	%	Valid %	Cum. %
Valid	Very easy	28	4.61	4.67	4.67
	Somewhat easy	222	36.57	37.06	41.74
	Somewhat difficult	254	41.85	42.40	84.14
	Very difficult	53	8.73	8.85	92.99
	No experience	42	6.92	7.01	100
	Total	599	98.68	100	
Missing	System	8	1.32		
Total		607	100		

4.1.5 Writing the paper

		Freq.	%	Valid %	Cum. %
Valid	Very easy	24	3.95	4.06	4.06
	Somewhat easy	183	30.15	30.96	35.03
	Somewhat difficult	264	43.49	44.67	79.70
	Very difficult	75	12.36	12.69	92.39
	No experience	45	7.41	7.61	100
	Total	591	97.36	100	
Missing	System	16	2.64		
Total		607	100		

4.1.6 Documenting and citing your information sources

		Freq.	%	Valid %	Cum. %
Valid	Very easy	50	8.24	8.38	8.38
	Somewhat easy	245	40.36	41.04	49.41
	Somewhat difficult	216	35.58	36.18	85.59
	Very difficult	36	5.93	6.03	91.62
···	No experience	50	8.24	8.38	100
	Total	597	98.35	100	
Missing	System	10	1.65		
Total		607	100		

4.2 How challenging is it for you to IDENTIFY and RETRIEVE information sources? Please rate the difficulty of each of the following activities:

4.2.1 Using a library catalogue

		Freq.	%	Valid %	Cum. %
Valid	Very easy	75	12.36	12.61	12.61
	Somewhat easy	284	46.79	47.73	60.34
	Somewhat difficult	169	27.84	28.40	88.74
	Very difficult	20	3.29	3.36	92.10
	No experience	47	7.74	7.90	100
	Total	595	98.02	100	
Missing	System	12	1.98		
Total		607	100		

4.2.2 Using an electronic index (e.g. Academic Search Premier, etc)

		Freq.	%	Valid %	Cum. %
Valid	Very easy	47	7.74	7.95	7.95
	Somewhat easy	217	35.75	36.72	44.67
	Somewhat difficult	181	29.82	30.63	75.30
	Very difficult	27	4.45	4.57	79.86
·	No experience	119	19.60	20.14	100
	Total	591	97.36	100	
Missing	System	16	2.64		<u>-</u>
Total		607	100		

4.2.3 Using a print index

		Freq.	%	Valid %	Cum. %
Valid	Very easy	42	6.92	7.09	7.09
	Somewhat easy	238	39.21	40.20	47.30
	Somewhat difficult	196	32.29	33.11	80.41
	Very difficult	22	3.62	3.72	84.12
	No experience	94	15.49	15.88	100
	Total	592	97.53	100	
Missing	System	15	2.47		
Total		607	100		

4.2.4 Using an Internet search engine

		Freq.	%	Valid %	Cum. %
Valid	Very easy	189	31.14	32.03	32.03
	Somewhat easy	291	47.94	49.32	81.36
	Somewhat difficult	74	12.19	12.54	93.90
	Very difficult	18	2.97	3.05	96.95
	No experience	18	2.97	3.05	100
	Total	590	97.20	100	
Missing	System	17	2.80		
Total		607	100		

4.2.5 Physically locating information sources in a library

		Freq.	%	Valid %	Cum. %
Valid	Very easy	58	9.56	9.73	9.73
	Somewhat easy	258	42.50	43.29	53.02
	Somewhat difficult	193	31.80	32.38	85.40
	Very difficult	49	8.07	8.22	93.62
	No experience	38	6.26	6.38	100
	Total	596	98.19	100	
Missing	System	11	1.81		
Total		607	100		

4.2.6 Obtaining materials through inter-library loan

		Freq.	%	Valid %	Cum. %
Valid	Very easy	22	3.62	3.74	3.74
	Somewhat easy	169	27.84	28.69	32.43
	Somewhat difficult	197	32.45	33.45	65.87
	Very difficult	36	5.93	6.11	71.99
	No experience	165	27.18	28.01	100
· · · · · · · · · · · · · · · · · · ·	Total	589	97.03	100	
Missing	System	18	2.97		
Total		607	100		

4.3 How challenging is it for you to use the information sources? Please rate the difficulty of each of the following activities:

