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ABSTRACT

Ten randomly-chosen U.S. American Library Association (ALA) accredited programs which grant the first professional degree in library and information science (LIS) were studied to determine to what degree, and in what manner, 15 information technologies (ITs) based on computers have been incorporated into the curricula. The method of study included both catalog analysis and telephone interviews with faculty members. Data collected included the number and type of coursework hours needed for the attainment of the first professional degree; absence or presence of computer-related requirements for admission to and graduation from the programs; characterization of the place in the curriculum of the ITs; and the degree to which the ITs are taught by hands-on experience. Eight programs offered exposure to at least one-half of the studied ITs through required courses, electives, or non-curricular activities. Instruction about or experience with electronic mail, local area networks, Internet/Bitnet use, PC operating systems, and database creation/handling was present in every studied program. Three programs included 14 or 15 ITs in their curricula; six included between 10 and 12. The interview schedule is included in the appendix. (Contains 21 references.) (Author/JLB)

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A STUDY OF THE INCORPORATION OF INFORMATION TECHNOLOGIES INTO THE CURRICULA OF SOME ALA-ACCREDITED LIBRARY AND INFORMATION SCIENCE PROGRAMS

A Master's Research Paper submitted to the
Kent State University School of Library and Information Science
in partial fulfillment of the requirements
for the degree Master of Library Science

by

Charlotte P. Lefelhocz

December, 1993

ABSTRACT

Ten, randomly-chosen, U.S., American-Library-Association-accredited programs which grant the first professional degree in library and information science (LIS) were studied to determine, to what degree and in what manner, fifteen information technologies (ITs) which are based on computers have been incorporated into their curricula. The method of study included both catalog analysis and telephone interviews of faculty members. Faculty members were selected for the study based on the subject areas under which they chose to be listed in the Directory of the Association for Library and Information Science Education, 1992-93 edition.

Data collected include the number and type of coursework hours needed for the attainment of the first professional degree, absence or presence of computer-related requirements for admission to and graduation from the programs, characterization of the place in the curriculum of the ITs and the degree to which the ITs are taught by hands-on experience.

Eight programs offered exposure to at least one-half of the studied ITs through required courses, electives or non-curricular activities. Instruction about or experience with E-mail, LANs, Internet/Bitnet use, PC operating systems and database creation/handling was present in every studied program. Three programs included fourteen or fifteen ITs in their program; six included between ten and twelve.

Database creation/handling showed the highest incidence of occurrence in required courses, closely followed by hypertext/hypermedia, PC operating systems, telecommunications packages and word processing. Least-frequently occurring in required courses were desktop publishing, graphics and bibliographic software.

No evidence was found of a significant difference between Ph.D-granting and non-Ph.D.-granting programs in their approach to integrating ITs into their curricula. Tables provide descriptive information about which ITs have been integrated into three types of courses: previously-existing, stand-alone and catchall.

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B.A., Mount Mercy College, 1965

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Approved by

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I. Introduction

How are schools of library and information science (LIS) preparing their students for a working world in which, in libraries of all types, employees and patrons are using computers? Specifically, to what extent and in what manner, have the new information technologies (ITs) based on computers been incorporated into curricular and other offerings of schools of LIS?

A wide-ranging and extensive discussion of the place of the new ITs in the LIS schools' curricula is evident in the literature. What is absent is a descriptive summary of the place in the curricula of education about, or exposure to, particular ITs. For instance, which ITs have been integrated into existing courses, which are in stand-alone courses, has exposure to some come to be expected as a condition of entrance and finally, are there other approaches to introducing them?

A study of the problem is justified because LIS educators are interested in how LIS schools, others as well as their own, are approaching the revisions in curricula which respond to the ongoing onslaught of new technology. Employers of librarians are interested, too, for they wish to know which proficiencies to expect in new graduates. Finally, students, both current LIS enrollees and candidates for enrollment, can better

understand and better navigate a path in the information field if they appreciate the pervasive effect computers have had upon it.

II. Review of the Literature

Library Literature, LISA and ERIC were searched to include publications on the topic since 1989. Abstracts of the citations were read, when possible, to enable a choice of only those citations which discussed education for the first professional degree. No discussions of post-master's programs, continuing or distance education were included. Discussions of courses in which searching, either online or CD-ROM, was the main focus, were excluded because that information technology (IT) is presently found in almost all LIS curricula.

The search yielded journal articles and chapters of books. Only those parts of the articles or chapters which discuss IT in the curriculum are summarized here; no attempt has been made to summarize the author's other viewpoints.

A. General Discussions of the Problem

Cooper and Lunin reviewed developments in education of information

professionals over a decade and stated, "technology has been the driving force behind the most visible and significant curricular changes."[1] A concurring opinion is expressed in a review of curriculum revision in ALA-accredited schools during the 1980's.[2] Three indicators that LIS schools were providing students with some grounding in automation were found in an earlier study: (1) courses cross-listed with computer science departments, (2) the positioning of the library school within the parent institution and (3) joint-degree programs between LIS schools and an automation-related discipline.[3]

Australian LIS schools were found to have more widespread use of computer-assisted learning than computer-assisted teaching, with considerable diversity in courses where the former is used. More than half of the schools had plans to extend computer-assisted learning in the next three years.[4] Four stages of development in the incorporation of IT into the curricula of European schools were defined as (1) initial experimentation, (2) introductory IT units added to the curriculum, (3) permeation of IT into the entire curriculum and (4) new IT-oriented curricula being developed. A significant developmental gap was found to exist between North European and South European schools.[5]

Two authors have written general discussions of the direction LIS schools should take in incorporating new ITs into the curriculum which emphasize not losing sight of the historical service objectives of the profession. They both state also that competencies in using existing technologies as well as evaluating potential technologies and applying them

should be taught.[6] A plea for less concern with theoretical and philosophical issues and much more attention to IT is voiced by one author.[7]

In predicting a future where "libraries in increasing numbers will need to rely on central computing facilities and their technical staffs," Malinconico stresses the need for well-developed communication skills, particularly those which facilitate functioning within a bureaucracy. He suggests that formal education should provide (1) operational experience, (2) familiarity with the best examples of applications of modern technologies, (3) understanding of the complexity of automated bibliographic systems, (4) understanding of the performance determinants of technologies' applications and (5) skill in asking the right questions rather than having the right answers.[8]

To guide curriculum development in LIS schools while responding to the computer as the single most powerful agent of change, Deerwester proposed classifying graduating students as members of one of four profiles. First, the general librarian, who would develop a conceptual model which includes "computer hardware and its operating system, a smattering of software packages and how they work, and a nodding acquaintance with structured programming language." Second, the librarian with technical responsibilities, who would possess "a deeper understanding of the computer and its role in an information society" and "might be called upon to make decisions about technological solutions to information problems, or to decide how resources are to be allocated." Third, the technical expert with library responsibilities, who would take a several-course sequence

within a LIS school covering e.g., programming or text processing, but would concentrate on interdisciplinary courses in, for instance, computer science or business schools. Fourth, the technical expert, who would ideally have a second bachelors or masters in computer science or another technical field.[9]

