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AUTHOR Larson, Jan; Smith, Marian A.

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ABSTRACT

To learn more about students' computer-literacy levels and attitudes about computer use, a pilot study was performed in the summer of 1993 to evaluate the computer literacy of first-year students entering the University of Wisconsin-Eau Claire. A survey was completed by 444 incoming students during their orientation programs. The majority had some degree of computer experience when they entered the university; most cited word processing as their chief experience. Roughly 66% had no desktop-publishing experience; spreadsheet program experience was also limited. Nearly all students listed high school as the source of their experience. Overall, greater computer literacy did not positively improve students' attitudes toward using computers. Nearly 61% of high-experience users reported strongly avoiding computers. Women were more likely to avoid using computers, but gender appears to play less of a role in determining students' enjoyment of using computers than does choice of major. Implications for instruction are discussed. (Contains 23 references.) (SLD)

Title:

An Assessment of the Computer Literacy and Computer Attitudes of Incoming First-Year Students at the University of Wisconsin-Eau Claire

Authors:

Jan Larson
University of Wisconsin-Eau Claire

Marian A. Smith
Chippewa Valley Technical College
Eau Claire, WI 54701

PARK AND GARFIELD AVE.
EAU CLAIRE, WI 54702-4004

Computers are an unavoidable fact of life. They are used to gather, store, process and distribute information. More than ever before, the nation's workers are required to use computers to conduct business. And that means the nation's educators must address the demand both to teach and use computers in the classroom.

According to the U.S. Census Bureau's report, "Computer Use in the United States, 1989," more than 75 million Americans reported using a computer in some way. That figure was up from 47 million in 1984 (U.S. Department of Labor, 1992-1993). All indications are that the trend toward increased computer use will continue. For students graduating from post-secondary institutions, it is essential to have skills in microcomputer applications in their chosen career field.

In response to the computer age, many educators have embraced computer technology as an effective teaching tool. The effectiveness of computers as instructional tools has been documented in a variety of disciplines (Fleming, 1988; Hague & Mason, 1986; Sadler, 1987; Wiley, 1987). Classroom integration of computer technology is necessary to meet the future demands of society and the workplace.

Curriculum designers in post-secondary education seem to have abandoned the debate over whether computers should be used in the classroom and have turned their focus on the questions of when and how computers can be used effectively in education (Loyd & Gressard, 1984). But before computers can become an integrated part of the educational environment, educators need to know what computer literacy students possess before entering the classroom. Educators also must understand what attitudes students harbor toward computers. Understanding students' fears and anxieties will help educators craft instructional methods to overcome specific negative attitudes (Arch & Cummins, 1989).

Although limited research has been done to identify students' computer literacy levels, less effort has been devoted to understanding factors affecting students' attitudes toward computers as they enter post-secondary educational institutions. An assessment of students' computer literacy and attitudes would help educators in curriculum planning and in developing strategies to incorporate computer use successfully into various instructional settings. Such a literacy assessment would be useful particularly for educators who teach classes using computers as part of their instructional methodology. Identifying the existing computer literacy of first-year students will help teachers effectively plan curricula that would strike a balance between computer training and content instruction.

The status of students' computer literacy is of interest to many educators, including instructors who teach introductory computer courses and to instructors who teach other subjects, such as writing and mathematics, in a computer lab. Due to the varying levels of computer literacy among first-year college students, instructors who teach courses with a computer component often are faced with the difficult task of teaching students with a wide variety of ability levels (Harrington, 1990). Although the computer software used by students in many college courses is fairly simple and easy to use, the students still spend a significant portion of class time mastering software. The computer technology, then, could interfere with, or detract from, students' ability to focus on course content.

In an effort to learn more about students' computer literacy levels and attitudes about computer use, a study was performed during the summer of 1993 to evaluate the computer literacy of first-year students entering the University of Wisconsin-Eau Claire. It is hoped educators may use the study in a wide variety of subject areas to help plan classes and adapt teaching methodologies to meet students' needs.

Research Questions

The following questions guided the study:
1. How long have students been using computers as they enter the university as first-year students?
2. What kind of computer experience, if any, do incoming first-year students have? (e.g. word processing, desk-top publishing, programming, spreadsheets, data bases, graphics packages)
3. Where did students obtain their computer experience? (e.g. school, work, home)
4. Is there a relationship between student experience levels and attitudes toward computers?
5. Is there a relationship between student major and computer attitudes?
6. Is there a relationship between student gender and the level of computer literacy?
7. Is there a relationship between student gender and computer attitudes?

The answers to these research questions will be used to identify the existing computer literacy of incoming first-year students in order to help develop curricula that is relevant to the students' needs and to help develop instructional methods which take into consideration students' attitudes toward computers.

Review of the Literature

A number of studies have been conducted in educational settings to measure students' computer literacy, which refers to students' knowledge about computers and computer operations (Oates, 1983), and to identify how computer attitudes affect students' ability to use computers (Strickland, 1989). In a study at the University of Virginia, Loyd and Gressard (1984) found that levels of computer experience varied greatly in the students they studied. Their study indicated that students with more computer experience were significantly more confident in their use of computers than were students with little computer experience. Researchers viewed increased confidence as a positive factor which influenced students' general attitudes toward computer use. There is some evidence, however, that general attitudes toward computer use differ by gender, with women being less confident of their abilities and distrusting computers more than their male counterparts (Lockheed, 1985).