4.3.1 Determining whether an information source is appropriate for an academic project

		Freq.	%	Valid %	Cum. %
Valid	Very easy	54	8.90	9.00	9.00
	Somewhat easy	304	50.08	50.67	59.67
	Somewhat difficult	183	30.15	30.50	90.17
	Very difficult	27	4.45	4.50	94.67
	No experience	32	5.27	5.33	100
	Total	600	98.85	100	i
Missing	System	7	1.15		•
Total		607	100		

4.3.2 Deciding what information from your sources to integrate into your project

		Freq.	_ %	Valid %	Cum. %
Valid	Very easy	44	7.25	7.35	7.35
	Somewhat easy	258	42.50	43.07	50.42
	Somewhat difficult	234	38.55	39.07	89.48
	Very difficult	30	4.94	5.01	94.49
	No experience	33	5.44	5.51	100
	Total	599	98.68	100	<u></u>
Missing	System	8	1.32		
Total		607	100		

4.3.3 Knowing WHEN to document a source

		Freq.	%	Valid %	Cum. %
Valid	Very easy	42	6.92	7.01	7.01
	Somewhat easy	251	41.35	41.90	48.91
	Somewhat difficult	217	35.75	36.23	85.14
	Very difficult	31	5.11	5.18	90.32
	No experience	58	9.56	9.68	100
' '	Total	599	98.68	100	
Missing	System	8	1.32		 -
Total		607	100		

4.3.4 Knowing HOW to document a source

		Freq.	%	Valid %	Cum. %
Valid	Very easy	43	7.08	7.18	7.18
	Somewhat easy	219	36.08	36.56	43.74
	Somewhat difficult	241	39.70	40.23	83.97
	Very difficult	32	5.27	5.34	89.32
	No experience	64	10.54	10.68	100
	Total	599	98.68	100	
Missing	System	8	1.32		
Total		607	100		

5.1 In general, how much do you enjoy gathering information for research?

		Freq.	%	Valid %	Cum. %
Valid	Very much	68	11.20	11.31	11.31
	Quite a bit	257	42.34	42.76	54
	Some	188	30.97	31.28	85.36
	Very little	88	14.50	14.64	100
	Total	601	99.01	100	
Missing	System	6	0.99	***	
Total		607	100		

5.2 People have different beliefs about the use of information. Please indicate the extent of your agreement or disagreement with each of the following belief statements:

5.2.1 Skillful users of information know the best way to approach research questions.

		Freq.	%	Valid %	Cum. %
Valid	Strongly agree	170	28.01	28.48	28.48
	Agree	393	64.74	65.83	94.30
	Disagree	33	5.44	5.53	99.83
	Strongly disagree	1	0.16	0.17	100
	Total	597	98.35	100	
Missing	System	10	1.65		
Total		607	100		

5.2.2 A course on access, evaluation and use of information would be useful.

·		Freq.	%	Valid %	Cum. %
Valid	Strongly agree	112	18.45	18.82	18.82
	Agree	410	67.55	68.91	87.73
	Disagree	72	11.86	12.10	99.83
	Strongly disagree	1	0.16	0.17	100
	Total	595	98.02	100	
Missing	System	12	1.98		
Total		607	100		

5.2.3 When two researchers disagree, one of them must be wrong.

• • •		Freq.	%	Valid %	Cum. %
Valid	Strongly agree	26	4.28	4.36	4.36
	Agree	125	20.59	20.94	25.29
	Disagree	294	48.43	49.25	74.54
	Strongly disagree	152	25.04	25.46	100
	Total	597	98.35	100	
Missing	System	10	1.65		
Total	<u> </u>	607	100		

5.2.4 Free Internet resources can provide all information needed for research projects and assignments.

		Freq.	%	Valid %	Cum. %
Valid	Strongly agree	49	8.07	8.19	8.19
	Agree	188	30.97	31.44	39.63
	Disagree	289	47.61	48.33	87.96
	Strongly disagree	72	11.86	12.04	100
	Total	598	98.52	100	
Missing	System	9	1.48		ALTERNA SANTA
Total		607	100		

