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ABSTRACT

This is the final report of a 2-year project that evaluated a formal information literacy instruction program at Cornell University's Mann Library (New York). An evaluation study surveyed graduates of Mann Library's instruction program to determine which skills were retained by students and were useful in their careers after graduation; in addition, employers of Cornell graduates were surveyed to identify which information skills and knowledge are desirable in an entry-level employee. This report presents information on the history and background leading to the need for the evaluation study, and describes the results of a review of the literature of information literacy, information management instruction, and instruction evaluation programs. It defines the goals of this evaluation study, describes the methodology used, and presents results of the two surveys. It is noted that the questionnaires developed for this purpose were not skill tests, but identified major information literacy skills and knowledge needed by college graduates in business and finance. The conclusion discusses the implications of survey results for future program content and evaluation efforts. The following appendixes are provided: the survey instruments and their results; comments from businesses and recent graduates; and the goals and competencies specified by the Mann Library Information Literacy Program. (99 references) (MAB)

American Library Association

Carroll Preston Baber Research Grant

Final Report

October 1991

Assessing the Value of an Information Literacy Program

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Summary

Information literacy, the ability to retrieve and manage information, is a new form of literacy compelled by advancements in technology. In today's world, where computing and telecommunications technologies dominate, America's students must graduate with information literacy skills. The January 1989 final report of the ALA Presidential Committee on Information Literacy stressed the importance of these skills and issued a call for a concerted national effort to address this pressing educational need.[1] Cornell University's Albert R. Mann Library has made significant contributions towards developing an information literate undergraduate population. In a prototype program that began in 1987, over 1000 business and finance students have received instruction in information access and management skills.

The Carroll Preston Baber Research Grant, received in 1989 from the American Library Association, provided support for a formal information literacy instruction program evaluation at Mann Library. Most previous evaluation attempts have not offered the potential for replication elsewhere, have addressed the narrower concept of bibliographic instruction, and are not applicable to information literacy instruction programs. The questionnaires developed for this study focused on computer skills related to information access and management, rather than on skills related to library use, or even on skills related to the bibliography of a specific subject area. The questionnaires could serve as models for evaluations of information literacy instruction programs in other academic environments.

The evaluation study consisted of two surveys. Graduates of Mann Library's instruction program were surveyed to learn which skills were retained by students and were useful in their careers after graduation. Before developing the student survey, it was deemed necessary to identify which skills and knowledge were considered by

employers to be important. A questionnaire for employers was developed and administered to a selection of employers of Cornell graduates. The results of this survey were used in the development of a questionnaire that was administered to a selection of Cornell graduates who had majored in business and finance. The results of both surveys will influence the future content of Mann Library's information literacy program as it evolves beyond the prototype stage.

This is the final report of a two-year project. The report presents history and background leading to the need for an evaluation study, describes results of a review of the literature of information literacy, information management instruction and instruction evaluation programs. It defines the goals of this evaluation study, describes the methodology used, and presents results of the two surveys. The surveys investigated the usefulness and relevance of Mann Library's instruction program content. The questionnaires developed for this purpose were not skill tests, but identified major information literacy skills and knowledge needed by college graduates in business. The conclusion discusses the implications of survey results for future program content and evaluation efforts.

Background

The world is being revolutionized by the impact of telecommunications and powerful computers, particularly microcomputers. Using these new technologies, information can be stored in small spaces, retrieved and manipulated with great speed, and transmitted to a distant location in seconds. Information has become a strategic commodity in the global economy.

> "In fact, those with access to and control of information will be the power brokers of the future. They will become increasingly powerful and information wealthy at the expense of their competitors." [2]

The increasing domination of new information technologies and the transition from print to electronic information storage formats are forcing a fundamental innovation in the nature of how information is used. Members of society must learn new skills for retrieving information from a variety of electronic systems and formats, and for organizing and manipulating information using electronic processes. These new skills are essential for success and positive contributions to education, research, business, health care, politics, and other arenas of society. These new skills--information literacy skills--are survival skills in the modern world.

Literacy can be defined as having the skills necessary to connect with the information needed to survive in society. The traditional notion of literacy, delineated by the skills of reading and writing, is no longer sufficient.

> "Literacy has taken on a new dimension. It no longer means the ability to read, write, and complete basic mathematical operations. The demands of an information-and-service-based economy require that these skills be at a more advanced level than those necessitated in the previous period characterized by heavy manufacturing industries."[3]

Librarians have traditionally had teaching roles, particularly in public and academic library environments. The instructional role is crucial at Mann Library, which has for the past ten years provided classroom instruction, workshops, and tutorials that have reached thousands of students. The instruction program has evolved, in response to the growing realization that library use instruction is too limited when information is available wherever telecommunications connections exist. The belief that bibliographic instruction--instruction in the bibliography of a subject or discipline--does not go far enough in addressing the need for new information technology skills has also led to program changes at Mann. Information literacy skills now form the foundation of Mann's

instruction program.

The basic underlying goal of instruction at Mann is to produce students who will be literate in an electronic world. Students should receive instruction in information literacy skills that will enable them to function as leaders and as contributors to modern society, and to cope with the increasing complexity of the information environment. In practical terms it could be said that graduates who are literate will, in addition to the traditional skills of literacy, 1) understand the role, power, and uses of information; 2) understand the variety of contents and formats of information; 3) understand systems for organizing information; 4) develop the capability to retrieve information; and 5) develop the ability to evaluate, organize and manipulate information.

Mann Library's primary user population of over 5,000 undergraduates and approximately 1,500 graduate students and 650 faculty belong to Cornell University's College of Agriculture and Life Sciences, College of Human Ecology, and Division of Biological Sciences. The core of Mann's instruction program has been an active course related instruction program and a series of workshops open to all Cornell affiliated individuals. The information literacy program which this study addresses was built out of those programs specifically for the undergraduate program in business and finance within the Department of Agricultural Economics.

In course-related instruction at Mann Library, librarians teach information management knowledge and skills related to specific course work and assignments. Teaching is usually provided at faculty members' request and takes place during regular class sessions or in separately scheduled sessions. This is a very popular program which has provided almost six hundred course-related sessions to 15,469 students since autumn, 1983.

Most students receiving this instruction are motivated to learn. They believe that their abilities to complete class assignments will be improved as a result of the information management instruction they receive. In addition, they have immediate opportunities to put what they learn to practice. Course-related instruction is valuable also in allowing librarians, students, and faculty to form collegial ties in their work together.

Mann's series of workshops has also been very popular. Workshops in word processing, spreadsheets, bibliographic searching, and file management are provided. The workshops are voluntary, attended by people who have an immediate need to use a system or software package. Multiple sessions of each workshop are offered each semester to provide students with ample opportunities to receive instruction. These workshops have reached 15,867 Cornellians since summer 1984.

The workshops consist of lectures, demonstrations, and hands-on practice. This is supplemented by an individual tutorial for each workshop participant. Recent studies conducted by Mann Library have shown clearly the need for this individualized instruction[4,5], and the importance of reinforcing instruction with hands-on system practice. [6]

Mann has also conducted several research projects to investigate various instructional models, one of which is the Agricultural Economics Information Literacy Program. This and other models are outlined below.

1. **Tutorial experiment:**

Individual tutorials are an integral part of Mann's workshop program. Students who have taken the workshop in searching bibliographic databases, for example, later conduct their own searches with the supervision of a librarian "coach." A systematic evaluation of

this tutorial component of the workshop method was conducted in fall 1989, to assess the need for such a labor-intensive instruction process. Tutorial sessions were tape-recorded as coaches assisted students in conducting a search of bibliographic databases. Students were interviewed after the searches were completed.

2. Credit Course experiment:

In fall 1990 Mann offered a half-semester, two-credit class in the Communications Department. The course covered information evaluation, selection, access, retrieval, organization, storage, and communication. It provided hands-on laboratories, a cohesive curriculum, the full range of knowledge and skills, incremental learning, the motivation of earning credit, control of class content, and the ability to build rapport with the students.

3. The Agricultural Economics Information Literacy experiment:

This instruction program was designed in cooperation with the Curriculum Committee of the Department of Agricultural Economics. The design process was described at the Seventeenth National LOEX Library Instruction Conference in May 1989.[7] Library staff taught information management knowledge and skills in a cohesive curriculum presented in a sequence of classes required of freshmen, sophomores, juniors, and seniors. This model for providing the complete scope of skills and knowledge, to be learned incrementally (that is, each class built on the content of the previous class), reached a very large group of students and was tested between 1987 and 1990.

Undergraduate business and finance students comprised the target population for this experiment. This major, offered by the Department of Agricultural Economics, features several required classes normally taken in the freshman, sophomore, and junior years. A librarian worked with the faculty for these courses to design instructional goals, to agree

on lecture and exercise content, and to create a cohesive curriculum which would be presented incrementally throughout the freshman, sophomore, and junior years.

This Agricultural Economics information literacy program was described in an April 1989 position paper presented by Bill Coons to the ACRL Fifth National Conference:

> "The goal of our program is to ensure that our students are equipped with the knowledge, motivation, and scope of abilities necessary to become aware and sophisticated producers and users of information. We want to improve our students' efficiency and effectiveness by teaching them superior information management and retrieval skills.
>
> "Our action plan to design, implement, and evaluate an information literacy program incorporated these strategies:
> 1. Identifying the core elements of information literacy and organizing them into a cohesive curriculum
> 2. Forming specific pedagogical strategies and techniques for transferring information literacy concepts and skills in the classroom
> 3. Analyzing the curriculum and majors to determine the most appropriate points for inserting our programs as natural inclusions in established classes
> 4. Implementing the curriculum and extending it to the same population of students at different times over their four years in order to gradually develop their level of information literacy
> 5. Evaluating the success of the program and tracking a body of students over time to assess how their attitudes toward, awareness of, and skills with information have altered..."
>
> "The prototype version of the constructs and skills of our program was initiated with the College of Agriculture and Life Sciences Department of Agricultural Economics. We began with a pilot test for two classes (60 students) in the summer of 1987. The program formally began with five Fall '87 and Spring '88 classes and we are now beginning our second cycle. With over 700 undergraduate Business and Finance majors, our information

literacy program has now been integrated into several existing courses within the curriculum of that department. These classes are as diverse as Introductory Statistics, Managerial Accounting, Business Policy and Marketing Management. Through these initial efforts, we have reached over 1000 students.

" Our instruction incorporates lecture, demonstration, and discussion; involves class assignments cooperatively developed by the faculty member and a librarian, and relies on a variety of resources - irrespective of format - to teach our objectives..."

"Core components of our information literacy program focus on increasing students' awareness, changing their attitudes, transmitting knowledge to them, and developing their information access and retrieval skills. Our efforts are planned and structured over a four year time span such that each succeeding session cumulatively builds upon the lessons learned in the previous session; we are not dealing with one-shot BI classes. We teach a sequence of classes from the sophomore to senior levels, each building upon the content of the previous class, and each relating the components of one to the other..."[8]

This study, and its results, have been the activities mandated by part five of the action plan just quoted.

Methodology

The goals of this evaluation project were to:

- Assess Mann's information literacy instruction program;
- Ascertain the information skills which employers would like to see in recent college graduates; and
- Ascertain the information skills which recent graduates find necessary in their jobs.

Two surveys were designed and administered to achieve these goals. The first surveyed employers of our graduates and the second surveyed recent graduates from the Business and Finance program within the Department of Agricultural Economics. As previously stated, this was the department where our information literacy prototype had been tested. We interviewed faculty from the Department of Agricultural Economics to get their input on the types of questions, skills and issues that should be incorporated into the surveys.

The questionnaire administered to employers of recent Cornell graduates was designed to determine which information skills employers consider important in recent graduates. Questions were intended to reveal how businesspeople perceive information skills and whether there is any relationship among these perceptions based on size of business, type of industry or by profession. The project investigator met with consultants on survey research from the Cornell Dept. of Biometrics to determine the best methods for gathering this information. The method chosen, a mail survey, allowed us to reach a large population while being less time intensive and easier to administer than phone or interview surveys. The Biometrics consultants indicated that we should obtain a response rate of at least 50%, with 70-80% being ideal.

The population for the survey of employers was taken from several sources. Two hundred eighty-four recruiters who visited Cornell to interview potential employees were included. Another 259 alumni were chosen based on a search of the alumni records database. Individuals who graduated between 1950 and 1970 with administrative positions in business were selected. Eighty-two supervisors of recent Business and Finance graduates were also included. In total the survey population consisted of 625.

The survey instrument was created in consultation with the Cornell Institute for Social and Economic Research Survey Research Facility (SRF). A copy of the survey can be found in Appendix A. This survey was mailed to the 625 business people in May of 1990. A follow-up letter was sent to those who had not responded after two weeks. As of June 15, 296 useable responses were received, giving us a response rate of 47.36%, close to the 50% suggested by the Biometrics Dept. consultants.

SPSS/PC was used for data entry and analysis.

A similar methodology was followed to survey recent Cornell Business and Finance graduates. The population surveyed consisted of 157 May 1990 graduates and 442 May 1988-January 1990 graduates. All graduates of the Business and Finance program were included in the survey population with the exception of those who lived outside of the United States and Canada. The May 1988 graduates function as a comparison of sorts, as they received less instruction from Mann Library during their four years at Cornell than the 1990 graduates. The May 1988 graduates would have graduated before the Mann Library information literacy program was well established in the Dept. of Agricultural Economics.

The survey instrument was based on the survey sent to businesses, but included additional questions to assess the Mann Library program specifically. Survey respondents were asked to assess their own skills in various information technologies. We also asked them what skills were required for their jobs and where they learned these skills. A copy of the survey can be found in Appendix B.

The survey was mailed on June 15, 1990 to the 599 U.S. and Canadian graduates. A follow-up letter was sent in July to those who had not yet responded. The transient nature of recent graduates made getting an adequate response rate extremely difficult. Many surveys were returned without a forwarding address. Through significant efforts at address verification, we finally managed to obtain 317 responses. However, it was November 1990 before we reached this point, with a final response rate of 52.9%.

Again, SPSS/PC was used for data entry and analysis.

Results

The first section of the employer questionnaire asks some basic questions about the use of computers in organizations. Computers are used by over 50% of the employees in 69.9% of the companies surveyed. Only 6% of the respondents indicated that employees in their companies do not use computers. Figure 1 shows the importance of computer skills in hiring, both as indicated by employers and as perceived by our students who are now employees. Almost 40% of the employers surveyed consider computer skills important to the hiring decision. It is interesting to note that more employers than students consider computer skills important or somewhat important in this decision. Just under 20% of students and employers consider computer skills unimportant in the hiring decision.

We surveyed employers about their expectations for skills in six different areas: 1) finding information in computerized databases, 2) manipulating numeric data with a computer, 3) creating and managing databases, 4) writing computer programs, 5) preparing and producing documents using computers, and 6) using computer telecommunications networks and software. Employers were asked to rank the skill level expected in a number of specific areas within each of these broad categories of information skills. A mean value for each skill area was computed based on a ranking of 1=skills not relevant for job, 2=none, will learn on job, 3=basic skills, 4=intermediate skills and 5=advanced skills. Figures 2-7 illustrate these responses.

One concern expressed by hiring supervisors was that they did not have the same skill level expectations for all the people they hired. Thus, it was difficult to answer these questions. In spite of this problem, the results show some areas are clearly more important than others. Table 1 illustrates this. Telecommunication skills were the skills ranked the least important for new graduates, with only 20.3% of employers expecting skills at or above the basic level. Computer programming skills were ranked higher than telecommunication skills, but are expected at or above the basic level by only 24.6% of the employers surveyed. Database management skills are expected at or

above the basic level by 26% of the employers surveyed. Skills in finding information in computerized databases at or above the basic level were expected by 37.5% of employers. Table II illustrates employers' responses to the individual questions within the general area of finding information in computerized databases.

Skills in manipulating numeric data were expected by 39.6% of employers. This figure inculdes use of a variety of software for data manipulation, including spreadsheets and statistical software. Figure 8 shows the expected skill level for the use of spreadsheets specifically, as opposed to a mean score for all the skills addressed in the section for manipulating numeric data. 63.5% of the employers surveyed consider familiarity with the use of spreadsheets essential for their newly hired employees. Written comments at the end of the surveys underscore this. Students repeatedly mention the need for using spreadsheets in their jobs. One employer commented, " basic spreadsheet skills and word processing ability are ***critical***. We will not hire an entry level marketing person without these skills." Document preparation skills appear from the figures to be the skill most universally expected. Overall skills in document preparation, including word processing, desktop publishing and graphics were expected by 46% of employers. Specific skill in using a word processing program at or above the basic level was expected by 66.5% of employers.

Chi-square and one-way analysis of variance tests were performed to determine whether there was a connection between the skills expected and either the type of business or the size of the company for which the respondent worked. No correlation was found, except in very obvious cases, for example, skill in searching agricultural databases was needed more often in agribusiness than in other kinds of companies.

The survey sent to recent graduates asked them to evaluate the level of skill expected of them in their new positions in the same six areas outlined above: 1) finding information in computerized databases, 2) manipulating numeric data with a computer, 3) creating and managing databases, 4) writing computer programs, 5) preparing and producing documents using computers, and 6) using computer telecommunications networks and software. Students were asked to rank the skills expected of them as

1=don't know, 2=not needed, 3=basic skill, 4=intermediate skill, and 5=advanced skill. A mean value was created in each general category for these rankings, after recoding to eliminate the respondents who reported that they did not know what skill level was expected. Figures 9-14 illustrate the trends from these survey responses. 52.7% of the respondents indicated that they were expected to have skills in finding information in computerized databases at or above the basic level. Table III illustrates recent graduates' responses to the individual questions in this category.

Skills in manipulating numeric data were needed at or above the basic level by 48.5% of respondents. However, within that category, 75.1% of respondents indicated that they needed basic skills or better in the use of spreadsheet packages. Document preparation skills were needed by 55.3% of respondents. Within that category, 82.1% of the respondents indicated that they needed at least basic knowledge of a word processing package. As in the survey of employers, skills in telecommunications, programming and database management were not expected at the same level. Only 28.4% of respondents indicated that they needed database management skills, 20.8% for programming skills and 24.2% for telecommunication skills at or above the basic level.

Students were asked to rate their own skills in the six general areas addressed by the surveys. Figure 15 illustrates the responses to these questions.

As previously stated, one of the main goals of the project was to evaluate the effectiveness of the Mann Library Information Literacy Program. The recent graduates were asked to identify any methods which provided an opportunity for learning skills in the six areas discussed above and to rate their importance in their overall learning process. They were asked to choose from "On my own, at Cornell through academic classes, at Cornell through Mann Library's instruction, on the job, high school, and other." High School was not an important source for learning these computer skills for most students. For learning skills in finding information in computerized databases, Mann Library's instruction program was rated as an important source by 86 students out of the 317 surveyed. Another 47 students rated our program somewhat important.

However, 73 students rated the program as somewhat unimportant and 31 rated it unimportant. Sources for learning skills in all of the areas surveyed are illustrated in Figures 16-21.

It was anticipated that there would be some difference in the ratings of the importance of the Mann Library information literacy program based on year of graduation because the May 1988 graduates finished their work at Cornell before the program was fully in place. We found a positive correlation between the ratings of the Mann program and graduation date in four skill areas: finding information in computerized databases, manipulating numeric data with a computer, creating and managing databases and telecommunications, indicating that the rated importance of Mann's program increased with the increased instruction received by the more recent graduates.

Numbers and statistics can tell much, but written comments can have a powerful voice. We allowed space at the end of our surveys for respondents to express their ideas on the value of information or the importance of computers in their companies or their individual jobs. One of the purposes of our study was to determine whether the managers and workers in industry today share our philosophy on the importance of information skills. This quote perhaps answers that question, at least for one respondent. " In this decade we will realize there are only two options: understand information supported by computer technology and have a shot at success or ignore [its] value and assure failure." Other selected quotes from these comment sections may be found in Appendix C and D.

Conclusions

Our surveys have given us an excellent perspective on the skills being required of our business and finance graduates, an understanding of the needs and priorities of employers of our graduates, and an overall sense of the value of the concept of information literacy as perceived by our students and their employers.

Our results indicate that computers are used by many employees, and that information skills are considered important in the hiring process by many employers. Comments on the surveys show that some employers, while not already using computer technology throughout their organizations, feel that the need for computer skills in their organizations will increase over the next several years. Since we are training future leaders for industry, it is this increasing need our programs must meet.

The percentages in Table 1 provide a picture of the extent to which computer skills are required in today's workplace. The figures seem somewhat low, but are likely to increase over the next few years based on comments and other responses on the surveys. These figures are also composite figures for a group of skills. Percentages for the use of a wordprocessing package or spreadsheet specifically were, in fact, much higher. It appears that less emphasis should be placed on teaching mainframe programming skills for those who do not intend to be professional programmers. Instead, instruction should center on the use of applications software, such as spreadsheets and wordprocessing packages, which may include skills in programming within those packages.

