DOCUMENT RESUME

ED 269 033 IR 051 510

AUTHOR Davies, Denise M.
TITLE Computer Competencies for MLS Graduates: A Study of the UH Graduate School of Library Studies.
PUB DATE Nov 85
NOTE 99p.; Research paper for Certificate in Advanced Library/Information Studies, University of Hawaii. Figure 1 and course descriptions may not reproduce well due to small print.
PUB TYPE Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Computer Literacy; Curriculum Development; Curriculum Evaluation; Graduate Students; Higher Education; *Information Science; *Library Education; *Library Science; *Minimum Competencies; Questionnaires; Research Methodology; Surveys; *Technological Advancement
IDENTIFIERS *University of Hawaii

ABSTRACT

This study is designed to identify the computer competencies that should be required of library/information studies (LIS) graduates of the Graduate School of Library Studies (GSLS) at the University of Hawaii at Manoa. The long term objective of the study is to provide information for the policy and planning of GSLS. The study examines how certain aspects of the understanding of, use of, and attitudes towards the new information technologies are perceived by faculty and graduating students. A review of the literature covers computer literacy, competencies for the library/information science professional, curriculum trends in library/information science education, and the use of computers and information technologies in the library/information science field. Two self-administered questionnaires--one for faculty and one for graduating students--were distributed to the entire faculty (N=9), and all students graduating in the spring or summer semesters of 1985 (N=21). Individual items on the two questionnaires were grouped in the areas of computer knowledge, skills or experience, and attitudes. The Statistical Package for the Social Sciences (SPSSx) was used to analyze the results of the questionnaires. Individual chapters present the research problem; the literature review; the research methodology; the results of the survey; discussion and recommendations; and conclusions. Numerous tables are included throughout. A bibliography, the survey instruments, and GSLS curriculum content statements and course descriptions are attached. (THC)

COMPUTER COMPETENCIES FOR MLS GRADUATES: A STUDY OF THE UH GRADUATE SCHOOL OF LIBRARY STUDIES

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Paper submitted in partial completion of requirements for the Certificate in Advanced Library/Information Studies

Graduate School of Library Studies
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November, 1985

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ACKNOWLEDGEMENTS

I would like to thank several people who were generous with their time and knowledge in advising me during this research study: Dr. Carol Tenopir, my faculty advisor, for her help throughout this study; Dr. Larry Osborne, particularly for his help with the statistical parts of the study; John Davies, my husband, for his help and support; the faculty and graduating students of GSLS who took the time to complete the questionnaire.

A. THE RESEARCH PROBLEM

Library/Information studies (LIS) is involved with the organization, storage, retrieval and dissemination of information. Rapid advances in information technologies, including the computer, have occurred in the past several years. These developments have changed the information workplace, library or other, and have broadened the competencies required of LIS professionals. The education of LIS professionals must respond to this changing work environment and provide its graduates with the knowledge, skills and attitudes necessary for the effective use of the new information technologies. This study addresses the question of what computer competencies that should be required of LIS graduates.

1. The Graduate School of Library Studies

The first goal of the Graduate School of Library Studies (GSLS) at the University of Hawaii at Manoa, as defined in the 1985/87 brochure, is

> to furnish students with the knowledge, skills, and attitudes that are basic to professional competence and career-long professional growth in the field of library and information services... In carrying out these goals and objectives, the School seeks to transmit its awareness of the rapidly-changing world of libraries and mass communication in the 1980s. Graduates must be prepared for environments characterized by new technologies and new social and organizational patterns.

In response to the changing LIS profession, GSLS has added new information science and other computer-related courses to the curriculum, a computer lab has been set up, funding is available for software and hardware, and a half-time faculty position created to supervise the computer lab. However, the level of computer competence expected of students graduating with a Masters of Library Studies (MLS) has not been defined as an overall program objective. The identification of computer competencies necessary for MLS graduates would be useful in further defining the educational objectives of the MLS program.

The GSLS program requires 36 credit hours leading to a Masters in Library Studies and is accredited by the American Library Association. The faculty consists of the Dean, 8 full time positions, 1 lecturer, and 1 half-time position. The Spring '85 student enrollment of GSLS was 15 full time, and 72 part time students. These were students in the MLS program, in the Certificate in Advanced Library/Information Studies (CALIS), in continuing education courses and unclassified students. The school is on a three semester system and approximately 15-20 students graduate with the MLS degree each semester.

Three courses are required of all students. LS601 - Introduction to Reference and Information Services; LS605 - Basic Cataloging and Classification; and LS610 - The Library in Society. An administration course of the student's choice - academic, public, special, or school library media centers - is also required. Students who wish to be

certified as School Library Specialists by the Hawaii Department of Education have additional required courses (GSLS, 1985).

2. Objectives and Research Questions

The long term objective of the study is to provide information for the policy and planning of GSLS, e.g. content of existing courses, the academic advising of students, and the designing of future curriculum.

The immediate objectives of this study are:

1. To determine if students graduating from GSLS with a MLS should be required to have some degree of computer competence before graduation.

2. To identify components of minimum and specialized levels of computer competence for MLS graduates.

3. To identify the existing courses that include these competencies.

4. To determine students' perception of their computer competencies.

5. To identify factors associated with increasing the computer competence of MLS students.

Computer competence is likely to be a result of a combination of factors and this study can only begin to explore the relationships. However, since this study is concerned with the graduates of the University of Hawaii, GSLS MLS program, it will concentrate on the relationship between the computer-related courses taken and the perceived level of competence of the graduates. It would be difficult in this situation to measure the effects of any one course, since a course is not taken in isolation. Therefore the first hypothesis is stated that students who report a higher level of computer competence will have completed more computer-related courses.

Another factor that may be considered to be of importance for the perceived level of computer competence is computer experience. This may be as a result of courses taken - e.g. more computer assignments, but also includes the students' use of computers in the workplace, the use of a computer at home and/or previous computer experience. The second hypothesis states that students having more computer experience will report a higher level of computer competence.

The research questions as developed from the objective are as follows:

1. What do faculty and graduates perceive as minimum computer competencies for MLS graduates?

2. What do faculty and graduates perceive as specialist computer competencies for MLS graduates?

3. Are these competencies included in the present curriculum? If so, in which courses are they included?

4. What perceptions do graduating students have of their computer competencies?

5. What factors are associated with graduates who report a higher computer competence?

3. Justification

The increasing use of information technologies, including computers, in libraries and in all aspects of the information field presents todays MLS graduates with challenges that require some degree of computer competence. MLS graduates, as beginning LIS professionals, must be prepared to work with these tools and be aware of the advantages and potentials as well as their limitations.

Curriculum development, and the defining of goals and objectives are important continuing program activities of GSLS. Changes have been made in the curriculum since the last definition of competencies in 1982 (Bard, Leide & Craytor, 1983). These changes include additional courses, many of them computer-related, and changed course content for existing courses.The original competencies that were identified (see Appendix C) could be expanded to include the computer competencies identified in this study. An examination of the topic may also be useful for students in planning their academic career.

This study attempts to identify those computer competencies that should be required of all graduating students. It examines how certain aspects of the understanding of, use of, and attitudes towards the new information technologies are perceived by faculty and graduating students. The study may also identify areas of the curriculum that need to be strengthened.

B. REVIEW OF THE LITERATURE

Four topics will be included in the review of the literature: (1) computer literacy; (2) competencies for the library/information science professional; (3) curriculum trends in library/information science education; (4) the use of computers and information technologies in the library/information science field.

1. Computer literacy

Society is increasingly using computers as tools in all areas of activity - at work, at home, at school and for entertainment. The need for "computer literacy" in our society is often discussed both in the popular literature, (Ossman, 1984) and in the area of education (Johnson, Anderson, Hansen & Klassen, 1984; Klassen, 1983; Knapper & Willis, 1984; Luehrmann, 1983; Swartz, Shuller, Chernow, 1984; The, 1984). Computer literacy has been identified as a national educational goal (Anderson, 1982; Computer literacy act of 1984; Licklider, 1982; Masat, 1981).

Although the term "computer literacy" is often used, it carries with it a variety of meanings depending on the user and the audience. A discussion of the components of computer literacy is important to this study since the concern here is the computer literacy necessary for a particular group of people - information professionals who will be using computers as tools in their workplace.

Anderson and Klassen (1981) as part of the planning phase of a project "Instructional Materials for Computer Literacy" have outlined eight areas which summarize the instructional objectives for computer literacy. These areas indicate "desired learning outcomes" and may be summarized as: (1) Applications - use of computers in various areas and subjects and the application of computers to new areas. (2) Hardware - basic vocabulary of computer system components. The level of knowledge should be dependent on the role of the learner. (3) Impact - social effects of computerization, both positive and negative. (4) Limitations - sense of the capabilities and limitations of computers. (5) Programming/Algorithms - ability to read, modify, and construct algorithms and programs. (6) Software and data processing - vocabulary relevant to software, information processing and data. (7) Usage - motor skills for sequencing and execution of certain tasks on the computer. (8) Values and feelings - positive attitudes toward personal use of computers as well as balanced attitudes toward computers as a social force.

The first six areas deal with the cognitive domain or knowlege of different aspects of computers. The seventh area, that of usage, deals with skills, and the eighth with attitudes.

Barger (1983) reviewed definitions of computer literacy and identified three components: (1) Computer structure and operation, which should include an understanding of the basic operation of hardware and software. The level of understanding would vary depending

on educational level of the individual; (2) Computer applications and limitations, which includes the possibilities, limitations and effects of corputers on the individual and society; (3) Computer programming. Thoughts on computer programming are divided by two points of view. One group promotes the idea that only professional programmers need to be trained to program. Others should be trained to evaluate and choose ready-made programs that are suitable for their needs. The opposing view believes that if programming skills are not taught, the students are not computer literate. Barger proposes a middle ground which would involve "a standard of minimal understanding and ability in programming. It would involve learning enough of a language to handle some simple routines and appreciate how a language works and how problems are solved through programming routines."

Lockheed, Hunter, Anderson, Beazley and Esty, (1983) in a project participated in by the National Center for Education Statistics, the Education Technology and Science Staff, and the Office of Educational Research and Improvement reviewed the definitions of computer literacy as the first major activity in gathering information or computer literacy in elementary and secondary education. A panel of "10 nationally recognized experts in computer use and applications in education provided expertise in defining concepts and identifying issues." They proposed the following definition for computer literacy:

> Computer literacy may be defined as whatever a person needs to know and do with computers in order to function competently in our information-based society.

Computer literacy includes three kinds of competence: Skill, knowledge, and understanding. It includes the:

1. ability to use and instruct computers to aid in learning, solving problems, and managing information:

2. knowledge of functions, applications, capabilities, limitation, and social implications of computers and related technology; and

3. understanding needed to learn and evaluate new applications and social issues as they arise

This definition highlights the fact that specific skills, knowledge and understanding will vary from person to person, from job to job, and from time to time. The term "computer literacy" does not, however, cover the specialized knowledge and skills that are required for careers in computer-related fields.

Masat (1981) prepared a Research Report for the American Association for Higher Education. The report is organized around five areas: (1) computer literacy in higher education and its relationship to computer science; (2) the use of computers in education, including the impact of microcomputers; (3) academic considerations such as curriculum, general and continuing education, instruction, computer assisted instruction, and staffing issues; (4) administrative concerns such as the planning, costs, and development issues associated with computer literacy; and (5) national issues such as networks, data bases, privacy and security, and the role of the federal government in computer literacy.

Masat in a review of national discussions, identified the following functions of computer literacy: imparting knowledge about handling information; dispeling fears and myths associated with computers; developing skills in using and programming a computer;

developing procedural learning; addressing the ethical and societal issues raised by computing.

One of the problems affecting higher education is the fact that there is presently no nationally based computer education curriculum in the elementary and secondary schools. Students at the university level arrive with a wide range of computer literacy from little or none to quite experienced. Adults are returning to the campus to take computer courses or to learn about recent advances in computers and computer applications. Rapid advances in technology increase the amount of learning necessary to remain current (Masat, 1981).

According to Masat, the "place of computer literacy in the curriculum of colleges and universities depends on whether it is considered to be a basic skill, general education or a 'math' requirement". It may become the function of the individual schools such as the business or engineering school to ensure that its graduates are computer literate. He points out the problems that must be addressed -- How can computer literacy courses be best fit into "an already overcrowded, politicized, and underfunded curriculum"? How are resources to be allocated? (Masat, 1981)

2. Competencies - library /information science

The discussion of what competencies are necessary for the library/information science professional is one that has been discussed but not resolved. This review focuses on the more recent literature which reflects concern for the rapid changes and challenges that confront the LIS profession (Daniel & Ely, 1982; Griffiths, 1984; Smith, 1983; White, 1983a).

King Research, Inc, in 1982, conducted an 18 month project - "New Directions in Library and Information Science Education" sponsored by the U.S. Department of Education. One of the objectives of the study was to identify, define, describe and validate present and future competencies of librarians and other information professionals. Although the full report is not yet available (the report by Griffiths and King is a forthcoming publication of ASIS) the Project Director, Jose-Marie Griffiths, has written several articles describing the methodology and preliminary results (Griffiths, 1983; Griffiths, 1984; Griffiths and King, 1984).

Griffiths (1983) defines competencies in broad terms being comprised of one or more of the following: (1) knowledges (2) skills and/or (3) attitudes. These may vary by work setting, work function, and level of position among other things. Griffiths (1984) describes the ideal cycle for the definition and validation of required competencies as beginning with competencies identified by employers as being required for a particular work situation. This would in turn

affect education and training requirements after determining whether the competencies were best learned in formal education at the undergraduate or graduate level, as on-the-job training or through continuing education. Performance measures would determine whether or not competencies had been attained. Changes in the environment, user needs, and new technology would cause this to be an ongoing process.