B. Difficulties Anticipated or Encountered in Incorporating IT into the Curriculum

There is general agreement that IT should be integrated into the curriculum rather than taught independently. Difficulties in funding for acquisition/maintenance of hardware and software and the problems posed by students who possess differing levels of computer literacy are mentioned by at least three authors.[10] Van Brakel discusses, as well, difficulties in: (1) using networked software to allow workstation users to access the same software simultaneously, including didactical implications this imposes, (2) choosing among vendors/databases and providing summarized documentation for a class, (3) training staff and (4) making hardware and software function as part of one's unique environment.[11]

Wallace discusses many of the problems mentioned by van Brakel in addition to lack of computer literacy of some faculty members and problems posed by expected faster changes in technology introduction.[12] In discussing education of library automation specialists, McLain, Wallace and Heim emphasize the development of interdepartmental relationships and the

difficulty of attracting qualified faculty.[13]

Froehlich's solutions-oriented paper, which provides a specific description of one LIS school's approach to the problem, develops many of the themes previously mentioned and recommends that LIS schools establish a committee consisting of external advisors and/or some faculty and staff who are more technologically literate.[14]

C. Descriptions of Technology-Related Courses or Software

Except where noted the articles discussed describe studies in ALA-accredited programs only. In a cursory examination of program bulletins, McLain, Wallace and Heim found wide variability in both the number of courses which emphasized the use of computers and the nature and difficulty of those courses. They suggest a curriculum for educating library automation specialists for the third level of Deerwester's schema which includes: four, not-necessarily technology-oriented, core courses, five required courses (Advanced Microcomputers, Statistical Inference, Analysis of Information Systems, Bibliographic Control Systems and Practicum in Library Automation) and three electives.[15]

Vondran has described curriculum change at one American school. Two changes he noted which involved IT were: providing an introduction to online database searching in the introductory reference course and placing greater emphasis on new forms of published media, including electronic

data, in the collections management course. Introduction to computing and information technology was "effectively removed from the core curriculum and is now considered a proficiency required as a prerequisite to other courses in the program." Those students who have previous IT experience may demonstrate their proficiency by examination; those who are not computer literate may take a special non-credit course within the school.[16]

In a study of courses taught in sixteen United Kingdom LIS programs, Rowland and Tseng categorized software used and noted common trends. Most of their common trends echo those of authors discussed in the previous section of this paper. One which is unique is increasing interest in expert systems and hypertext.[17]

Stephenson, in a study of beginning research methods courses, found 58 percent of fifty-two respondents included coverage of computer-based statistical analysis (CBSA). Of those, 70 percent included hands-on experience.[18] Smith and Adams studied all research methods and statistics courses, and found more schools had adopted CBSA in the three intervening years between their study and Stephenson's (79% of all beginning courses).[19]

Woodsworth studied bulletins from sixty schools in the United States and Canada to determine how concepts of networking and library cooperation were being taught. Seven of the schools had courses which dealt primarily with computing and telecommunications networks, thirty-two had separate courses which dealt with aspects of library cooperation and networking, while twelve covered aspects of networking as units in other courses.[20]

Kranch studied the teaching of artificial intelligence and expert systems (AI/ES) in ALA-accredited and other schools. He found that 72 percent of fifty ALA-accredited respondents had AI/ES courses and that teaching methods used were "lectures and written materials rather than laboratory practice with programs."[21]

Davis found a small, insignificant percentage increase in Association for Library and Information Science Education (ALISE) schools requiring or offering optional computer programming from 1980 to 1986. He attributed a change from COBOL and PL/1 to BASIC and Pascal to the shift from mainframes to microcomputers. The 1986 survey results mentioned for the first time, database management software and Prolog, a new language associated with AI/ES.[22]

III. Methodology

A list of library schools whose first-professional-degree programs have been approved by the Committee on Accreditation of the American Library Association was perused.[23] Schools not in the fifty United States were excluded. Remaining schools were divided into two groups, those which do not grant the Ph.D. (Group A) and those which do (Group B).[24]

The ratio of Group A schools to (Group A + Group B) schools is 0.56. To reflect this relative proportion in the sample, six schools were randomly chosen from Group A and four from Group B. Reserve choices were made

from each group (three from Group A and two from Group B) in the event that relevant data could not be obtained from all initially-chosen schools. Examination of the catalogs of the ten randomly-chosen schools revealed that one school chosen in Group A granted the Ph.D.; it was replaced by the first reserve school of Group A.

Four categories of information were tabulated from the chosen-schools' catalogs:

1. Type and number of credit hours required for the first professional degree

2. Whether there was a specific admission requirement or any statement about admission which related to computers

3. Whether there was a specific graduation requirement or any statement about graduation which related to computers

4. Any information which could be gleaned about the place in the curriculum of fifteen ITs: word processing (WP), data-base management systems (DBMS) use, spreadsheets, desktop publishing, graphics, hypertext/hypermedia, bibliographic software, information retrieval systems, E-mail, local area networks (LANs), telecommunications packages, Internet/ Bitnet use, personal computer (PC) operating systems, PC programming and statistics applications.

ITs were chosen on the basis of unavailability of information about them in previous research except for PC programming and statistics applications which were included to indicate whether a trend described by previous researchers could be confirmed.

One faculty member was chosen from each school; subject interests as published in the Directory of the ALISE, 1992-93 edition, were the criteria used in this selection. Each selected faculty member received a letter (Appendix A) which described the project, explained how

confidentiality would be maintained, delineated how they had been selected for participation, requested their participation, and indicated that they would receive a phone call during which we could arrange a telephone interview time if they were willing to participate.

In three cases (two of Group A) the selected faculty member was unable to participate and that faculty member, or someone within that department, recommended another person to be the primary interviewee. In both Group-A cases the person was another faculty member; in the Group-B case it was the chief instructor of the school laboratory.

The primary interviewee answered questions about all ITs except in three cases (two of Group A); in these cases the primary interviewee recommended either another faculty member or the head of the school laboratory as a better source of information for particular ITs.

During the first part of the telephone interview, the information gathered from the catalog of the respective school was confirmed and/or clarified. In the second part of the interview, questions were asked about each of the fifteen ITs; a flow chart (Appendix B) was used to keep the telephone interview on target.

IV. Analysis of Data

ITs were defined as available if LIS students could access them on their campus. No attempt was made to determine how the ITs were made

available to LIS students, e.g., on a local area network (LAN) in the LIS laboratory or through the university's mainframe.

A required course was defined as a for-graduate-credit course which students in the Master's program of that school, regardless of concentration, were usually expected to take. A course was considered to be required, even if a student could be exempted from it through either an examination or previous experience, if the school's catalog indicated that most students were required to take that course. Electives were all other for-graduate-credit courses.

Hands on was defined as any experience using (not discussing, reading or writing about) an IT, whether in class, as part of an assignment or a requirement that students demonstrate capabilities in that IT. Hands on was further defined as requiring every student enrolled in a particular course to have a hands-on experience. For instance, if a hands-on experience could be chosen by some students in a particular course, but was not required of all enrollees in that course, it was not considered hands on in this analysis.

Emphasis was placed on the first occurrence of the technology in the curriculum. No attempt was made to determine every occurrence, although in some cases the information was volunteered and is reported.

A. Credit Hour Requirements for First Professional Degree

Credits granted by schools on the quarter system were converted to semester credits by equating three quarter hours to two semester hours.[25] With that conversion, in the ten studied schools, the number of credit hours required for the first professional degree ranged between thirty-six and forty-two. The mode (seven schools) was thirty-six and the mean was 37.4. The mean for Group A schools was thirty-seven; the mean for Group B schools was thirty-eight.