5.2.5 Good research yields clear results; poor research yields ambiguous and not clearly defined results.

		Freq.	%	Valid %	Cum. %
Valid	Strongly agree	87	14.33	14.52	14.52
Agree	Agree	402	66.23	67.11	81.64
	Disagree	93	15.32	15.53	97.16
	Strongly disagree	17	2.80	2.84	100
	Total	599	98.68	100	
Missing	System	8	1.32		
Total		607	100		

5.2.6 Ability to access, evaluate and use of information is important to life-long learning.

		Freq.	%	Valid %	Cum. %
Valid	Strongly agree	261	43.00	43.72	43.72
	Agree	310	51.07	51.93	95.64
	Disagree	25	4.12	4.19	99.83
	Strongly disagree	1	0.16	0.17	100
	Total	597	98.35	100	
Missing	System	10	1.65		
Total		607	100		

YOUR FAMILIARITY WITH CONCEPTS AND STRATEGIES IN USE OF INFORMATION

6.1 Which of the following searches would retrieve the MOST results in an online search?

	Freq.	%	Valid %	Cum. %
movies OR films	187	30.81	31.06	31.06
movies AND films	165	27.18	27.41	58.47
movies NOT films	30	4.94	4.98	63.46
movies INSTEAD OF films	25	4.12	4.15	67.61
Don't know	195	32.13	32.39	100
Total	602	99.18	100	
	5	0.82		
	607	100		
	movies AND films movies NOT films movies INSTEAD OF films Don't know	movies OR films 187 movies AND films 165 movies NOT films 30 movies INSTEAD OF films 25 Don't know 195 Total 602 5	movies OR films 187 30.81 movies AND films 165 27.18 movies NOT films 30 4.94 movies INSTEAD OF films 25 4.12 Don't know 195 32.13 Total 602 99.18 5 0.82	movies OR films 187 30.81 31.06 movies AND films 165 27.18 27.41 movies NOT films 30 4.94 4.98 movies INSTEAD OF films 25 4.12 4.15 Don't know 195 32.13 32.39 Total 602 99.18 100 5 0.82

6.2 Which of the following is the correct way to TRUNCATE a search word?

		Freq.	%	Valid %	Cum. %
Valid	Typing in only the first syllable of the word as a keyword	93	15.32	15.45	15.45
Combining search words with "and," "or," or "not"		181	29.82	30.07	45.51
	Using the * or ! symbol in place of the last few letters of the word	69	11.37	11.46	56.98
	None of the above	95	15.65	15.78	72.76
	Don't know	164	27.02	27.24	100
	Total	602	99.18	100	
Missing		5	0.82		-
Total		607	100		

6.3 You retrieve the following information from a library catalog search. Which of the following would be the MOST efficient way to find a comprehensive listing of other books in the catalog of this topic?

		Freq.	%	Valid %	Cum. %
Valid	Identifying other books written by the same authors	80	13.18	13.29	13.29
	Examining the bibliography in the book	90	14.83	14.95	28.24
	Scanning the shelves where the book is located	155	25.54	25.75	53.99
	Searching again using subject headings that closely match	175	28.83	29.07	83.06
	Don't know	102	16.80	16.94	100
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

7.1 Researchers must distinguish between academic journals and popular magazines. Which of the following statements is LEAST ACCURATE?

		Freq.	%	Valid %	Cum. %
	And and a land a whole a way ide				24.42
Valid	Academic journal articles provide	147	24.22	24.42	24,42
	objective facts; popular magazine				
	articles do not.				
	Articles in academic journals usually	112	18.45	18.60	43.02
	include a list of references to other				
	scholarly works; articles in popular				
	magazines usually do not.				
	The intended audience for academic	118	19.44	19.60	62.62
;	journals is mainly other scholars; the				
	intended audience for popular				
l	magazines is the general public.			1	
	This games to the general parties				
	Authors and editors for academic	101	16.64	16.78	79.40
	journals are usually employed in	ĺ			
	higher education; authors and editors	ĺĺĺ			
	for popular magazines are usually				
	employed by the for-profit media.	1			
		174	20 42	20.00	100
	Don't know	124	20.43	20.60	
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

7.2 You find the following entry in the References section of a recent article:

Erisman, H.M. (2002). The Cuban Revolution's evolving identity. Latin American Politics and Society 44(1), 145-153

In what issue of "Latin American Politics and Society" will you find this article?