Telecommunications seems to be the area whose time has not yet come in at least a portion of the business world. Over 80 respondents to the business questionnaire indicated that these skills were not applicable to the jobs that they supervised. As networking technology develops further and more companies make use of it, we believe this is likely to change. That belief is supported by comments on the surveys.

One apparent contradiction in the data is illustrated by Table 1. The levels of skill employers indicated are expected were lower than the levels our recent graduates reported are required of them. Of particular note is the difference in skills required in "Finding Information in Computerized Databases", where the percentage of employers requiring at least basic skills is 37.5% and the percentage of students who find they are expected to have basic skills is 52.7%. This difference could be in part a result of the problem identified by respondents that not all of their employees need the same level of skill. These results could also be affected by the fact that recent graduates have these skills, want to use them, and are later expected to use them after demonstrating their

capabilities.

This survey was sent to business and finance graduates, whose positions might be different than those graduating in science or the humanities. However, it is likely that the skills needed in one area of industry are going to be needed in other areas as well. One student commented, " Now that I know how important knowledge in computers is for work in any type of business, I wish that I had more exposure to different programs, packages and software at Cornell. There were opportunities to learn, but I didn't take advantage of them."

One of our main purposes in completing this study was to evaluate the effectiveness of our program. Mann Library was rated most highly from among the six categories of skills as a source of skills for finding information in computerized databases (see Figure 16). Our program placed emphasis on teaching students to access information in bibliographic, full-text and numeric databases as part of the information literacy program, so these results are not unexpected. However, instruction in the other skill areas was also included.

Although we attempted to reach all graduates of the Business and Finance program, evidence seems to show that we did not have enough contact time with the students to make a significant impact with all of them. Other Cornell classes and "on the job" were rated more important than Mann Library as a source of many of these skills. This has implications for the structure of our future programs.

The student survey instrument we developed is not a test of skills, but instead a self-evaluation tool. It incorporates the technologies and skills which are currently of primary importance in the use of computers to find and manage information. However, the technology is changing so fast, that any instrument, such as this one, is bound to be dated after a very short time. The dynamic nature of the computing environment demands that any evaluation effort or tool be dynamic as well.

The most important question that must be answered is what implications does this study have for information literacy instruction in general. The following conclusions

must be considered in the development of instructional programs:

1) Skills in the use of computers are considered in the hiring process and may give students an edge. However, more importantly, these skills are valuable to the effective performance of our students' jobs once they have them.

2) Computers are used in many companies currently, and their use is increasing.

3) Most employers are willing to train good people if they don't have the computer skills needed.

4) Few employers expect intermediate or advanced skills except when hiring for very specific positions.

5) Use of computers does not seem to vary by industry or the size of the organization a person works for. Thus, skills in managing information with computers are needed for whatever type of business related career a person is preparing for.

6) Students require less training in mainframe computer programming languages and more training in the use of applications software, including programming within these packages.

7) Other Cornell classes, "on the job" and "on my own" often rate higher than Mann Library's instruction program as students' sources of information management skills. This is probably not a result of the quality of our program, but the amount of contact time with the students.

Mann Library must now consider these points as our information literacy program continues to evolve.

TABLE I : Skill Expectations and Requirements

	% of employers expecting skills at basic level or above	% of recent grads with skill required at basic level or above
Finding information in computerized databases	37.5%	52.7%
Manipulating numeric data with a computer	39.6%	48.5%
Creating and managing databases	26.0%	28.4%
Writing computer programs	24.6%	20.8%
Preparing and producing documents	46.0%	55.3%
Using computer telecommunications	20.3%	24.2%

TABLE II : Skills in Finding Information in Computerized Databases Expected by Employers

	Require Basic Skills or Better
Find appropriate computerized information resources	41.5%
Find information in various storage formats (e.g., floppy, hard or optical disks; magnetic tape)	51.5%
Understand how databases are organized in order to find information more effectively	53.4%
Search numeric databases such as census data or commodity prices	24.9%
Search full-text databases such as complete journal articles or other textual documents	25.3%
Search bibliographic databases to find references to articles, books, or reports	24.9%
Search directory databases such as name and address files	35.8%
Search in-house proprietary files such as personnel databases, inventory records, customer service files, etc.	42.5%

TABLE III : Skills in Finding Information in Computerized Databases Expected of Recent Graduates

	Require Basic Skills or Better
Find appropriate computerized information resources	68.8%
Find information in various storage formats (e.g., floppy, hard or optical disks; magnetic tape)	66.6%
Understand how databases are organized in order to find information more effectively	63.2%
Search numeric databases such as census data or commodity prices	42.6%
Search full-text databases such as complete journal articles or other textual documents	36.0%
Search bibliographic databases to find references to articles, books or reports	30.0%
Search directory databases such as name and address files	53.9%
Search in-house proprietary files such as personnel databases, inventory records, customer service files, etc.	60.6%
Construct a logical strategy to search for information in a database	47.7%
Use controlled vocabulary such as SIC codes, registry numbers or thesaurus terms to conduct search	38.5%
Use key words to conduct an effective information search	53.4%
Use logical operators such as "and," "or," and "not" to increase or decrease search results	37.1%
Apply the concept of truncation or "wildcards"	25.2%
Correctly interpret field tags, abbreviations, codes and other data elements accompanying citations	36.0%

Figure 1: Importance of Computer Skills in Hiring

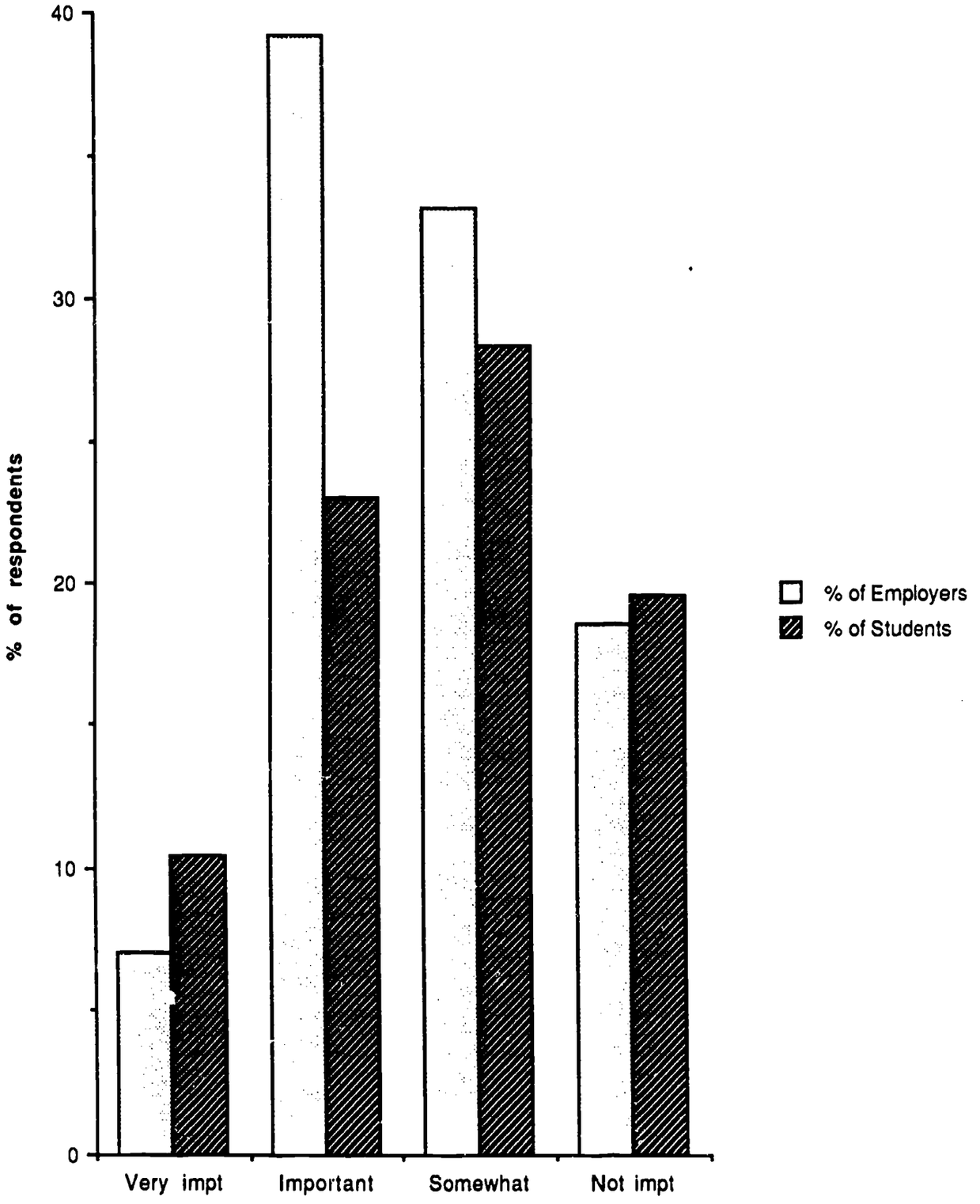


Figure 2: Employers Expectations for Skills in Finding Information in Computerized Databases