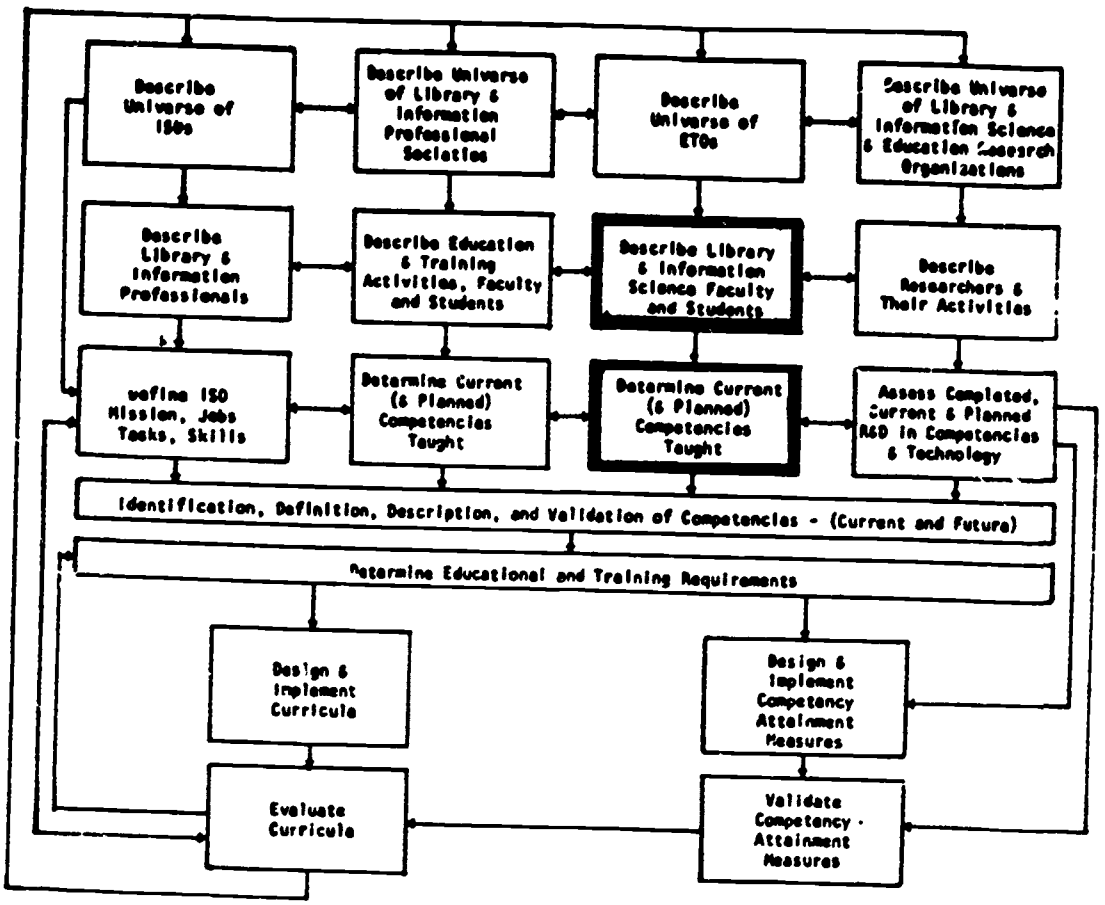
In actual fact this process does not exist now.

> Few employers know which competencies are really necessary to perform information professional work, let alone how well information professionals' perform, the effectiveness of their work or the higher order effects of information services or products... Since competency attainment resulting from university curricula and continuing education or training is not formalized, it is very difficult to determine current education and training requirements, let alone future requirements." (Griffiths, 1984)

The "New Directions ..." project identified information professional competencies through interviews with information professionals in a variety of work settings and through reviews of the literature.

A parallel step in the planning process for determining information professional competencies is "the need to describe education and training activities as well as faculty and students involved in ETOs [education and training organizations] and professional societies" and to determine "current (and planned) competencies that are taught by ETOs and professional societies" (Griffiths, 1983). Figure 1 illustrates where the present study fits,

FIGURE 1 -- A PLANNING FRAMEWORK FOR DETERMINING NEW DIRECTIONS IN LIBRARY AND INFORMATION SCIENCE EDUCATION *



NOTE: The "▬▬▬" lines indicate the area of concern of this study.
* Figure from Griffiths, 1983. p.10

focused on one educational institution and in particular on those competencies related to computers and new information technologies.

The 1983 Clinic on Library Applications of Data Processing was devoted to "Professional Competencies - Technology and the Librarian" (Smith, 1983). Several of the papers address the competencies required by information professionals in different types of libraries. Sweeney (1983), addressing the public library situation, suggests six competency areas that should be emphasized for all information professionals: (1) managing information technology; (2) keeping informed about the state of the art of specific information technologies; (3) the future, or developing, information technologies; (4) The analysis and diagnostics of information-seeking behavior; (5) understanding the societal issues that develop from the information technology; and (6) building knowledge bases. These competencies do not include "some important skills... such as searching remote machine-readable databases, search strategy, networking, and information theory....[which] are vitally important to librarians today, and are generally recognized as such."

Daniel (1983) presented a list of 37 competencies which should be required for School Media Specialists relating to building level computer coordination. These are arranged in five areas. From the general to the specific these are:(1) communication and leadership; (2) Supervision/coordination management; (3) teaching; (4) organization, information provision/curriculum integration; (5) hardware/software selection and development.

A note of caution is introduced by White (1983a). Although agreeing with the usefulness of identifying basic competencies, basing these competencies on current practice is short-sighted. Some competencies may best be acquired as part of on-the-job training rather than as a part of the formal education process.

3. Library /Information science education

The changes that have taken place in library/information science education have been the subject of much discussion (Balnaves, 1978; Borbely, Tower, Forster & Crosby, 1985; Daniel, 1983; Davis, 1981; Fondin, 1964; Fosdick, 1984; Gleaves, 1982; Lancaster, 1984; Rusch, 1983; Tague, 1979; White, 1983b).

Schlessinger and Schlessinger (1983) surveyed accredited library education programs in the United States and found an increasing use of microcomputers. They predict that the emphasis on developing computer literacy will decrease in the future and that there will be increasing pressure to make computer programming competency a requirement for each graduate. They also feel that there will be increasing emphasis on advanced skills in working with statistical packages and library management using computers.

Evans (1984) expresses his view that if schools of librarianship and/or information management "define ourselves as educating people for careers in information management we have a central role to play in teaching the new communication technologies."

Through surveys of graduate library school course catalogs in 1977 and 1982, Fosdick (1984) determined trends in library and information science instruction at the graduate level. "Information science is now viewed as critical to modern professional education... Class topics include such new technologies as microcomputers, database management systems, networking, office technologies, word processing and videodiscs." His study showed the increase in the number of information science courses, courses on interactive (online) computer systems, and programming. Computer skills are now integrated to a greater degree in traditional library school courses.

In 1982 a list of content statements was developed at GSLS (Bard, Leidi & Craytor, 1983). Several new courses have been developed since that time reflecting the changing needs of the library/information field. The following courses have been added since 1982: Introductory programming (LS593, Fall '84), Online information services (LS663, Spring '82) Library automation (LS672, Spring '84), Records Management (LS673, Fall'83), Database design (LS674, Spring '84), Microcomputers in libraries and information centers (LS675, originally offered as LS693, Summer '83). The content of previously existing courses has in many instances been modified to reflect the increasing use of computers

in the library and information field.

Tenopir (1985) examined and analysed catalogs from a variety of university departments throughout the United States that offer courses in information science. Information science courses deal with the manipulation or management of information and often involve the use of automation. There is usually some training involved in the tools required for computer processing. She noted that library schools tend to emphasize "the retrieval, use, and human side of information science rather than the technical skills or tools."

4. Use of information technologies library/information profession

Dowlin (1984) describes the electronic library as an information organization that incorporates the new technology available in the electronic age to enhance its ability to provide service and to increase its efficiency and effectiveness. It uses the new technologies to provide and enhance "online and bibligraphic searching, acquisition, cataloging, circuation, a public catalog, community resource files, networking, budgeting and other administrative functions, periodical and serials control, word processing, electronic mail, and a decision-support system."

There is a clear indication that librarians are using microcomputers in greater and greater numbers. McGraw-Hill conducted a

survey under contract with Bowker, in mid-1984 to a broad sample of U.S. libraries. "Nearly 5,000 public libraries, 1600 academic libraries and more than 7,000 special libraries own and are using more than 45,000 microcomputers". School libraries have more than 140,000 micros. "This same sample reported that they plan to purchase some 128,000 new microcomputers by the end of 1986...An average of 65.7 percent of the librarians in all types of libraries anticipated learning to use microcomputers before the end of 1985." The major current use is internal library functions, with a clear trend toward providing public access to microcomputers in libraries (Berry, 1985).

This study is focusing on the computer competencies that should possibly be required of LIS graduates. The four areas that have been reviewed -- computer literacy, LIS competencies, LIS education trends, and the use of computer technologies in the LIS field, all contribute to an understanding of the topic.

C. METHOD

1. Definitions

The following definitions were used throughout the study:

- **LIS competencies:** the knowledge, skills and attitudes that are necessary for all LIS professionals. These are the minimum competencies necessary to function as a beginning professional in the LIS field.

- **Computer competencies:** those competencies i.e. knowledge, skills and attitudes, that relate specifically to computers and other information technologies such as telecommunications.

These two competency areas may be thought of as overlapping, i.e. some but not all computer competencies may be necessary for a beginning professional in the LIS field.

Operational definitions used in this study:

- **Minimum computer competency:** the knowledge, skills and/or attitudes relating to computers and other information technologies, that have been identified by more than 75 percent (i.e. the top quartile) of the study respondents as being necessary for all graduates of CSLS.

- **Specialist computer competency:** those competencies that were identified by more than 75 percent (i.e. the top quartile) of the study respondents as being necessary for graduates of GSLS who are specialists in a certain area. Specialists would also have the minimum computer competencies.

- **Computer-related courses:** The following GSLS courses are considered as computer-related, i.e. they include some aspects of the understanding and use of computers and require students to work with computers: LS647 - The Systems Approach to Library Operation; LS663 - Online Information Services; LS670 - Introduction to Information Storage and Retrieval; LS671 - Computers in Information and Library Processing; LS672 - Library Automation; LS673 - Information and Records Management; LS674 - Database Design and Creation; LS675 - Microcomputers in Libraries and Information Centers; LS695 - Seminar in Research in Librarianship.

- **Non-computer-related courses:** The remainder of the GSLS courses are considered to be non-computer-related. Some discussion and/or use of computers may be included in these courses, but not to as great an extent as in the courses listed above.

2. Study Design

The study was designed as a survey of faculty and graduating students of GSLS. The population chosen for this study consisted of the entire faculty, excluding the investigator (N=9), and all students graduating in the Spring or Summer Semester, 1985 (N=21). The students graduating in the Spring had almost completed their course work and would be able to report on whether or not they felt they were competent on the items in the survey. Summer graduates would still be requiring 1-4 courses to complete their graduation requirements. Only one of the computer- related courses, LS675, was being offered during the summer semester. Two of the respondents of the study would be taking the course at that time.

3. Instrument Design

The survey was implemented through two self-administered questionnaires: one for faculty and one for graduating students. The computer competency questions (questions 1-6 on the Faculty Questionnaire; questions 11-16 on the Graduating Student Questionnaire) were designed based on the pool of questions presented in the Computer literacy: Definition and survey items for assessment in school (Lockheed et al., 1983). The lack of valid data for questionnaire ite is discussed in Section C7, Limitations. The questionnaires are provided in Appendix A - Faculty Questionnaire and Appendix B - Student

Questionnaire. These questions dealt with computer related knowledge, skill, experience and use. Other competencies related to computers were added from competencies identified by Daniel (1983), Dowlin ' 984), Griffiths (1984), Sweeney (1983).

The faculty and student questionnaires had a similar format for the computer competency questions. The individual items were grouped into the areas of computer knowledge, skills or experience, and attitudes. Both faculty and students were asked to identify each item as either (1) A basic or minimum competency for all graduating students; (2) A competency for students specializing in a certain area; (3) Not applicable to an MLS degree; (4) Don't know. Faculty were asked to indicate courses they taught that included each item. Students were asked to indicate if they felt competent or not for each item. Additional questions for student background information were part of the graduating students questionnaire. These included the date of beginning the program, courses taken that were identified from the GSLS course syllabi as having some computer component, previous computer experience, use of a computer at home or at work, and the amount of time spent in the computer lab.

4. Pretest

The instrument was reviewed by three GSLS faculty members. As a result, changes were made to wording of the questions to facilitate question comprehension and to create parallel question structure. The

revised questionnaire was then delivered to two graduating students as a pretest. Changes were made to the section of the questionnaire dealing with the student background information. The final form of the questionnaire is given in Appendix A - Faculty Questionnaire and Appendix B - Graduating Student Questionnaire. From the pretest it was found that the questionnaire could be answered in 10 to 20 minutes.

5. Fieldwork

The instrument was self administered. A list of graduating students was obtained from the GSLS office. Spring graduates were easily identified. However the list of Summer graduates was not considered to be accurate, since students had not yet indicated if they would be graduating at that time. All of the students that were thought to be graduating in the summer semester received a questionnaire, and were asked to complete it only if they intended to graduate in August, 1985. Faculty (N=9) and students (N=28) received the questionnaire and cover letter through their GSLS mail box in mid-April with the request to return it within two weeks (before April 29). This would give the subjects time to complete the questionnaire before final exams. 10 of 28 (36%) of the student questionnaires and 7 of 9 (78%) of the faculty questionnaires were returned in this time. A reminder sign was posted which resulted in 8 more student responses (for a total of 64%) and 1 additional faculty response (for a total of 89%). Questionnaires had been coded so that non-respondents could be

sent a second questionnaire if necessary. A follow-up letter and a second questionnaire were given to non-respondents on May 8th which resulted in 4 additional student (for a total of 78%) and the final faculty questionnaire being returned (total of 100%). A total of 22 student questionniares were received, the remaining 6 students were found to be not graduating in the spring or summer semesters. One of the questionnaires was discarded as no date of graduation or entry into the program was given.