		Freq.	%	Valid %	Cum. %
Valid	Volume 2002, Number 44	44	7.25	7.31	7.31
	Volume 44, Number 1	263	43.33	43.69	51.00
	Volume 1, Number 145-153	159	26.19	26.41	77.41
	The issue cannot be determined	136	22.41	22.59	100
	Total	602	99.18	100	· · ·
Missing		5	0.82		
Total		607	100		

7.3 For each of the following, indicate whether the item is an entire book, a journal article, or a portion of a book.

7.3.1 Jorgenson, Lars W. "Reinterpreting Navajo Rites," Navajo Culture 6(1946): 469-78.

		Freq.	%	Valid %	Cum. %
Valid	Entire book	76	12.52	12.67	12.67
	Journal article	184	30.31	30.67	43.33
	Portion of a book	246	40.53	41.00	84.33
	Don't know	94	15.49	15.67	100
	Total	600	98.85	100	
Missing	0	7	1.15		
Total	<u> </u>	607	100		

7.3.2 Allem, Glover Morrill. Bats. Cambridge: Harvard University Press, 1939.

		Freq.	%	Valid %	Cum. %
Valid	Entire book	295	48.60	49.33	49.33
	Journal article	150	24.71	25.08	74.41
	Portion of a book	64	10.54	10.70	85.12
	Don't know	89	14.66	14.88	100
	Total	598	98.52	100	
Missing	0	9	1.48		
Total		607	100		

7.3.3 Tanaka, Kazuko, "The New Feminist Movement in Japan, 1970-1990." In Japanese Women, edited by Kumiko Fujimura-Fanselow. New York: Feminist Press, 1995.

		Freq.	%	Valid %	Cum. %
Valid	Entire book	127	20.92	21.42	21.42
	Journal article	265	43.66	44.69	66.10
	Portion of a book	114	18.78	19.22	85.33
	Don't know	87	14.33	14.67	100
	Total	593	97.69	100	
Missing	0	14	2.31		
Total		607	100	:	

8.1 Researchers must distinguish between primary and secondary sources. Which of the following statements is MOST ACCURATE?

		Freq.	%	Valid %	Cum. %
Valid	Primary sources are more scholarly	42	6.92	6.98	6.98
	Primary sources are old	56	9.23	9.30	16.28
	Primary sources examine subjects first-hand	341	56.18	56.64	72.92
	Primary sources are more appropriate for academic projects	44	7.25	7.31	80.23
	All of the above	23	3.79	3.82	84.05
	Don't know	96	15.82	15.95	100
	Total	602	99.18	100	
Missing		5	0.82		<u></u>
Total		607	100		

8.2 Which of the following is likely to result in the most comprehensive list of relevant scholarly articles for a research project?

		Freq.	%	Valid %	Cum. %
Valid	Searching in an index or database a specific academic field	139	22.90	23.09	23.09
	Using a general Internet search engine	81	13.34	13.46	36.54
	Paging through print volumes in a specific academic field	99	16.31	16.45	52.99
	Searching the library catalog	96	15.82	15.95	68.94
	All of the above	81	13.34	13.46	82.39
	Don't know	106	17.46	17.61	100
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

8.3 A peer-reviewed or refereed journal is BEST described as:

		Freq.	%	Valid %	Cum. %
Valid	Publishes reviews of other articles	91	14.99	15.12	15.12
	Publishes articles approved by other scholars	168	27.68	27.91	43.02
	Includes only articles written collaboratively by peers	86	14.17	14.29	57.31
	Includes references for each article it publishes	58	9.56	9.63	66.94
	Don't know	199	32.78	33.06	100
	Total	602	99.18	100	
Missing		5	0.82		
Total		607	100		

9.1 In a scholarly article or research paper, a CITATION is:

		Freq.	%	Valid %	Cum. %
Valid	Direct quotation from someone else's written work	131	21.58	21.69	21.69
	Source information for any ideas or text from written work	179	29.49	29.64	51.32
	Physical location of a source	62	10.21	10.26	61.59
	All of the above	74	12.19	12.25	73.84
	Don't know	158	26.03	26.16	100
	Total	604	99.51	100	
Missing		3	0.49		
Total		607	100		

9.2 A citation is NOT required when:

		Freq.	%	Valid %	Cum. %
Valid	Paraphrasing, not quoting, a source	79	13.01	13.08	13.08
	More than one source says the same thing	75	12.36	12.42	25.50
	Describing own findings or analysis	234	38.55	38.74	64.24
	All of the above	49	8.07	8.11	72.35
	Don't know	167	27.51	27.65	100
	Total	604	99.51	100	
Missing		3	0.49		
Total		607	100		

9.3 Among the challenges of research is determining whether a source is scholarly. Below is a list of source characteristics. For each characteristic, if this were the only information you had about a source, what conclusion would you draw about whether the source is likely to be scholarly? If a source...