B. Computer-Related Admission Requirements

None of the studied schools had an admission requirement related to computers. However, in four cases (one of Group A), the catalog did have a statement relating to computers and admission. The catalog statements either noted that prior exposure to computers was desirable and/or that certain careers in LIS required prior exposure to computers.

One Group-A interviewee mentioned that admitted students received a letter which stated that word processing and an acquaintance with computers was expected of them; students who had no experience in word processing were further advised to take a course through the university computer center in WordPerfect. One Group-B interviewee indicated that a student's exposure to computers was discussed with them during the

admission process; in this case a questionnaire about prior exposure was sent with materials the student received upon admission. One Group-A interviewee stated that a draft for two different such requirements had been placed before the faculty within the last three months and had failed.

C. Computer-Related Graduation Requirements (Other than Coursework)

One Group-B school required that all students demonstrate proficiency in the use of specific computer technologies by the middle of their first semester of study; the proficiency was demonstrated by passing a competency examination. One Group-A school had as a prerequisite to a required course, a not-for-graduate-credit course which was an introduction to computer usage in bibliographical problems; in this case demonstrated competency could be substituted for the prerequisite.

Five schools (all of Group A) had written comprehensive or written final examinations. In only one case, however, did the interviewee indicate that a question in information science was part of the examination. One Group-B school required a work experience before graduation. The interviewee indicated that if a student were interested in making the experience computer-related, it was possible, although there was no requirement that it be so.

D. Word Processing

In six schools (three of Group A), WP was discussed as a topic in a course; in five (two of Group A) of these schools the course was required. In all six schools except one, a hands-on experience was mandatory. In the exception, a Group-B school, a hands-on experience was expected as part of an assignment in which a WP package was evaluated. One of the six schools, a Group-A school, offered WP in an elective as well, with a hands-on experience.

Two schools, one of Group B and one of Group A, expected students to demonstrate hands-on competency although no graduate credit was given. In the workshops which were offered in the first case, there was minimum instruction in WP, that is, teaching students only to open, close and upload a PC Write file to E-mail. Students were advised to learn another WP package on their own. Two schools, both of Group A, did not address the issue; in both cases, however, the interviewee indicated that it was evident students were using WP to prepare handed-in assignments.

E. Spreadsheets

In all courses in which spreadsheet technology was taught a hands-on experience was required. Four schools (two of Group A) offered

spreadsheets in a required course and four (all of Group A) offered them in an elective. One Group-B school was considering incorporating them into an elective. The interviewee was not aware of their presence in any course in one Group-B school.

F. Desktop Publishing

Two schools (one of Group A) introduced desktop publishing in a required course without hands-on experience. Two schools (one of Group A) introduced desktop publishing in an elective; both required a hands-on experience.

Six respondents (three of Group A) said desktop publishing was not discussed in any course. In one Group-A case of these six, the software had been used in an elective course until a recent change in instructors; the graduate student association was presently using it to prepare promotional materials. In one Group-B case the interviewee indicated that students could use the software during their required work experience if they so elected.

G. Graphics

Graphics was defined as a separate software package such as Harvard Graphics. Six (three of Group A) respondents indicated there was no specific place in their curriculum where such graphics was offered. Comments from two Group-A interviewees which were volunteered were: (1) graphics had previously been part of an elective but a new instructor no longer taught it and (2) students were experiencing graphics hands-on using both BASIC and Windows in both a required course and an elective. One Group-B interviewee noted that the school offers the graphics in WordPerfect 5.1 hands on in a required course and he considers it to be as sophisticated as any separate graphics software package. Another Group-B interviewee volunteered that one professor in that school is moving in the direction of offering graphics as part of a course, probably within the next year.

Four schools (three of Group A) had a definite place in their curriculum for graphics. One Group-A school discussed it in a required course without a hands-on experience. Of the three schools offering hands-on experience, two, both Group-A schools, offered it in electives. The Group-B school presented it in a required course.

H. Hypertext/Hypermedia

All schools had the technology available, although in one Group-A case the software mentioned was a DBMS with hypertext capabilities and in another Group-A case the interviewee volunteered that it had not been updated in three years.

In one Group-B school the technology was not taught in the curriculum. In three schools (two of Group A) lectures and/or demonstrations in a required course constituted the only coverage; in the Group-B school of these cases the interviewee commented that an interested student could pursue the topic either completely independently or as a special project in some courses. In one Group-A school the technology was offered via lecture and/or demonstration in both a required course and an elective.

One Group-A school taught the technology hands on in a required course. In one Group-B school it was taught in one section of a required course with no hands-on requirement although students could choose such an experience. This same school offered it in two electives with a hands-on experience.

Four schools (three of Group A) offered first exposure in electives; in three (two of Group A) of these cases, hands-on experience was included. In one of these cases (Group A) the course was in another department in the university but was recommended as an elective for LIS students.

I. Bibliographic Software

Bibliographic software was defined as software which is used specifically to prepare bibliographies. ProCite is the example which the interviewer mentioned. Four schools (three of Group A) indicated availability to students of such software but no presence in a course.

One Group-A school discussed it, with little or no hands-on experience, in a required course as well as discussing it in an elective; in this case the interviewee was uncertain of the degree of hands-on use in the elective. One Group-B school presented it in both a required course and an elective; in both courses the experience was hands on.

Four schools (two of Group A) did not present it in a required course but presented it in at least one elective; three of these cases (two of Group A), included a hands-on experience.

J. E-mail

Three respondents (one of Group A) indicated their students' first exposure to E-mail was at a general orientation. A fourth respondent (Group B) indicated a first exposure at orientation followed by a hands-on experience in a required course.

Two schools (one of Group A) expected students to demonstrate hands-on competency although no graduate credit was given. Students

could learn the technology in a not-for-graduate-credit course in the Group-A instance; in the Group-B instance they could learn the technology in workshops.

Three Group-A respondents indicated their schools offered first exposure in a required course. In the first of the three cases, the first exposure was a demonstration only; an elective in that school offered hands-on use. In both the second and third cases the first exposure was through hands-on experience; in one of these cases there was an additional opportunity for a hands-on experience in an elective.

In one Group-A school first exposure could be by either of two avenues: in an elective with hands-on experience or through a noncredit forty-five-minute lecture/demo session presented by the head of the microcomputer laboratory at regular intervals for interested students.

K. LANs

Hands-on experience with a LAN was defined as something more than using one, e.g., learning to set one up or how to administer one.

Two schools, both Group B, discussed the technology in a required course with no hands-on experience. One Group-A school discussed it in both a required course and an elective; neither course included a hands-on experience.

Seven schools (three of Group A) presented the technology in an

elective only. Of these, three schools (two of Group A) provided a hands-on experience. Three schools (two of Group A) presented it in lecture only; one school presented it in lecture and the interviewee was uncertain if the students had a hands-on experience.

One Group-A school discussed in the previous paragraph was developing a course which would include at least discussion of LANs. At this school, some students enrolled in an elective had previously experienced the technology hands on as they had been part of an independent project in setting up the school laboratory's new LAN.