Respondents were advised that their replies would be kept confidential and that individual names would not be used. Spoken comments of the students indicated that they enjoyed completing the questionnaire.

6. Data Analysis

The Statistical Package for the Social Sciences (SPSSx) was used to analyse the results of the questionnaires on the University of Hawaii Computing Center DEC-20 computer.

Each question (item) was considered as a possible computer competency variable. Questionnaire items were grouped into sets of variables pertaining to knowledge of computers and computer applications, skills in the use of computers and computer programming, and attitudes. Frequency distributions of the responses for the following sets of variables were obtained: (1) Whether or not graduates

should have some degree of computer competence; (2) Minimum and specialist computer competencies as identified by faculty and students; (3) Graduates' perception of their own competence on each of the computer competency variables; (4) A profile of graduating students including date of entering the program, previous computer experience, attendance at computer workshops, type of library/other job they hope to work in after graduation, whether or not they have a computer at home, or use a computer at work.

Minimum computer competencies were those items that had been identified by more than 75 percent of the respondents as being necessary for all graduates of GSLS. Specialist computer competencies were those items that had been identified by more than 75 percent of the respondents (both faculty and students) as going beyond a minimum computer competency for all graduating students but should be included for students specializing in a particular area. The cumulative percent of basic plus specialist was used since a specialist would also need all the minimum competencies.

If a question was not answered it was assumed that the respondent didn't know whether or not the item should be considered as a minimum competency. All "don't know" responses were treated as missing values for that particular item.

Competencies were tabulated by computer-related courses and non-computer-related courses.

A competency score was calculated for minimum computer competencies identified in each section of the questionnaire, for the areas of knowledge, skills and attitudes, and as a total. If a student stated that he/she felt competent on an item, a score of "1" was given. Items that the student did not feel competent on were given a "0". The minimum competency items were then summed to give the minimum competency score. A specialist competency score was calculated in the same manner for the specialist competencies that were identified by the study. After an examination of the frequency distributions, dichotomous variables were created to represent high and low scores for both the minimum and specialist competency scores.

A score was calculated for the students' computer background. This derived variable included previous computer experience, having a computer at home, using a computer at work, and having attended computer workshops. Each of the four variables was represented by a "0" or a "1" and values were summed to a possible total of "4". Based on the frequency distribution of this calculated background variable, a dichotomous variable was created representing students with a "high" or "low" computer background.

Minimum and specialist competency scores were correlated with computer-related courses taken, hours spent in the computer lab and previous computer experience. Crosstabulations of the dichotomous variables that showed significant correlation were made.

7. Limitations

The major limitations to the study involve the lack of validated questionnaire items, a small study population, and the fact that it was limited to one LIS school.

Validated questionnaire items: The questions available from the Lockheed pool have not been subjected to a full-scale field test. There is "almost no information available on the performance of the questions, i.e., their reliability, their validity, or their relationship to one another." (Lockheed et al., 1983). In addition, since questions were modified to reflect the specific areas of computer application of concern to the library profession, they could not be compared to the original pool of questions.

Since students were reporting their self-perception of competency, it is possible that they stated that they felt competent in a certain area when in reality they do not feel competent. However, since students were informed that their answers would be confidential, it is assumed that they answered honestly. Secondly, others (faculty or employers) might not agree that the student is competent in a given area even if he/she perceives himself/herself as being competent.

Individual questions may also not represent distinct variables. There is probably some interdependence of question items i.e. different questions may be measuring the same competence.

No attempt was made to ask questions for internal validity in

this questionnaire. There was a concern that if the questionnaire was too long, there would be a much lower response rate. Obtaining responses from the entire population was desirable due to the small number of individuals.

Different types of questions would be required to begin to study students' attitudes towards computers and information technologies.

Small study population: This study is a survey of a small number of educators and graduating students only. Practitioners, former graduates and employers of GSLS graduates were not included.

Although the total GSLS population was studied, the same study could be carried out on a larger population such as the graduating students and faculty of other LIS graduate schools.

The list of Summer graduates was not complete at the time that this study was conducted.

With a small number of cases it was not possible to determine with any degree of certainty that students had specified items as minimum competencies only if they felt that they were competent on those items.

Limited to one LIS school: Since the study was carried out in only one graduate school for LIS, the results can not be generalized beyond the University of Hawaii GSLS. Each school has its own program and emphasis. The same study carried out on a number of schools may yield different results.

D. RESULTS

The results of the questionnaire analysis are presented in this section. Discussion of significant results are presented in Section E.

On the question "should graduates have some degree of computer competence?" 90 percent of the students felt that "all MLS graduates should have at least a basic computer competence". Fifty-seven percent of the students and 56 percent of the faculty felt that "most students graduating now with an MLS have at least a basic minimum computer competence".

1. Minimum Competencies

Table 1 shows the frequencies for each item that was identified as a minimum competency. Faculty, student and combined frequencies are shown. A total of 19 minimum competencies were selected by a majority of all respondents. Student perception of their competency on each item is also shown. No additional minimum competencies were suggested by the respondents on the questionnaire.

TABLE 1 -- MINIMUM COMPUTER COMPETENCIES, AS SELECTED BY FACULTY AND GRADUATING STUDENTS OF GSLS

		MINIMUM COMPETENCIES			STUDENTS FEEL
		FACULTY	STUDENTS	ALL	COMPETENT
		%	%	%	%
		N=9	N=21	N=30	N=21
KNOWLEDGE OF COMPUTERS					
1.1	History computers	88	86	86	91
1.2	Computer info st & ret	100	91	93	95
1.3	Computer functions	100	86	90	91
1.4	Computer definitions	100	95	97	86
1.5	Hardware experience	88	95	93	81
KNOWLEDGE OF COMPUTER APPLICATIONS					
2.1	Computers in libraries	100	95	97	95
2.2	Database searching	88	76	79	71
2.7	Communications	38	71	76	67
2.8	Word processing	75	86	83	90
EXPERIENCE IN USE OF COMPUTER APPLICATIONS					
3.6	Exp. word processing	75	85	82	81
3.8	Exp. OCLC	75	76	76	91
3.9	Exp. basic computer operations	57	81	75	81
AWARENESS OF ISSUES					
5.1	Computers as tools	100	81	87	100
5.2	Impact on libraries	88	86	86	95
5.3	Limitations	100	86	90	86
5.4	Implementation	88	75	79	91
5.6	Privacy issues	88	91	90	91
ATTITUDES					
6.1	Keep up to date	100	86	90	95
6.2	Confident	100	67	76	63

NOTES: (1) Numbers in column 1 refer to question numbers on the faculty questionnaire. (2) Table excludes missing values.

Knowledge - of computers and computer applications: From Section 1 of the questionnaire on "Knowledge about computers", all five items were identified as minimum competencies. Both faculty and students indicated that all MLS graduates should:"know the history of computers; understand the basic principles of computer assisted storage and retrieval of information; understand the input, processing, and output components and functions of computers; understand basic computer definitions; and, have actual experience with a variety of computer hardware".

Four of the items in Section 2 dealing with "Knowledge of computer applications", were identified by a majority of respondents as minimum competencies. There was agreement by faculty and students that MLS graduates should: "be aware of the uses of computers in libraries; understand the principles of searching a computer database; and understand the values and benefits of word processing". More of the faculty (88%) than students (71%) felt that graduates should "understand the potential uses of telecommunications technologies for library resource sharing, access to information, and other forms of communication".

Skills - use of computer applications and programming skills: Three of the items in Section 3, "Experience in the use of computer applications" were identifed as minimum competencies. These items were: experience in "the use of word processing program(s); the use of a library cataloging utility such as OCLC; and performing basic

computer operations such as loading, saving, copying programs and formatting disks." A higher percentage of students (81%) felt that the basic computer operations were necessary while only 57 percent of the faculty agreed.

None of the "Skills in computer programming" of Section 4 were identified as minimum competencies.

Attitudes: From Section 5, "Awareness of issues", 5 of the 7 items were identified as basic minimum competencies. More than 75 percent of both the faculty and students felt that graduates should: "be aware that the computer is a tool for managing information; understand the impact of computers on library operations; be aware of the limitations of computers; be aware of the issues involved in implementing computer technology in an organization; and, be aware of the effect of computers on privacy, and freedom of information".

Both items from the sixth Section on "attitudes" were specified as minimum competencies by a majority of respondents. Both faculty and students were in agreement that graduates should be "aware of the need to continue to keep up to date with the rapid changes taking place in the field of computers and information technologies". However, although 100 percent of the faculty felt that graduates should "feel confident and comfortable in the use of computers", only 67 percent of the students felt that this should be a minimum competency.

Perception of Competence - Minimum competencies: The last column of Table 1 shows the percentage of graduates that felt competent on

each of the minimum computer competency variables. For the 19 items that had been identified as minimum competencies, more than 90 percent of the graduates felt competent on eleven of the items. More than 80 percent of the graduates felt competent on an additional five of the items. The frequency distribution shows that on three of the items, fewer than 7b percent of the graduates felt competent. These areas were: understanding "the principles of searching a computer da.abase" (71% felt competent); understanding "the potential uses of telecommunicationt technologies for library resource sharing...", only 67 percent felt competent, and only 63 percent indicated feeling "confident and comfortable in the use of computers".

With such a small number of cases it was not possible to determine with any degree of certainty that students had specified items as minimum competencies only if they felt that they were competent on those items.

Table 2 summarizes the frequency distribution of students minimum competency score for each section of the questionnaire and for the total of all the minimum competencies. Less than one quarter of the graduates (23%) felt competent on all 19 of the competencies, the majority (86%) felt competent on 15 or more of the 19 minimum competencies.

TABLE 2 -- FREQUENCY DISTRIBUTION OF GRADUATING STUDENTS MINIMUM COMPETENCY SCORES FOR EACH QUESTIONNAIRE SECTION AND TOTAL

SECTION	IDENTITIFIED MINIMUM COMPETENCIES N	FEEL COMPETENT ON ALL %	FEEL COMPETENT ON ALL BUT 1 %
Knowledg of computers	5	71	80
Knge. of computer applications	4	48	77
Exper. use computer applic.	3	62	91
Skills computer programming	0	-	-
Awareness of issues	5	76	95
Attitudes	2	57	95

Frequency distribution of total minimum competency score

MINIMUM COMPETENCY SCORE	GRADUATES FELT COMPETENT %
0 - 11	5
12 - 13	5
14 - 15	28
16 - 17	14
18 - 19	48
	100

mean = 16, mode = 15, median = 16.

NOTE: 86 percent of the graduating students felt competent on 15 of the 19 identified minimum competencies.

2. Specialist Competencies

Table 3 summarizes the additional competencies that were specified as specialist competencies. Faculty and student responses are given separately and a total of all respondents is shown in column 3. The remaining 25 items on the questionnaire were specified by a majority of the respondents as specialist competencies. Students perception of their competency on these items is shown in the last column. No additional specialist competencies were suggested by the respondents.

Knowledge - of computers and computer applications: All respondents (100%) indicated that the following items from Section 2 should be specialist competencies: "be aware of the special characteristics of library and bibliographic databases; understand the use of database management / file management programs; be aware of the uses of computers for library management and planning; be able to evaluate software; be able to communicate technical requirements to programmers, systems analysts and other non-librarians; understand the advantages and problems of an integrated library automation system". A smaller number of respondents (85%) selected the "knowledge of how graphics programs can be used" as a specialist competency.

TABLE 3 - ADDITIONAL SPECIALIST COMPUTER COMPETENCIES, AS SELECTED BY FACULTY AND GRADUATING STUDENTS OF GSLS

		SPECIALIST COMPETENCIES			FEEL
		FACULTY	STUDENTS	ALL	COMPETENT
		%	%	%	%
		N=9	N=21	N=30	N=21
KNOWLEDGE OF COMPUTER APPLICATIONS					
2.3	Bibliographic database	100	100	100	76
2.4	DBMS	100	100	100	57
2.5	Library management	100	100	100	38
2.6	Graphics	88	84	85	19
2.9	Evaluate software	100	100	100	76
2.10	Talk to programmers	100	100	100	43
2.11	Integrated automation	100	100	100	57
EXPERIENCE IN USE OF COMPUTER APPLICATIONS					
3.1	Exp. database search	89	100	97	71
3.2	Exp. DBMS	83	95	93	62
3.3	Exp. statistical prog.	86	90	89	24
3.4	Exp. graphics	86	91	89	29
3.5	Exp. spreadsheet	71	95	89	29
3.7	Exp. telecommunications	83	91	89	38
3.10	Write documentation	88	95	93	38
3.11	Needs analysis	86	95	93	48
SKILLS IN COMPUTER PROGRAMMING					
4.1	Flowcharts	86	76	79	43
4.2	Structured english	83	74	76	33
4.3	Procedures	83	72	75	48
4.4	Topdown design	86	74	77	52
4.5	Error conditions	80	79	79	33
4.6	Write programs	86	84	85	48
4.7	How program works	88	90	89	67
4.8	Problem solving	88	90	89	52
AWARENESS OF ISSUES					
5.5	Resource sharing	100	95	97	95
5.7	Data security	88	95	93	95

NOTES: (1) Frequencies are cumulative percents of those who specified the item as a minimum competency plus those who specified it as a specialist competency; (2) Numbers in column 1 refer to question numbers on the faculty questionnaire; (3) Table excludes missing values.