9.3.1 Is available online

		Freq.	%	Valid %	Cum. %
Valid	Scholariy	89	14.66	14.81	14.81
	Non-scholarly	148	24.38	24.63	39.43
	Cannot be determined	291	47.94	48.42	87.85
	Don't know	73	12.03	12.15	100
	Total	601	99.01	100	
Missing		6	0.99		
Total		607	100	!	

9.3.2 Is translated from another language

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	139	22.90	23.21	23.21
	Non-scholarly	116	19.11	19.37	42.57
	Cannot be determined	275	45.30	45.91	88.48
	Don't know	69	11.37	11.52	100
	Total	599	98.68	100	
Missing		8	1.32		
Total		607	100		

9.3.3 Is published in a peer-reviewed journal

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	230	37.89	38.59	38.59
	Non-scholarly	134	22.08	22.48	61.07
	Cannot be determined	134	22.08	22.48	83.56
	Don't know	98	16.14	16.44	100
	Total	596	98.19	100	·
Missing		11	1.81		
Total		607	100		

9.3.4 Is posted on a political blog

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	140	23.06	23.45	23.45
	Non-scholarly	188	30.97	31.49	54.94
	Cannot be determined	196	32.29	32.83	87.77
	Don't know	73	12.03	12.23	100
	Total	597	98.35	100	
Missing		10	1.65		
Total	•	607	100		

9.3.5 Was recently published

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	87	14.33	14.57	14.57
	Non-scholarly	119	19.60	19.93	34.51
	Cannot be determined	320	52.72	53.60	88.11
	Don't know	71	11.70	11.89	100
	Total	597	98.35	100	
Missing		10	1.65		<u> </u>
Total	 -	607	100		***************************************

9.3.6 Has a lengthy list of references

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	235	38.71	39.30	39.30
	Non-scholarly	113	18.62	18.90	58.19
	Cannot be determined	176	29.00	29.43	87.63
	Don't know	74	12.19	12.37	100
	Total	598	98.52	100	
Missing		9	1.48		
Total		607	100		

9.3.7 Was published by a university press

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	281	46.29	46.83	46.83
	Non-scholarly	84	13.84	14.00	60.83
	Cannot be determined	160	26.36	26.67	87.5
	Don't know	75	12.36	12.50	100
	Total	600	98.85	100	
Missing		7	1.15		•
Total		607	100		

9.3.8 Was published in "Time" or "Newsweek"

		Freq.	%	Valid %	Cum. %
Valid	Scholarly	203	33.44	33.83	33.83
	Non-scholarly	150	24.71	25.00	58.83
	Cannot be determined	162	26.69	27.00	85.83
	Don't know	85	14.00	14.17	100
i	Total	600	98.85	100	
Missing		7	1.15		
Total		607	1.00		

10.1 You are required to write a research paper for your American History class examining the roles of women in the American Civil War. An initial search turns up the following sources. Which one is LEAST likely to be appropriate for your paper?

		Freq.	%	Valid %	Cum. %
Valid	(2009 University press book)	81	13.34	13.41	13.41
	(2000 Encyclopedia volumes)	259	42.67	42.88	56.29
	(2002 Journal article)	144	23.72	23.84	80.13
	(2006 Personal webpage)	120	19.77	19.87	100
	Total	604	99.51	100	
Missing		3	0.49		
Total	·!···	607	100		

10.2 On what basis did you select your response to the above question?

		Freq.	%	Valid %	Cum. %
Valid	Whether the source is likely to be scholarly	165	27.18	27.32	27.32
	How recently the source was published	80	13.18	13.25	40.56
	Whether the source was a print or internet source	87	14.33	14.40	54.97
	The number of pages with information about this topic	80	13.18	13.25	68,21
	All of the above equally influenced my response to the preceding question	192	31.63	31.79	100
	Total	604	99.51	100	··· -
Missing		3	0.49		
Total		607	100		

10.3 Suppose you have more relevant sources than you can use in a short research assignment. Which of the following is the BEST way to determine whether to use a particular source?