L. Telecommunications Packages

A hands-on telecommunications package experience was defined as setting up a package like ProComm or Kermit. Three schools (two of Group A) offered a hands-on experience in a required course. In two of these cases, in at least one elective, there was another hands-on experience. Two schools (one of Group A) introduced the technology in a required course with lecture only and offered it in an elective with a hands-on experience.

In two schools (one of Group A) the topic was discussed in an elective only; in the Group-B case a hands-on experience was expected. Three schools had software available if students wished to pursue the subject on their own. In the Group-B case the school charged a nominal

fee to students who wanted the software. In one of the Group-A cases, a memo which described access to various information resources provided a description of the software; this memo was distributed to all students.

M. Internet/Bitnet Use

First exposure to Internet/Bitnet use was outside of the curricular offerings in four cases. In the first case (Group B), students received a rudimentary introduction at orientation; there was further exposure through seminars and an extra-curricular offering, that is, an Internet Club. In the second case, students who had no background were sent to the computer center for free one-day workshops. This interviewee noted that students were expected to access Internet and Bitnet in some of their courses, although its use was a tool, not a learning objective, in those courses. In the third and fourth cases, students were expected to demonstrate hands-on competency; to enable them to do this the Group-A school offered a not-for-graduate-credit course and the Group-B school offered workshops. In the Group-B school's curriculum there was further exposure in one section of a required course and three electives, all hands on.

Four schools (three of Group A) offered first exposure in a required course with a hands-on experience. Of the four schools offering first exposure in a required course, three (two of Group A) volunteered

that they offered further exposure in at least one elective as did one Group-B school mentioned in the previous paragraph. In all of these cases the experiences in electives were hands on.

In two schools, first exposure occurred in an elective. In the Group-A case the experience was hands on and further exposure was available via a non-credit forty-five-minute lecture/demo session presented by the head of the microcomputer laboratory at regular intervals for interested students. In the Group-B case the interviewee was unable to characterize the type of exposure.

N. PC Operating Systems

Five schools (three of Group A) presented at least one PC operating system in a required course with four of these (three of Group A) requiring a hands-on experience. Two of the five, both Group A, provided further exposure in at least one elective. In both cases the experience was hands on. One Group-A school had first exposure in an elective with a hands-on experience.

Four schools (two of Group A) expected their students who were not knowledgeable in PC operating systems to become educated in them outside of graduate-level courses. In two of these cases (one of Group-A) opportunities were provided in the department: as part of an undergraduate course in the Group-A case and in a workshop in the Group-B case.

In two cases (one of Group A) students were informed of computer center workshops which taught the technology.

O. PC Programming

PC programming was defined as creating a program using a programming language. Six schools (four of Group A) had software available but PC programming was not part of their curriculum. In one Group-B school a hands-on experience was part of an elective. In three schools (two of Group A) it was a hands-on experience in a required course.

P. Statistics Applications

The examples of a statistics applications package given by the interviewer were SPSS and SAS. Three schools (two of Group A) had either one of the examples or a similar package available to students, although there was no specific place in their curriculum where such a package was taught. In one Group-A case consideration was being given to including the technology in a course in the future. In two schools (one of Group A) such packages were discussed in a course without hands-on experience; in the Group-A school the course was an elective and in the Group-B school it was required.

Four schools offered a hands-on experience. In the first, a Group-B school, the experience was given in one section of an elective. In the second, a Group-A school, the experience was offered in two different electives. In the third and fourth cases (one of Group A), the experience was offered in a required course, although the Group-A interviewee indicated that it probably would not be in the near future.

Q. DBMS Use and Information Retrieval Systems

The interviewer asked about instruction in databases in two different ways, expecting that most schools would characterize their instruction in a specific fashion. One question was asked about use only, of standard office-type DBMS software. A second question was posed as to the presence of instruction in student-created databases, that is, creation of information retrieval systems. Because some schools either did not distinguish their instructional efforts in this way, or did not use an office-type DBMS, the analyses of the replies about the two technologies are combined here.

Four schools (all Group A) did present database instruction first, with office-type DBMS software and later in the curriculum, either in the same course, or in another course, taught students about creation of databases. In one case, database design and office-type DBMS's were discussed in a required course, with no hands-on experience. The

interviewee indicated that if students had no previous hands-on experience with an office-type DBMS, it was suggested that they take a course in the university's business school, although most students had such previous experience. In the other three cases a hands-on experience was offered in a required course.

In two of the four cases, the distinction between the two types of instruction was made, but both types of instruction were presented in the same course, all hands on. Three of the four schools also had at least one elective which offered hands-on experience in the creation of databases.

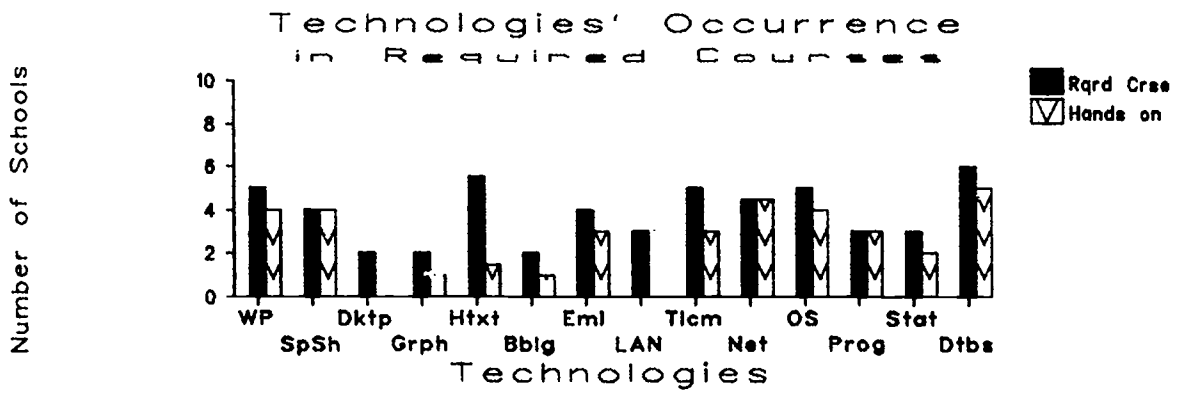
Four schools (two of Group A) did not discuss office-type DBMS's but did offer hands-on experience in database creation in at least one elective without offering it in a required course. Two Group-B schools offered a first experience in databases by teaching hands-on database creation in a required course. In one of these cases there was an elective in the curriculum which offered a more extensive hands-on experience in database creation.

R. Comparative Presence of All ITs in All Studied Curricula

Figure 1 shows the comparative presence of all studied ITs in required courses in the ten studied schools' curricula. In two cases an IT was offered in one section, rather than in every section of a required course; these occurrences are counted as 0.5. The data to support Figure 1

are in Table 4 in Appendix C.