Skills - use of computer applications and programming skills: The majority of respondents (more than 89%) selected the following items from Section 3 - "Experience in use of computer applications". Specialists should: have conducted online database search(es); have used database management / file management, statistical, graphics, spreadsheet and telecommunications program(s); have written documentation or user's guide; and have conducted a needs analysis for a library system. In general, more of the students than faculty specified these items. The range of the frequency distribution for the students on these items was from 90 to 100 percent. The faculty responses ranged from a low of 71 percent, for the use of spreadsheets, to a high of 89 percent, for having experience in conducting an online database search.

All items from Section 4 - Skills in computer programming were selected as specialist competencies. More than 85 percent of the all respondents specified being able to write simple programming routines, having an appreciation of how a programming language works, and understanding how problems are solved through programming, as specialist competencies. For the remainder of the items the faculty frequency distribution ranged from 80 to 96 percent while the student frequency distribution ranged from 72 to 79 percent. These items included being able to: draw flowcharts or other diagrams of algorithms; write in structured English or other pseudocode for planning; understand the concept of subtasks or procedures, and understand the process of top-down design.

Attitudes: From Section 5 - Awareness of issues, the majority of respondents (more than 93%) felt that specialists should know how computers are used in the sharing of resources and should understand the importance of data security.

Perception of Competence - Specialist competencies:

The last column of Table 3 shows the percentages of graduates that felt competent on each item. More than 75 percent of the graduates felt that they: were aware of the special characteristics of library and bibliographic databases; were able to evaluate software; knew how computers are used in the sharing of resources; understood the importance of data security. On the low end of the range, less than 45 percent of the graduates felt competent on the following items: aware of the uses of computers for library management and planning; able to communicate technical requirements to programmers, systems analysts and other non-librarians; have had experience with statistical, graphics, spreadsheet, or telecommunications programs; have written documentation or user's guide; able to draw flowcharts or other diagrams of algorithms; able to write in structured english or other pseudocode for planning; aware of the various treatments of error conditions in programming. The remainder of the selected specialist competencies had a range of 46 to 74 percent of the graduates that perceived themselves as competent. These items included: understanding the use of and having experience with database management / file management programs; understanding the advantages and problems of an integrated library

automation system; understanding the process of top-down design in computer programming; being able to write simple programming routines; and understanding how problems are solved through programming.

Table 4 shows the frequency distribution of the specialist competency scores. The specialist competency score is based on items specified as minimum competencies and those added as specialist competencies. One-fifth (20%) of the graduates felt competent on more than 40 of the total 44 competencies; 43% of the graduates felt competent on more than 33 of the total 44 competencies.

3. Profile of graduating students

A profile of student background information is shown in Tables 5 and 6. Table 5 shows the frequency distribution for the type of library/other job the students hoped to work in after graduation. Academic (62%) and special (57%) libraries have the highest frequencies. Less than half of the graduates hope to work in public libraries (43%), and slightly more than one quarter (29%) hope to work in school libraries. Ten percent responded that they hoped to work in other (non-library) jobs. Free lance information specialist and archives were mentioned in the last category.

TABLE 4 -- FREQUENCY DISTRIBUTION OF GRADUATING STUDENTS' SPECIALIST COMPETENCIES SCORES FOR EACH QUESTIONNAIRE SECTION AND TOTAL

SECTION	IDENTIFIED SPECIALIST COMPETENCIES N	FEEL COMPETENT ON ALL %	FEEL COMPETENT ON ALL BUT 1 %
Knowledge of computers	5	71	80
Knge. computer applications	11	14	28
Exp. use computer applications	9	19	29
Skills computer programming	8	19	33
Awareness of issues	7	76	95
Attitudes	2	57	95
TOTAL	44	[illegible]	[illegible]

DISTRIBUTION OF TOTAL SPECIALIST COMPETENCY SCORES

SPECIALIST COMPETENCE SCORE	GRADUATES FELT COMPETENT N=21 %
0 - 12	0
13 - 22	33
23 - 32	24
33 - 44	43
	100

Note: 20 percent of the graduates felt competent on 40 of the 44 specialist competencies.

TABLE 5 -- TYPE OF LIBRARY STUDENTS HOPE TO WORK IN AFTER GRADUATION

Academic library	62%
Public library	43%
School library	29%
Special library	57%
Other	10%

NOTE: Multiple responses cause numbers to add to more than 100 percent.

Frequency distributions of students' computer experience are shown in Table 6. Twenty-four percent of the students have a computer at home, the length of time they had had one ranged from 1 month to 6 years. One third (33%) of the students use a computer at work, 38 percent do not, and the remaining 29 percent reported that they were not working. The majority (81%), have "attended workshops or non-class lectures concerned with computers or other information technologies". The group was split almost in half with 52 percent reporting some previous computer experience before attending GSLS, the remainder having none. Those reporting previous experience (multiple responses) indicated programming (29%), word processing (19%), database management (19%), and/or games (19%) as the major uses. The majority (76%) of the students had used the GSLS computer lab for more than 20 hours. Students were given a score of 1 for each of the following: if they had a computer at home, if they used a computer at work, if they had some previous or additional computer experience. These were then summed to form the student's computer background score.

TABLE 6 -- BACKGROUND COMPUTER EXPERIENCE OF GRADUATING STUDENTS

		N=21	%
1	Have a computer at home		24
2	Use a computer at work		33
3	Some previous computer experience		52
4	Other computer experience		14
	Used the GSLS computer lab more than 20 hours		76
	Attended computer workshops		81

NOTE: Items 1 to 4 summed to create student computer background variable.

COMPUTER BACKGROUND SCORE	%
0 - 1	48
2 - 4	52
Total	100

4. LIS Courses

The computer-related courses and the computer competencies that are included in each, as reported by the instructor of each class, are shown in Table 7. Minimum competencies, as selected by the majority of respondents and discussed in Section D1, are indicated by a "*" in the first column. The remainder of the competencies were selected as additional specialist competencies as discussed in D2. The percentage of students that had completed each course is given in the first row of the table. Course titles and descriptions corresponding to the course numbers are given in Appendix D. No indication of the depth of treatment of a competency in a course is attempted here. Some faculty commented that a competency was included in the course "to some extent".

A statistical analysis of course coverage of the computer competencies was not undertaken, an examination of Table 7 however, shows that there is a broad coverage of the competencies from the sections on knowledge of computers and computer applications, awareness of issues, and attitudes. Fewer courses include the competencies in the sections on experience in use of computer applications and skills in programming. Two of the competencies are not included in any of the computer-related courses -- experience in the use of OCLC,

TABLE 7 -- COMPUTER COMPETENCIES INCLUDED IN COMPUTER-RELATED COURSES AS REPORTED BY COURSE INSTRUCTORS

	GSLS COMPUTER-RELATED COURSES								
	LS647	LS663	LS670	LS671	LS672	LS673	LS674	LS675	LS695
HAVE TAKEN CLASS =	43%	52%	76%	14%	29%	29%	29%	38%	10%
KNOWLEDGE OF COMPUTERS									
* History of computers			X					X	X
* Computer info st & ret.		X	X						
* Computer functions	X		X	X				X	
* Computer definitions			X	X	X			X	
* Hardware experience			X	X		X	X	X	
KNOWLEDGE OF COMPUTER APPLICATIONS									
* Computers in libraries		X		X	X		X	X	
* Database searching		X	X				X	X	
Bibliographic d'bases		X		X	X		X		
Dbms			X			X	X	X	
Library management						X		X	
Graphics								X	
* Communications		X	X		X			X	
* Word processing						X		X	
Evaluate software	X			X		X	X	X	
Talk to programmers	X			X	X	X	X		
Integrated automation					X			X	
EXPERIENCE IN USE OF COMPUTER APPLICATIONS									
Exp. database search		X					X	X	
Exp. dbms			X			X	X	X	
Exp. statistical prog.									X
Exp. graphics								X	
Exp. spreadsheet						X		X	
* Exp. word processing						X		X	
Exp. telecommunications		X					X		
* Exp. OCLC									
* Exp. basic computer ops.								X	
Write documentation	X					X	X		
Needs analysis	X						X		

(continued...)

NOTES: (1) The "*" in column 1 refers to basic minimum computer competencies. (2) The "X" indicates that the competency is included to some degree in that class. (3) See Appendix D for a list of course names and descriptions.

TABLE 7 -- continued

COURSES =		LS647	LS663	LS670	LS671	LS672	LS673	LS674	LS675	LS695
HAVE TAKEN COURSE	%=	43	52	76	14	29	29	29	38	10
SKILLS IN COMPUTER PROGRAMMING										
Flowcharts		X			X		X			
Structured english		X			X					
Procedures		X			X					
Topdown design		X			X					
Error conditions					X					
Write programs					X					
How program works				X	X					
Problem solving		X			X					
AWARENESS OF ISSUES										
* Computers as tools		X	X	X	X	X	X	X	X	X
Impact on libraries		X	X		X	X		X		X
* Limitations		X	X	X	X	X	X	X	X	X
* Implementation		X	X		X	X	X	X	X	X
Resource sharing										
* Privacy issues		X								X
Data security		X					X			
ATTITUDES										
* Keep up to date		X	X	X	X	X	X	X	X	X
* Confident		X	X	X	X	X	X	X	X	X
Total number of minimum competencies included		7	7	11	9	8	9	8	15	7

NOTES: (1) The "*" in column 1 refers to basic minimum computer competencies. (2) The "X" indicates that the competency is included to some degree in that class.(3) See Appendix D for a list of course names and descriptions.

and knowing how computers are used in the sharing of resources. Each of these items are included in one or more of the non-computer-related courses discussed in Table 9.

LS675 - Microcomputers in Libraries and Information Centers, included 15 of the 19 minimum competencies. LS670 - Introduction to Information Storage and Retrieval, included eleven. The majority of students (76%) had completed the LS670 course. The remainder of the computer-related courses each included 7 to 9 of the minimum competencies. Half of the students (50%) had taken LS663 - Online Information Services; approximately 40 percent of the students had taken LS647 - The Systems Approach to Library Operations and LS675. The remainder of the computer-related courses had been taken by less than one third of the graduating students. These courses were: LS671 - Computers in Information and Library Processing; LS672 - Library Automation; LS673 - Information and Records Management; LS674 - Database Design and Creation; and LS695 - Seminar in Research in Librarianship.

Table 8 shows a histogram of the total number of computer-related courses taken by the graduating students. One third (33%) of the students had taken 4 or more computer-related courses; half (52%) of the students had taken 3 or more computer-related courses; the majority of students (81%) had taken 2 or more computer-related courses. The median number of computer-related courses taken by the graduates was 3, with a mean of 3.1 and a standard deviation of 1.9.

TABLE 8 - HISTOGRAM OF TOTAL NUMBER OF COMPUTER-RELATED COURSES TAKEN BY GRADUATING STUDENTS

TOTAL COMPUTER-RELATED COURSES TAKEN	GRADUATING STUDENTS N=21 %	
8	0	
7	5	*****
6	9	*********
5	14	**************
4	5	*****
3	19	********************
2	29	******************************
1	14	**************
0	5	*****

0----I----I----I----I----I----I----I
5 10 15 20 25 30

Median = 3, mean = 3.1, mode = 2, standard deviation = 1.9

Non-computer-related courses also included some of the computer competencies as reported by course instructors. These courses are summarized in Table 9. The table lists only those competencies that are included in one or more of the courses. The percentage of students taking these courses was not collected. All students would have completed LS601 and LS605 since these are required courses.

LS605 - Basic Cataloging and Classification and LS651 - Administration of Public Libraries, included 6 minimum competencies, LS601 - Introduction to Reference and Information Services, included 5 minimum competencies. The remainder of the courses included 1 to 4 of the minimum computer competencies.

The sections dealing with awareness of issues and attitudes showed the highest concentration of non-computer-related courses including the competency items.

5. Factors Associated with Minimum Competence Score

The minimum competency score for each section of the questionnaire and the total minimum competence score were correlated with the total number of computer-related courses completed, hours spent in the computer lab, and the students' computer background, using the Pearson correlation coefficient.

TABLE 9 -- NON-COMPUTER RELATED COURSES
WHICH INCLUDE COMPUTER COMPETENCIES

	LS601	LS605	LS615	LS618	LS650	LS651	LS661	LS662	LS665
KNOWLEDGE OF COMPUTERS									
* Computer info s & r	X								
KNOWLEDGE OF COMPUTER APPLICATIONS									
* Computers in librar	X						X	X	
* Database searching	X								
Library management					X				
EXPERIENCE IN USE OF COMPUTER APPLICATIONS									
Exp. database srch	X								
* Exp. OCLC		X							
Needs analysis						X			
AWARENESS OF ISSUES									
* Computers as tools	X	X		X		X	X	X	X
Impact on libraries	X	X			X	X	X	X	X
* Limitations		X			X	X	X	X	
* Implementation		X				X			X
Resource sharing	X	X				X			X
* Privacy issues		X	X			X			
Data security						X			
ATTITUDES									
* Keep up to date	X	X	X		X	X	X	X	X
* Confident		X			X	X			
Number of minimum competencies	5	6	2	1	3	6	4	4	3

NOTES: (1) The "*" in column 1 refers to minimum computer competencies. (2) Only those competencies are listed that are included in one or more of the non-computer related courses. (3) Only those courses are listed that included one or more of the competencies. (3) Two sections of LS601 are offered. Some variation existed depending on the course section.

The minimum competency score for each section of the questionnaire and the total minimum competence score were also correlated with intended library job and individual computer related courses using Kendall's tau-b, a non-parametric correlation which is suitable for ordinal level data.

Associations as measured by the Pearson's r and Kendall's tau-b correlation coefficients are reported as follows: .15 to .29 as a moderately weak association, .30 to .39 as a moderate association, .40 to .64 a moderately strong association, and .65 to 1.00 as a strong association. Only associations with a significance of p .05 are discussed in this section. Significance of p .005 is noted as applicable. Due to the small number of cases in this study, and because variables are not unrelated, measures of association should be treated with caution.