		Freq.	%	Valid %	Cum. %
Valid	Whether the source is a print or Internet source	33	5.44	5.46	5.46
	How recently the source was published	70	11.53	11.59	17.05
	How easily you can get the source	85	14.00	14.07	31,13
	Whether the source is scholarly	166	27.35	27.48	58.61
	Whether the author is highly respected	71	11.70	11.75	70.36
	All of the above are equally valid criteria for choosing among sources	179	29.49	29.64	100
	Total	604	99.51	100	
Missing		3	0.49		
Total	-	607	100		

10.4 For your health class, you are writing a five page paper on the BENEFITS OF AEROBIC EXERCISE. What would be the BEST approach to research on this topic?

		Freq.	%	Valid %	Cum. %
Valid	Get an overview about the topic from a commercial Web site, then get recent/more specific information from magazine articles.	75	12.36	12.42	12.42
	Get scholarly journal articles for recent/very specific information about the topic.	153	25.21	25.33	37.75
	Get an overview of the topic from a current encyclopedia on exercise and health, then get more recent/more specific information from scholarly journal articles.	296	48.76	49.01	86.75
	Get an overview of the topic from a health encyclopedia.	80	13.18	13.25	100
	Total	604	99.51	100	
Missing		3	0.49		
Total		607	100		

10.5 Copyright protection covers works:

		Freq.	%	Valid %	Cum. %
Valid	as long as the author or creator is still alive.	91	14.99	15.07	15.07
	only if an explicit copyright notice (Copyright by) is displayed.	129	21.25	21.36	36.42
	that represent an original idea, in any format (text, music, drawing, video,).	338	55.68	55.96	92.38
	only if they have been published.	46	7.58	7.62	100
	Total	604	99.51	100	
Missing		3	0.49		•
Total		607	100		

11.1 You want to help your father understand a medical diagnosis. You need to find good information written for the non-expert. Look at the database descriptions below and select the BEST source to search for this information need.

		Freq.	%	Valid %	Cum.%
Valid	NewsBank NewsFile	98	16.14	16.23	16.23
	Health Reference Center (Academic)	203	33.44	33.61	49.83
	BioMedical Reference Collections (Basic)	139	22.90	23.01	72.85
	All of the above	164	27.02	27.15	100
	Total	604	99.51	100	· · · · · · · · · · · · · · · · · · ·
Missing		3	0.49		
Total		607	100		

11.2 You need to research an aspect of the topic ASSESSMENT OF STUDENTS' ACADEMIC PERFORMANCE IN SCHOOLS. Which one of the following would be an appropriate research question?

		Freq.	%	Valid %	Cum. %
Valid	Should school-based assessment replace standardized test?	294	48.43	48.68	48.68
	Should all school children receive subsidy for internet access?	125	20.59	20.70	69.37
	Should English become the medium of instruction in all schools?	139	22.90	23.01	92.38
	Do teacher unions help teachers keep their jobs?	46	7.58	7.62	100
	Total	604	99.51	100	
Missing	System	3	0.49		
Total		607	100	· ·	

11.3 Which group of keywords best describes the information need for the following assignment: "Prepare a presentation about the gains achieved by women in the 1980s."

		Freq.	%	Valid %	Cum. %
Valid	presentation, women, gains	84	13.84	13.91	13.91
	women, gains, achieved	105	17.30	17.38	31.29
	women, gains, 1980s	371	61.12	61.42	92.72
	gains, achieved, 1980s	44	7.25	7.28	100
	Total	604	99.51	100	
Missing	System	3	0.49		
Total		607	100		

11.4 Typically a library's online catalog contains:

		Freq.	%	Valid %	Cum. %
Valid	information about books, videos and other non-print items in the library.	250	41.19	41.39	41.39
	the complete text of all journal articles in the library	93	15.32	15.40	56.79
	information about courses provided by your institution.	101	16.64	16.72	73.51
	all of the above.	160	26.36	26.49	100
	Total	604	99.51	100	
Missing	System	3	0.49		
Total		607	100		