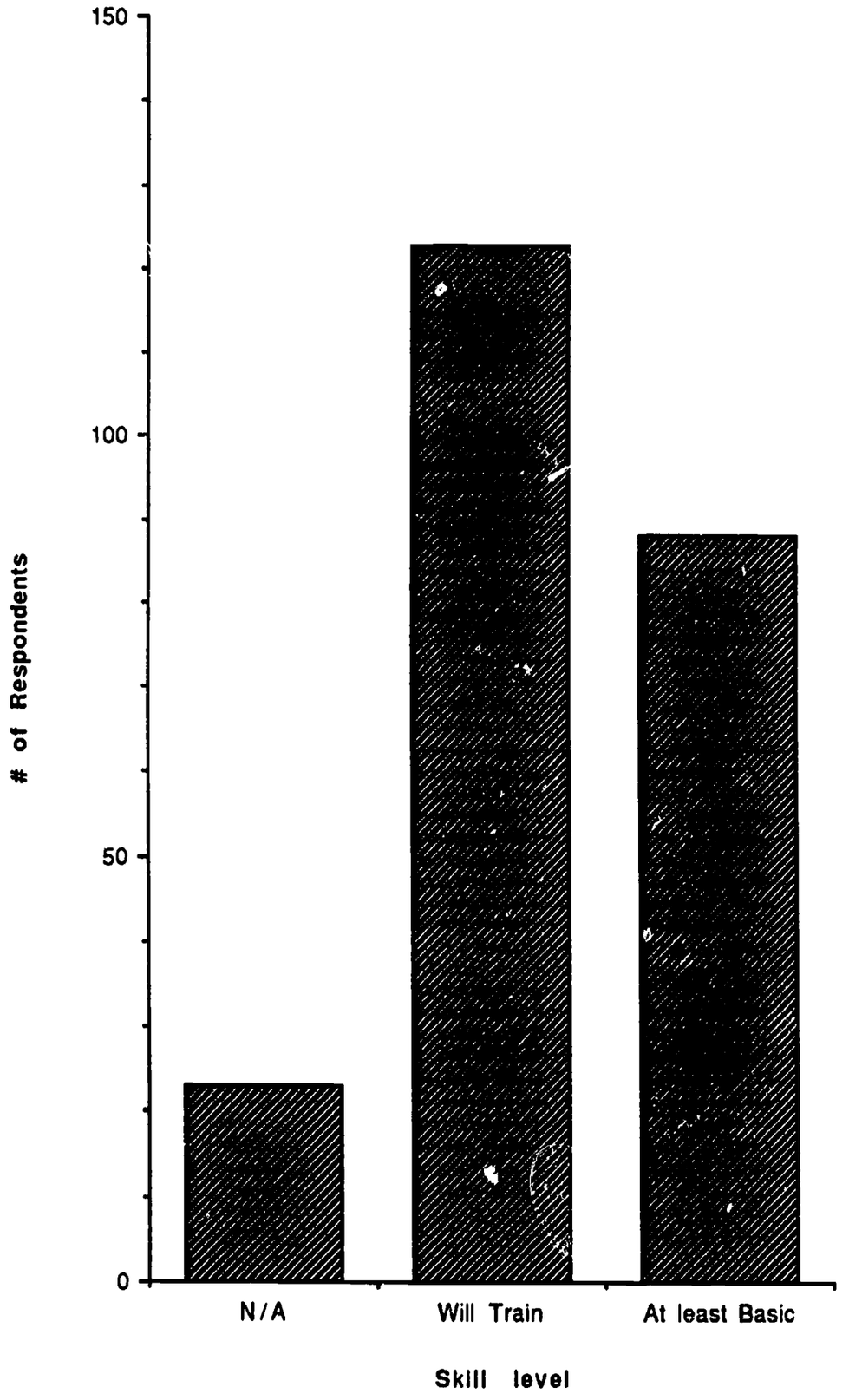


Figure 3: Employers Expectations for Skills in Manipulating Numeric Data

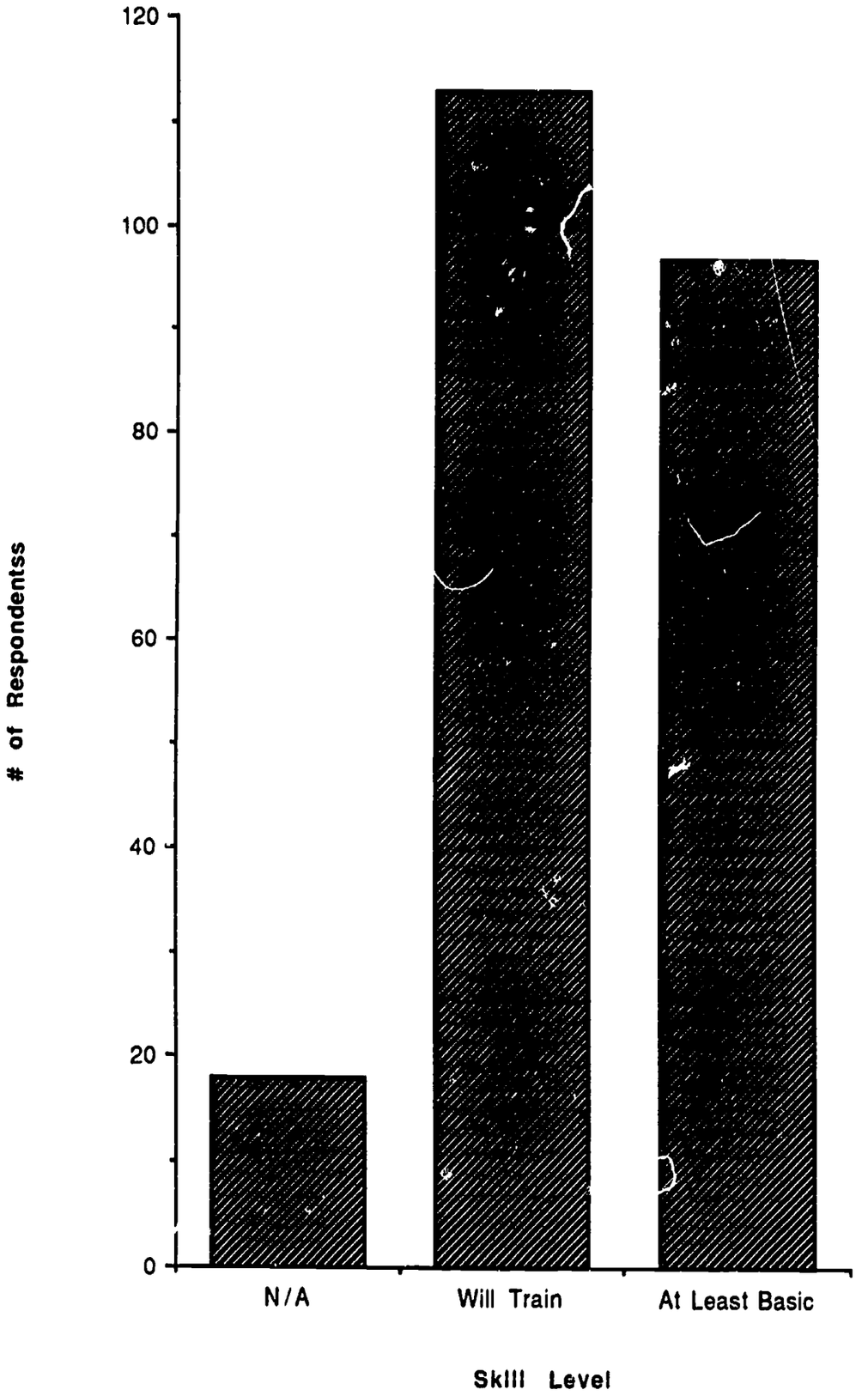


Figure 4: Employers Expectations for skills in Database Management

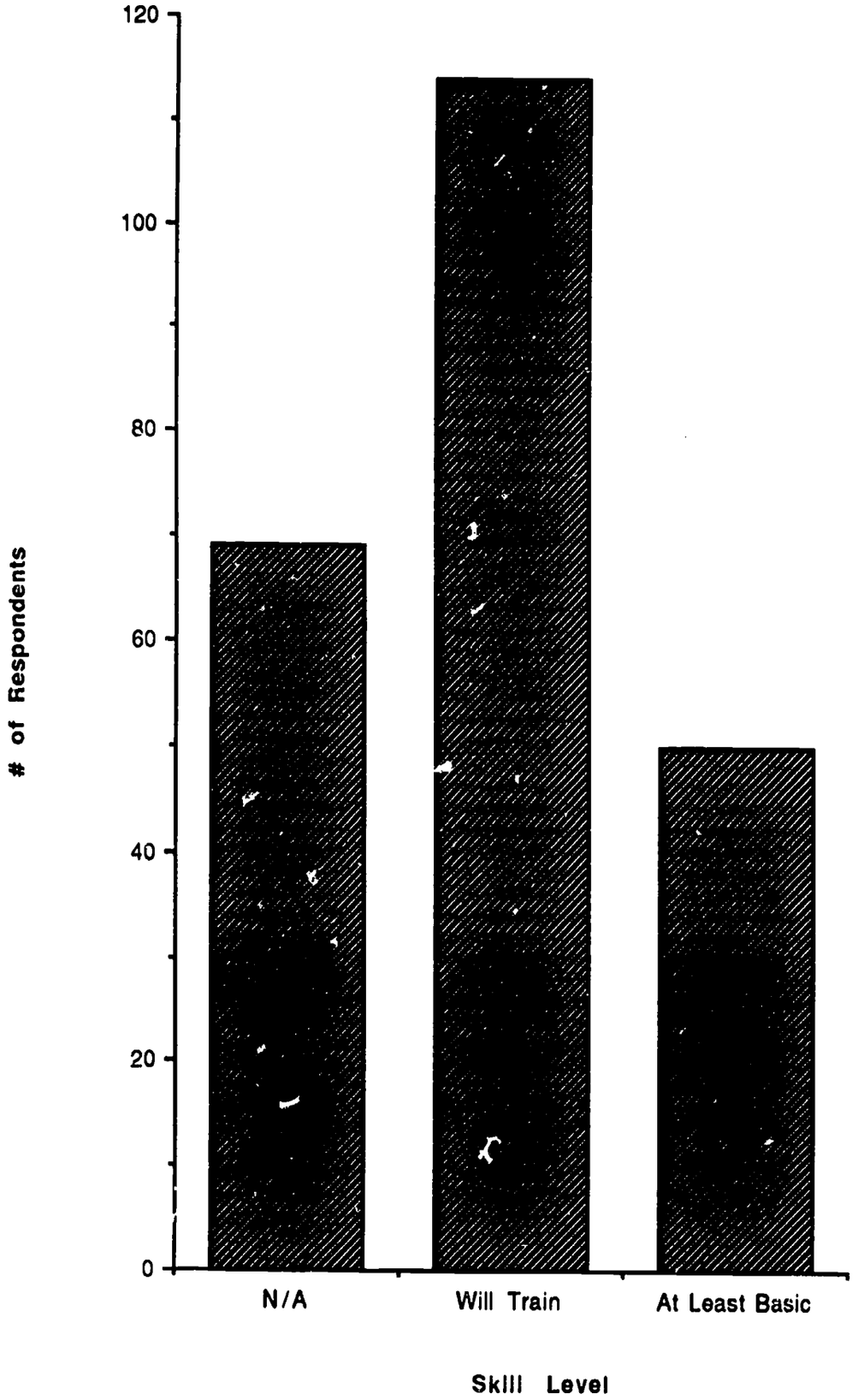


Figure 5: Employers Expectations for Skills in Computer Programming

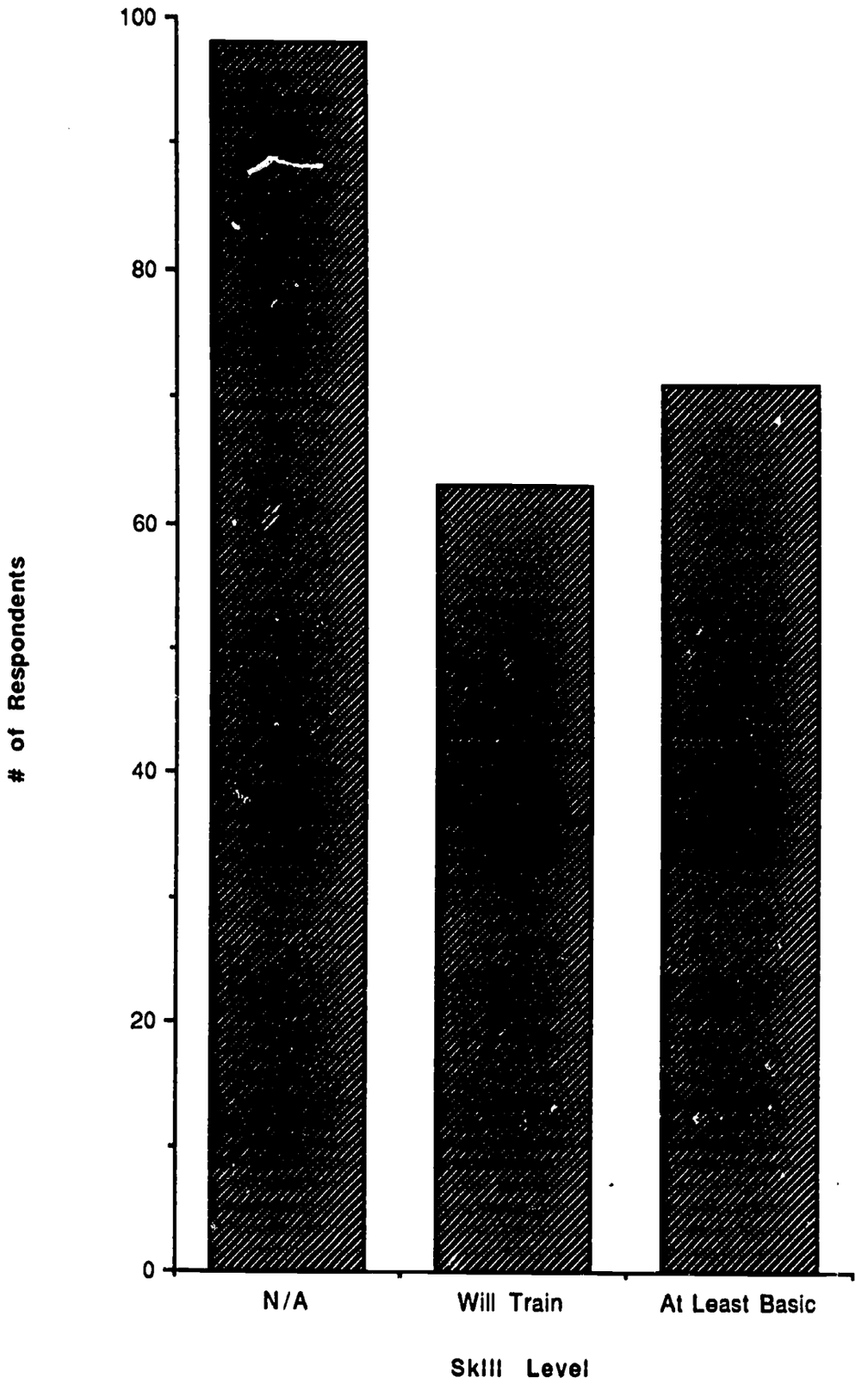


Figure 6: Employers Expectations for Skills in Preparing and Producing Documents Using Computers

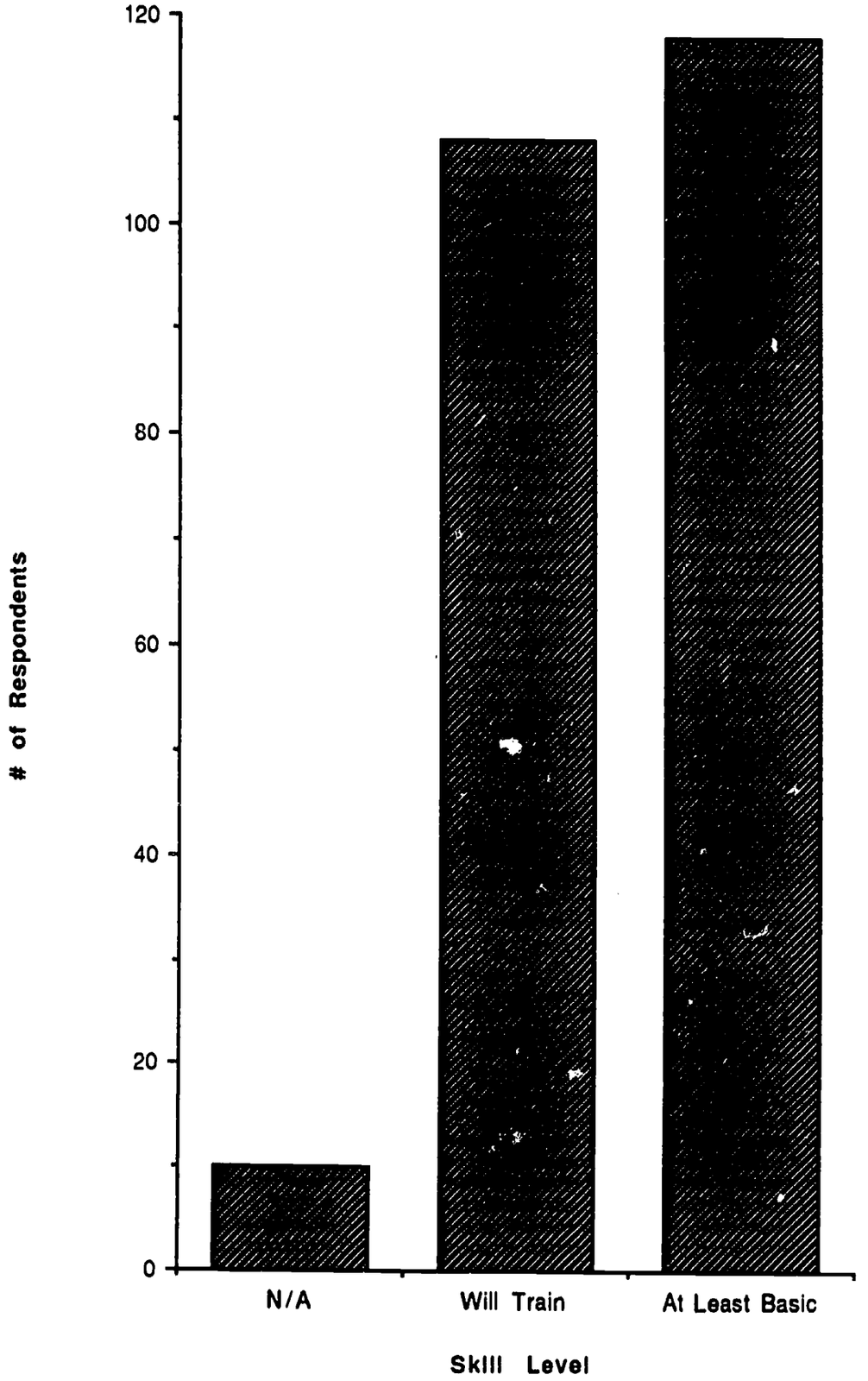


Figure 7: Employers Expectations for Skills in Computer Telecommunications

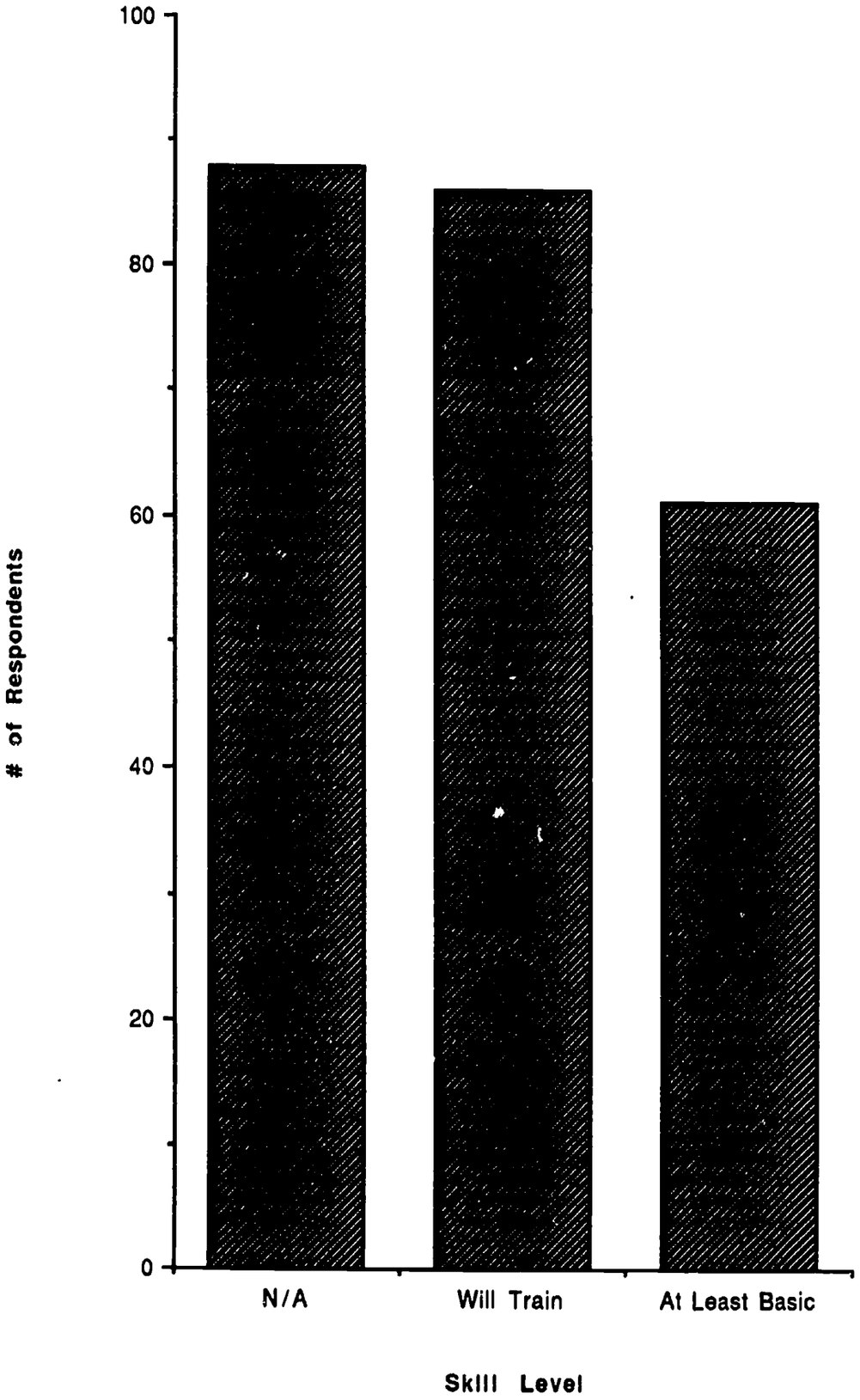


Figure 8: Employers Expectations for Skills in Use of Spreadsheets

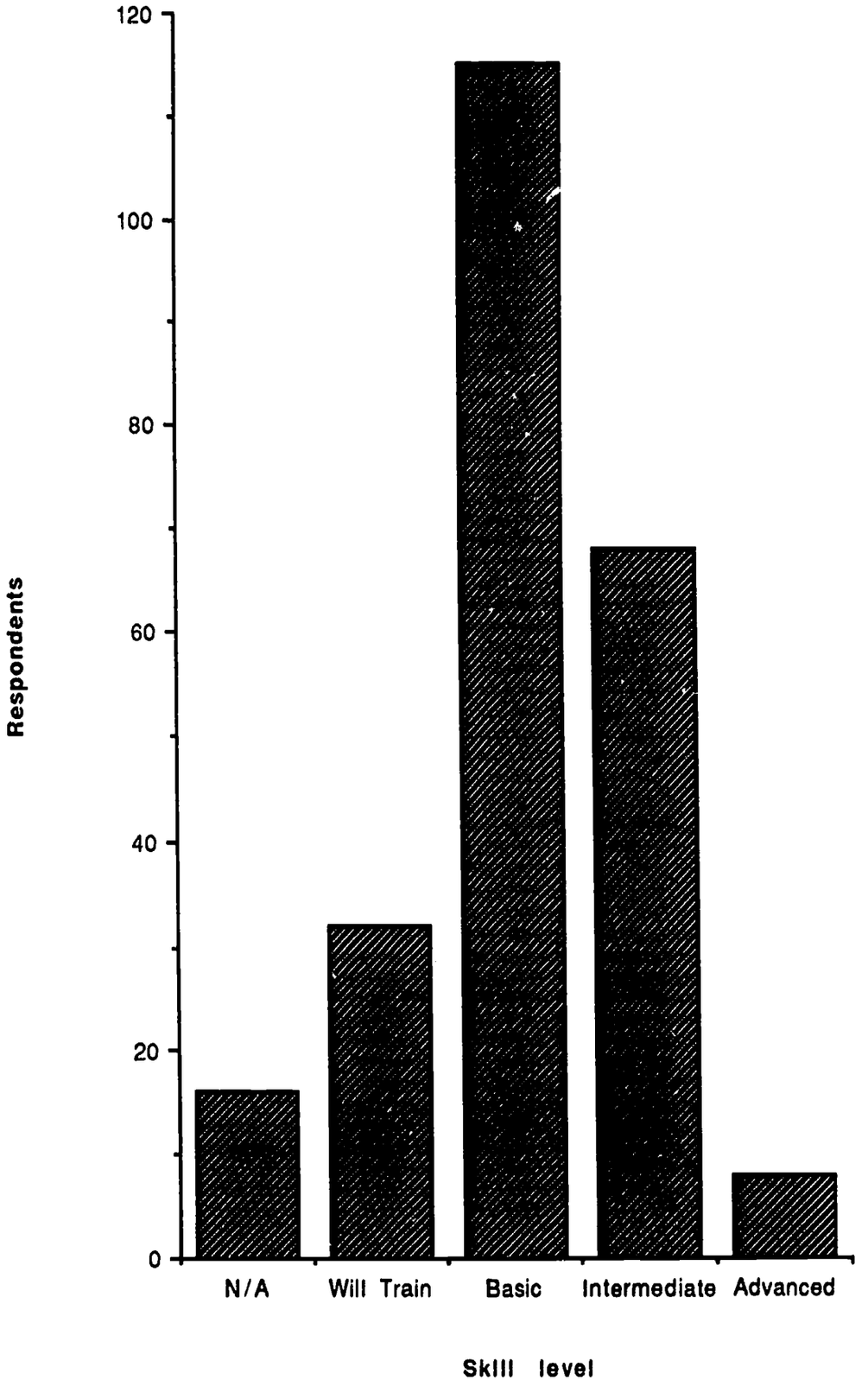


Figure 9: Skills in Finding Information in Computerized Databases Expected of Recent Cornell Graduates

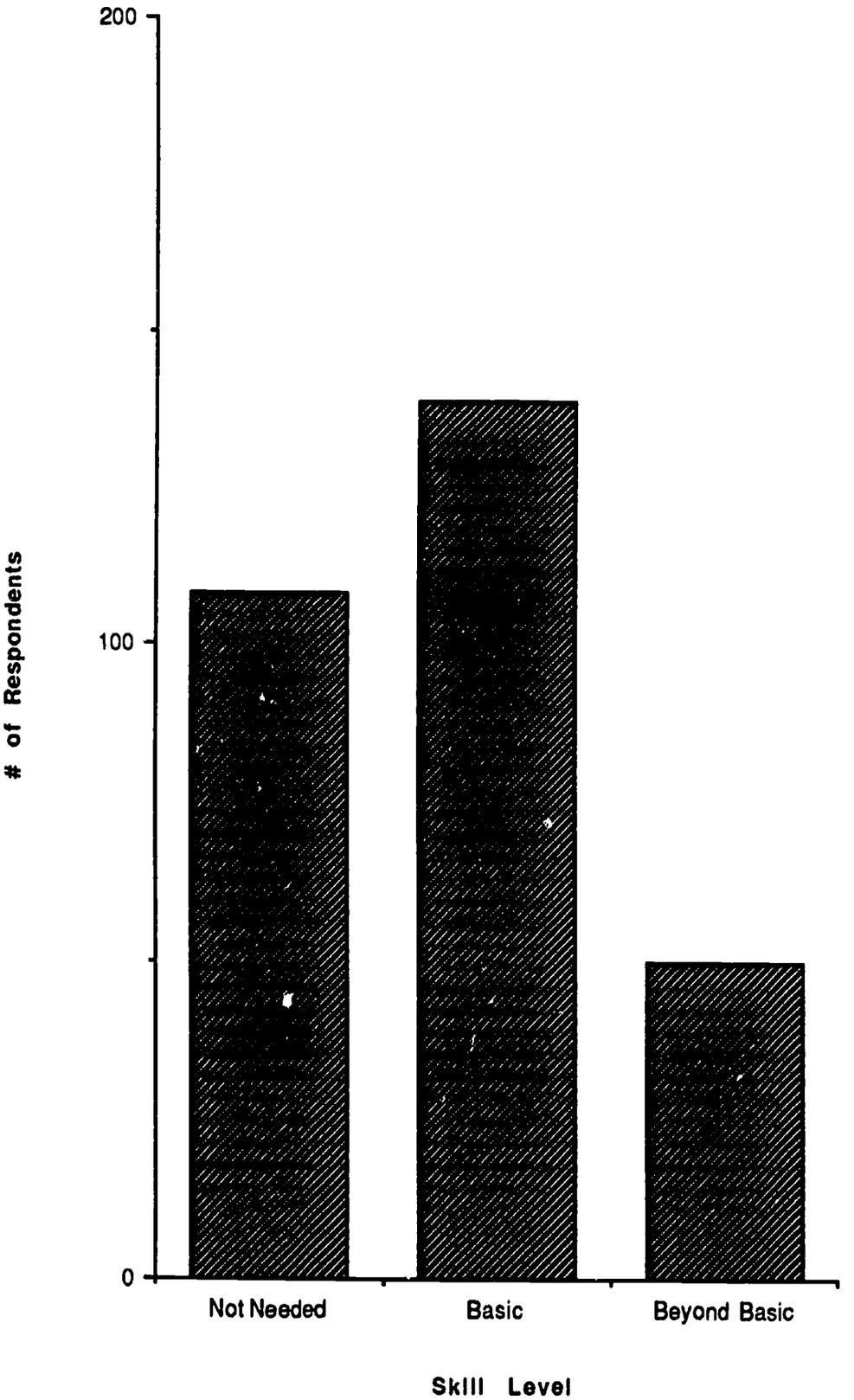


Figure 10: Skills in Manipulating Numeric Data Expected of Recent Cornell Graduates