Computer-related courses: Table 10 shows the correlation of computer-related courses taken by students with the minimum competency scores obtained by the students on the sections of the questionnaire and as a total minimum competency score. The minimum competence score of the noted sections showed positive association with the following computer-related courses: Knowledge of computers showed a moderately strong association with LS663 and a moderate association with LS670; knowledge of computer applications had a moderate association with LS673 and LS671 and a moderately strong association with LS672 and

TABLE 10 -- CORRELATION OF COMPUTER-RELATED COURSES TAKEN BY GRADUATING STUDENTS WITH MINIMUM COMPUTER COMPETENCY SCORES

	GSLS COMPUTER-RELATED COURSES								
	LS647	LS663	LS670	LS671	LS672	LS673	LS674	LS675	LS695
	tau-b	tau-b	tau-b	tau-b	tau-b	tau-b	tau-b	tau-b	tau-b
SECTIONS									
Knowledge of computers	.22	.47 *	.36 *	.24	.11	.17	-.10	-.01	-.20
Knge. computer applic.	.08	.36 *	.29	.38 *	.45 *	.34	.45 *	-.54 *	.07
Exp. use computer applic.	.27	-.10	.06	-.18	.10	.32	.10	.14	-.16
Awareness of issues	-.14	.19	-.06	.22	.11	-.16	.11	-.40 *	-.16
Attitudes	.14	.22	-.05	.34	.33	.07	.52 *	-.48 *	-.02
Total minimum computer competency score	.21	.34 *	.20	.29	.25	.25	.23	-.37 *	-.14
Computer background score	.18	.41 *	.15	.35 *	.2[illegible]	.16	.41 *	-.52 *	.02

NOTES: "*" indicates that p<.05

LS674; attitudes had a moderately strong association with LS674. The basic competence score showed a moderate association with LS663.

The minimum competency scores for the following sections showed a moderately strong negative association with LS675: the knowledge of computer applications ($p < .005$), awareness of issues, and attitudes. There was also a moderate negative association of LS675 with the total basic competencies. Further analysis was carried out to determine if these students had any different characteristics as a group. The results are discussed below under "Computer background" and are shown in Tables 11 and 15.

Students that had taken four or more of the computer-related courses showed a positive correlation with knowledge of computers and knowledge of computer applications. There was no significant association between the total minimum competency score and the number of computer-related courses taken.

Computer lab: No significant correlation was found between the minimum computer competency score and the amount of time that students had used the computer lab.

Computer background:

Table 10 also shows the association of individual computer-related courses with the student's computer background score. LS663 and LS674 showed a moderately strong, positive association and LS671 showed a moderate positive association with the computer background

score. LS675 showed a moderately strong, negative association with the computer background score.

The minimum competence score for the individual sections, using Pearson's r, showed a strong positive association with the computer background score in the attitude section ($p<.005$). The total minimum competence score showed a strong positive association ($p<.005$) with the computer background variable.

A dichotomous variable was created from the minimum competence score. The mean and median values for the frequency distribution of student's minimum competency scores was 16 with the modal value of 15 (See Table 2). Those students that felt competent on fifteen or more (possible total of 19) of the items were classified as having a high feeling of competence (62% of students). Those who perceived themselves as competent on fewer than fifteen of the items were classified as having a low feeling of competence (38% of students).

The computer background score, when correlated with individual computer-related courses using Kendall's tau-b, showed a moderate positive association with LS671, and a moderately strong positive association with LS663 and LS674. There was a moderately strong negative association of the computer background score with LS675.

The calculated computer background variable of Table 6 was dichotomized in order to create a two by two table for crosstabulation. Those scoring 1 or 0 were considered to have a low computer background (48% of students). These students had had little

or no previous computer experience before attending GSLS, did not have a computer at home and generally did not use a computer at work. Students having a score of 2 or more out of a possible 4 were considered as having a high computer background (52% of students). This dichotomy also divided the students into two approximately equal groups.

Table 11 shows the crosstabulation of students who had completed LS675 or not against the dichotomized background variable. The majority of students with a low computer background score (70%) did take the course. Those students who had a high computer background score, generally did not take LS675. There was a strong positive association (phi=.6) between the variables. These results are discussed more fully in Section E5.

Table 12 is a crosstabulation of the dichotomized minimum competency score against the dichotomous computer background variable. All of the students that had a low score on the minimum competecies (i.e. they scored less than 15 out of a total of 19) had a low computer background score. The majority (80%) of students that had a high minimum competence score had a high computer background score. A chi-square test showed little probability ($p<.000$) that this was a chance distribution.

TABLE 11 -- CROSSTABULATION OF STUDENTS WHO HAVE TAKEN LS675 AGAINST COMPUTER BACKGROUND

	COMPUTER BACKGROUND	
	LOW	HIGH
	N=10	N=9
TAKEN LS675	%	%
NO	30	89
YES	70	11
TOTAL	100	100

Fisher's exact test = .01
Phi = .6

TABLE 12 -- CROSSTABULATION OF DICHOTOMIZED MINIMUM COMPETENCY SCORE AGAINST STUDENT COMPUTER BACKGROUND

	COMPUTER BACKGROUND	
	LOW	HIGH
	N=10	N=11
MINIMUM COMPETENCY	%	%
High	20	100
Low	80	0
Total	100	100

Chi-square = 11.02, p=.0009, degrees of freedom = 1

Intended library job: No significant association was found between the type of library job the student intended to work in after graduation and the minimum competence score. Kendall's tau-b did indicate that students who intend to work in academic libraries did have a moderately strong, positive association with the total number of computer related courses taken, i.e. those students tended to take a greater number of computer-related courses. Those students intending to work in school libraries showed a moderately strong, negative association with the total number of computer-related courses completed ($p<.005$), i.e. students expecting to work in school libraries tended to take fewer computer-related courses. Those students intending to work in special libraries showed a moderately strong, positive association with previous computer experience.

6. Factors Associated with Specialist Competence Score:

Computer-related courses: Table 13 shows the correlation, using Kendall's tau-b, of computer-related courses taken by students with the specialist competency scores obtained by the students on the sections of the questionnaire and as a total specialist competency score. The following significant positive associations were found between the specialist competency scores of the individual sections with individual computer-related courses: knowledge of computers showed a moderately strong association with LS663 and a moderate association with LS670;

TABLE 13 -- CORRELATION OF COMPUTER-RELATED COURSES TAKEN BY GRADUATING STUDENTS WITH SPECIALIST COMPUTER COMPETENCY SCORES

	GSLS COMPUTER-RELATED COURSES								
	LS647 tau-b	LS663 tau-b	LS670 tau-b	LS671 tau-b	LS672 tau-b	LS673 tau-b	LS674 tau-b	LS675 tau-b	LS695 tau-b
SECTIONS									
Knowledge of computers	.22	.47 *	.38 *	.24	.11	.17	-.10	-.01	-.20
Knge. computer applic.	.21	.33 *	.31	.35 *	.40 *	.34 *	.43 *	-.30	-.11
Exp. use computer applic.	.33 *	.30	.25	.27	.33 *	.41 *	.38 *	-.20	.02
Skills in comp. prog.	.48 *	.25	.38 *	.39 *	.13	.15	.13	-.30	-.03
Awareness of issues	-.14	.19	-.06	.22	.11	-.16	.11	-.46 *	-.17
Attitudes	.15	.22	-.05	.34 *	.33 *	.07	.53 *	-.48 *	-.02
Total specialist computer competency score	.37 *	.34 *	.33 *	.39 *	.31	.26	.32 *	-.28	-.12

NOTES: "*" indicates that p<.05

knowledge of computer applications showed a moderate association with LS663, LS671, and a moderately strong association with LS672, LS673, LS674; experience in the use of computer applications showed a moderate association with LS647, LS672 and LS674 there was a moderately strong association with LS673; skills in computer programming showed a moderately strong association with LS647 and a moderate association with LS670 and LS671; attitudes showed a moderate association with LS671 and LS672, and a moderately strong association with LS674. The total specialist competency score showed a moderate association with LS647, LS663, LS670, LS671 and LS674

The sections on awareness of issues and attitudes showed a moderately strong negative association with LS675.

A positive association, using Pearson's r, was shown between the total number of computer-related courses taken and the specialist competence score in the following sections: knowledge of computers; knowledge of computer applications ($p<.005$); experience in the use of computers ($p<.005$); and programming skills ($p<.05$). A moderately strong association was shown with the total number of computer related courses taken and the total specialist competence score ($p<.005$).

Computer lab: Pearson's r showed no significant association with the amount of time spent in the computer lab.

Computer background: The specialist competence score for each section when correlated with the computer background score (r), showed moderately strong positive correlation in the following sections:

knowledge of computer applications, experience in use of computer applications, skills in computer programming, and attitudes. The total specialist competence score showed a moderately strong association with the computer background score ($p<.005$)

A dichotomous variable was also derived from the specialist competence score. The frequency distribution of the specialist competency scores had a mode of 21, and a mean and median of 29. Those with a score greater than the median, i.e. who felt competent on 30 or more (total of 44) of the items were classified as having a high feeling of competence (52% of students) Those feeling competent on fewer than 30 of the items were classified as having a low feeling of competence (48% of students).

Table 14 is a crosstabulation of the dichotomized specialist competency score against the dichotomous computer background variable. The majority (80%) of the students that had a low score on the specialist competecies (i.e. they scored less than 30 out of a total of 44) had a low computer background score. The majority (73%) of students that had a high minimum competence score had a high computer background score. A chi-square test showed a probability of $p<.05$ that this was a chance distribution.

Crosstabulations of the dichotomous computer background variable with the computer-related courses that students had taken, and the total number of computer related courses they had taken, showed interesting results. A summary is shown in Table 15. Few of the

TABLE 14 -- CROSSTABULATION OF DICHOTOMIZED SPECIALIST COMPETENCY SCORE AGAINST STUDENT COMPUTER BACKGROUND

	COMPUTER BACKGROUND	
	LOW N=10	HIGH N=11
SPECIALIST COMPETENCY	%	%
High	20	73
Low	80	27
Total	100	100

Chi-square = 3.92, p=.047, phi = .53

students that took LS675 had a high computer background (13%). All of the other computer related courses had more than half and often more than three-quarters of the students that had taken the course, having a high computer background. In addition, students that had taken LS675 had taken the lowest number of computer related courses as a group.

TABLE 15 -- CROSSTABULATION OF COMPUTER-RELATED COURSES COMPLETED BY GRADUATING STUDENTS, WITH FACTORS ASSOCIATED WITH COMPUTER COMPETENCE

COURSES =	LS647	LS663	LS670	LS671	LS672	LS673	LS674	LS675	LS695
HAVE TAKEN COURSE %=	43	52	76	14	29	29	29	38	10
N=	9	11	16	3	6	6	6	8	2
High computer background score	56	73	56	100	83	67	100	13	50
Previous computer exp.	56	64	56	100	83	67	83	13	[illegible]
Total computer related courses completed									
2 or more	100	91	94	100	100	100	100	88	50
3 or more	67	73	69	100	100	100	83	63	50
4 or more	56	64	44	100	67	83	67	38	50
High minimum computer competency score	67	82	69	100	83	83	100	25	50
High specialist computer competency score	67	64	56	100	67	83	67	25	50
Lab more than 20 hrs.	78	82	75	67	100	100	83	100	50

Crosstabulations were done of total computer related courses completed against the minimum and specialist competence scores and controlling for computer background. No significant correlation was found.

E. DISCUSSION AND RECOMMENDATIONS

1. Minimum Competencies

Nineteen items were identified by the majority of respondents as minimum computer competencies for all graduates. It should be noted again that these competencies are not unrelated variables. It would be useful in a future study, with a larger population, to do a factor analysis of the variables to create clusters of related knowledge, skills and attitudes.

A greater percentage of faculty than students felt that telecommunications were important as a minimum competency. This may reflect a lack of experience on the part of students - only 67 percent felt competent in this area. Modems and communications software have been used more during the Spring'85 semester to illustrate communications capabilities. Future graduates may have more knowledge in this area in the future.

Only 52 percent of the students have taken LS663 (which is concerned with the use and techniques of online databases) however 71 percent of the students claimed to "understand the principles of searching a computer database". Students are also exposed to online database searching in LS601, and to the use of in-house databases in LS670, LS674, LS675.

The small number of "skills" that were identified in comparison to the other sections indicates that the emphasis of the GSLS faculty and students is on knowledge and attitudes. The faculty placed even less emphasis on skills than students. Only 57 percent of faculty thought that students should have performed basic computer operations as a minimum competency. This was also the trend in the experience section for specialist competencies.

None of the programming skills were identified as minimum competencies. Very few students take a full programming course in GSLS. Only 14 percent of the graduating students had taken LS671. This may change in the future with LS593 being offered as a non-credit introductory programming course. Other courses that also include programming concepts are LS647 and LS670. Most use of computers now is with pre-programmed applications software.

The students response that "confidence" is not a minimum competency may reflect a lack of confidence in their own use of computers. It is possible that students need more skills and experience, perhaps beyond the minimum competencies identified, in order to gain this confidence.

Keeping in mind that these "feelings of competence" are self reported, still we have an indication that most graduates (86%) feel competent in at least 15 of the 19 minimum competencies. The items that could be given more stress to improve the students competence are

in the areas of telecommunications, database searching and increasing students confidence in their use of computers.

A more indepth look at the minimum computer competencies that have been identified in this study would be useful. Questions to check the internal validity should be included. A study designed to probe more deeply into students attitudes towards computers and technology would also be useful.

2. Specialist Competencies

The area of specialization was not specified on the questionnaire and these findings may not be particularly useful, since all items may be important for some area of specialization e.g. type of library, particular job function or level of position.