Figure 1 should be interpreted carefully for two reasons. First, no data about electives are presented here, although the information



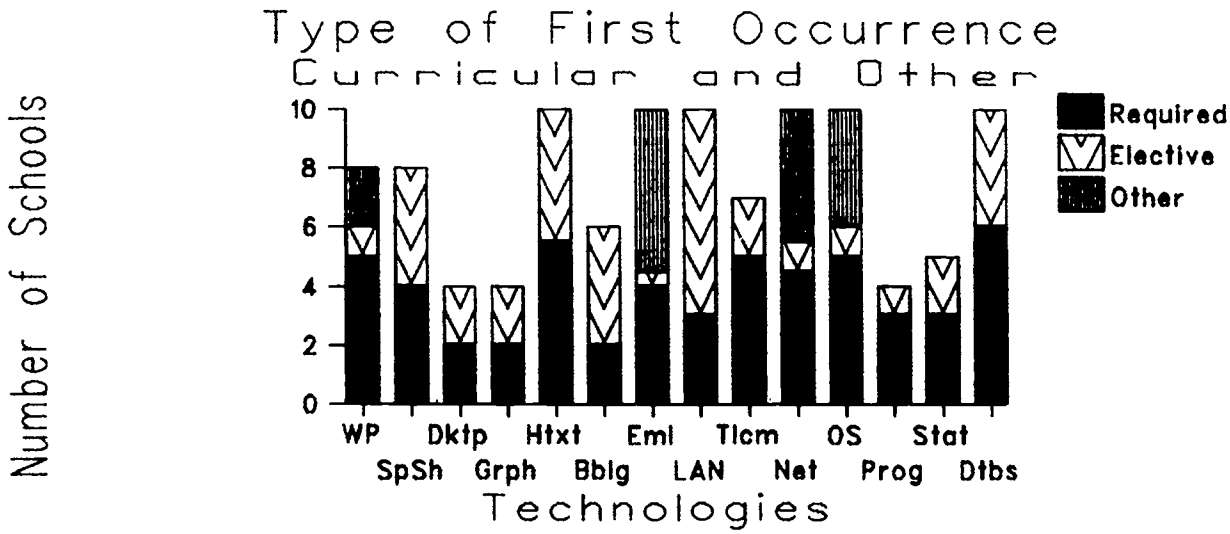
WP	= Word Processing	LAN	= Local Area Networks
SpSh	= Spreadsheets	Tlcm	= Telecommunications Packages
Dktp	= Desktop Publishing	Net	= Internet/Bitnet
Grph	= Graphics	OS	= PC Operating Systems
Htxt	= Hypertext/Hypermedia	Prog	= PC Programming
Bblg	= Bibliographic Software	Stat	= Statistics Packages
Eml	= E-mail	Dtbs	= Database Creation/Handling

Figure 1. Occurrence of Technologies in Required Courses in All Schools

volunteered by respondents indicated a significant presence of ITs in electives. Second, Figure 1 does not include any exposure which was not for credit.

S. All Reported First Occurrences of Technologies

Figure 2 shows, for each IT, the type of all reported first occurrences, topic only or hands on, curricular and non-curricular. The last-mentioned opportunities are included in the "Other" category. They are: orientations, workshops, not-for-graduate-credit prerequisites and



WP = Word Processing
SpSh = Spreadsheets
Dktp = Desktop Publishing
Grph = Graphics
Htxt = Hypertext/Hypermedia
Bblg = Bibliographic Software
Eml = E-mail
LAN = Local Area Networks
Tlcm = Telecommunications Packages
Net = Internet/Bitnet
OS = PC Operating Systems
Prog = PC Programming
Stat = Statistics Packages
Dtbs = Database Creation/Handling

Figure 2. First Occurrence of Technologies by Type

computer-center instruction. Computer-center instruction was counted if the interviewee indicated that students were advised to take such instruction. Mere presence of such instruction in the institution's computer center did not qualify it for inclusion here.

For three ITs, non-integer values are reported here. In two cases one section of a course, rather than all sections of that course, offered a first occurrence of an IT. In the third case, first exposure to an IT could be either in an elective or in a non-credit seminar. Table 5 in Appendix C contains supporting data for Figure 2.

Comparison of Figure 2 to Figure 1 indicates a considerable increase in exposure to ITs when all methods of access, rather than just required courses, are considered. Figure 2 shows graphically that fully one half of the studied technologies are present, to some degree, in at least eight of the ten studied schools. An opportunity for instruction and/or experience with six of the studied ITs is available in every studied school. These ITs are hypertext/hypermedia, E-mail, LANs, Internet/Bitnet, PC operating systems and database creation/handling. Three ITs are present in either seven or eight schools: word processing, spreadsheets, and telecommunications. ITs which occur in four or fewer schools are desktop publishing, graphics and PC programming.

T. Type of First Occurrence by School

For each school, the type of first occurrence of all ITs is presented in Figure 3. The presentation method here can be either topic only or hands on. "Other" is defined as it was for Figure 2 as experiences which the school expects students to have outside of courses. It includes orientations, workshops, not-for-graduate-credit prerequisites and computer-center instruction. The data which support Figure 3 appear in Table 6 in Appendix C.

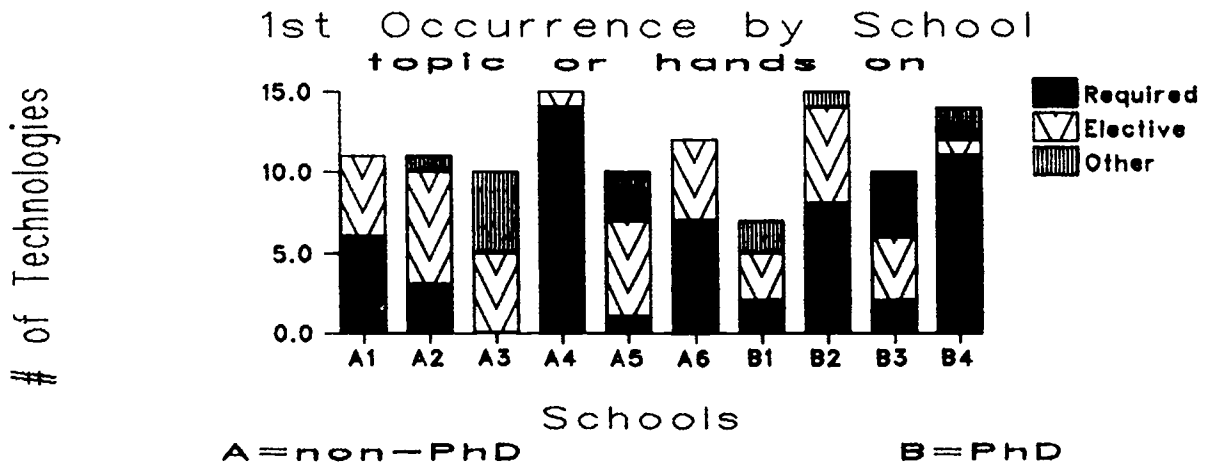


Figure 3. First Occurrence by School

Figure 3 shows that three schools (one of Group A) include

fourteen or fifteen of the studied ITs in their program. Six schools (five of Group A) include between ten and twelve ITs.

U. Comparative Presence of All ITs in Individual Schools

Figure 4 shows the degree to which all ITs are present in each of the studied schools. It also shows, for the fifteen technologies studied, as a group, the nature of their presence in students' experiences. Two comments need to be made about the data for electives. First, every occurrence of an IT in an elective was counted, even if there was more than one elective per IT. Second, the value for electives is derived from volunteered information and should be interpreted with caution; it is not as accurate as it would be if the interviewees had been asked for all occurrences of the fifteen technologies in electives. Table 7 in Appendix C contains the data with which Figure 4 was constructed.