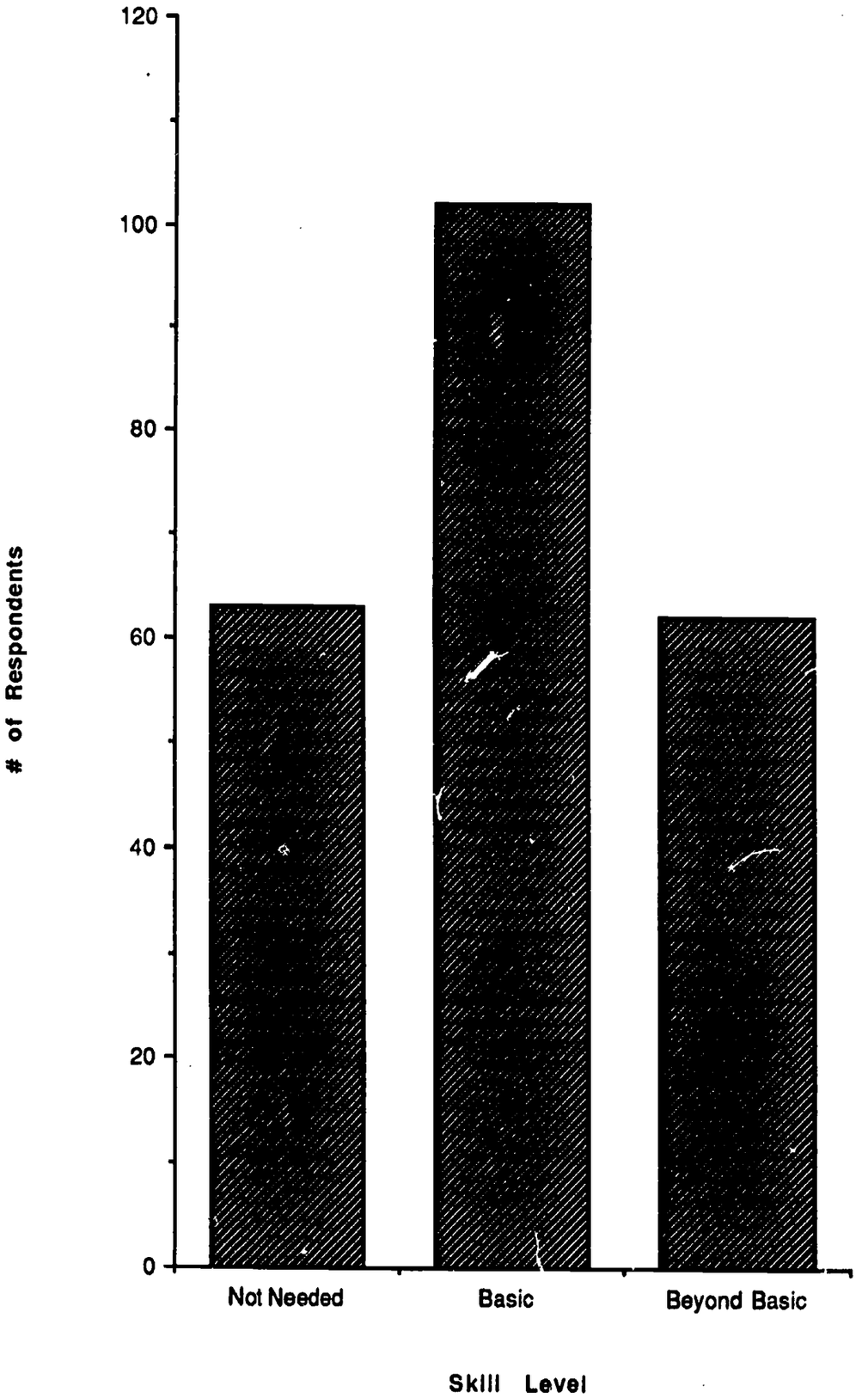


Figure 11: Skills in Database Management Expected of Recent Cornell Graduates

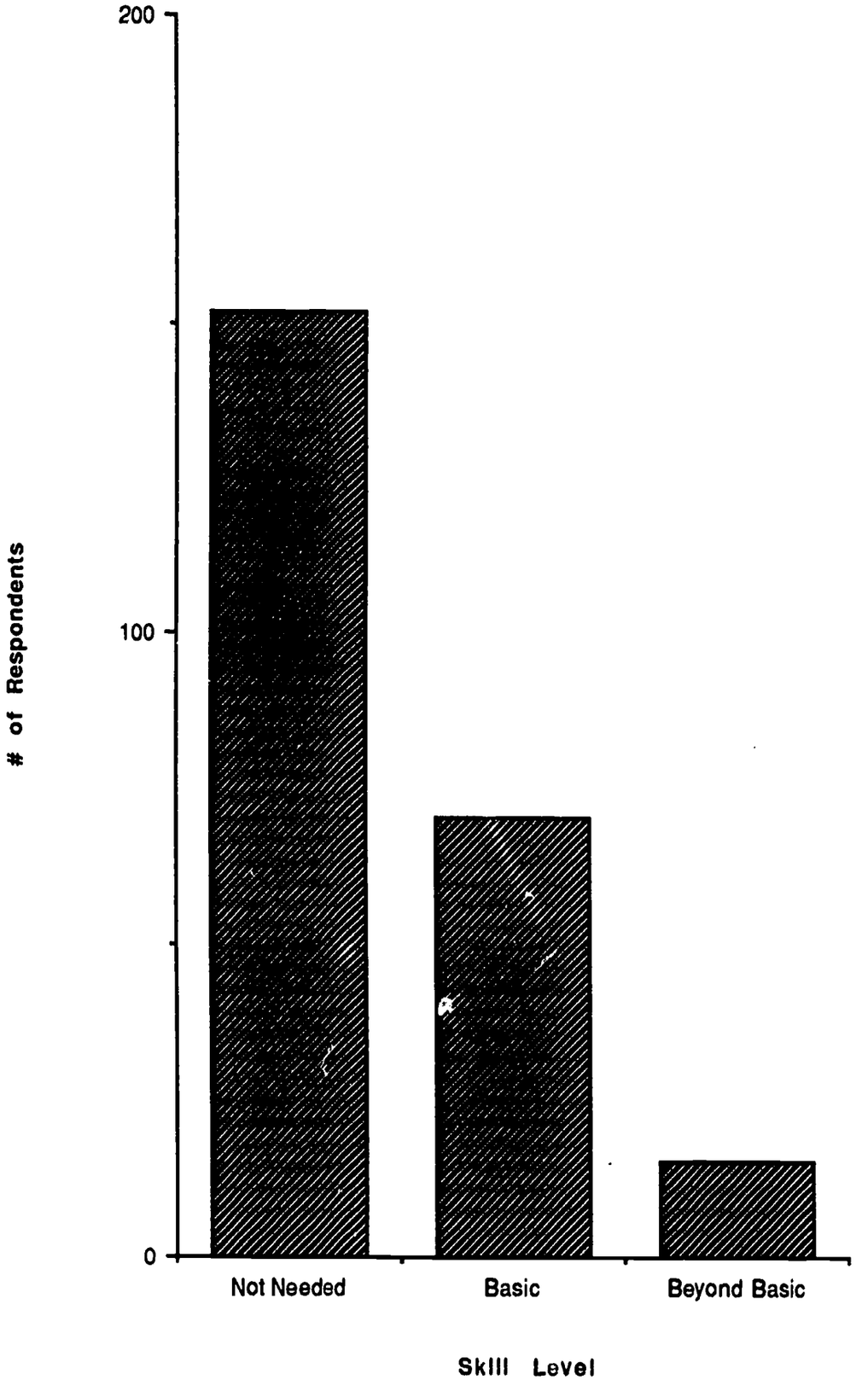


Figure 12: Programming Skills Expected of Recent Cornell Graduates

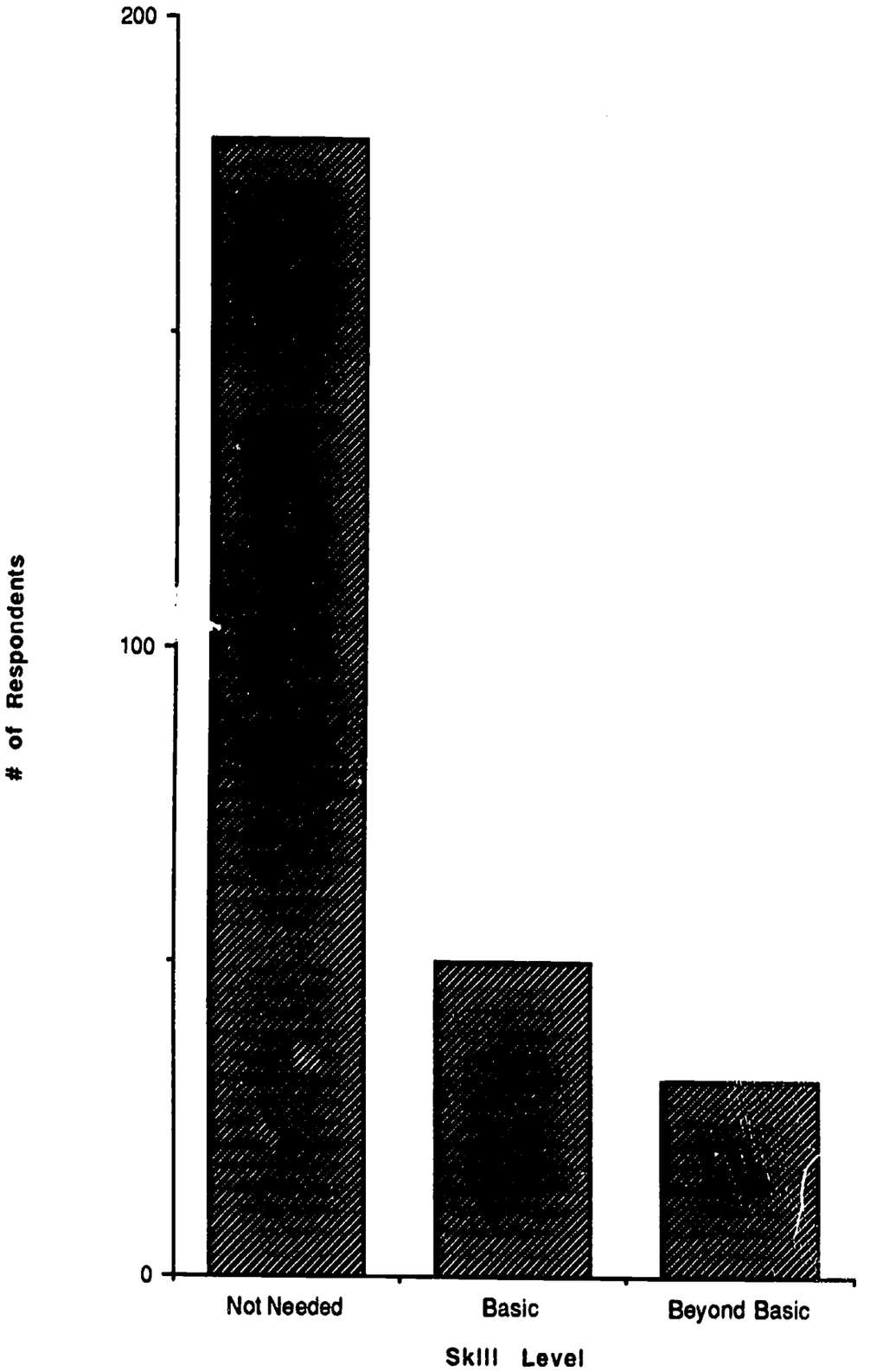


Figure 13: Skills in Preparing and Producing Documents Expected of Recent Cornell Graduates

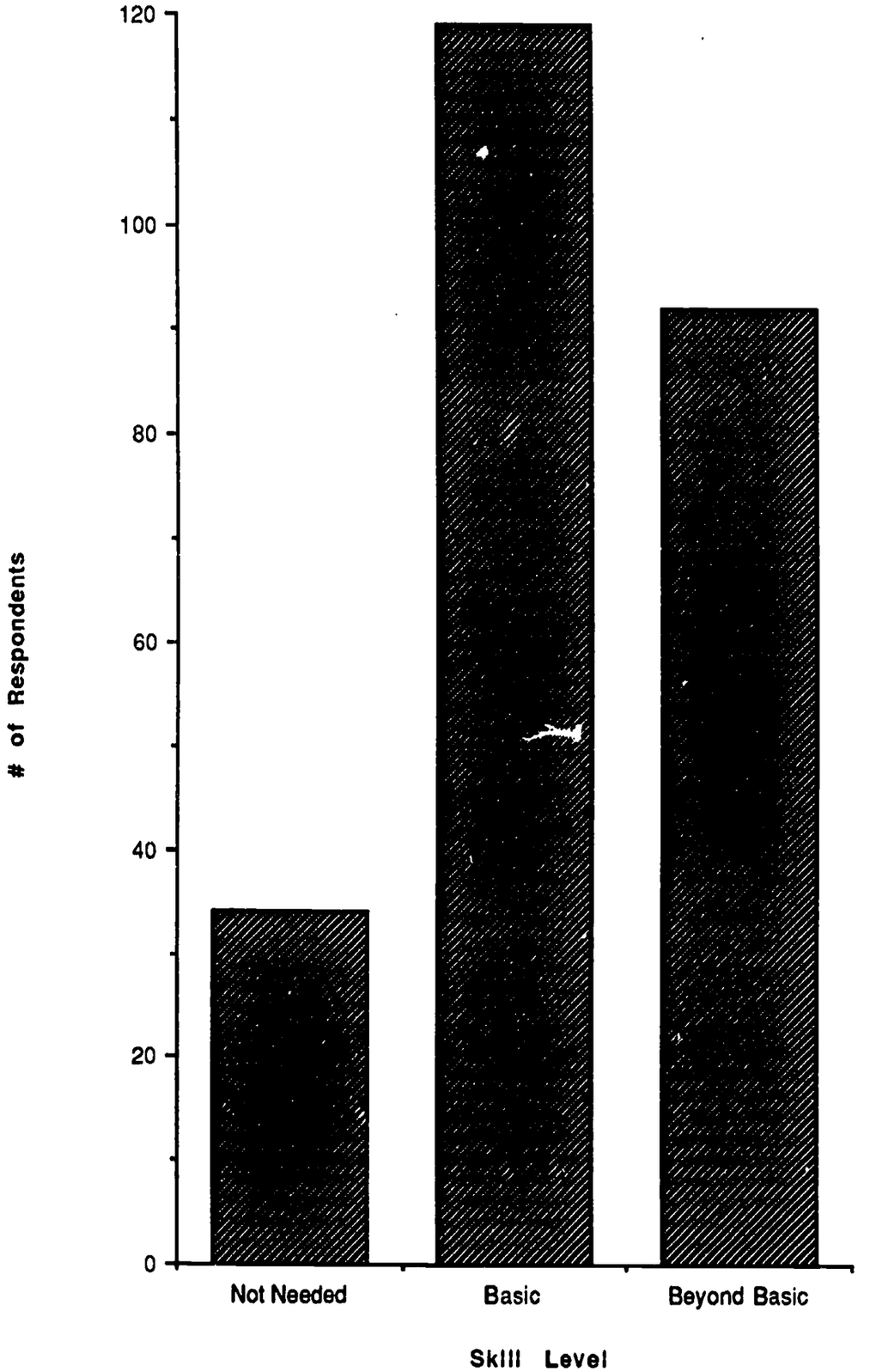


Figure 14: Skills in Computer Telecommunications Expected of Recent Cornell Graduates

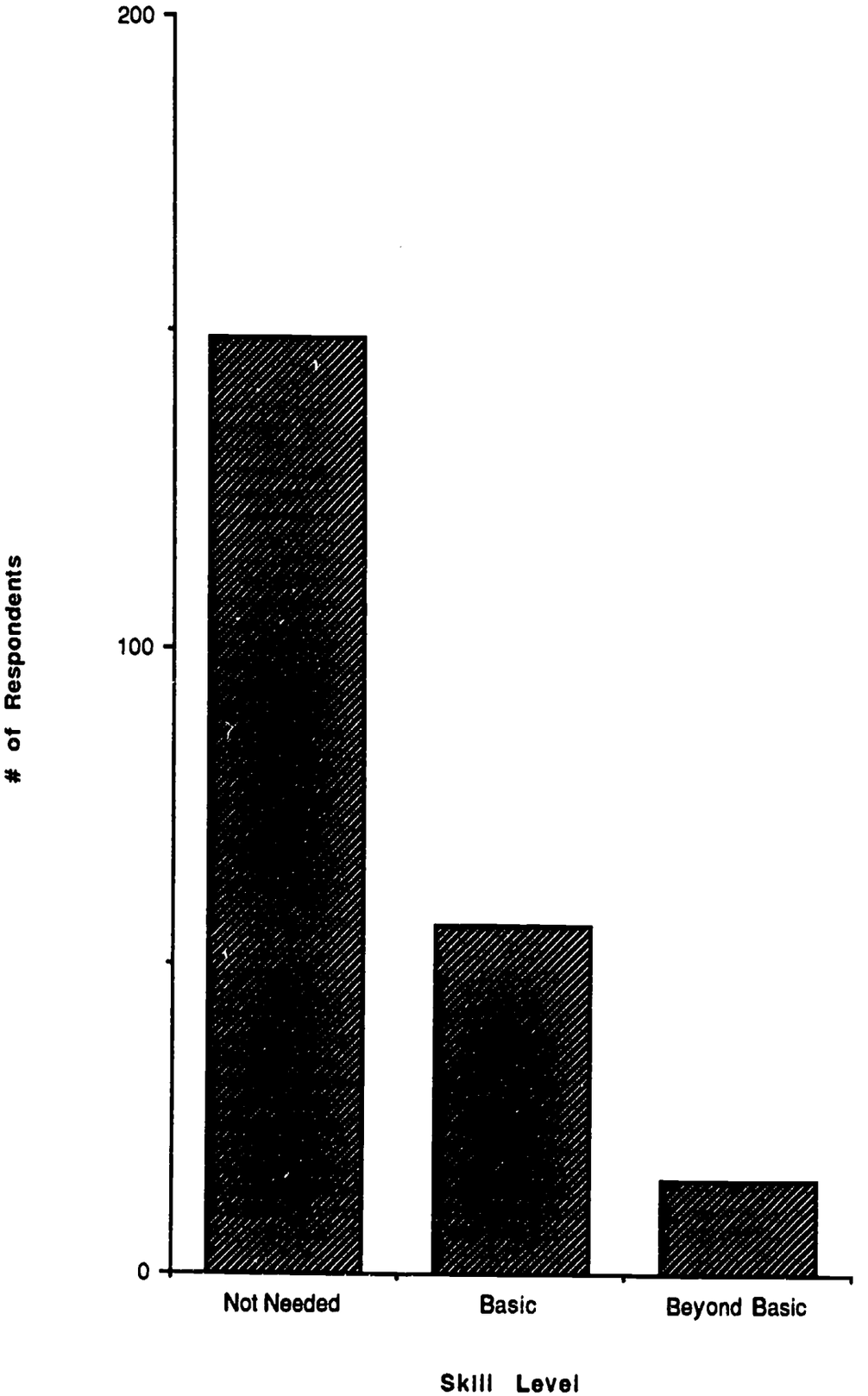


Figure 15: Students' Ratings of Computer Skills

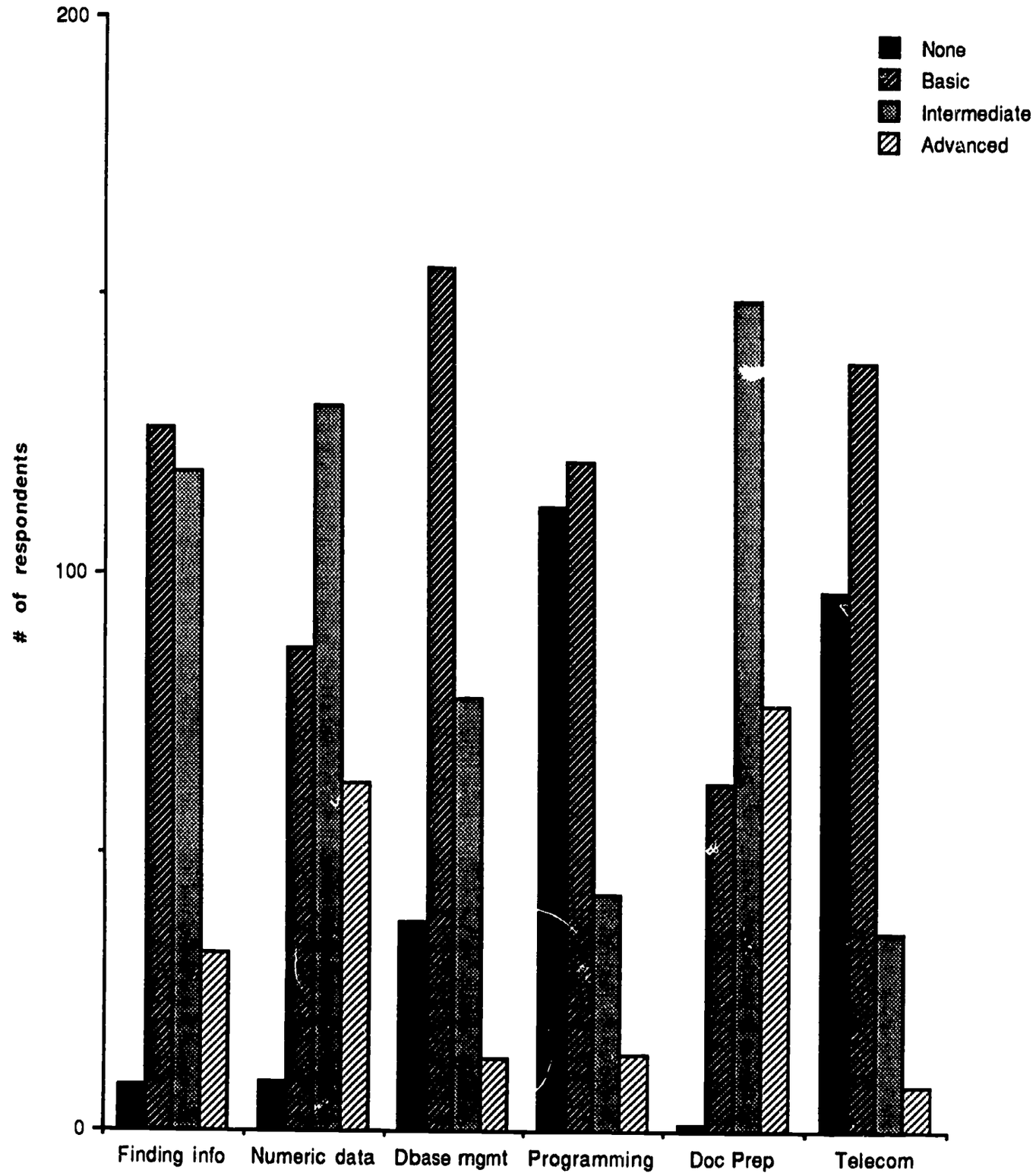


Figure 16: Methods for Learning Skills in Finding Information in Computerized Databases