The percentage of students feeling competent on the specialist competencies is generally lower than on those that had been identified as minimum competencies. This is to be expected since a smaller percentage of students would be specialists. The 20 percent of students who feel competent on 40 or more of the 44 competencies might be considered to be specialists competent in their knowledge, skills and attitudes relating to computers in the library / information field. The majority of students did feel competent in the section dealing with the awareness of issues.

Programming skills, although they were selected as specialist competencies, received less emphasis than knowledge and experience of computer applications and the awareness of issues. The percentage of faculty that felt they were important competencies for specialists was generally greater than the percentage of students who felt that way.

3. Profile of Graduating Students

An interesting area of further study would be to explore the computer background and experience of incoming students as a longitudinal study. A trend might be anticipated towards a greater percentage of students enrolling with previous computer experience -- either gained through formal education, through work experience, or through owning and using a personal computer. Information on age, sex, undergraduate major, and academic achievement would provide more background information.

A survey of incoming students (N=28) in the Fall '85 semester showed that 50 percent had used a computer at work, 21 percent had a computer at home, 39 percent had taken computer courses and a total of 68 percent had some previous computer experience. It would appear from these figures that a greater number of students are entering the program with computer experience. This would be an interesting trend to follow and see how it relates to computer competency of future graduates.

4. LIS Courses

It appears that all items that were selected as minimum competencies, and most that are specialist competencies, are covered by one or more of the computer-related or non-computer related courses.

Of the computer-related courses, LS670 and LS675, which are the introductory courses dealing with computers, include the greatest number of the minimum computer competencies.

To the extent that the non-computer-related courses deal with computer competencies, they tend to concentrate on the issues raised by the use of computers in libraries and information services and to the attitudes of students. Some possible additional areas of computer integration may be in the area of computers for library management, although this is a specialist competency, and in the specific subject area reference courses in their use of databases in the humanities, social sciences, or the sciences.

5. Factors associated with Computer Competency Scores

Computer competency is a result of a complex interaction of variables. Since students do not take any one course in isolation, it is impossible to say from this study that the students' computer competence is a result of any one course. The results do show relationships that can be useful. The fact that there was a negative association between LS675 and computer competence led to further

study. This finding was rather surprising since it would seem that these students had been exposed to a wide variety of computer experiences and applications. LS675 is a course that includes the highest number of minimum competencies and from observation students spent long hours in the computer lab.

Students who had taken LS675 were quite different from students in other computer-related courses. They had little or no previous computer experience and generally took fewer computer-related courses. This leads to the conclusion that no one course is sufficient to make a person feel competent on all of the minimum computer competencies that had been selected by the respondents in this study.

The high degree of association between the students' computer background variable and their perception of competence point out an interesting area for further study. Does this indicate that those students that have previous computer experience, have a computer at home and/or use a computer at work have an aptitude to work with computers, are more aware of their uses and are more likely to feel confident in their use of them? If this is the case, what can be done to increase students computer background outside of the classroom/lab situation?

One possibility is in the area of recruitment. Perhaps an attempt should be made to actively recruit people who have computer experience, or to require computer courses as a prerequisite to entering the program. Another possibility is to encourage students to

purchase and use computers at home. The University of Hawaii is encouraging this through its special discount offers of computers for students and faculty. Students are now encouraged to use the computer lab as needed even when not required for specific assignments. There is an increased use of the lab for word processing. Students could be given more opportunity to work with computers as part of their internships or part time jobs. Two internships are available at GSLS as of the Fall '85 semester for computer lab assistants, as compared to only one in Spring '85. An additional 4 - 6 students work as computer lab volunteers. Students are employed as interns in the University Library Systems office. Increased use of computers and automation in the University, State and special libraries in Hawaii will also give future students increased computer experience.

6. Recommendations from Respondents

Respondents were asked, through an open-ended question, to make recommendations to "improve the computer competency of graduates". Suggestions were grouped as follows: Integrate computers into existing non-computer-related courses; increase the resources available in the school -- hardware, software, faculty, lab hours, courses; require a basic computer course of all students; make available non-credit introductory computer courses, including use of special applications such as word processing; have a specialization in library automation.

F. CONCLUSIONS

From this study it appears that faculty and students of GSLS feel that certain computer competencies are important for all students graduating from the MLS program.

Nineteen competencies - knowledge, skills or attitudes - pertaining to computers were identified as minimum computer competencies. The majority of GSLS graduating students do perceive themselves to be competent on most of those items that were selected as minimum computer competencies. There is room for improvement, however, in the area of telecommunications and in increasing the students' feeling of overall self confidence in their use of computers.

An additional 25 competencies were identified as necessary at the specialist level. A smaller percentage of graduates felt competent in the identified specialist knowledge, skills or attitudes.

The computer competencies identified are included in the curriculum both in the computer-related courses and to a lesser extent in the non-computer-related courses.

It appears that computer competence is not the result of any one course. More likely it is the result of a combination of learning experiences, from courses, work experience and perhaps personal characteristics. Computer background was found to be an important factor in the computer competence of graduating students.

BIBLIOGRAPHY

Anderson, R.E. & Klassen, D. L. (1981). A conceptual framework for developing computer literacy instruction. AEDS Journal, Vol.14(Spring):128-150.

Anderson, R.E. (1982). National computer literacy, 1980. IN Computer Literacy: Issues and directions for 1985, Seidel, R.J., Anderson, R.E., & Hunter, B.(Eds.), New York: Academic Press. pp.9-17

Balnaves, J. (1978). Education for information science in the next decade. Australian Library Journal, Vol.27(8):119-126.

Bard, T.B., Leide, J.E., & Craytor, C. (1983). Content statements: A component of instructional planning for basic library education. Journal of Education for Librarianship. Vol.23(Winter):238-242.

Barger, R.N. (1983). Computer literacy: Toward a clearer definition. Technical Horizons in Education Journal, Vol.11(2):108-112.

Bearman, T.C. (1984). The changing role of the information professional. Library Trends, Vol.32(3):255-259.

Berry, J. (1985). Library use of micro-computers: Massive & growing. Library Journal, February 1, 1985.

Borbely, J., Tower, Forster, & Crosby (1985). Changes in information technology: Its implications for graduate school curriculum. Online, Vol.9(2):126-128.

Cambre, M.A., & Cook, D.L. (1984). Computer anxiety: Definition, measurement, and correlates. Paper presented at the Annual meeting of the American Educational Research Association, New Orleans, LA. 33p.

Computer literacy act of 1984. House of Representatives Report 98-752, Part 1&2, May 1984.

Daniel, E.H. (1983). Education matters. In L.C. Smith (Ed.) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983). :77-83.(ERIC ED247937).

Daniel, E.H. & Ely, D.P. (1982). Competency-based education for school library media specialists. Journal of Education for Librarianship, Vol.23(1):273-278.

Davis, C.H., & Shaw, D. (1981). A brief look at introductory information science in library schools, 1980. Journal of Education for Librarianship, (Research Record), Vol.2 (4):341-343.

Divilbiss, J.L. (1978). Problems of teaching library automation. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, :67-74.

Dowlin, C.E. (1981). Education for the electronic library. Drexel Library Quarterly, Vol.17(4):77-90.

Dowlin, C.E. (1984). The electronic library. New York: Neal-Schuman.

Evans, G.F. (1984). Teaching new technologies: Whose role is it? IFLA Journal, Vol.10(2):151-157.

Fine, S. (1979). Resistance to technological innovation in libraries: Research report, Part II: Data analysis and statistical report. Final Report, Pittisburgh Univ., PA: Graduate School of Library and Information Sciences. 250p.

Fondin, H. (1984). The impact of new information systems on the training of future information professionals. Journal of Information Science, Vol.8(2):49-55.

Fosdick, H. (1984). Trends in information science education. Special Libraries, Vol.75(4):292-302.

Garoogian, R. (1981). The changing role of library schools in recruitment and selection: Implications for the profession. Drexel Library Quarterly, Vol.17( ):75-93.

Gillespie, R.G. (1981). Goals for computing in higher education. Journal of Educational Technology Systems, Vol.9(2):171-178.

Gleaves, E.S. (1982). Library education: Issues for the eighties. Journal of Education for Librarianship, Vol.22(4):260-274.

Griffin, H.L. (1983). Special librarians face the new technology. In L.C. Smith (Ed.) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983). :77-83. (ERIC ED247937).

Griffiths, J.M. (1983). Competency requirements for library and information science professionals. In L.C. Smith (Ed.) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983. :5-11.

Griffiths, J.M. (1983). New directions for library and information science education. Journal of education for Librarianship, Vol.24(Summer):48-50.

Griffiths, J.M. (1984). Educating the information professional of the future. Challenges to an Information Society, Proceedings of the 47th American Society for Information Sciences Annual Meeting, Vol.21. White Plains, N.Y.:Knowledge Industry, :68-73.

Griffiths, J.M. (1984). Our competencies defined: A progress report and sampling. American Libraries, Vol.15(1):43-45.

Gross, P.N. (1983). Flushing out the fear of computing. Data Management, Vol.21(6):34-35.

GSLS (1985). 1985/87 University of Hawaii at Manoa Graduate School of Library Studies (bulletin).

Henderson, K.L. (1983). The new technology and competencies for "The most typical of the activities of libraries": Technical serivces. In Smith (1983) p.12-42.

Horton, W.F. (1983). Information literacy vs. computer literacy. ASIS Bulletin, Vol.9(4):14-16.

Johnson, D.C., Anderson, R.E., Hansen, T.P., & Klassen, D.L. (1984). Computer literacy - what is it? In J.H. Tashner (Ed.) Improving instructions with microcomputers. Phoenix, AZ:Oryx, :22-26.

Klassen, D. (1983). Computer literacy revisited. AEDS Journal, Vol.17(1-2):41-49.

Knapper, C.K., Wills, B.L. (1984). Teaching computing across the curriculum: A Canadian viewpoint. Technical Horizons in Education Journal, Vol.11(4):98-102.

Lancaster, F.W. (1984). Implications for library and information science education. Library Trends, Vol.32(3):337-348.

Large, J.A. & Guy, R.F. (1983) The role of new technology in the librarianship syllabus. Paper presented at the Annual Conference of the International Federation of Library Associations (49th, Munich, West Germany, August 21-27, 1983), 12 pages. (ERIC ED239633).

Licklider, J.C.R. (1982). National goals for computer literacy. IN Computer Literacy: Issues and directions for 1985, Seidel, R.J., Anderson, R.E., & Hunter, B.(Eds.), New York: Academic Press. pp.281-292.

Lockheed, M.E., Hunter, B. Anderson, R.E., Beazley, R.M., & Esty, E.T. (1983). Computer literacy:: Definition and survey items for assessment in school. National Center for Education Statistics.

Luehrmann, A. (1983). Compu er literacy. AEDS Monitor, Vol.21(7,8):20-21.

Masat, F.E. (1981). Computer literacy in higher education (AAHE-ERIC/Higher Education Research Report No. 6). Washington, DC: American Association for Higher Education.

Maurer, M.M., & Simonson, M.R. (1984). Development and validation of a measure of computer anxiety. Paper presented at Annual Meeting of the Association for Educational Communications and Technology, Dallas, TX

McGarry, K.J. (1983). The influence of technology on professional curricula. Aslib Proceedings, Vol.35(2):99-107.

Naumer, J.M. & White, G.T. (1984). Technological support systems in A.L.A. accredited programs. Journal of Education for Librarianship, Vol.24(4):246-259.

Nitecki, D.A. (1983). Competencies required of p ic services librarians to use new technologies. In L . Smith (Ed.) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983. :43-57. (ERIC ED247937).

Ossman, R.R. (1984). Information sources on computer literacy. Microcomputers for Information Management, Vol.1(2):155-158.

Rogers, C.D. (1982). Microcomputers in specail libraries: A survey. North Carolina Libraries, Vol.40(3/4):203-209.

Rusch, D.D. (1983). Comparative trends in library and information science curricula in the USA, Canada, and the Federal Republic of Germany. Paper presented at the Annual Conference of the International Federation of Library Associations (49th, Munich, West Germany, August 21-27, 1983), 19 pages. (ERIC ED239633).

Schlessinger, B.S. & Schlessinger, J.H. (1983). The use of microcomputers in education for librarianship and information science. IN C. Keren & L.Perlmutter (eds.) The Application of mini- and micro-computers in information, documentation and libraries. Elsevier, :177-182.

Scott, A.D. (1983). Mini- and microcomputers in education and training for library and information work. IN C. Keren & L.Perlmutter (eds.) The Application of mini- and micro-computers in information, documentation and libraries. Elsevier, :183-188.

Seidel, R.J. (1982). On the development of an information handling curriculum: Computer literacy, a dynamic concept. IN Computer Literacy: Issues and directions for 1985, Seidel, R.J., Anderson, R.E., & Hunter, B.(Eds.), New York: Academic Press. 19-32.

Smith, L.C. (Ed.)(1983) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983). (ERIC ED247937).

Speller, B.F. & Bowie, C.F. (1982). Microcomputing in library education. North Carolina Libraries, Vol.40(3/4):220-223.

Stephens, L.J. (1981). Group differences in computer science aptitude. AEDS Journal, Vol.14 (Winter):84-95.

Strange, J.H. (1981). Adapting to the computer revolution. New technologies for higher education (Current issues in higher education, No. 5), Washington, DC: American Association for Higher Education.

Swartz, T.F., Shuller, S.M., & Chernow, F.B. (1984). Educator's complete guide to computers. West Nyak, NY: Parker Pub., 280p.

Sweeney, R.T. (1983). The public librarian of the last years of the twentieth century. In L.C. Smith (Ed.) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983. :58-68. (ERIC ED247937).

Tague, J. (1979). Information science in graduate library programs. Canadian Library Journal, Vol.36(3):89-99.

Tenopir, C. (1985). Information science education in the United States: Characteristics and curricula. Education for Information, Vol.3 :3-28.