The "Other" category gives some weight to any not-for-graduate-credit experiences with the studied technologies or other means by which the studied schools make the ITs available or more available to students. The definition of "Other" here includes all types of experiences included as "Other" in Figure 3: not-for-graduate-credit prerequisites, orientations, workshops, and computer-center instruction as well as four other types. These are non-course experiences, department-provided written

information, course changes or introductions and recommendations by advisors.

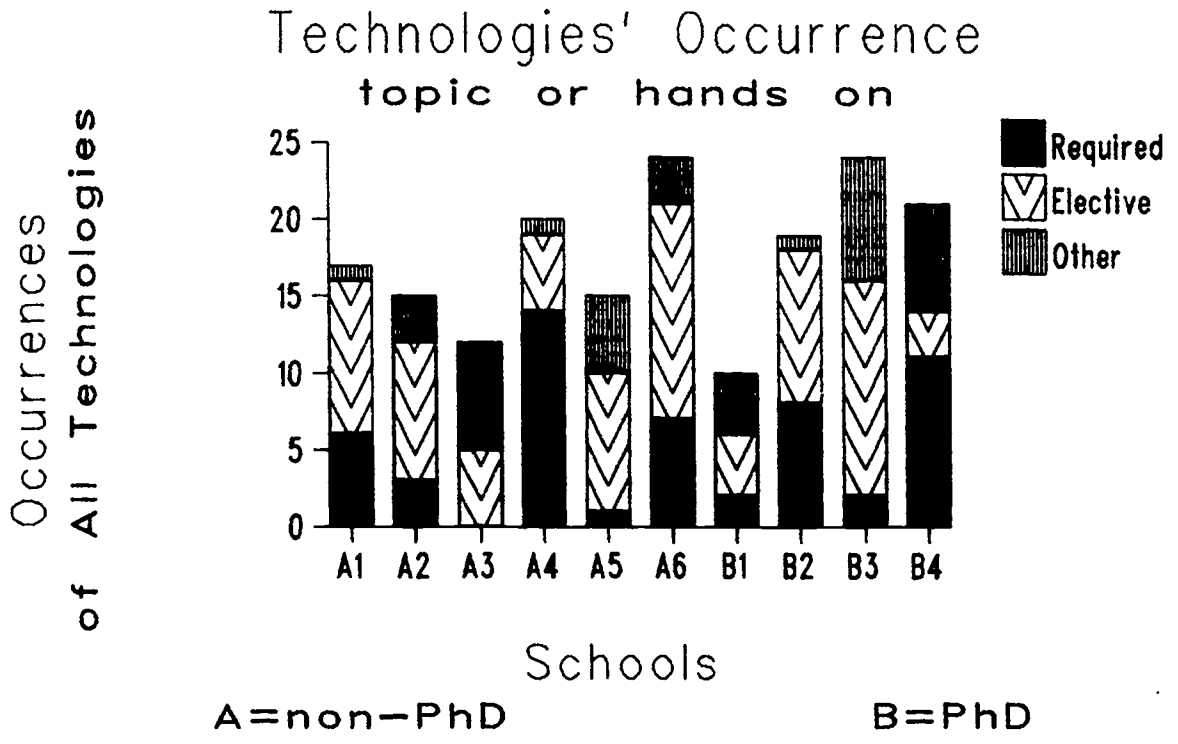


Figure 4. Occurrences of All Technologies by School

Non-course experiences included informal sessions in a school's computer laboratory in Internet and E-mail, an experience in E-mail on the school-run bulletin board, an Internet club and use of desktop publishing software by a graduate student association. Written information was provided by the department in three cases: a memo about telecommunications in general, a memo on telecommunications shareware availability and an Internet guide. Course changes or introductions included a course under development in LANs and anticipated inclusion of spreadsheets in an existing course. In one instance, students were advised to take a course in the business school if they had no previous experience with office-type DBMS software.

V. Types of Courses in which ITs Are Presented

Froehlich has described "three scenarios for the inclusion of information technologies in the curriculum." First, directly integrating them into a course; second, presenting them in a separate course, even though they are an extension of a traditional course; and third, incorporating those ITs which are independent of traditional courses into a course which encompasses all technologies not covered elsewhere.[26]

This researcher will refer to Froehlich's third scenario as a catchall course. It is herein defined as a course in which at least four of the studied ITs are presented. Of the sixty courses in which ITs

appeared in this study, eleven courses, in six schools (four of Group A), fit this catchall description.

Course descriptions were read for the remaining forty-nine courses and the courses were categorized. Tabulation of the ITs offered in each type of course was then performed. The results of this categorization and tabulation are in Tables 1, 2 and 3. The results are somewhat limited in scope both because of the small number of schools studied and the aforementioned incomplete accounting of all electives. Nevertheless some idea is given of the variety in schools' approaches to the integration of the studied ITs into curricular offerings.

V. Summary and Conclusions

There are probably as many variations in integrating ITs into the curriculum as there are schools. Certainly Figures 3 and 4 show that there is not one typical profile in the ten studied schools when one considers the relationships among required, elective and other occurrences of the ITs.

The four schools which do not have catchall courses are A3, A5, B1 and B3. It is evident upon examination of Figures 3 and 4 that three of these four schools are on the low end of total values for occurrences of all technologies. This is probably an artifact related more to the way the data were gathered than a reflection of these four schools'

TABLE 1

ITs WHICH HAVE BEEN INTEGRATED INTO AN EXISTING COURSE

COURSE TYPE	N	ITs	n
Cataloging	1		
		Internet	1
Collection Development	1		
		Spreadsheets	1
Foundations	1		
		Internet	1
Indexing, Abstracting	3		
		Bibliographic Software	2
		DBMS	1
		Information Retrieval	1
Management	2		
		Spreadsheets	2
Media, Audiovisual	7		
		Hypertext/Hypermedia	7
		Desktop Publishing	1
		Graphics	1
		Information Retrieval	1
Reference	6		
		Internet	2
		Telecommunications Pkge.	2
		Bibliographic Software	1
		DBMS	1
		Information Retrieval	1
		Spreadsheets	1
		Statistical Packages	1
Research	5		
		Statistical Packages	5
Technical Processes	1		
		E-mail	1

TABLE 2

ITs PRESENTED IN A SEPARATE COURSE

COURSE TYPE	N	ITs	n
Automation	4		
		Local Area Networks	2
		PC Programming	1
		Spreadsheets	1
		Telecommunications Pkge.	1
		Word Processing	1
Database Creation	7		
		Information Retrieval	6
		DBMS	2
		Bibliographic Software	2
Microcomputers in Lib.	2		
		Bibliographic Software	1
		DBMS	1
		Hypertext/Hypermedia	1
		Local Area Networks	1
		Spreadsheets	1
Networks	2		
		Internet	2
		Local Area Networks	2
		Telecommunications Pkge.	1
Online/OnDisc Searching	4		
		Bibliographic Software	3
		Internet/Bitnet	1
		Telecommunications Pkge.	1
Special Topics	3		
		Internet/Bitnet	1
		Information Retrieval	1
		Local Area Networks	1

TABLE 3

ITs IN CATCHALL COURSES

	n
Word Processing	6
Spreadsheets	5
Desktop Publishing	2
Graphics	6
Hypertext/Hypermedia	4
Bibliographic Software	3
E-mail	6
Local Area Networks	3
Telecommunications Packages	7
Internet/Bitnet	5
PC Operating Systems	10
PC Programming	2
Statistical Packages	2
DBMS	4
Database Creation	4

commonality in not having a catchall course. By not asking for every occurrence of ITs in electives, this researcher inadvertently put schools which had a catchall course in a more advantageous position. That is, schools with no catchall course are more likely to integrate technologies

in more different courses and probably in more electives. Some evidence to support this argument is given by school B3's position as one of two schools with the highest occurrence of technologies.