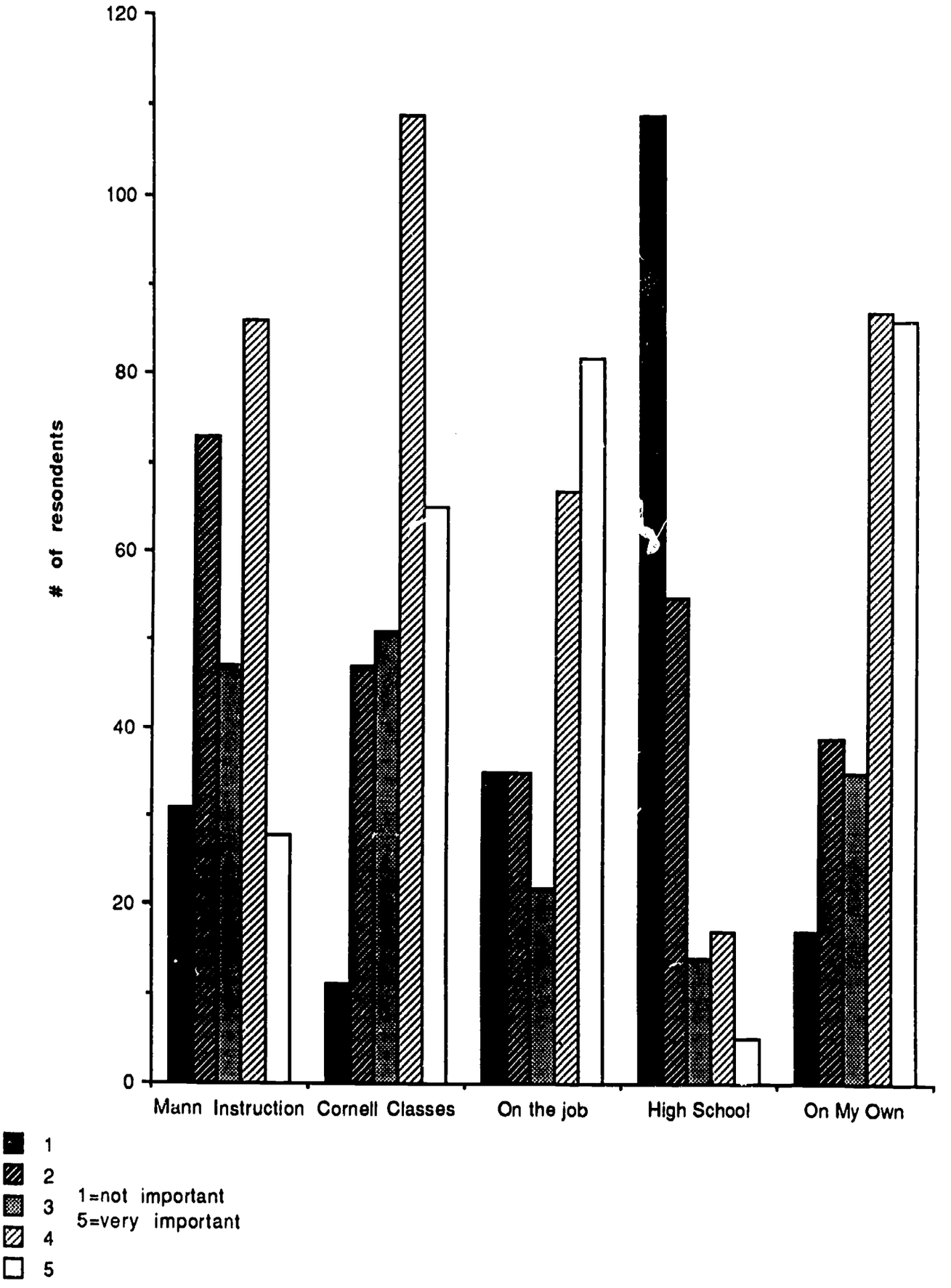


Figure 17: Methods for Learning Skills in Manipulating Numeric Data with a Computer

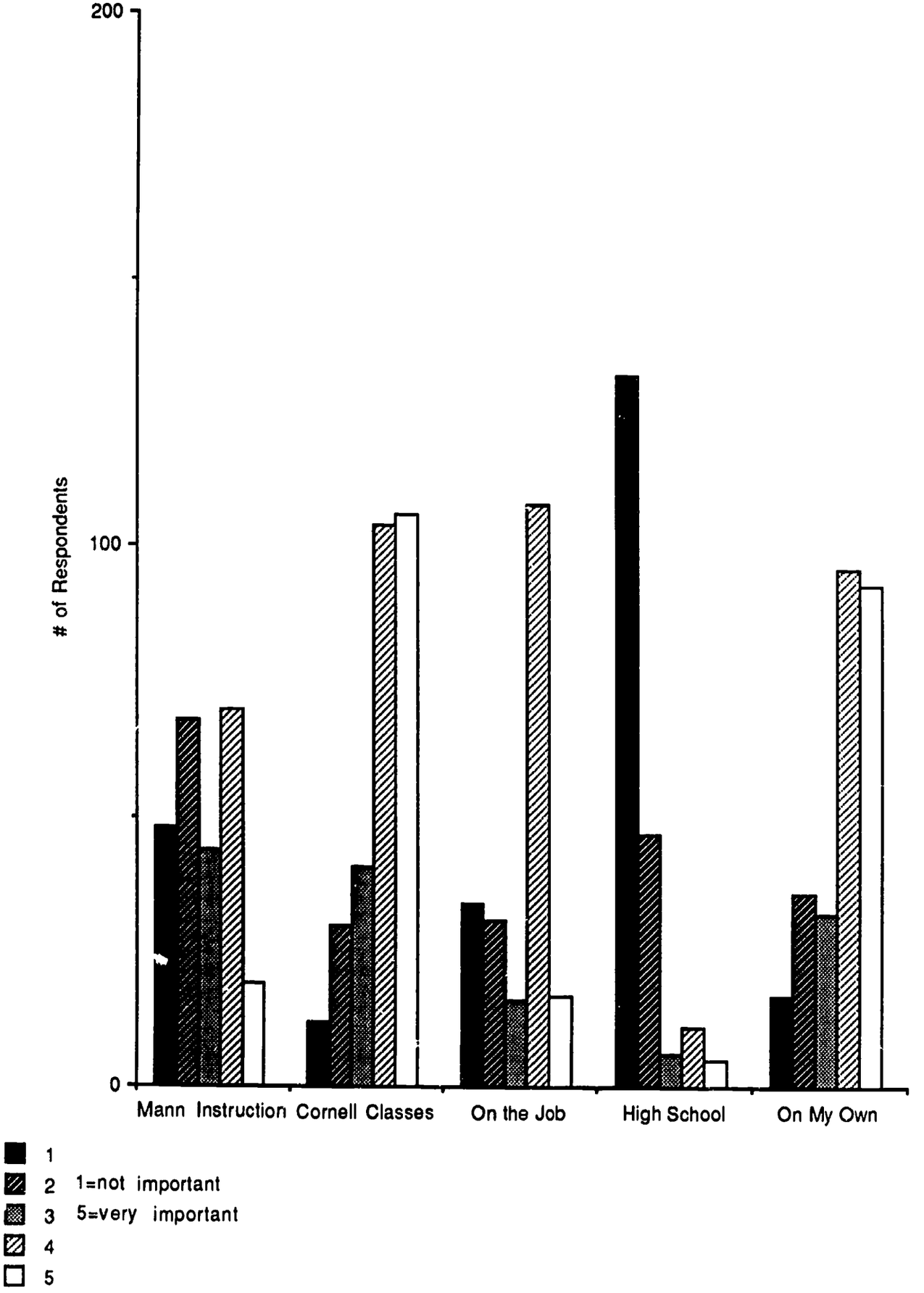


Figure 18: Methods for Learning Skills in Database Management

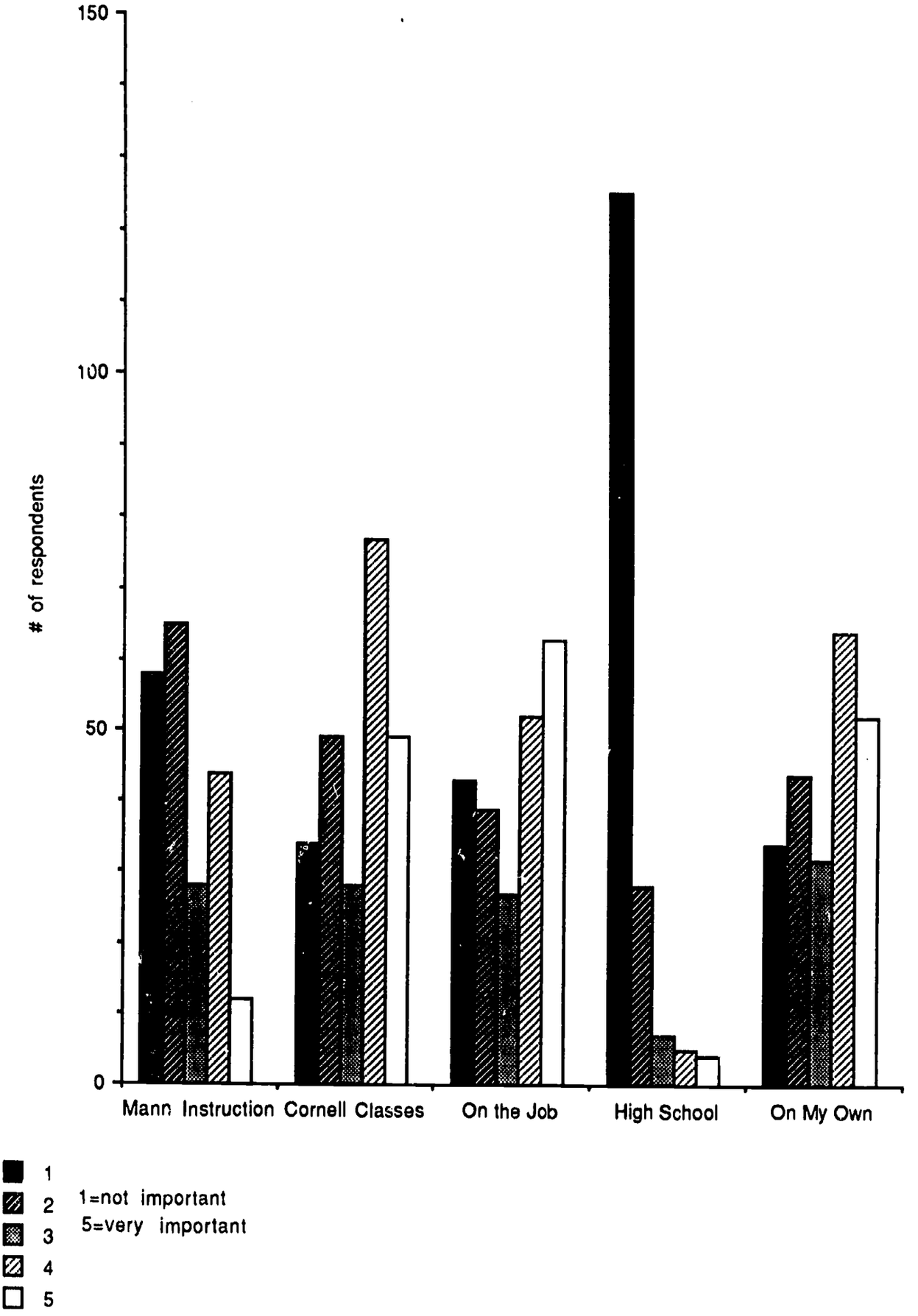


Figure 19: Methods for Learning Skills in Computer Programming

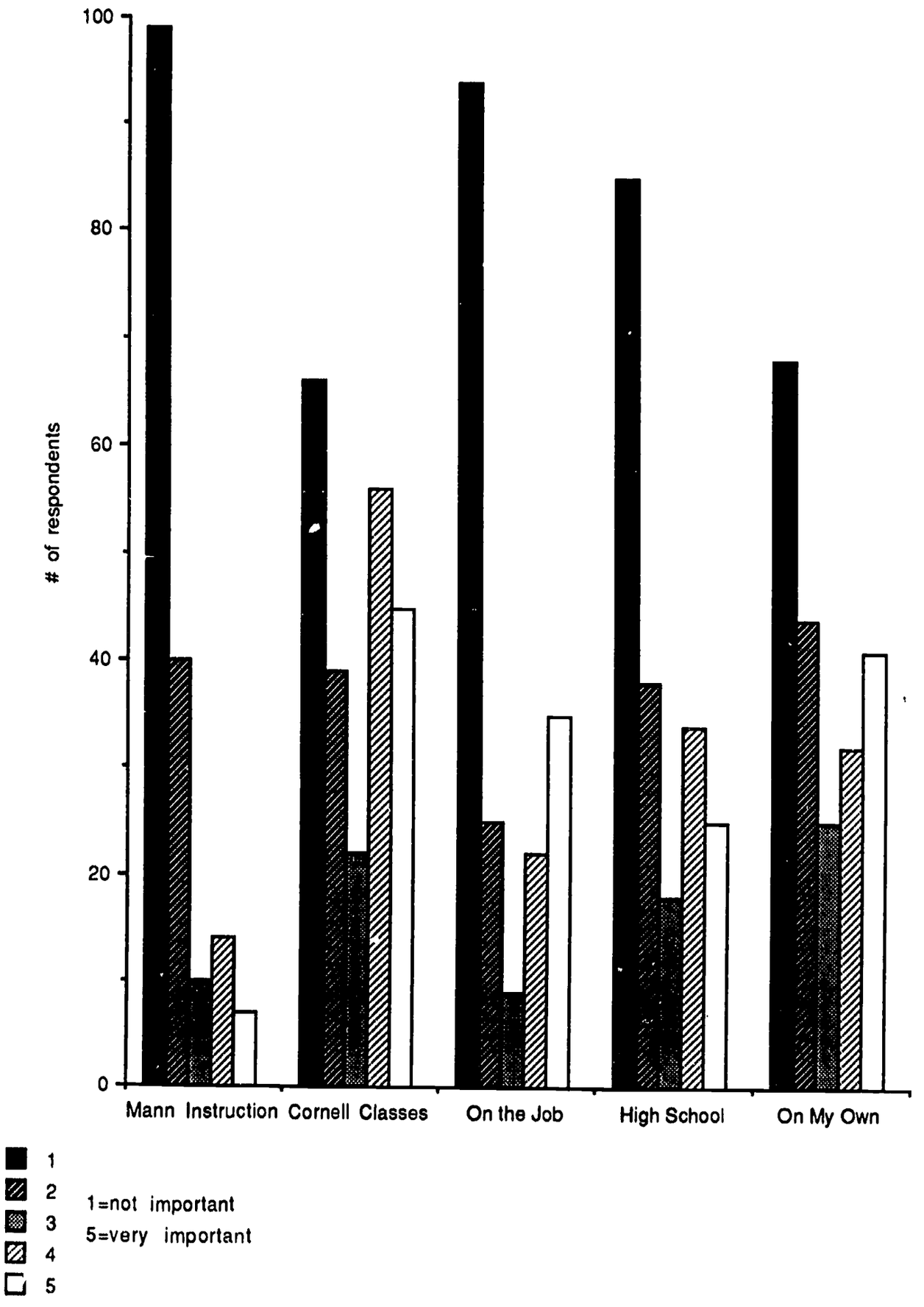


Figure 20: Methods for Learning Skills in Preparing and Producing Documents

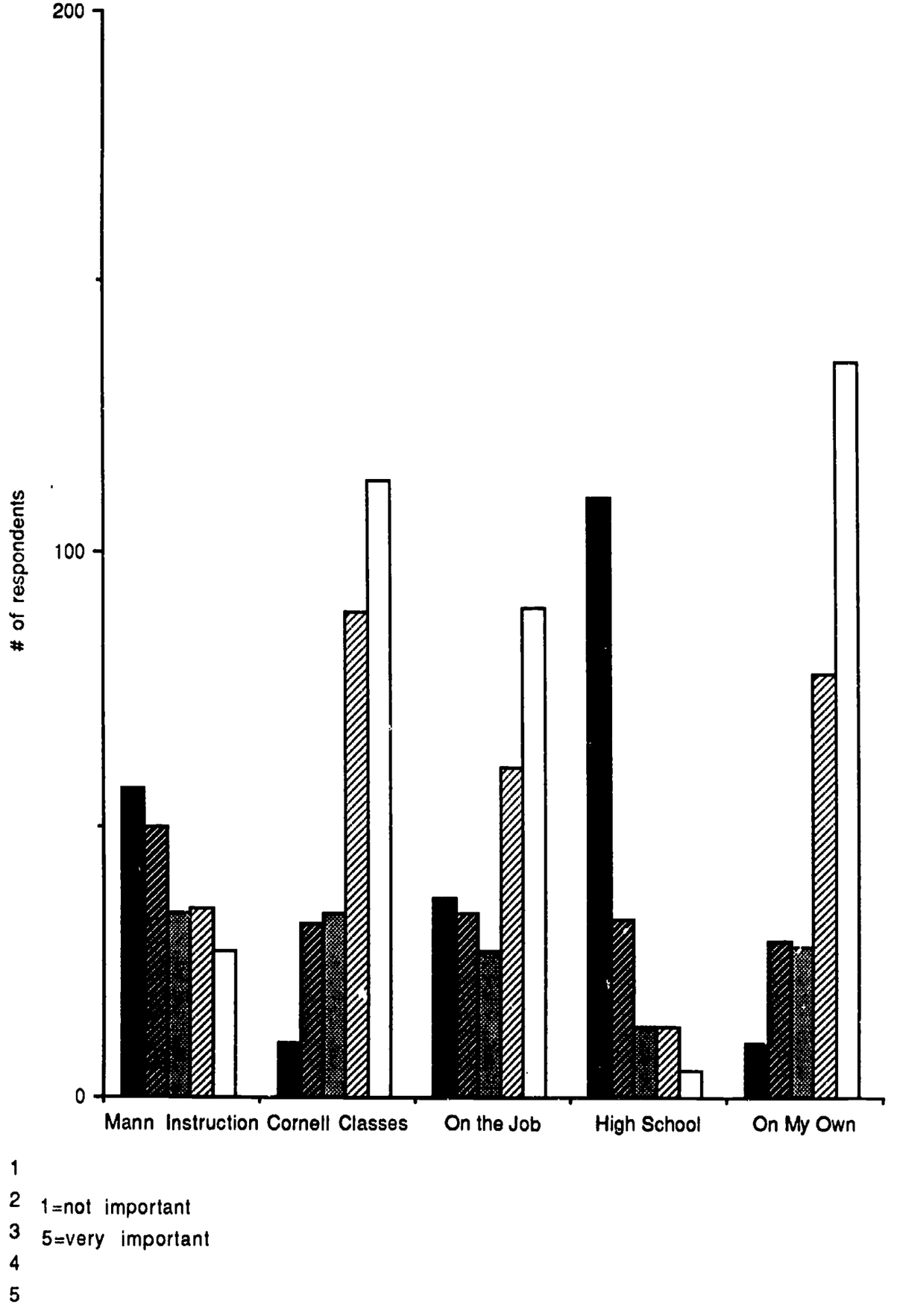
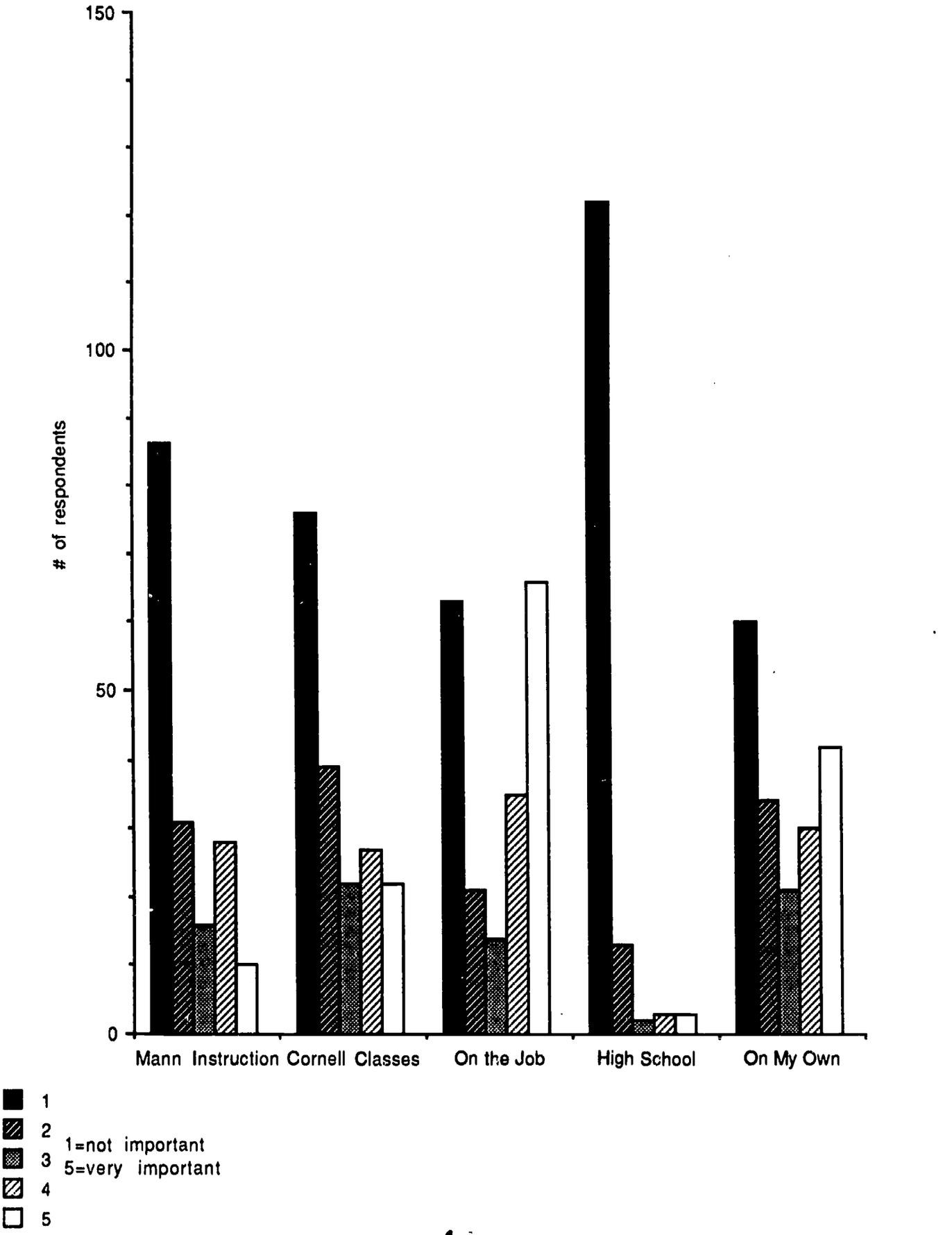