11.5 Which of the following usually requires a password because it does not allow free access for all Web users?

		Freq.	%	Valid %	Cum. %
Valid	Library online catalog	150	24.71	24.83	24.83
	Databases such as WiseNews	320	52.72	52.98	77.81
	Yahoo! Web directories	81	13.34	13.41	91.23
	Bookstores' Web sites	53	8.73	8.77	100
	Total	604	99.51	100	
Missing	System	3	0.49		
Total		607	100		

Appendix E

Survey on Use of Information: Scoring Manual of the Competency Items
(Sections 6 to 11)

6.1 a 6.2 c 6.3 d b/ 7.1 a 7.2 b 7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b 9.1 b	i	1 1 2 1 Max=2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
6.3 d b/ 7.1 a 7.2 b 7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c	i	2 1 Max=2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
7.1 a 7.2 b 7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b	i	1 Max=2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
7.1 a 7.2 b 7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b	/c	Max=2 1 1 1 1 1 1 1 1 1 1 1 1 1
7.2 b 7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
7.2 b 7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b		1 1 1 1 1 1 1 1 Max=2 1
7.3.1 b 7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b		1 1 1 2 1 Max=2
7.3.2 a 7.3.3 c 8.1 c 8.2 a c 8.3 b		1 1 2 1 Max=2
7.3.3 c 8.1 c 8.2 a c 8.3 b		1 1 2 1 Max=2 1
8.1 c 8.2 a c		1 2 1 Max=2
8.2 a c b		2 1 Max=2 1
8.3 b		1 Max=2 1
8.3 b		Max=2 1
		1
		The state of the s
9.1 b		
		1
9.2 c		1
9.3.1 c		1
9.3.2 c		1
9.3.3 a		1
9.3.4 b		1
9.3.5 c		1
9.3.6 a		1
9.3.7 a		1
9.3.8 b		1
10.1 d		1
10.2 a		1
10.3 d		2
b/	/e	1
		Max=2
10.4 c		1
10.5 c		1
11.1 b		1
11.2 a		1
11.3 c		1
11.4 a		1
11.5 b		1

^{*} Adapted from the scoring manual of the St. Olaf College of the US, one of the developers of the Research Practices Survey

Appendix F

Follow-up Session Student Consent Form

Dear Student,

Follow up Session to the Survey on Use of Information

Thank you for completing the Survey on Use of Information and for agreeing to participate in this two-hour follow up session which aims to get more in-depth understanding of how university freshmen use information and their experiences and views on the use. You will be asked to work on an information task using any resources in the Library, including the Internet. You may also approach other people if needed. I will be the observer while you work on it and I will ask you some questions during the process to understand more about your work. There is no right or wrong way to approach the task and I will not influence you on the ways you work on it. After the task, we will have an interview focusing on your experience and views on information use. During the follow-up session, software will be used to capture the computer screen display and the whole process will be audio-recorded. Any data collected in this session will be used for research purposes only and will be held strictly confidential and anonymous. At no time will your name be reported, or your name identified with your responses. Participation in this study is totally voluntary and you are free to withdraw from the study at any time.

By your completion of this session, and by checking the appropriate box below, you are giving informed consent for the use of your responses in this research.

[]	I agree to participate	
[J	I do not agree to participate	
N		of norticinant.	
IN	arne	of participant:	_
Si	gna	ure:	_
тι		vou	
1.1	Idil	you.	

Chiu Wing WONG

Appendix G: Information Task Student Sheets

Please circle the appropriate response to the following questions:	

How much do you know about farm workers?

A great deal Some Very little

2. How much do you know about what pesticides do for crops?

A great deal Some Very little

3. How much do you know about the effect of pesticides on human health?

A great deal Some Very little

4. How much do you know about agricultural businesses?

A great deal Some Very little

5. How interesting to you is the topic of agricultural business practices and their effects on farm workers?

Highly interesting Somewhat interesting Not interesting

Information task:

Your instructor mentioned in class that farm workers are routinely exposed to pesticides and suffer many health problems due to the practices of farming corporations. You are asked to write a 3-5 page research paper (with a reference list) on one or two aspects of this subject, including possible solutions to the problem.