In both Figure 3 and Figure 4, these four schools show a higher incidence of "Other" occurrences of ITs than the other schools, with the exception of B4. While B4 does have a high incidence of "Other" occurrences, it also has a high number of occurrences of ITs in required courses, which A3, A5, B1 and B3 do not. This is because they resemble the school Vondran[27] described in that they have removed the introduction to computers from their for-credit curriculum. They have not ignored those students who are not computer literate, however. Rather than including the introduction to computers within their curriculum, they rely upon some combination of the following three not-for-credit experiences: prerequisites to a required course, workshops to prepare students for specific exams and computer-center instruction.

Is there a significant difference in the way that Group-A schools and Group-B schools are integrating IT into their curricula? There is no evidence in the data gathered here for such a difference. Indeed the data suggest that there are more similarities than dissimilarities between Group-A and Group-B schools. For instance, in Figure 3, of the ten schools, the two schools which are most closely matched in that they have somewhat similar ratios of elective/required and other/required occurrences and nearly-identical heights, are A5 and B3. A5 is a non-Ph.D. school and B3 is a Ph.D school.

Another indication of similarities rather than dissimilarities between non-Ph.D. schools and Ph.D. schools are the four schools which do not have catchall courses for ITs. Two, A3 and A5, do not have a Ph.D. program and two, B1 and B3, do.

If we accept van der Starre's account of four stages in the development of IT-related teaching in European schools,[28] the studied American schools, as a group, fall somewhere between the second and third stages. That is, they are between the second stage, when introductory IT units have been added to the curriculum and the third stage, that of permeation of ITs into the entire curriculum. The variety of ITs in many different curricular offerings which is documented in Tables 1, 2 and 3 shows that the studied schools are closer to the third stage than the second.

Some schools are farther along the path of total permeation of ITs into the curriculum than others. It is hoped that this study will be seen as an inducement for further study which will enable LIS educators to learn from each other's experiences, allowing them to walk that path with more certain and more sure steps.

Appendix A

School of Library and Information Science
(216) 672-2782
Fax 216-672-7965

Kent STATE UNIVERSITY
P. O. Box 5190, Kent, Ohio 44242-0001

Incorporation of Information Technologies into
American Library and Information Science Schools' Curricula

September __, 1993

First Name I. Last Name, Title
University
School/Department
Street Address
City, State Zip

Dear Title Last Name:

I am a graduate student in the School of Library and Information Science at Kent State University; as part of the requirements for my Master's degree, I am studying one facet of library and information science education. Specifically, I am interested in how new information technologies have been introduced into the curricula of programs which prepare students for the first professional degree.

You were chosen for this study because of your subject interests as published in the current ALISE directory. I will be studying the current catalog of your school and then conducting a telephone interview to confirm my findings and further explore the topic. I estimate that the telephone interview will take at most thirty minutes.

Confidentiality of responses will be maintained so that only the investigator will have access to telephone interview data; no school or department will be identifiable in any reports or other publications which result from this research. This project has been reviewed by the Kent State University Human Subjects Review Board. If you have questions about Kent State University's rules for research, please call Dr. Eugene Wenninger at (216)672-2851. If you have questions about this research project, please call me at (216)467-3669 or my advisor, Dr. Thomas Froehlich at (216)672-2782. The decision to participate in this research project is entirely yours; your refusal to participate or withdrawal from participation at any time will entail no penalties.

Results of this study will help in planning for curricular adaptations and revisions in library and information science programs. If you would like to receive an executive summary of the research results I will give you an opportunity to request one in our telephone interview. I will be calling you within the next week to confirm your desire to participate in this project and to arrange a convenient interview time. Your participation will be very important to my research; I hope that you will agree to be interviewed.

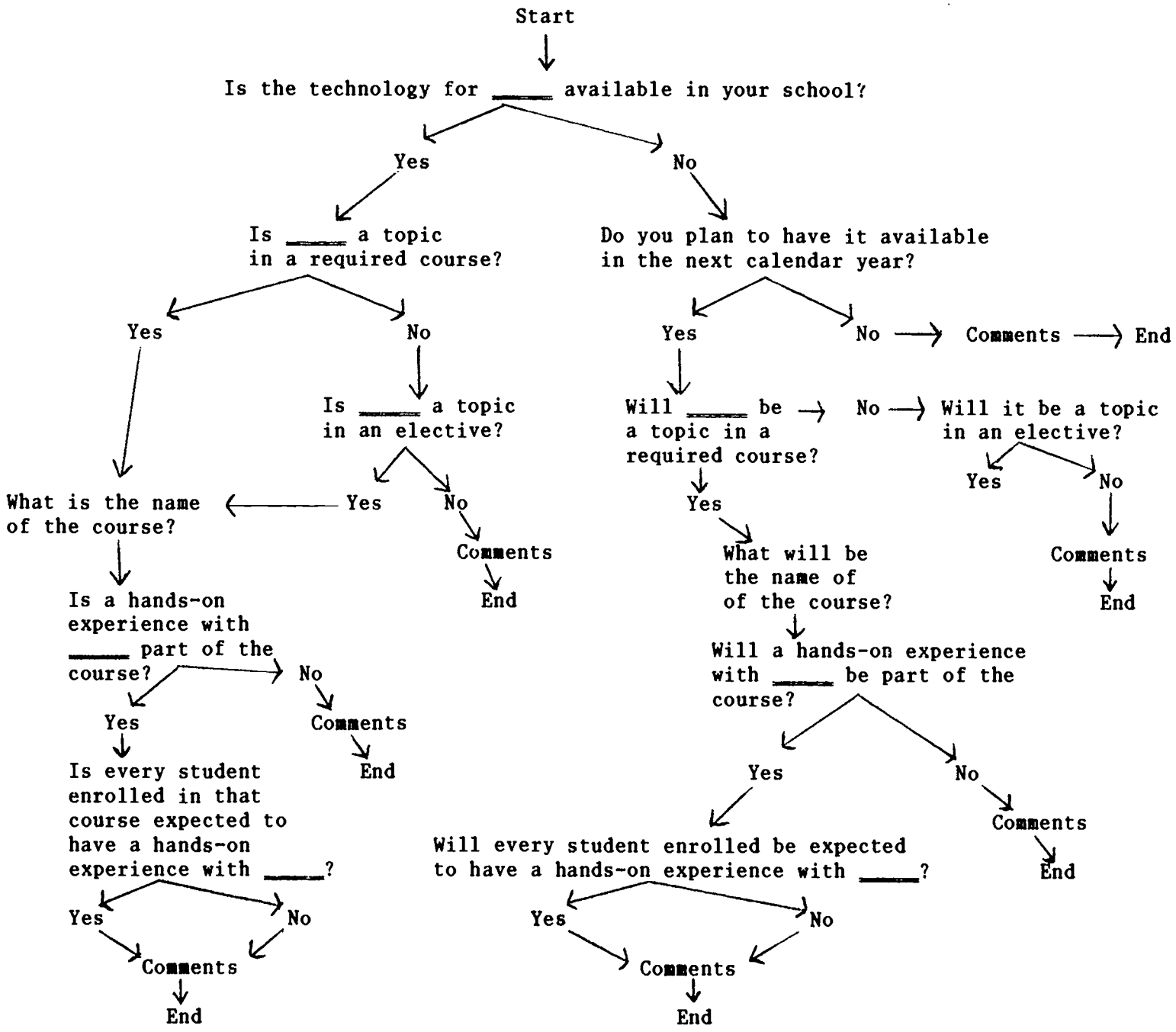
Sincerely yours,

Charlotte P. Lefelhocz
Graduate Student

Appendix B

Incorporation of Information Technologies into
American Library and Information Science Schools' Curricula