Figure 21: Methods for Learning Skills in Computer Telecommunications



Literature Review

The goals of the literature review were: to provide a background on the definitions of information literacy and the importance of information literacy instruction; to identify components of information literacy and information management skills instruction; and to identify measurement and evaluation techniques that might prove useful. Relevant examples from literatures of bibliographic instruction and education were included in the review of evaluation studies. Resources used for the review included the LOEX Clearinghouse on Educational Resources, several bibliographic databases (ERIC, Social Sciences Citation Index, Dissertation Abstracts, Arts and Humanities Search, Linguistics and Language Behavior Abstracts, Social Work Abstracts, Work/Family Life Database, Educational Testing Service Test Collection, Magazine Index, and National Newspaper Index), examination of bibliographies in relevant articles, and use of collegial networks.

The literature reveals widespread agreement that information management and access skills are essential to survival in modern society. However, it is clear that there is considerable variation and vagueness in the meaning of the term "information literacy". The American Library Association has made an effort to correct this and bring some clarity. The Presidential Committee on Information Literacy has provided this definition:

> "...people--as individuals and as a nation--must be information literate. To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. Producing such a citizenry will require that schools and colleges appreciate and integrate the concept of information literacy into their learning programs and that they play a leadership role in equipping individuals and institutions to take advantage of the opportunities inherent within the information society."[9]

Libraries have been starting to include information literacy instruction as part of their missions, in many cases as an extension of existing bibliographic instruction

programs. Bracken and Tucker conducted an extensive study of articles on bibliographic instruction, identifying publication characteristics and major authors and works in the field.[10] The study is evidence that bibliographic instruction is a mature, established specialty within the profession of librarianship, with the authors stating that "the literature devoted to bibliographic instruction has been in print for more than a century."[11] In the late 1970's and early 1980's, this literature began to include descriptions of library instruction programs that included information technology instruction. One representative example of this was Dreifus' 1982 advocacy of online bibliographic searching as an integral part of library instruction.[12]

The role of libraries in providing instruction in use of bibliographic information resources has been widely recognized for a long time. The nature and scope of instruction has changed in many libraries across the country over the past decade, in response to rapid advancements in computer and telecommunications technologies. Proceedings of a 1983 conference which explored the role of academic libraries in the information society presented faculty's and administrators' views of the impacts of technology.[13] At the conference, Alan Guskin, Chancellor of the University of Wisconsin at Parkside, stated that "the library is the most appropriate location at the university to train people in the use of this new information technology, especially the microcomputer,"[14] and predicted that "the library may very well become the center for short workshops on how to use microcomputers, much as many libraries have become the primary instructional unit for teaching people how to utilize the numerous bibliographic and information resources available in the library."[15] Guskin emphasized the importance of the microcomputer because "the microcomputer provides ease of access and decentralized access to an increasing variety of networks of information. It is a superb information retrieval tool that will enable a library user to gain quicker and more comprehensive access to sources of information..."[16]

At the same time, the general public has not yet recognized that libraries are key resources in education for surviving in, and contributing to, modern society. Shill cited examples of popular views of technology for information access, pointing out the absence of libraries in these views.[17] His article addressed the need for libraries to conduct instruction in which "emphasis is placed on the total information environment..."[18] and described major environmental characteristics that must be taken into account, including population, domestic life, education, income, the government's role in information dissemination, the structure of the information industry, developments in technology, libraries, and higher education, and patterns of scholarly communication. He pointed out that the adoption of new instructional programs and objectives by libraries might be helped by the use of a "...name more reflective of the new environment, such as 'information instruction'," [19] and concluded that it is the responsibility of academic librarians to provide students with "the conceptual framework and skill base they will need to exploit the information environment and thus avoid becoming its 'peasants'."[20] This was one of many discussions of terminology which have appeared. These discussions address the changing views of the library's instructional role regarding information technology. They also address difference between basic computer use instruction and instruction in use of computer systems for information access and management.

For example, Horton described computer literacy in terms of understanding and knowledge of computer software and hardware.[21] He defined information literacy in terms of awareness of the knowledge explosion, and skills for using computer technology to "identify, access and obtain data, documents, and literature needed for problem-solving and decision-making."[22]

A few years later, Kuhlthau provided a brief definition of information literacy: "Defined as comprising library skills and computer literacy, information literacy

requires skills necessary for the interpretation and use of information."[23] She provided background information regarding the impact of the 1983 report, ***A Nation At Risk***[24] on education in the United States, detailed specific skills that comprise literacy in general and information literacy in particular, and spoke of methods and programs to raise the level of information literacy in students, concluding that

> "Helping students gain information literacy also means helping students to learn to think. Learning to question, to weigh alternatives, to interpret inferences, and to seek further data can only help individuals to cope with a continuously increasing wealth of information, and to survive in a world growing ever more complex."[25]

In the same year, Day provided another discussion of the definition of information literacy as distinguished from computer literacy, in her extensive literature review.[26] She suggested "the impossibility of reaching a precise definition relevant to every individual"[27] because minimum knowledge levels will be changing "...as the needs of the individual expand, and as the world of computing evolves."[28] The impact of technological change on literacy was also recognized by Blake and Tjoumas:

> "The information environment is quite vibrant. With such a wide range of information resources available, the concept of literacy has to be enlarged to include all information formats. Being literate in today's world means being able to "read" a diversity of media and encompasses a wide range of abilities."[29]

Within the profession of librarianship, there is an awakening to the concept of information literacy and the need for education to develop it. For example, the book "Coping with Information Literacy", a compilation of papers presented at the Seventeenth National LOEX Library Instruction Conference held in Ann Arbor, Michigan in May of 1989, presented the activities of several university libraries in information literacy and undergraduate education.[30] Formation of the American Library Association's Presidential

Committee on Information Literacy was further evidence of information literacy's importance within the profession. The Committee's report states that "State Departments of Education, Commissions on Higher Education, and Academic Governing Boards should be responsible to ensure that a climate conducive to students becoming information literate exists in their states and on their campuses."[31]

The Association of College and Research Libraries has chosen information literacy for its theme for 1990-91 and as the topic for the president's program at the ALA Annual Conference in 1991.[32] To support this theme, Ridgeway compiled a brief review of the key literature defining information literacy and describing information literacy programs and publications.[33] Soon afterward, MacAdam described courses at the University of Michigan which could serve as models for information literacy instruction.[34] Previously, Mann Library described its own prototype information literacy instruction program at the ACRL National Conference in April, 1989.[35]

The need for information literacy instruction, and the role of libraries in this instruction, are widely recognized. The final report of the American Library Association Presidential Committee on Information Literacy made strong statements regarding this importance: "No other change in American society has offered greater challenges than the emergence of the Information Age"[36], and

> "Information literacy is a survival skill in the Information Age. Instead of drowning in the abundance of information that floods their lives, information literate people know how to find, evaluate, and use information effectively to solve a particular problem or make a decision--whether the information they select comes from a computer, a book, a government agency, a film, or any number of other possible resources. Libraries, which provide a significant public access point to such information and usually at no cost, must play a key role in preparing people for the demands of today's information society."[37]

The recurrent efforts to define the concept of information literacy, and to describe its components, are striking. Debate about the definition of information literacy took place in a discussion forum at the ALA Midwinter meeting in 1990, where Lori Arp suggested that information literacy be thought of as a continuum rather than an either/or condition, and controversy regarding the terminology of information literacy versus bibliographic instruction was voiced.[38] This constant redefinition of, and debate about information literacy lead to speculation regarding why it is so hard to define and to quantify.

An answer to this question can be found in the literature of "traditional" literacy, the literacy involving reading and writing skills. A brief glance at a few publications about literacy revealed debate about the precise definition of the word literacy itself. The ***International Encyclopedia of Education*** provided a basic definition:

> "A person is literate 'who can with understanding both read and write a short simple statement on his everyday life', whereas an individual who is functionally literate is able to 'engage in all those activities in which literacy is required for effective functioning of his group and community and also for enabling him to continue to use reading, writing, and calculation for his own and the community's development'"[39]

Regardless of this encyclopedia definition, literacy scholars have continued to develop and refine their own definitions of literacy, and to discuss methods of measurement. Donlon, McPeek, and Chatham described the difficulty of developing literacy assessment tools, partly because

> "it is virtually impossible to achieve a satisfactory definition of literacy...the problem is confounded by the varying demands of different cultures and subcultures and by cultural change through time. As a result, a person who is virtually illiterate by the standards of an advanced culture may well be able to meet the demands of his own less-developed civilization."[40]

In a world of diversity and rapid change, functional definitions which contain measurable criteria are very difficult to develop. In their recent work, ***Toward Defining Literacy***,[41] Venezky, Wagner, and Ciliberti also discussed this difficulty.

> "Social concepts such as literacy and poverty are integrally tied to their labels. Like jelly and sand, they are without intrinsic shape, defined and redefined by the vessels that hold them. Who is literate depends upon how we define literacy--whether it is a minimal ability, evidenced by the oral pronunciation of a few simple lines from a primer, or a more advanced complex of skills requiring numeracy, writing, and reading together."[42]

> "...it is remarkably difficult to ascertain exactly what literacy skills might be required for specified performance levels. Even if a given performance context were adequately analyzed, local or societal changes might force reanalysis."[43]

The authors also discussed the challenges inherent in measuring literacy. They compared and contrasted the traditional focus on reading grade level scores with the competency-based approach (which measures skills beyond reading, such as problem solving and interpersonal skills) and the profiles approach (which emphasizes literacy skills for specific purposes).

Nickerson also discussed the difficulty of defining literacy and stated "perhaps the least debatable observation that we can make about literacy, as the term has been used in the past, is that its connotation has changed considerably over time."[44] He described recent information technology developments that have affected society, including the proliferation of personal computers, the decreasing cost of equipment, and the rapidly increasing power of computers, and stated that "...our conception of what it means to be literate may change as computer-based systems become increasingly common and more and more people regularly use them."[45]

One source of dissent regarding information literacy is the role of computing technology. In an early definition of information literacy, "information literacy is the ability to obtain and evaluate information effectively for a given need,"[46] Breivik stated that one aspect of the definition was that it was "resistant to changes in resources and technology," while still related to computer literacy. Ormondroyd echoed concerns that have been voiced by other bibliographic instruction experts when she voiced worries regarding inequalities of access to technology.[47] Despite these concerns, an emphasis on technology in information literacy instruction is essential. Horton presents the argument that computer literacy is "a prerequisite to information literacy."[48]

Studies and reports have highlighted the potential for computing technology to revolutionize the teaching process, for example in computer-based training or computer-aided course instructional design.[49] Computers can be used as teaching tools (such as in computer-assisted instruction), as development tools (such as in computer-aided design), and as basic work tools (word processors). These are all crucial computing uses, but the ability to use computers for information access and management is central to literacy. Johnston describes some major computer skills for information access and management, including using electronic mail systems, creating electronic files, obtaining information from databases, and sharing data over computer networks. In this report, Johnston illustrates how changing technology has changed instructional needs in an academic environment:

> "Today, few campuses offer classes in the use of the tools of hard text--handwriting, use of the library, and typing. It is commonly assumed that facility with these tools is a part of pre-college education. There are two exceptions to this. Libraries offer orientation sessions for students, and study-skills centers provide some of this training in writing and study habits for those in special need. By and large, however, it is assumed that these tools were acquired in previous schooling to a level sufficient to equip

students to perform the usual academic tasks.

> "The electronic tools are too new to make this assumption. For some years special training needs to be provided on campuses. Should it be done through regular classes in the disciplines or provided separately through campus-wide workshops? By and large it would seem most appropriate to be done in the latter context. Too few faculty possess the requisite skills to teach students. Furthermore, most faculty probably feel that it is inappropriate for them to provide this training; after all, the skills in question are designed to enhance, not supplant, the normal academic activities. It is clear, though, that faculty will need to acquire facility with these tools if they are to integrate their use into academic and instructional work."[50]

Breivik has been an outspoken advocate of libraries' role in information literacy instruction.[51] Demo emphasized the idea that information literacy skills must be taught to students,[52] and the ERIC Clearinghouse on Information Resources[53] reported that "library resource centers have become laboratories for learning the essential components of an information system and for interpreting information."[54]

The development of instruction at Mann Library has been based on the belief that advancements in technology have already changed the definition of literacy. At Mann, the premise is that literacy, at its core, involves the ability to find. understand, and communicate information. In the recent past, reading and writing skills were central to communicating information, while in today's society, it is also necessary to be able to use computing and telecommunications technology to find, understand, and communicate information. Academic libraries teach the knowledge and skills necessary to access and manage information. In modern society, it is necessary to know how to use computing and telecommunications technology to access and manage information, and this knowledge will become increasingly more important to those who intend to become scholars and leaders in

society. Therefore the teaching of information technology skills and concepts to develop and enhance the information literacy of its users forms the foundation of instruction at Mann Library.

Beginning in the mid-1980's, Mann developed goals and competencies for its information literacy instruction which have been singled out by the chair of the Presidential Commission on Information Literacy as "the best expanded definition which I have found to date."[55] This work was deemed important by the library both in its expansion of the meaning of information literacy and in identifying areas where instruction could concentrate and progress could be measured. These goals and competencies are provided as an attachment at the end of this report, and are early examples of the use of competency-based education for information literacy instruction.

Stoffle and Pryor define competency-based education as "an educational approach that structures learning around competencies defined as fundamental for successful performance."[56] They state that librarians who understand competency-based education "are better able to relate their instructional programs to the needs of the institution and are prepared to adopt new approaches which may help improve the library instruction program itself,"[57] and provide a review of examples of programs at several institutions.

A prototype information literacy instruction program, based on its information literacy goals and competencies, was developed at Mann and tested for three years with business and finance majors at Cornell University. Undergraduate business students are in a profession in which the need for information management skills has been recognized by librarians and by businesspeople. ALA's Presidential Commission on Information Literacy gave examples of case studies in business[58] and presented the view of an opinion leader: "Herbert E. Meyer, who has served as an editor for ***Fortune*** magazine and as vice-chairman of the National Intelligence Council, underscores the importance of access

to and use of good information for business in an age characterized by rapid change, a global environment, and unprecedented access to information. In his 1988 book, ***Real World Intelligence***, he describes the astonishment and growing distress of executives who are discovering that the only thing as difficult and dangerous as managing a large enterprise with too little information is managing one with too much."[59]

"While Meyer emphasizes that companies should rely on public sources that are available to anyone for much of their information[60], it is clear that many companies do not know how to find and use such information effectively. Every day lack of timely and accurate information is costly to American businesses."

Futas and Vidor[61] surveyed graduates of the Emory University Business School to determine what students had read, where they had found their readings, and what reading material continued to be important in their careers. Surveys were distributed to 1977 and 1983 graduates, and results showed a significant increase between the 1977 and 1983 students in their use of online services, and revealed that approximately 25% of respondents from both groups were still users of online services. A study by Bell and Halperin showed that, while use of online systems by students of the Wharton School declined somewhat after graduation, "sixty-six percent reported using commercial time-sharing after graduation."[62] These two studies were particularly relevant to Mann Library's evaluation of its prototype information literacy instruction program for undergraduate business students. David Vidor and Steven Bell assisted Mann Library in its questionnaire development by sharing copies of the survey instruments used at Emory University and at the Wharton School, respectively.

The importance of access to computer technology for business students was underscored in a 1989 survey at Cornell in which students were asked which courses they

would take more of, if they had their undergraduate education to do over again. The most frequent response was computer sciences courses, and the report's conclusion emphasized the importance of microcomputer-based training in the undergraduate business curriculum.[63]

Hansen argued for an adoption of competency-based education in business by advocating a proficiency approach and suggesting a list of specific proficiencies for economics majors. The contents of his list reflected a recognition of the importance of information management skills, with the first proficiency on the list being:

> "1. Gaining Access to Existing Knowledge
> --locate published research in economics and related fields.
> --locate information on particular topics and issues in economics.
> --search out economic data as well as information about the meaning of the data and how they are derived."[64]

The theme of information literacy as crucial to business success has appeared in writings that predict the near future, such as in ***Workplace 2000***, in which the nature of work in the next century was envisioned:

> "Since Workplace 2000 will be characterized by a tremendous increase in the availability of information, success in the organization will flow to those who can effectively use the data presented to them to modify their own behavior or to identify new opportunities for the organization. Americans who want to succeed will need the ability to analyze data, draw conclusions, and present recommendations."[65]

The content of Mann's prototype information literacy program for business and finance majors is reflected in the assignments given to the students, copies of which are included as attachments at the end of this report. Instruction emphasized the use of electronic bibliographic, numeric, and full text resources for information access, and included examples of important applications software for information management. After

instruction had been conducted for three years, the American Library Association's Baber Grant funded an evaluation of program contents. Project work began by sifting through the voluminous literatures of educational measurement and of bibliographic instruction evaluation in a search for previous methods and experience.