The, L. (1984). Squaring off over computer literacy. In J.H. Tashner (Ed.) Improving instructions with microcomputers. Phoenix, AZ:Oryx, :14-21.

Virgo, J.C. (1983). The role of the association in developing professional competence. In L.C. Smith (Ed.) Professional competencies - Technology and the librarian. Clinic on Library Applications of Data Processing (20th, Urbana-Champaign, IL, April 24-26, 1983). :109-123. (ERIC ED247937).

Weingand, D.E. (1984). The information hotseat: Continuing education in a changing world. Journal of Education for Librarianship, Vol.24(4):278-282.

White, H.S. (1983a). Defining basic competencies. American Libraries, Vol. (Sept.):519-525

White, H. S. (1983b). Recent developments in library education. Bowker Annual of Library and Book Trade Information, 28th edition. New York: Bowker. :257-260.

Widmer, C. & Parker, J. (1983). Micro-anxiety: how to beat it before you get it. Electronic Education, Vol.3(3):23-24.

Wolters, E. (1983). Education of librarians and documentalists using a computer laboratory and a library information system. IN C. Keren & L.Perlmutter (eds.) The Application of mini- and micro-computers in information, documentation and libraries. Elsevier, :171-182.

Zemke, R. (1983). How to conduct a needs assessment for computer-literacy training. Training, Vol.20(9):24-31.

Computer Competencies for MLS Graduates

Dear

The purpose of this study is to identify the components of computer competence for students graduating from the Graduate School of Library Studies with a Masters in Library Studies. The attached questionnaire is a list of knowledge, skills and attitudes that could be considered to be components of computer competence for MLS graduates.

GSLS faculty and graduating students will be surveyed. The results of this study will be useful for curriculum development.

This study is being carried out in partial fulfillment of the requirements for the Certificate in Advanced Library and Information Studies and has been authorized by the CALIS Committee.

The questionnaire can be completed in 20 minutes. Please complete the questionnaire and return it to Denise Davies before April 29. Your cooperation and prompt attention would be greatly appreciated. All answers will remain confidential.

INSTRUCTIONS

FACULTY: In COLUMN 1 - mark each item with a number (1), (2), (3), or (4), indicating that you feel:

- 1 the item should be a basic minimum computer competency for all graduating students.
- 2 the item goes beyond a basic minimum computer competency for all graduating students but should be included for students specializing in a particular area.
- 3 the item is not a computer competency applicable to graduates of an MLS program.
- 4 you don't know.

NOTE: When adding items under "Other" please include only those items that you feel should be a basic minimum computer competency for all graduating students. Include the course number(s) if you teach this in any course.

In COLUMN 2 - indicate with course number(s), any item that is covered by course(s) that you teach.

Please contact me if you have any questions regarding the questionnaire.

Thank you for your time and valuable input to this study.

Denise Davies
April 13, 1985

COMPETENCY 1-Basic min. 2-Specialist 3-Not applic. 4-Don't know	COURSE NUMBERS if you teach this	
		1. KNOWLEDGE ABOUT COMPUTERS
1.1		Know the history of computers.
1.2		Understand the basic principles of computer assisted storage and retrieval of information.
1.3		Understand the input, processing, and output components and functions of computers.
1.4		Understand basic computer definitions e.g. RAM, ROM, software, hardware, CPU, microprocessor ...
1.5		Has had hands on experience with a variety of computer hardware e.g. microcomputer, storage medium, printer, modem ...
1.6		Other(basic min.)_____
		2. KNOWLEDGE OF COMPUTER APPLICATIONS
2.1		Aware of the uses of computers in libraries.
2.2		Understand the principles of searching a computer database.
2.3		Aware of the special characteristics of library and bibliographic databases.
2.4		Understand the use of database management / file management programs.
2.5		Aware of the uses of computers for library management and planning e.g. statistical and spreadsheet programs.
2.6		Know how graphics programs can be used.
2.7		Understand the potential uses of telecommunications technologies for library resource sharing, access to information, and other forms of communications.
2.8		Understand the values and benefits of word processing.
2.9		Able to evaluate software.
2.10		Can communicate technical requirements to programmers, systems analysts and other non-librarians.
2.11		Understand the advantages and problems of an integrated library automation system.
2.12		Other(basic min.)_____

	COMPETENCY 1-Basic min. 2-Specialist 3-Not applic 4-Don't know	COURSE NUMBERS if you teach this	
			3. EXPERIENCE IN USE OF COMPUTER APPLICATIONS
3.1			Have conducted online database search(es).
3.2			Have used database mangagement / file management program(s).
3.3			Have used statistical program(s).
3.4			Have used graphics program(s).
3.5			Have used spreadsheet program(s).
3.6			Have used word processing program(s).
3.7			Have used telecommunications program(s).
3.8			Have used library cataloging utility e.g. OCLC.
3.9			Have performed basic computer operations e.g. loading, saving, copying programs, formatting disks.
3.10			Have written documentation or user's guide.
3.11			Have conducted a needs analysis for a library system.
3.12			Other(basic min.)_____
			4. SKILLS IN COMPUTER PROGRAMMING
4.1			Able to draw flowcharts or other diagrams of algorithms.
4.2			Able to write in structured english or other "pseudocode" for planning.
4.3			Understand the concept of subtasks or procedures.
4			Understand the process of top down design.
4.5			Aware of the various treatments of error conditions.
4.6			Able to write simple programming routines.
4.7			Have an appreciation of how a programming language works.
4.8			Understand how problems are solved through programming.
4.9			Other(basic min.)_____

COMPETENCY 1-Basic min. 2-Specialist 3-Not applic 4-Don't know	COURSE NUMBERS if you teach this	
		5. AWARENESS OF ISSUES
5.1		Aware that the computer is a tool for managing information.
5.2		Understand the impact of computers on library operations.
5.3		Aware of the limitations of computers.
5.4		Aware of the issues involved in implementing computer technology in an organization.
5.5		Know how computers are used in the sharing of resources.
5.6		Aware of the effect of computers on privacy, freedom of information.
5.7		Understand the importance of data security.
5.8		Other(basic min.)_____
		6. ATTITUDES
6.1		Aware of the need to continue to keep up to date with the rapid changes taking place in the field of computers and information technologies.
6.2		Feel confident and comfortables in their use of computers.
6.3		Other(basic min.)_____

7. Do you feel that most students graduating now with an MLS have at least a basic minimum computer competence?

____Yes.
____No.
____Don't know.

8. What recommendation(s) would you give to improve the computer competency of GSLS students?

Thank you very much for completing the questionnaire.

Computer Competencies for MLS Graduates

Dear

The purpose of this study is to identify the components of computer competence for students graduating from the Graduate School of Library Studies with a Masters in Library Studies. The attached questionnaire is a list of knowledge, skills and attitudes that could be considered to be components of computer competence for MLS graduates.

GSLS faculty and graduating students will be surveyed. The results of this study will be useful for GSLS curriculum development.

This study is being carried out in partial fulfillment of the requirements for the Certificate in Advanced Library and Information Studies and has been authorized by the CALIS Committee.

The questionnaire can be completed in 20 minutes. Please complete the questionnaire and return it to Denise Davies before April 29. Your cooperation and prompt attention would be greatly appreciated. All answers will remain confidential.

Please contact me if you have any questions regarding the questionnaire.

Thank you for your time and for your valuable input into this study.

Denise Davies
April 14, 1985

1. Date first entered the MLS program _____(Semester)/_____(Year).

2. Expected date of graduation _____(Semester)/_____(Year).

3.1 Check any of the following courses that you have taken. Summer graduates please mark with an S if you will be taking the class in the summer semester.

____ LS593 Introductory programming - Pascal.
____ LS601 Introduction to reference.
____ LS605 Basic cataloging and classification.
____ LS647 Systems approach to library operations.
____ LS663 Online information services.
____ LS670 Introduction to information storage and retrieval.
____ LS671 Computers in information and library processing (PL/1).
____ LS672 Library automation.
____ LS673 Information and records management.
____ LS674 Database design and creation.
____ LS675 Microcomputers in libraries and information centers.
____ LS695 Seminar in research in librarianship.
____ LS715 Seminar in information policy and planning.

3.2 During your MLS program, how much time have you spent in the computer lab? (include OCLC, DIALOG searches, use of microcomputers, UHCC). N.B. there are 15 weeks in a semester.

____ More than 40 hours.
____ 31 - 40 hours.
____ 21 - 30 hours.
____ 11 - 20 hours.
____ 1 - 10 hours.
____ Less than 1 hour.

4. Which area(s) of librarianship do you hope to work in? Check all that apply.

____ Academic libraries.
____ Public libraries.
____ School libraries.
____ Special libraries.
____ Other (Please describe)_____

5. Have you attended any workshops or non-class lectures concerned with computers or other information technologies?

____ Yes.
____ No.

6. How would you describe your computer experience before beginning the MLS program?

____ No previous experience.
____ Some experience.
____ Very experienced.

7. If you had used computers before attending GSLS, what had you used them for?

____ Word processing.
____ Database management / file management.
____ Spreadsheet / financial management.
____ Programming - What language(s)_____
____ Games.
____ Other_____

8. Do you have a computer at home?

____ Yes. How long have you had it? _____(Years)/_____(Months).
____ No.

9. Do you use a computer at work?

____ Yes.
____ No.
____ I am not working.

10. Do you feel that all MLS graduates should have at least a basic computer competence?

____ Yes.
____ No.

INSTRUCTIONS for questions 11 - 16: In COLUMN 1 - mark each item with a number (1), (2), (3), or (4), indicating that you feel:

- 1 the item should be a basic minimum computer competency for all graduating students.
- 2 the item goes beyond a basic minimum computer competency for all graduating students but should be included for students specializing in a particular area.
- 3 the item is not a computer competency applicable to graduates of an MLS program.
- 4 you don't know.

NOTE: When adding items under "Other" please include only those items that you feel should be a basic minimum computer competency for all graduating students.

In COLUMN 2, mark with:

- Y if you feel you have this competency.
- N if you feel you do not have this competency.

COMPETENCY 1-Basic min. 2-Specialist 3-Not applic. 4-Don't know	YOU HAVE THIS COMPET-ENCY? Y / N	
		11. KNOWLEDGE ABOUT COMPUTERS
11.1	_____	Know the history of computers.
11.2	_____	Understand the basic principles of computer assisted storage and retrieval of information.
11.3	_____	Understand the input, processing, and output components and functions of computers.
11.4	_____	Understand basic computer definitions e.g. RAM, ROM, software, hardware, CPU, microprocessor ...
11.5	_____	Have hands on experience with a variety of computer hardware e.g. microcomputer, storage medium, printer, modem ...
11.6	_____	Other(basic min.)_____
		12. KNOWLEDGE OF COMPUTER APPLICATIONS
12.1	_____	Aware of the uses of computers in libraries.
12.2	_____	Understand the principles of searching a computer database.
12.3	_____	Aware of the special characteristics of library and bibliographic databases.
12.4	_____	Understand the use of database management / file management programs.
12.5	_____	Aware of the uses of computers for library management and planning e.g. statistical and spreadsheet programs.
12.6	_____	Know how graphics programs can be used.
12.7	_____	Understand the potential uses of telecommunications technologies for library resource sharing, access to information, and other forms of communications.
12.8	_____	Understand the values and benefits of word processing.
12.9	_____	Able to evaluate software.
12.10	_____	Can communicate technical requirements to programmers, systems analysts and other non-librarians.
12.11	_____	Understand the advantages and problems of an integrated library automation system.
12.12	_____	Other(basic min.)_____

COMPETENCY 1-Basic min. 2-Specialist 3-Not applic. 4-Don't know	YOU HAVE THIS COMPET-ENCY? Y / N	
		13. EXPERIENCE IN USE OF COMPUTER APPLICATIONS
13.1	_____	Have conducted online database search(es).
13.2	_____	Have used database mangagement / file management program(s).
13.3	_____	Have used statistical program(s).
13.4	_____	Have used graphics program(s).
13.5	_____	Have used spreadsheet program(s).
13.6	_____	Have used word processing program(s).
13.7	_____	Have used telecommunications program(s).
13.8	_____	Have used library cataloging utility e.g. OCLC.
13.9	_____	Have performed basic computer operations e.g. loading, saving, copying programs, formatting disks.
13.10	_____	Have written documentation or user's guide.
13.11	_____	Have conducted a needs analysis for a library system.
13.12	_____	Other(basic min.)_____

		14. SKILLS IN COMPUTER PROGRAMMING
14.1	_____	Able to draw flowcharts or other diagrams of algorithms.
14.2	_____	Able to write in structured english or other "pseudocode" for planning.
14.3	_____	Understand the concept of subtasks or procedures.
14.4	_____	Understand the process of top down design.
14.5	_____	Aware of the various treatments of error conditions.
14.6	_____	Able to write simple programming routines.
14.7	_____	Have an appreciation of how a programming language works.
14.8	_____	Understand how problems are solved through programming.
14.9	_____	Other(basic min.)_____

COMPETENCY 1-Basic min. 2-Specialist 3-Not applic. 4-Don't know	YOU HAVE THIS COMPET-ENCY? Y / N	
		15. AWARENESS OF ISSUES
15.1	_____	Aware that the computer is a tool for managing information.
15.2	_____	Understand the impact of computers on library operations.
15.3	_____	Aware of the limitations of computers.
15.4	_____	Aware of the issues involved in implementing computer technology in an organization.
15.5	_____	Know how computers are used in the sharing of resources.
15.6	_____	Aware of the effect of computers on privacy, freedom of information.
15.7	_____	Understand the importance of data security.
15.8	_____	Other(basic min.)_____

_____

		16. ATTITUDES
16.1	_____	Aware of the need to continue to keep up to date with the rapid changes taking place in the field of computers and information technologies.
16.2	_____	Feel confident and comfortable in the use of computers.
16.3	_____	Other(basic min.)_____

_____

17. Do you feel that most students graduating now with an MLS have at least a basic minimum computer competence?

____Yes.
____No.
____Don't know.

18. What recommendation(s) would you give to improve the computer competency of GSLS students?

Thank you very much for completing this questionnaire.