FLOW CHART FOR INTERVIEW SCHEDULE



APPENDIX C

TABLE 4

OCCURRENCE OF TECHNOLOGIES IN REQUIRED COURSES

TECHNOLOGY	TOPIC OR HANDS ON	HANDS ON
Word Processing	5	4
Spreadsheets	4	4
Desktop Publishing	2	0
Graphics	2	1
Hypertext/Hypermedia	5.5[a]	1.5[a]
Bibliographic Software	2	1
E-mail	4	3
Local Area Networks	3	0
Telecommunications Packages	5	3
Internet/Bitnet	4.5[a]	4.5[a]
PC Operating Systems	5	4
PC Programming	3	3
Statistics Packages	3	2
Database Creation or Manipulation	6	5

[a]Technology offered in one, not every, section of a required course was counted as 0.5.

Table 5

ALL REPORTED FIRST OCCURRENCES OF TECHNOLOGIES BY TYPE

TECHNOLOGY	REQUIRED	ELECTIVE	OTHER
Word Processing	5	1	2
Spreadsheets	4	4	0
Desktop Publishing	2	2	0
Graphics	2	2	0
Hypertext/Hypermedia	5.5[a]	4.5[a]	0
Bibliographic Software	2	4	0
E-mail	4	0.5[b]	5.5[b]
Local Area Networks	3	7	0
Telecommunications Packages	5	2	0
Internet/Bitnet	4.5[a]	1[a,b]	4.5[b]
PC Operating Systems	5	1	4
PC Programming	3	1	0
Statistics Packages	3	2	0
Database Creation or Manipulation	6	4	0

[a] In one school the IT was offered in one section, not every, of a required course and was offered in at least one elective.

[b] In one school the IT was were offered in an elective as well as a not-for-credit seminar.

Table 6

TYPE OF FIRST OCCURRENCE OF TECHNOLOGIES
BY SCHOOL

SCHOOL CODE	REQUIRED COURSE	ELECTIVE	OTHER
A1	6	5	0
A2	3	7[a]	1[a]
A3	0	5	5
A4	14	1	0
A5	1	6	3
A6	7	5	0
B1	2	3	2
B2	8	6	1
B3	2	4	4
B4	11	1	2

[a]Two ITs were presented in an elective as well as in a not-for-credit seminar.

Table 7

ALL OCCURRENCES OF ALL TECHNOLOGIES BY SCHOOL

SCHOOL CODE	REQUIRED COURSE	ELECTIVE	OTHER
A1	6	10	1
A2	3	9	3
A3	0	5	7
A4	14	5	1
A5	1	9	5
A6	7	14	3
B1	2	4	4
B2	8	10	1
B3	2	14	8
B4	11	3	7

NOTES

[1]Marianne Cooper and Lois F. Lunin, "Education and Training of the Information Professional," in Annual Review of Information Science and Technology Volume 24, ed. Martha E. Williams (Amsterdam: Elsevier Science, 1989), 304.

[2]Timothy W. Sineath, "Curriculum Revision Summary and Comparative Analysis," in Library and Information Science Education Statistical Report 1991, (State College, PA: Association for Library and Information Science Education, 1992), 316.

[3]John P. McLain, Danny P. Wallace, and Kathleen M. Heim, "Educating for Automation: Can the Library Schools Do the Job?" Journal of Library Administration 13 (no. 1/2 1990): 16.

[4]Joyce Kirk, "Computer-Assisted Learning and Teaching in Library and Information Studies in Australia," Information Processing and Management 29 (no. 2 1993): 255.

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[6]Raymond F. Vondran, "Rethinking Library Education in the Information Age," Journal of Library Administration 11 (no. 3/4 1989): 29; Yves Courrier, "Information Services in Crisis and the Post-Industrial Society," Education for Information 8 (September 1990): 236.

[7]Linda Main, "Research versus Practice: A 'No' Contest," Journal of Education for Library and Information Science 30 (no. 3 1990): 226-28.

[8]S. Michael Malinconico, "What Librarians Need to Know to Survive in an Age of Technology," Journal of Education for Library and Information Science 33 (no. 3 1992): 229, 235-38.

[9]Scott Deerwester, "Teaching about Computers and Technology," Bulletin of the American Society for Information Science 12 (no. 4 1986): 8.

[10]Pieter A. van Brakel, "Teaching Information Technology: A Challenging Task," The Electronic Library 9 (no. 3 1991) 131-32; Danny P. Wallace, "The Impact of Technology on Library and Information Science Education," in Educating Black Librarians, ed. Benjamin F. Speller, Jr., (Jefferson, NC: McFarland, 1991): 99-100; Thomas J. Froehlich, "Dilemmas in Incorporating and Teaching Information Technologies in Schools of Library and Information Science: An American Experience," TMs [photocopy] of paper presented at Proceedings of CONSAL IX, Ninth Congress of Southeast Asian Librarians: Future Dimensions and Library Development, Bangkok, Thailand, 1993, 4, 7-8.

[11]van Brakel, 131-33.

[12]Wallace, 101-03.

[13]McLain, Wallace and Heim, 18.

[14]Froehlich, 6, 10-12.

[15]McLain, Wallace and Heim, 8-13.

[16]Vondran, 35.

[17]Fytton Rowland and Gwyneth M. Tseng, "Computer Methods in the Teaching of Library and Information Studies," Education for Information 9 (1991): 47-54.

[18]Mary Sue Stephenson, "Teaching Research Methods in Library and Information Studies Programs," Journal of Education for Library and Information Science 31 (no. 1 1990): 50, 56.

[19]Nathan M. Smith and Irene Adams, "Characteristics of Research Courses in Library Schools," Journal of Education for Library and Information Science 33 (no. 1 1992): 75-76.

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[22]Charles H. Davis, "Programming Languages Taught in Library Schools, 1980 versus 1986," Journal of Education for Library and Information Science 31 (no. 1 1990): 25-32.

[23]Journal of Education for Library and Information Science 34 (no. 2 1993): 184-85.

[24]Association for Library and Information Science Education, Directory of the Association for Library and Information Science Education, 1992-93 (Raleigh, North Carolina: Journal of Education for Library and Information Science, 1992), 8.

[25]Jay M. Shafritz, Richard P. Koeppe and Elizabeth W. Soper, The Facts on File Dictionary of Education (New York: Facts on File, 1988), 381.

[26]Froehlich, 7.

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