Much of the evaluation literature found dealt with measurement of students' understanding of the use of information resources. The LOEX Clearinghouse on Educational Resources provided a wealth of examples of unpublished library skills exercises.[66] Several examples also appear as ERIC documents.[67-78] Examples of library skills measurements from before 1980 emphasized the card catalog, indexes, and physical organizational characteristics of books and other print resources.[79,80] James Darwin Hooks reviewed the library skills measurement literature for his dissertation in 1979.[81]

The literature of library instruction program evaluation is extensive. While most of it deals with the evaluation of bibliographic instruction programs, many of the principles it puts forth can also be applied to newer challenge of evaluating information literacy instruction programs. Werking conducted a review of the bibliographic instruction literature in 1980, examining "reasons for evaluating, what and how instruction librarians evaluate, problems with evaluation, and questions of proof."[82] The American Library Association published an evaluation handbook in 1983,[83] and Miller and Bratton spoke of evaluation as a crucial element in the instructional design process.[84]

Since information technology knowledge and abilities are central to information literacy, examples of relevant skill tests and program evaluation were sought. Huston reviewed the literature of end-user education for bibliographic searching in her research monograph, which also describes the development and evaluation of an instruction program for users of online bibliographic retrieval systems.[85] Since libraries have only

recently begun to provide information access and management instruction that includes technology skills beyond online bibliographic searching, few examples of information technology skills measurement were found. An article by Menou advocated quantitative measurement of information skills,[86] and an example of an evaluation of an information technology skills curriculum was presented by Grant and Main.[87]

An evaluation and comparison of instruction methods for developing skills in the use of print and automated information sources is being conducted by the University of Alabama Libraries. The ***Interim Performance Report*** from this project, which is supported by the U. S. Department of Education's College Library Technology and Cooperation Grants Program (Higher Education Act, Title II-D) described the use of student bibliographies' quality as an evaluation criterion, and presents a review of the literature.[88] Hoeke developed and evaluated a computer-assisted instruction program to teach historical and conceptual aspects of information literacy.[89] Finally, an article describing a computer literacy course (not an information literacy course) for agricultural economics students provided interesting background and methodology for evaluating a closely related species of instruction.[90]

The general educational evaluation literature was reviewed briefly, to supplement the library literature. ***How to Evaluate Education Programs*** provided a useful, nontechnical overview.[91] Several publications on survey methodology provided background for developing the questionnaires to be sent to businesspeople and to students who had received instruction in Mann's information literacy program.[92-94] The newsletter of the Southern Tier Library System gave basic definitions that helped crystallize what Mann's information literacy program evaluation would be: "Evaluation is the interpretation of results against predetermined objectives and goals...,"[95] and what it would *not* be: "Measurement is the quantitative collection of observations: class size,

retention rate, or how many passed a test of skills at the end of a session."[96] Bookstein gave a practical warning regarding the library research implications of questionnaire flaws.[97]

This literature review provided background which aided the development of Mann Library's evaluation of its information literacy instruction program. The review also placed the Mann Library information literacy program in context among work that has been done by other institutions. The bulk of this review was conducted during the 1989-1990 academic year. The May, 1991 issue of ***College and Research Libraries News*** contains several current articles devoted to information literacy, including an update of ACRL activities and a brief list of recent information literacy resources.[98] Finally, no review of the information literacy literature would be complete without a mention of Breivik and Gee's ***Information Literacy Revolution in the Library***, an excellent overview of the emerging information literacy field.[99]

Appendix A

COMPUTER SKILLS FOR INFORMATION RETRIEVAL AND MANAGEMENT

Preparing Undergraduates for Employment: A Survey of Businesses To Determine Computing Skills Desirable in Newly Hired College Graduates

Sponsored by the American Library Association

and Conducted by:

Albert R. Mann Library
Cornell University
Ithaca, NY 14853-4301

May 1990

COMPUTER SKILLS FOR INFORMATION RETRIEVAL AND MANAGEMENT

A Survey of Businesses to Determine
Computing Skills Desirable in Newly Hired College Graduates

This questionnaire has been designed to gather data concerning the importance, in your organization, of the skills for using computers to retrieve and manage information. The term computer refers to any type of computer.

There are three sections of this questionnaire:

- **SECTION ONE** addresses basic information about computer use by all the employees for whom you are responsible (not just newly hired college graduates);
- **SECTION TWO** seeks to determine the computer skills you would like to see in the employees for whom you are responsible who are newly hired college graduates; and
- **SECTION THREE** relates to background information about your company or organization.

SECTION ONE

In questions 1-5 we are interested in learning about the use of computers and databases by those employees for whom you are responsible.

1) What percent of your employees use computers in the conduct of their work?
(Please approximate the percentage figure if you're unsure.)

_____% PERCENT OF EMPLOYEES WHO USE COMPUTERS

2) What kinds of computers do your employees use?
(Circle ALL that apply)

a. Mainframes
b. Minicomputers
c. Microcomputers (personal computers)
d. Terminal connected to mainframe
e. Other (Please specify)_____
f. Employees do not use computers. **SKIP TO QUESTION 6** (page 2)

3) What percent of your employees' time is spent using computers?

_____% PERCENT OF TIME EMPLOYEES SPEND USING COMPUTERS

4) Do employees who work for you use any computerized commercial databases to find information?
(Please circle ONE response.)

1 NO ---------> **SKIP TO QUESTION 6** (page 2)
2 YES

5) How frequently do employees who work for you use the following types of computerized databases for finding information?

	How frequently do your employees use these databases? (Please circle ONE response for each category)						
	I DON'T KNOW	NEVER	LESS THAN ONCE A YEAR	SEVERAL TIMES A YEAR	ABOUT ONCE A MONTH	ABOUT ONCE A WEEK	ALMOST DAILY
a. Information Service Providers (BRS, DIALOG, STN, Pergamon, Knowledge Index, BRS After Dark)	1	2	3	4	5	6	7
b. Information Service Networks (CompuServe, GENIE)	1	2	3	4	5	6	7
c. Wire Services (UPI, AP or Reuters)	1	2	3	4	5	6	7
d. Business Databases (Dow Jones News Retrieval Service, CD Corporate, NEXIS, MAX, Compustat)	1	2	3	4	5	6	7
e. Agricultural Databases (Agridata, DTN or Grassroots)	1	2	3	4	5	6	7
f. Legal Databases (Lexis or Westlaw)	1	2	3	4	5	6	7
g. Other (please describe) _____	1	2	3	4	5	6	7

SECTION TWO

Questions 6-12 refer only to new employees who are recent college graduates. The questions focus on six broad categories of computer use: finding information in computerized databases; manipulating numeric data; creating and managing databases; computer programming; preparing and producing documents, and use of telecommunications networks and software.

6) How is your decision to hire *recent college graduates* influenced by their having the knowledge and skills necessary to use computing and telecommunications technologies? *(Please circle ONE response)*

1. Their computer skills are <u>very important</u> for the job; only candidates with appropriate skills would be considered.

2. Their computer skills are <u>important;</u> candidates with these skills would have an advantage over candidates without these skills.

3. Their computer skills are <u>somewhat important</u>; we would prefer that candidates have these skills, but candidates with or without them would be eligible for hire.

4. Their computer skills are <u>not important</u> and they are not a factor in our hiring decisions; candidates with or without these skills would be eligible for hire.

If you selected response 4, skip to question 13 (page 7).

PLEASE NOTE: There are five response categories for questions 7-12. They are:

1 **SKILLS NOT RELEVANT FOR JOB** — these skills are not used;
2 **NONE; WILL LEARN ON JOB** — these skills are used, but it is not important for your new employees to possess them prior to their employment;
3 **BASIC SKILLS** —comfortable with the technology, able to perform common tasks, but would need more training to complete complicated tasks;
4 **INTERMEDIATE SKILLS** —competent in performing most tasks;
5 **ADVANCED SKILLS** —an authority on the application of the software/hardware to a task.

7) Below are statements which describe ***skills for finding information in computerized databases***. Please indicate the level of competence you expect from new college graduates entering your employment.

|What skills should your new employees have prior to being hired?|
(Please circle ONE response for each skill)

	SKILLS NOT RELEVANT FOR JOB	NONE; WILL LEARN ON JOB	BASIC SKILLS	INTERMEDIATE SKILLS	ADVANCED SKILLS
a. Find appropriate computerized information resources	1	2	3	4	5
b. Find information in various storage formats (e.g., floppy, hard or optical disks; magnetic tape)	1	2	3	4	5
c. Understand how databases are organized in order to find information more effectively	1	2	3	4	5
d. Search numeric databases such as census data or commodity prices	1	2	3	4	5
e. Search full text databases such as complete journal articles or other textual documents	1	2	3	4	5
f. Search bibliographic databases to find references to articles, books or reports	1	2	3	4	5
g. Search directory databases such as name and address files	1	2	3	4	5
h. Search in-house proprietary files such as personnel databases, inventory records, customer service files, etc.	1	2	3	4	5

8) Below are statements which describe various ***skills for manipulating numeric data with a computer.*** Please indicate the level of competence you expect from new college graduates entering your employent.

What skills should your new employees have prior to being hired?
(Please circle ONE response for each skill)

	SKILLS NOT RELEVANT FOR JOB	NONE; WILL LEARN ON JOB	BASIC SKILLS	INTERMEDIATE SKILLS	ADVANCED SKILLS
a. Use a spreadsheet program such as Lotus, Excel, Quattro or SuperCalc for data entry.	1	2	3	4	5
b. Import numeric data into a spreadsheet from a mainframe or data diskette.	1	2	3	4	5
c. Use a spreadsheet program to perform simple arithmetic calculations	1	2	3	4	5
d. Use a spreadsheet program for detailed analyses	1	2	3	4	5
e. Use statistical packages, such as SPSS, SYSTAT, or SAS for statistical analyses.	1	2	3	4	5
f. Conduct simulation, forecasting, or inventory programs involving mathematical modeling.	1	2	3	4	5
g. Use parametric or nonparametric statistics.	1	2	3	4	5

9) Below are statements which describe various ***skills for creating and managing databases***. Please indicate the level of competence you expect from new college graduates entering your employment.

|What skills should your new employees have prior to being hired?|
(Please circle ONE response for each skill)

	SKILLS NOT RELEVANT FOR JOB	NONE; WILL LEARN ON JOB	BASIC SKILLS	INTERMEDIATE SKILLS	ADVANCED SKILLS
a. Create text databases such as legal case studies or technical reports	1	2	3	4	5
b. Create numeric databases such as employee leave records or inventory	1	2	3	4	5
c. Create directory databases such as client lists or addresses	1	2	3	4	5
d. Create bibliographic databases such as references to marketing articles or company reports	1	2	3	4	5
e. Use bibliographic file management packages such as ProCite or NoteBook to organize downloaded citations and personal reference files	1	2	3	4	5
f. Write documentation for databases	1	2	3	4	5
g. Manage proprietary databases	1	2	3	4	5

10) Below are statements which describe various ***skills for writing computer programs***. Please indicate the level of competence you expect from new college graduates entering your employment.

What skills should your new employees have prior to being hired?
(Please circle ONE response for each skill)

	SKILLS NOT RELEVANT FOR JOB	NONE; WILL LEARN ON JOB	BASIC SKILLS	INTERMEDIATE SKILLS	ADVANCED SKILLS
a. Write programs for use by others outside your organization	1	2	3	4	5
b. Write programs for use by others within your organization	1	2	3	4	5
c. Write programs for individual use	1	2	3	4	5
d. Write documentation for programs created so others can use them	1	2	3	4	5

11) Below are statements which describe various ***skills for preparing and producing documents using computers***. Please indicate the level of competence you expect from new college graduates entering your employment.

What skills should your new employees have prior to being hired?
(Please circle ONE response for each skill)

	SKILLS NOT RELEVANT FOR JOB	NONE; WILL LEARN ON JOB	BASIC SKILLS	INTERMEDIATE SKILLS	ADVANCED SKILLS
a. Use a wordprocessing program such as WordPerfect, WriteNow, or Word to produce letters, memos or reports	1	2	3	4	5
b. Use a desktop publishing program such as PageMaker or Ventura to produce newsletters, brochures or flyers	1	2	3	4	5
c. Use a graphics program such as Chart, FreeLance, SASGraph or MacDraw to produce graphs and charts for reports, slides or overhead transparencies	1	2	3	4	5

12) Below are statements which describe various ***skills for using computer telecommunications networks and software***. Please indicate the level of competence you expect from new college graduates entering your employment.

What skills should your new employees have prior to being hired?
(Please circle ONE response for each skill)

	SKILLS NOT RELEVANT FOR JOB	NONE; WILL LEARN ON JOB	BASIC SKILLS	INTERMEDIATE SKILLS	ADVANCED SKILLS
a. Connect to online systems using standard telecommunications software packages such as Smartcom, Red Rider, PC Talk, or Crosstalk	1	2	3	4	5
b. Set communication software parameters such as stop bits or parity	1	2	3	4	5
c. Create logon and other scripts to automate functions	1	2	3	4	5
d. Comprehend telecommunications terminology	1	2	3	4	5
e. Use networks such as Tymnet, Telenet, NSFnet or NYSERnet	1	2	3	4	5
f. Use electronic mail and bulletin boards to communicate with colleagues	1	2	3	4	5

SECTION THREE

The following questions refer to your professional background and additional information about the company or organization where you are *currently employed.*

13) What is the name and location of the company or organization where you are currently employed?

_____
(Name of Employer, Company or Organization)

_____
(City) (State) Zip

14) Please describe the type of organization or business where you are currently employed.
(For example, banking, insurance, retail, hospitality, etc.)

_____

15) What is your present job title? _____

16) Within which division or area of your company do you work? (For example, Administration, Research & Development, Sales, Production, etc.)

_____

17) How many employees are there in your entire organization?
(Please approximate if you are unsure.)

_____ TOTAL NUMBER OF EMPLOYEES IN ENTIRE ORGANIZATION

18) How many employees report directly to you and for how many employees are you responsible?

_____ NUMBER OF EMPLOYEES WHO REPORT DIRECTLY TO ME

_____ NUMBER OF EMPLOYEES FOR WHOM I AM RESPONSIBLE

19) Which **one** of the following choices represents your highest level of responsibility for employee recruitment? *(Please circle ONE response.)*

1 I have decision-making authority in all company hiring activities.

2 I have authority to hire only those employees who will work under my direct supervision.

3 I have authority to recommend hiring those employees who will work under my direct supervision but the ultimate decision is someone else's.

4 I have authority to recommend hiring employees who will not work under my direct supervision.

5 I am not involved with recruitment or hiring.

6 Other (Please specify)_____

20) What college degrees and majors have you completed? *(Please circle ALL that apply and write in your major in the blanks provided.)*

1	NONE	
2	ASSOCIATE'S	Major: _____
3	BACHELOR'S	Major: _____
4	BACHELOR'S	Major: _____
5	MASTER'S (excluding MBA)	Major: _____
6	MASTER'S (excluding MBA)	Major: _____
7	MBA	Major: _____
8	JD	Major: _____
9	Ph.D.	Major: _____
10	Other (Please specify) _____	Major: _____

21) Is there anything else you would like to tell us about the value of information or the importance of computers in your company? If so, please attach a separate sheet or use the space below for that purpose.

22) Additional Comments:

Thank you for your time and cooperation.
Please use the enclosed postage-paid envelope to return this questionnaire.

If you have any questions about our study or this questionnaire, please contact:

BILL COONS
Albert R. Mann Library
Cornell University
Ithaca, New York 14853-4301

(607) 255-7959
FAX: (607) 255-0850

Appendix B

COMPUTER SKILLS FOR INFORMATION RETRIEVAL AND MANAGEMENT

A Survey of the Skills of Selected Cornell University Business and Finance Graduates

Sponsored by the American Library Association

and Conducted by:

Albert R. Mann Library
Cornell University
Ithaca, NY 14853-4301

June 1990

COMPUTER SKILLS FOR INFORMATION RETRIEVAL AND MANAGEMENT

A Survey of Selected Cornell Business and Finance Graduates

Graduates from May 1988 through May 1990 have received a copy of this questionnaire, which has been designed to gather data concerning the importance of computer skills to retrieve and manage information (the term computer refers to any type of computer). Whether or not you are currently employed, we would appreciate it if you would answer all of the questionnaire. Thank you in advance for your participation.

There are three sections to this questionnaire:

- **SECTION ONE** addresses your use of computers;
- **SECTION TWO** addresses your computer skills level and how you attained these skills;
- **SECTION THREE** requests demographic information about you (and your organization if you are currently employed).

SECTION ONE

In questions 1-4 we are interested in learning about your use of computers on the job, or, if you are not yet employed, your current personal or educational use of computers.

1) What kinds of computers do you use?
(Circle ALL that apply)

a. Mainframes
b. Minicomputers
c. Microcomputers (personal computers)
d. Terminal connected to mainframe
e. Other (Please specify)_____
f. I do not use a computer **SKIP TO QUESTION 12** (page 12)

2) How experienced are you with using computers?
(Please circle ONE response)

a. very experienced
b. somewhat experienced
c. average experience
d. somewhat inexperienced
e. very inexperienced

3) What percent of your work time is spent using computers?

_____% PERCENT OF TIME SPENT USING COMPUTERS

4) How important were your computing skills to being hired for your job? If you are not yet employed, please **SKIP TO QUESTION 5** (this page). *(Please circle ONE response)*

1. My computer skills were very important for the job; only candidates with appropriate skills were considered.
2. My computer skills were important for the job; candidates with these skills had an advantage over candidates without these skills.
3. My computer skills were somewhat important for the job; it was preferred that candidates have these skills, but candidates with or without them were eligible for hire.
4. My computer skills were not important for the job and they were not a factor in my being hired; candidates with or without these skills were qualified for hiring.

SECTION TWO

Questions 5-11 focus on your computer skills. There are five response categories for these questions. They are:

1. **DON'T KNOW**
2. **NOT NEEDED** — the skill is not required of you as an employee;
3. **BASIC SKILL** — you are comfortable with the technology and able to perform common tasks;
4. **INTERMEDIATE SKILL** — you are required to be competent in performing most tasks;
5. **ADVANCED SKILL** — you are required to be an authority in performing tasks.

5a) Below are statements which describe ***skills for finding information in computerized databases***. Please indicate the skill level required of you as an employee. If you are not currently employed, please complete this question based upon your perception of the skills needed for employment in your field.

	What is the skill level required of you? *(Please circle ONE response for each item)*				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
a. Find appropriate computerized information resources	1	2	3	4	5
b. Find information in various storage formats (e.g., floppy, hard or optical disks; magnetic tape)	1	2	3	4	5
c. Understand how databases are organized in order to find information more effectively	1	2	3	4	5
d. Search numeric databases such as census data or commodity prices	1	2	3	4	5

(continued on next page)

5a) continued

	What is the skill level required of you? *(Please circle ONE response for each item)*				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
e. Search full-text databases such as complete journal articles or other textual documents	1	2	3	4	5
f. Search bibliographic databases to find references to articles, books or reports	1	2	3	4	5
g. Search directory databases such as name and address files	1	2	3	4	5
h. Search in-house proprietary files such as personnel databases, inventory records, customer service files, etc.	1	2	3	4	5
i. Construct a logical strategy to search for information in a database	1	2	3	4	5
j. Use controlled vocabulary such as SIC codes, registry numbers or thesaurus terms to conduct an effective information search	1	2	3	4	5
k. Use key words to conduct an effective information search	1	2	3	4	5
l. Use logical operators such as "and", "or", and "not" to increase or decrease search results	1	2	3	4	5
m. Apply the concept of truncation or "wildcards"	1	2	3	4	5
n. Correctly interpret field tags, abbreviations, codes and other data elements accompanying citations	1	2	3	4	5

5b) Whether or not you are expected to use these skills in your job, we are interested in learning how you rate your overall ***skills for finding information in computerized databases***. What is your skill level? *(Please circle ONE response.)*

1. None 2. Basic Skills 3. Intermediate Skills 4. Advanced Skills

5c) Whether or not the previous skills are needed for your job, we are interested in learning how important each of the following methods was for acquiring your ***skills for finding information in computerized databases***.

Circle any and all methods, A through F, which provided you with an opportunity to learn these skills. Then, for each circled method (A-F), place an "X" anywhere on the dotted line of the corresponding scale.

	How important was this method?
a. On my own through general experience, experimenting, reading manuals, or attending workshops.	Not Important ——— Very Important
b. At Cornell through my academic classes.	Not Important ——— Very Important
c. At Cornell through Mann Library's instruction (e.g., guest lectures in Ag Econ classes).	Not Important ——— Very Important
d. On the job.	Not Important ——— Very Important
e. High School.	Not Important ——— Very Important
f. Other (please describe)_____	Not Important ——— Very Important

6) How frequently do you use the following types of computerized databases for finding information?