GSLS Curriculum Content Statements

To prepare for the interview, students are encouraged to read the curriculum content statements adopted by the faculty in March 1982. This document will serve as the basis for discussion during the exit interview. An outline of the content statements follows:

At the entry level of service, the professional librarian has demonstrated ability:

I. To understand the development and communication of knowledge and information.
   - A. Knowledge of the processes by which knowledge and information are generated.
     1. Role theory in the generation of knowledge and information.
     2. Role of research in the generation of knowledge and information.
     3. Role of the individual in the creation of knowledge and information.
   - B. Knowledge of theories and dynamics of information dissemination.
     1. Uses of information by individuals.
     2. Impact of information on a society.
     3. Theories of information dissemination.
     4. Role of the library and other information agencies as instrumentalities of information dissemination.
     5. Role of librarians in synthesizing information.
   - C. Knowledge of the role of networks and other cooperative systems in the dissemination of information.
   - D. Knowledge of ethical concerns and codes related to the communication of knowledge and dissemination of information.

II. To understand the development and interrelationship of librarianship and information science.

A. Awareness of the relationships between librarianship, information science and other disciplines.

B. Knowledge of the functions of libraries and other information centers in the total information/communication environment: archival, cultural, educational, recreational, informational, scholarly.

C. Knowledge of the library as an open system responsive to its constituency: behavior patterns, economics, politics and governmental policies, social and cultural values, technologies.

D. Knowledge of the role of professional associations and organizations.

E. Awareness of the literature of librarianship.

III. To understand the theories and processes for selecting and organizing information sources.

A. Knowledge of theories, processes, factors influencing collection development.
   1. Functions (archival, cultural, educational, recreational, informational, scholarly) of the library.
   2. Needs and interests of library clientele.
   3. Goals of the library.
   4. Present state of the library collection.
   5. Conflict between censorship of information sources and the free flow of information.
   6. The selector's commitment to intellectual freedom.
   7. Purpose of a selection policy.
   8. Purpose of criteria and standards used in the evaluation and recommendation of information resources.
   9. Utilization of standard selection aids.

B. Knowledge of theories and processes necessary to organize information resources.
   1. Descriptive analysis.
   2. Subject analysis.
      a. Classification system.
      b. Verbal analysis of content.
   3. Bibliographic organization and control.
      a. Recording bibliographic data.
      b. Constructing and maintaining records and files (manual and online).

IV. To understand the theories and processes involved in retrieval, dissemination, and utilization of information sources.

A. Knowledge of theories and processes involved in providing access to information sources.
   1. Retrieval of information from printed information sources.
   2. Retrieval of information from computerized data bases.
   3. Retrieval of information through regional, national, and

international library cooperation.
a. Networking systems.
b. Interlibrary loan programs.

B. Knowledge of the relationship between the needs and interests of library constituents and information services.
1. Information services in different types of libraries.
2. Information services to various special client groups.

C. Knowledge of theories and practices involved in planning and evaluating library services.

V. To understand the principles of administration applicable to libraries and information centers.
A. Knowledge of the relationship between the parent institution or agency and the library.
B. Knowledge of the role of goals and objectives in the administration of libraries.
C. Knowledge of organizational theory and administration: planning, personnel management, organizational structure, budget and finance, evaluation.

VI. To understand the skills required for program development in particular information environments.
A. Knowledge of socio-economic issues related to library program development: population trends, governmental policies, economic conditions, advances in information and communication technologies, changes and trends in education, shortages of non-renewable energy sources.

B. Knowledge of needs assessment techniques.

VII. To understand research techniques and methods of applying new knowledge as it becomes available.
A. Knowledge of the scientific method.
B. Knowledge of the historical method of research.
C. Awareness of the value of applying both the scientific method and the historical method to problems related to libraries.
D. Knowledge of research designs used investigating and solving library problems.
E. Knowledge of criteria used to evaluate research studies related to library problems.

DESCRIPTION OF COURSES

LS 601 Introduction to Reference and Information Services (3)
Philosophy, principles and practice of reference/information services in libraries and information centers. The nature of reference work; reference interview search techniques; bibliography and bibliographic control. Evaluation and use of materials; introduction to computer-based information retrieval systems.

LS 605 Basic Cataloging and Classification (3)
An introductory course in cataloging and classification. Covers basic application of AACR2, Library of Congress and Dewey Decimal classification systems, and Library of Congress subject headings, as well as use of OCLC.

LS 606 Advanced Cataloging and Classification (3)
Prerequisite: LS 605 Basic Cataloging and Classification
Continues LS 605 with study of retrieval techniques from card to online catalogs, PRECIS, serial and non-western cataloging problems and utilization of bibliographic utilities.

LS 610 The Library in Society (3)
The current scene in American librarianship: factors affecting the development of libraries and the free flow of information; librarianship among the professions; internationalism of librarianship and information science with attention to the information infrastructure in selected countries other than the US.

LS 612 History of Books and Libraries (3)
The history of print communication: the recording, preservation and transmission of knowledge and the development of libraries from earliest times through the early 20th century. Studies developments in both Eastern and Western cultures with emphasis on printing as a major instrument of communication and cultural transmission.

LS 615 Building Library Collections (3)
Criteria and tools for evaluating and selecting library materials, devising and maintaining an acquisition program, and the structure of the commercial and noncommercial book trade. Findings of library use are drawn upon where applicable.

LS 618 Government Documents and Archives (3)
Sources, types, and uses of government documents, of the US and of international agencies and their acquisition and organization for use. The relationships between published and unpublished government records and the elements of archives management are discussed.

LS 619 Conservation of Library Materials (3)
Survey of the nature of library materials and the variety of processes which cause their deterioration and destruction, and of the procedures useful in combatting this deterioration and destruction. The subject is approached from the point of view of the library administrator rather than the practitioner (restorator, binder, etc.).

LS 642 Audiovisual Services in Libraries (3)
Study of the development and maintenance of audiovisual media collections as they apply to various types of libraries. Emphasis is given to evaluation techniques, sources, and use of audiovisual materials. Sample materials are viewed/audited and evaluated. Includes laboratory experience in the use of AV equipment.

LS 647 The Systems Approach to Library Operations (3)
An overview of systems analysis, its techniques, benefits, and limitations. Focus is on libraries, but concepts are generally applicable. Structured, top down solutions are stressed throughout.

LS 650 Administration of Academic Libraries (3)
Basic theories and principles of administration and organization for effective management of academic libraries; public relations, policy making, structure of jobs and department communication and coordination, staffing, financing, and housing.

LS 651 Administration of Public Libraries (3)

Basic theories and principles of administration and organization for effective management of public libraries; history, organization, costs and budgets, sources of financial support, working with trustees, government officials, and other governmental units.

LS 660 Information Sources and Systems in Science (3)

Prerequisite: LS 601 Introduction to Reference and Information Services or consent of instructor.

Study of the bibliographic structure and sources used in building and servicing collections and providing information in the basic and applied sciences. Special attention to such pure sciences as physics, chemistry, and biology, and to applied fields of medicine, agriculture, and engineering.

LS 661 Information Sources and Systems in the Humanities (3)

Prerequisite: LS 601 Introduction to Reference and Information Services or consent of instructor.

Study of the bibliographic structure of information sources in the humanities; examination of the predominant reference sources in the different subject areas, including fine arts, theatre arts, applied arts, literature, music, religion, mythology, and philosophy. Characteristics of the literature in each area and of typical problems and methods of references work in the humanities.

LS 662 Information Sources and Systems in the Social Sciences (3)

Prerequisite: LS 601 Introduction to Reference and Information Services or consent of instructor.

Study of the bibliographic structure of information sources in the social sciences, covering primarily the fields of sociology, anthropology, political science, business, economics, psychology, education, history, and other related fields. Special focus on problems of bibliographical control; generation and the cycle of information in the social sciences.

LS 663 Online Information Services (3)

Prerequisite: LS 601 Introduction to Reference and Information Services or consent of instructor.

A study of the use of computer data base systems for provision of online interactive retrieval of bibliographic and non-bibliographic information. Analysis of the role of online services in reference work. A scheduled laboratory provides practical experience in laboratory; query languages of selected commercial systems.

LS 664 Abstracting and Indexing for Information Services (3)

Prerequisite: LS 605 Basic Cataloging and Classification

Structural patterns of subject headings/thesauri such as alphabetico-specific and PRECIS; abstracting and indexing services. Evaluating, writing and editing abstracts, designing a thesaurus, and indexing a monograph being readied for publication.

LS 665 Administration of Special Libraries (3)

Basic theories and principles of administration and organization for effective management of special libraries with emphasis on the organization and target groups, services, physical planning and budgeting in business, government, and professional organizations. Applies basic principles of librarianship to special library situations.

LS 670 Introduction to Information Storage and Retrieval (3)

The special intellectual and mechanical tools for storage, searching, reproduction, and transmission of information. Deals with the audience and materials of documentation. Of particular value to service in special research and large public and university libraries.

LS 671 Computers in Information and Library Processing (3)

Prerequisite: An introductory course in computer programming, or equivalent.

Basic concepts of computer data processing, its capabilities and limitations in such applications as acquisition, circulation, bibliographic control, information storage and retrieval, technical processing and management. Computer programming, with practice on the computer.

LS 672 Library Automation (3)

Prerequisite: LS 670 Introduction to Information Storage and Retrieval or consent of instructor.

A survey of the theories, concepts, methods and practices relating to the automation of library operations.

LS 673 Information and Records Management (3)

Prerequisite: LS 670 Introduction to Information Storage and Retrieval or consent of instructor.

An introduction to the basic theories, methodologies, and technologies applicable to the management of operating records and internal data in organizations.

LS 674 Database Design and Creation (3)

Prerequisite: LS 670 Introduction to Information Storage and Retrieval or consent of instructor.

Principles of design and creation of word-oriented (bibliographic, full text, directory) data bases from information specialist and database producer viewpoints; characteristics of word-oriented databases, field and record design, value added fields, software choice for in-house databases, commercial private file services and database marketing. Each student will be required to create a prototype database.

LS 675 Microcomputers in Libraries and Information Centers (3)

Development and use of computers in historical context, in education, and in modern libraries and information centers. Recent development and implementation of microcomputers in educational settings; experience with equipment and software. Selection and evaluation of hardware and software, administrative and CAI applications of microcomputers, support resources and services; librarian's role.

LS 681 Materials and Services for Children (3)

History of children's literature. History, philosophy and objectives of library services for children; trends in materials and services. Contemporary materials, selection aids, evaluation criteria. Research in children's literature. Library activities and programs.

LS 682 Materials and Services for Young Adults (3)

Library materials and services for young people of junior and senior high school age. History, philosophy and objectives of library services for young adults; trends in materials and services. selection aids, evaluation criteria. Research in literature for young adults. Library activities and programs.

LS 684 Administration of School Library Media Centers (3)

Basic theories and principles of administration and organization for effective management of school library media centers. Philosophy and objectives of school library media service in schools (K-12); standards, personnel, facilities, resources, budget, library instruction, program planning and evaluation..

LS 685 Traditional Literature and Oral Narration (3)

Analysis and evaluation of traditional literature of various countries emphasizing the Pacific Ocean area and Asia with attention to its value and use as source material for storytelling. Instruction and practice in the selection, adaptation and presentation of stories.

LS 686 Learning Resources in the Content Areas (3)

Learning resources in the subject areas of elementary and secondary school curricula and non-fiction of personal interest to children and adolescents. Evaluation of books, films, and other media. Use of selection aids. Integration of library skills instruction with curriculum units.

LS 693V Special Topics in Librarianship (v)

Course content reflects interest of visiting and permanent faculty and will concentrate on one major topic of current interest such as Pacific Island resources, library service to the aged, library and information networks, microcomputers, reprography, archives, medical librarianship. Repeatable for credit up to 6 credits total

LS 695 Seminar in Research in Librarianship (3)

Various methodologies and their application to problems of librarianship. Evaluation of research studies. Experience in developing, writing, and critiquing proposals.

LS 696V Practicum in Librarianship (v)

A course which may be taken at the end of the professional program of study. It provides occasion for skill development and application of academic study through observation and practice in a fieldwork program. The practicum is arranged in a selected library depending on the student's interest and career goal. Seminar sessions. May be repeated once, 3 credits each time.

LS 699V Directed Reading and/or Research (v)
Individualized program of directed reading and/or research outside the scope of regularly titled courses. Enrollment requires approval before end of previous semester, with specification of goals, work requirements, number of credits, rationale.

LS 700V Thesis Research (v)
Research for master's thesis.

LS 701 Seminar in International Librarianship (3)
Comparative and international librarianship with special emphasis on countries in Asia and/or the Pacific; role of professional organizations and international agencies. Influence of social, cultural and political factors on library development.

LS 705 Asian Research Materials and Methods (3)
Bibliography, reference tools and research methods in sources on Asia in Western and Asian languages. Discussion of published and archival repositories.

LS 715 Seminar in Information Policy and Planning (3)
Prerequisite: LS 610; Library administration courses or consent of instructor.
The study of public and organizational information policy and planning in society, with particular attention to the impact of computer and communications technology, public access to information, control and effective utilization of scientific and technical information.

LS 716 International Publishing and Bibliography (3)
An introductory study of the information infrastructure in selected countries in Africa, Latin America, and Southeast Asia with emphasis on publishing and bibliographic activities. Includes study of publishing through language patterns, for example, Spanish language publishing. Relates the findings to resource acquisition programs and problems in American libraries.