1.	Before you start to do the research, list as many possible ways as you can think of to do the research.
2.	You may now start to do the research.
3.	How can you further narrow down the topic to one or two aspects of the subject?
	· · · · · · · · · · · · · · · · · · ·

_	······································
4.	Select one information source you find useful for the research and write a citation of it, in a format that academics commonly used. Name the citation format you used.
	· · · · · · · · · · · · · · · · · · ·
5.	Are there other things you would do if given more time?

Appendix H

Researcher's Guide for the Follow up Session to the Survey on Use of Information

- 1. Start the audio-recording.
- 2. Go through the consent form.
- Start the information task. Inform the student that this will last for about 1 hour 15 minutes.
- Pass p. 1 of the worksheet to the student. Ask the student to do the pre-questions.
- 5. Pass out the rest of the worksheet to the student. Read out the topic.

 Remind the student that he/she can use any resources in the Library including the Internet, or approach any persons by any means, and can use the application software at the PC, such as Microsoft Office.
- 6. Ask the student to answer item 1 of the worksheet. Filling in bullet points will be okay. Tell the student that the rest of the worksheet can be handled at the latter part of the session.
- 7. Inform the student: You can start to find information on the topic, as if you are working on that assignment. [Start the screen capture.]
- 8. Ask the following questions:
 - Why did you use this search tools?
 - Why did you use these keywords?
 - Why did you use this search step?
 - Why did you select this information sources?
- 9. Stop the screen capturing and save the file [File name: survey case #].

- Ask the student to finish the worksheet on narrowing the topic and writing one citation.
- 11. Time to work on this task is limited. What additional steps you might take to further work on the topic if you have more time?
- 12. Start the interview. Inform the student that this will last for 45 minutes.
- 13. How do you find the task you just worked on? Do the steps you took just now reveal your past practices?
- 14. In the past, what were the occasions that you needed to use information for school works? How often? Any example?
- 15. How about in your daily life?
- 16. Did you enjoy the process in information use?
- 17. How would you rate your ability in using information?
- 18. Where and how did the ability develop?
- 19. You used computer and the Internet to look for information just now. Who taught you how to do so?
- 20. Have you sought any guidance from any teacher or librarian? Were they useful?
- 21. How about from parents? Peers?
- 22. Did you have any instruction on the evaluation of information sources?
- 23. How about intellectual property, rights and freedom of access to information, plagiarism and citation style?
- 24. This research is about the use of information. Do you think that the knowledge and skills in using information is important?

- 25. If there are courses on knowledge and skills in using information, would you attend?
- 26. Close and save the audio-recording.
- 27. Thanks the student. Ask him/her to keep the topic of the information task in confidentiality.

Appendix I
Summary of subjects with School-based Assessment in 2007 HKALE/HKCEE (Hong Kong Examinations and Assessment Authority, 2007)

HK/ Sub	ALE jects	Mode of Assessment	Weighting
A/A	S Chemistry	Practical skills	20%
A	Government & Public Affairs	Project	22.5%
AS	Chinese Language & Culture	Reading programme	10%
AS	Liberal Studies	Project	20%
Α	Biology	Practical skills	20%
AS	Electronics	Project	20%
AS	Computer Applications	Core skills assessment/ Project	30%
A/A	S Physics	Practical skills	15%
Α	Visual Arts	Portfolio	25%
AS	Visual Arts	Portfolio	35%
Α	Chinese Literature	Creative writing/	25%
		Reading Report	
Α	Computer Studies	Core skills assessment/	20%
	Production Prof. ■ Calcinate Co. Co. Companies Affects States	Project	
HKC	CEE		
Subjects		Mode of Assessment	Weighting
Des	ign & Technology	Project	33.33%
Elec	tronics & Electricity	Project	30%
Fasl	nion & Clothing	Project	30%
Des	ign & Technology (Alt. Syl.)	Project	30%
Gra	phical Communication	Project	30%
Tec	hnological Studies	Project	30%
Con	nputer & IT	Project	20%
Inte	grated Humanities	Course assignment/	20%
		Course performance/	
		Internal tests & exams	
Scie	nce & Technology	Independent study	20%
Visu	ial Arts	Portfolio	50%
Chir	nese History	Essay & report/	20%
		Internal tests & exams	
Hist	ory	Course assignment/ 20%	
		Course performance/	
		Internal tests & exams	
Chir	nese Language	Reading activities/	15%
		Coursework & other	
		language activities	
Eng	lish Language	Oral assessment	15%

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