	How frequently do you use these databases? *(Please circle ONE response for each category)*				
	NEVER	LESS THAN ONCE A YEAR	SEVERAL TIMES A YEAR	ABOUT ONCE A WEEK	ALMOST DAILY
a. Information Service Providers ..... 1 (e.g., BRS, DIALOG, STN, ORBIT, Pergamon, Knowledge Index, BRS After Dark, EasyNet)		2	3	4	5

(continued on next page)

6) continued

	How frequently do you use these databases? (Please circle ONE response for each category)				
	NEVER	LESS THAN ONCE A YEAR	SEVERAL TIMES A YEAR	ABOUT ONCE A WEEK	ALMOST DAILY
b. Information Service Networks (e.g., CompuServe, GENIE)	1	2	3	4	5
c. Wire Services (e.g., UPI, AP or Reuters)	1	2	3	4	5
d. Business Databases (e.g., Dow Jones News Retrieval, CD Corporate, NEXIS, Compact Disclosure)	1	2	3	4	5
e. Agricultural Databases.. (e.g., Agridata, DTN or Grassroots)	1	2	3	4	5
f. Legal Databases (e.g., Lexis or Westlaw)	1	2	3	4	5
g. Other (please describe) _____	1	2	3	4	5

7a) Below are statements which describe various ***skills for manipulating numeric data with a computer*** Please indicate the skill level required of you as an employee. If you are not currently employed, please complete this question based upon your perception of the skills needed for employment in your field.

	What is the skill level required of you? (Please circle ONE response for each item)				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
a. Use a spreadsheet program such as Lotus, Excel, Quattro or SuperCalc for data entry	1	2	3	4	5
b. Import numeric data into a spreadsheet from a mainframe or data diskette	1	2	3	4	5
c. Use a spreadsheet program to perform simple arithmetic calculations	1	2	3	4	5
d. Use a spreadsheet program for detailed analyses	1	2	3	4	5

(continued on next page)

7a) continued

	What is the skill level required of you? (Please circle ONE response for each item)				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
e. Use statistical packages, such as SPSS, SYSTAT, or SAS for statistical analyses.	1	2	3	4	5
f. Conduct simulation, forecasting, or inventory programs involving mathematical modeling.	1	2	3	4	5
g. Use parametric or nonparametric statistics.	1	2	3	4	5

7b) Whether or not you are expected to use these skills in your job, we are interested in learning how you rate your overall ***skills for manipulating numeric data with a computer.*** What is your skill level? *(Please circle ONE response.)*

1. None 2. Basic Skills 3. Intermediate Skills 4. Advanced Skills

7c) Whether or not the previous skills are needed for your job, we are interested in learning how important each of the following methods was for acquiring your ***skills for manipulating numeric data with a computer.***

Circle any and all methods, A through F, which provided you with an opportunity to learn these skills. Then, for each circled method (A-F), place an "X" anywhere on the dotted line of the corresponding scale.

	How important was this method? Not Important — Very Important
a. On my own through general experience, experimenting, reading manuals, or attending workshops.	
b. At Cornell through my academic classes.	
c. At Cornell through Mann Library's instruction (e.g., guest lectures in Ag Econ classes).	
d. On the job.	

(continued on next page)

7c) **continued**

	How important was this method?
e. High School.	Not Important ... Very Important
f. Other (please describe)_____	Not Important ... Very Important

8a) Below are statements which describe various ***skills for creating and managing databases***. Please indicate the skill level required of you as an employee. If you are not currently employed, please complete this question based upon your perception of the skills needed for employment in your field.

	What is the skill level required of you? *(Please circle ONE response for each item)*				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
a. Create text databases such as legal case studies or technical reports	1	2	3	4	5
b. Create numeric databases such as employee leave records or inventory	1	2	3	4	5
c. Create directory databases such as client lists or addresses	1	2	3	4	5
d. Create bibliographic databases such as references to marketing articles or company reports	1	2	3	4	5
e. Use bibliographic file management packages such as ProCite or NoteBook to organize downloaded citations and personal reference files	1	2	3	4	5
f. Write documentation for databases	1	2	3	4	5
g. Manage proprietary databases	1	2	3	4	5

8b) Whether or not you are expected to use these skills in your job, we are interested in learning how you rate your overall ***skills for creating and managing databases***. What is your skill level? *(Please circle ONE response.)*

1. None 2. Basic Skills 3. Intermediate Skills 4. Advanced Skills

8c) Whether or not the previous skills are needed for your job, we are interested in learning how important each of the following methods was for acquiring your ***skills for creating and managing databases.***

Circle any and all methods, A through F, which provided you with an opportunity to learn these skills. Then, for each circled method (A-F), place an "X" anywhere on the dotted line of the corresponding scale.

	How important was this method?
a. On my own through general experience, experimenting, reading manuals, or attending workshops.	Not Important ——— Very Important
b. At Cornell through my academic classes.	Not Important ——— Very Important
c. At Cornell through Mann Library's instruction (e.g., guest lectures in Ag Econ classes).	Not Important ——— Very Important
d. On the job.	Not Important ——— Very Important
e. High School.	Not Important ——— Very Important
f. Other (please describe)_____	Not Important ——— Very Important

9a) Below are statements which describe various ***skills for writing computer programs.*** Please indicate the skill level required of you as an employee. If you are not currently employed, please complete this question based upon your perception of the skills needed for employment in your field.

	What is the skill level required of you? *(Please circle ONE response for each item)*				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
a. Write programs for use by others outside your organization	1	2	3	4	5
b. Write programs for use by others within your organization	1	2	3	4	5
c. Write programs for individual use	1	2	3	4	5
d. Write documentation for programs created so others can use them	1	2	3	4	5

9b) Whether or not you are expected to use these skills in your job, we are interested in learning how you rate your overall ***skills for writing computer programs***. What is your skill level? *(Please circle ONE response.)*

1. None 2. Basic Skills 3. Intermediate Skills 4. Advanced Skills

9c) Whether or not the previous skills are needed for your job, we are interested in learning how important each of the following methods was for acquiring your ***skills for writing computer programs***.

Circle any and all methods, A through F, which provided you with an opportunity to learn these skills. Then, for each circled method (A-F), place an "X" anywhere on the dotted line of the corresponding scale.

	How important was this method? Not Important ... Very Important
a. On my own through general experience, experimenting, reading manuals, or attending workshops.	
b. At Cornell through my academic classes.	
c. At Cornell through Mann Library's instruction (e.g., guest lectures in Ag Econ classes).	
d. On the job.	
e. High School.	
f. Other (please describe)_____	

10a) Below are statements which describe various ***skills for preparing and producing documents using computers***. Please indicate the skill level required of you as an employee. If you are not currently employed, please complete this question based upon your perception of the skills needed for employment in your field.

	What is the skill level required of you? *(Please circle ONE response for each item)*				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
a. Use a wordprocessing program such as WordPerfect, WriteNow, or Word to produce letters, memos or reports	1	2	3	4	5

(continued on next page)

10a) continued

	What is the skill level required of you? (Please circle ONE response for each item)				
	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
b. Use a desktop publishing program such as PageMaker or Ventura to produce newsletters, brochures or flyers	1	2	3	4	5
c. Use a graphics program such as Chart, FreeLance, SASGraph or MacDraw to produce graphs and charts for reports, slides or overhead transparencies	1	2	3	4	5

10b) Whether or not you are expected to use these skills in your job, we are interested in learning how you rate your overall ***skills for preparing and producing documents using computers***. What is your skill level?
(Please circle ONE response.)

1. None 2. Basic Skills 3. Intermediate Skills 4. Advanced Skills

10c) Whether or not the previous skills are needed for your job, we are interested in learning how important each of the following methods was for acquiring your ***skills for preparing and producing documents using computers***.

Circle any and all methods, A through F, which provided you with an opportunity to learn these skills. Then, for each circled method (A-F), place an "X" anywhere on the dotted line of the corresponding scale.

	How important was this method? Not Important ... Very Important
a. On my own through general experience, experimenting, reading manuals, or attending workshops.	
b. At Cornell through my academic classes.	
c. At Cornell through Mann Library's instruction (e.g., guest lectures in Ag Econ classes).	
d. On the job.	

(continued on next page)

10c) **continued**

How important was this method?

e. High School.

Not Important — Very Important

f. Other
(please describe)_____

Not Important — Very Important

11a) Below are statements which describe various ***skills for using computer telecommunications networks and software***. Please indicate the skill level required of you as an employee. If you are not currently employed, please complete this question based upon your perception of the skills needed for employment in your field.

What is the skill level required of you?
(Please circle ONE response for each item)

	DON'T KNOW	NOT NEEDED	BASIC SKILL	INTERMEDIATE SKILL	ADVANCED SKILL
a. Connect to online systems using standard telecommunications software packages such as Smartcom, Red Ryder, PC Talk, or Crosstalk	1	2	3	4	5
b. Set communication software parameters such as stop bits or parity	1	2	3	4	5
c. Create logon and other scripts to automate functions	1	2	3	4	5
d. Comprehend telecommunications terminology	1	2	3	4	5
e. Use networks such as Tymnet, Telenet, NSFnet or NYSERnet	1	2	3	4	5
f. Use electronic mail and bulletin boards to communicate with colleagues	1	2	3	4	5

11b) Whether or not you are expected to use these skills in your job, we are interested in learning how you rate your overall ***skills for using computer telecommunications networks and software***. What is your skill level?
(Please circle ONE response.)

1. None 2. Basic Skills 3. Intermediate Skills 4. Advanced Skills

11c) Whether or not the previous skills are needed for your job, we are interested in learning how important each of the following methods was for acquiring your ***skills for using computer telecommunications networks and software.***

Circle any and all methods, A through F, which provided you with an opportunity to learn these skills. Then, for each circled method (A-F), place an "X" anywhere on the dotted line of the corresponding scale.

	How important was this method?
a. On my own through general experience, experimenting, reading manuals, or attending workshops.	Not Important ——— Very Important
b. At Cornell through my academic classes.	Not Important ——— Very Important
c. At Cornell through Mann Library's instruction (e.g., guest lectures in Ag Econ classes).	Not Important ——— Very Important
d. On the job.	Not Important ——— Very Important
e. High School.	Not Important ——— Very Important
f. Other (please describe)_____	Not Important ——— Very Important

SECTION THREE

The following questions refer to your personal background and to your organization, if you are currently employed.

12) In what month and year did you receive your bachelor's degree from Cornell? *(Please circle ONE response)*

a. May 1988
b. August 1988
c. January 1989
d. May 1989
e. August 1989
f. January 1990
g. May 1990

13) What was your declared major within the Department of Agricultural Economics?

_____

14) In the course of your Agricultural Economics studies at Cornell, did you receive instruction from staff of Albert R. Mann Library in database access and information retrieval? Classes in which Mann Library staff guest lectured include Financial Accounting (221), Introductory Statistics (310), Managerial Accounting (323), Marketing Management (342), Information Systems and Decision Analysis (418), and Business Policy (424).
(Please circle ONE response)

a. Yes ---------> **CONTINUE WITH THE NEXT QUESTION**
b. No ---------> **SKIP TO QUESTION 16** (this page)
c. I Don't Remember ---------> **SKIP TO QUESTION 16** (this page)

15) If you answered Question 14 'YES', how frequently do you use either the skills you learned or the information you received as a result of this instruction?
(Please circle ONE response)

NEVER	LESS THAN ONCE A YEAR	SEVERAL TIMES A YEAR	ABOUT ONCE A WEEK	ALMOST DAILY
1	2	3	4	5

16) What is your present status?
(Please circle ONE response)

a. Currently employed ---------> **CONTINUE WITH THE NEXT QUESTION**
b. Enrolled in graduate school ---------> **SKIP TO QUESTION 22** (page 14)
c. Seeking employment ---------> **SKIP TO QUESTION 22** (page 14)
d. Other ---------> **SKIP TO QUESTION 22** (page 14)
(please describe) _____

17) What is the name and location of the company or organization where you are currently employed?

_____
(Name of Employer, Company or Organization)

_____
(City) (State) Zip

18) Please describe the type of organization or business where you are currently employed.
(For example, banking, insurance, retail, hospitality, etc.)

_____

19) What is your present job title? _____

20) Within which division or area of your company do you work?
(For example, Administration, Research & Development, Sales, Production, etc.)

_____

21) How many total employees are there in your entire organization (everyone in all divisions and at all locations)?
(Please approximate if you are unsure.)

_____ TOTAL NUMBER OF EMPLOYEES IN ENTIRE ORGANIZATION

22) Is there anything else you would like to tell us about the value of information or the importance of computers for your job? If so, please attach a separate sheet or use the space below for that purpose.

23) Additional Comments:

Thank you for your time and cooperation.

Please use the enclosed postage-paid envelope to return this questionnaire.

If you have any questions about our study or this questionnaire, please contact:

MARY OCHS
Albert R. Mann Library
Cornell University
Ithaca, New York 14853-4301

(607) 255-7960
FAX: (607) 255-0850

Appendix C: Comments from the Survey of Employers

"The computer in today's workplace is no longer a luxury. To compete I feel the Cornell graduates should be more than just familiar with the word processing and database/spreadsheet programs. They should know how to operate them with skill. The desktop publishing, the ability to link into databases, bulletin boards, etc. will also be valuable in the future. "

"Computers are becoming more important in public social services. We are now working with IBM to develop a child welfare and family services databases. We are not at the point of requiring computer literacy or familiarity in our professional social services staff, but that time is coming."

"Most positions expect a new employee to "land running" rather than providing a formal training program. As such, most employees have prior business experience (usually > 2 years) rather than coming directly from college."

"The cost of hardware, software and training is a major obstacle in service organization, particularly non-profit ones. The value of knowledgeable employees cannot be overstated..., but the technology is a major obstacle."

"As important as computer skills are, basic communication skills still remain more important..."

Obviously computers are crucial in today's business environment. However, ... we hire bright candidates with all different backgrounds -- learning computer skills isn't a problem when one has the right mindset to begin with!"

"The use of computers is becoming more important especially for recordkeeping, word processing, information retrieval and communication (electronic mail) in our organization. It is just beginning to be recognized as a valuable, if not necessary, tool for those personnel who are in the field. I think the main problem at my company is the allocation of funds and convincing some upper management of the need for such equipment for field managers and salespeople. "

"Colleges should devise courses that allow students to utilize personal computers in a 'hands-on' environment. Typically required computer courses are in programming (COBOL, Fortran) or a historical perspective of the computer age. These courses are not appropriate once students enter the business world."

"Half the battle in teaching new employees about using computers efficiently is ascertaining their keyboard or typing competence. I will not hire a new college grad who cannot type (with all ten fingers)."

"Even more useful is the ability to write standard, grammatical, well-organized English."

"The need for computer competence is growing, so that my responses indicate today's needs. Future needs will intensify."

"Familiarity with concepts is important. The successful employees are those who can quickly learn new areas and adapt. Understanding the fundamentals facilitates this. Good communication skills, interpersonal skills and work habits are also very important. Therefore, the specific training a student receives is less important than the broad, general knowledge they gain."

Appendix D: Comments from the Survey of Recent Graduates

"Make it harder to get work accomplished without a computer. I can't get any work done without a computer."

"The Mac has presence and needs to be taught!"

"There should be a mandatory computing class for Ag Ec majors. A class like Educ 247 [Microcomputers in Education] should be required of FRESHMEN. These basic computer skills should be introduced early to a student."

"There's no substitute for hacking."

"I cannot tell you how important it is to know how to use a computer for work purposes. Employers see it as a plus when a job applicant has knowledge of computers...It could make a difference between getting hired for a particular position or not. "

"Often the use of computers in Cornell Ag Ec classes were one-time workshops or one-time projects. These were very ineffective. Real learning comes when you [are] forced to use the program/system once a week (or at least regularly) for homework assignments."

"My law firm does not emphasize computer skills at all. We have LEXIS and WESTLAW available, but many attorneys there don't even know how [to use them]. I feel the training I got at Cornell helped me learn how to do LEXIS searches efficiently."

"I found some overlap in LOTUS training at Cornell. I learned it in [Ag Econ 323] and then had to sit through the training again in 324."

"The Mann Library lessons (although annoying!) opened up a world of available information to me that no one at my job knows exists. I am grateful for the exercises we had to do."

"It is critical that students be exposed to applications programs (i.e. Lotus, Dbase, ...) in their undergraduate classes. Practical experience with these widely used programs is as important as being able to write a business report. My exposure to Lotus at Cornell gave me a distinct advantage in the business world."

"In speaking with other fellow Cornell graduates it would seem that anyone employed in a financial institution is required to produce spreadsheets. Generally they are on company-designed programs/models, so that this seems an important area to concentrate on. In addition, I feel that it would have been helpful to have learned more about hardware--connecting computers and printers, software (DOS programs), how the computers run and working between two types of computers (e.g. IBM with Macintosh.)"

"I think the school should stress to students to use different types of computers, not just the Mac or the IBM, but both. The more programs you know how to use, the more marketable your skills."

"More computer courses should be offered at Cornell which relate to business applications as opposed to pure programming (i.e. database management instruction, basic modem usage and other on-line application). Business courses at Cornell seemed to concentrate solely on software (specifically Lotus) or programming. Instruction on various media (i.e. tape, in mainframe environment, downloading to pc, etc.) would be valuable in [the] business world."

"Applications for software and computers should be taught as freshman writing seminars are taught."

INFORMATION LITERACY PROGRAM

Albert R. Mann Library
Cornell University

Encompassing Goals

Students within the colleges and divisions which Mann Library serves, after the course of their four undergraduate years at Cornell, should possess the following core information literacy competencies (each of these core competencies contains subordinate objectives). College of Agriculture and Life Sciences, College of Human Ecology, Division of Biological Sciences and Division of Nutritional Sciences students will:

A. Understand the role and power of information in a democratic society;

B. Understand the variety of the content and the format of information;

C. Understand standard systems for the organization of information;

D. Develop the capability to retrieve information from a variety of systems and in various formats;

E. Develop the capability to organize and manipulate information for various access and retrieval purposes.

9/12/87

INFORMATION LITERACY PROGRAM

Albert R. Mann Library
Cornell University

Subordinate Objectives

Goal A:

Understand the role and power of information in a democratic society.

Objectives:

Students can describe and understand:

1. How scholars and researchers use information and keep currently informed;

2. How practicing professionals use information and keep currently informed;

3. How the use of information can improve the quality of scholars' and professionals' work;

4. The commodity nature of information: who generates, controls, and uses information. In particular, the role that governments play in the dissemination and control of information;

5. The costs of misinformation, the possibilities of abuse and its consequences.

9/12/87

INFORMATION LITERACY PROGRAM

Albert R. Mann Library
Cornell University

Subordinate Objectives

Goal B:

Understand the variety of the content and the format of information.

Objectives:

Within their discipline, students can:

1. Distinguish popular from scholarly treatments of a subject;

2. Distinguish between primary and secondary sources;

3. Define various standard formats for the storage of scholarly information, e.g. print, microform, optical, floppy and compact disk, and magnetic tape;

4. Evaluate the quality of information and the usefulness of the content and format of a particular information tool based on relevant criteria;

5. Identify appropriate print or computerized information resources and references in their discipline, e.g. encyclopedias, directories, indexes, and describe their value.

INFORMATION LITERACY PROGRAM

Albert R. Mann Library
Cornell University

Subordinate Objectives

Goal C:

Understand standard systems for the organization of information.

Objectives:

Within their discipline, students can :

1. Define types of databases and their organization, e.g. records, fields, and the retrieval function/process;

2. Recognize that different types of reference sources lead to various forms and formats of information;

3. Define standard terms such as bibliographic citation, periodical index, abstract, and citation index;

4. Differentiate between the types of materials typically represented in a library's catalog and those that are not;

5. Determine the index structure and access points of print or computerized information resources.

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INFORMATION LITERACY PROGRAM

Albert R. Mann Library
Cornell University

Subordinate Objectives

Goal D:

Develop the capability to retrieve information from a variety of systems and various formats.

Objectives:

Within their discipline, students can:

1. Construct a logical plan to organize their search for information;
2. Describe the differences between controlled vocabularies and keywords and use both efficiently in their search strategy;
3. Effectively use logical operators (e.g. and, or, not) to link their search terms and intersect concepts in various electronic information systems;
4. Understand and apply the concepts of truncation and field qualification in various electronic information systems;
5. Describe and use appropriate services which are available to assist them in locating information;
6. Successfully navigate within the libraries they use;
7. Accurately interpret bibliographic citations from print and computerized information resources and locate the materials they represent;
8. Operate a standard personal computer, develop mastery of certain programs/software, and maintain a working awareness of others;

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INFORMATION LITERACY PROGRAM

Albert R. Mann Library
Cornell University

Subordinate Objectives

Goal E:

Develop the capability to organize and manipulate information for various access and retrieval purposes.

Objectives:

Within their discipline, students can:

1. Use a bibliographic file management package to organize downloaded citations and personal files of references;

2. Conduct their own needs assessment, based on relevant criteria, to identify suitable software packages appropriate to a given application;

3. Use electronic spreadsheets (e.g. LOTUS) to reformat and analyze numeric data which has been either downloaded or manually entered into the package;

4. Use a word processing package (e.g. WordPerfect) to format papers, reformat downloaded references and construct bibliographies;

5. Write correct bibliographic citations for books, journal articles, and conference papers.

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