A study conducted at Purdue University (Sullivan, 1989) also measured students' knowledge of and previous experience with computers. Sullivan's study sought to gain a systematic knowledge of students' computer backgrounds. Sullivan found that although half the students surveyed had some previous experience with computers, many did not use computers regularly and had no motivation for using computers in their classes. Sullivan suggested that more complete information about students' computer literacy could help educators eliminate misconceptions about students' abilities and attitudes and develop curricula that more closely meets the needs of students.

Since 1985, students in freshmen computer literacy courses at Bentley College have participated in a study regarding their pre-college computing experience (Harrington, 1990). The annual surveys indicate that the number of students with a background in programming is decreasing, while the number of students with some background in productivity software is increasing. The school has used the results of the study to tailor its computer literacy course to students' backgrounds.

In addition to examining how students' computer experience affects current learning, several studies have been done to measure how past computer experience and attitudes about computer use may be linked. Howard, Murphy and Thomas (1987) found that increased computer experience reduced students' computer anxiety. Their study found that students' attitudes toward using computers could be improved by providing students with more computer knowledge and experience; more hours of computer experience at the college level seemed to promote higher levels of confidence and improved attitudes among students.

The researchers suggested that students who enter introductory courses with minimal experience and little knowledge about computers are more likely to suffer from high computer anxiety; therefore, classes that include computer training should be designed with the needs of these potential students in mind (Howard, Murphy, & Thomas, 1987).

Lee (1986) also studied the effects of computer experience on computer attitudes. In a study at the University of North Carolina at Charlotte, Lee found that past computer experience significantly affected performance in classroom activities in which students used computers. Lee suggested that minimal experience with computers may be sufficient to reduce anxiety, because there was not a significant difference between the performance of students whose computer skills were classified as "low experience" or "high experience." Other researchers also have hypothesized that inexperience and unfamiliarity with computers can cause high levels of anxiety and that such anxiety can interfere with students' academic performance (Hedl, O'Neil, & Hansen, 1973; Johnson & White, 1980; Johnson & Johnson, 1981).

Attitude also was found to be linked to computer use in a study conducted at a large midwestern university (Arndt, Clevenger, & Meiskey, 1985). The researchers found that high levels of computer use were associated with positive attitudes toward computers. Students with greater amounts of computer experience and relaxed attitudes toward computers were found to be less likely to view computers as threatening (Arndt, Clevenger, & Meiskey, 1985).

Gender also has been studied as a factor related to students' computer literacy and computer attitudes. In a study at a private liberal arts college, Arch and Cummins (1989) found that males tended to use and like computers more than did females. The researchers found that females tended to approach computers in a lab less frequently than males, and females had a more negative attitude about computers and their ability to use them. However, structured instruction in the use computers helped both males and females achieve a more positive attitude toward computer use and more confidence about their computer skills (Arch & Cummins, 1989).

Another study (Morahan-Martin, Olinsky, & Schumacher, 1992), which was conducted in 1989 and 1990 at Bryant College, provided evidence that gender differences are present in the computer experience, skills and attitudes of incoming college freshman. Although no differences were found in the amount of computer experience, males had more experience and skills than females in specific types of computer use, particularly programming.

Two studies conducted with students in New Jersey also showed a gender difference in attitudes toward computers (Wilder, Mackie, & Cooper, 1985). These studies found that both males and females perceive computer use as being more appropriate for males. The researchers suggest that students' attitudes toward, and gender-related perceptions of, computers are affected by previous school experiences.

Additional studies also have found that factors such as gender, age, experience and interest in computers can affect students' attitudes toward and use of computers (Lockheed, 1985; Smith, 1988) The findings of these and other studies suggest that additional research needs to be done to identify factors that could influence students' ability to use computers. A 1982 literature review by Lawton and Gershner (1982) found few empirical studies about issues related to computer literacy and attitudes, further suggesting a need for additional research in the area of factors affecting computer literacy and attitudes.

Methodology

The survey used to measure first-year students' computer literacy and to study factors affecting their attitudes toward computers was administered June through August of 1993 at the University of Wisconsin-Eau Claire. The University of Wisconsin-Eau Claire is a

liberal arts college with an enrollment of approximately 10,000 students.

The questionnaires were distributed via student orientation packets to the university's 2,000 incoming first-year students. A written questionnaire was considered an appropriate data collection instrument because it permitted a large number of people to be surveyed in a brief period of time. Researchers had no contact with students and students received no oral explanation of the study. Written instructions included with the questionnaires asked students to return completed surveys to a drop-off box located at the registration site. Responding to the survey were 444 students (152 women and 289 men).

Designed to collect information from students regarding computer abilities and attitudes, the questionnaire asked students to record the amount and type of their previous computer experience, the source of experience and their attitudes toward using computers. Demographic data, including age, gender and major also were collected.

Questionnaire responses were tabulated with the help of UW-Eau Claire's Computing and Networking Services (CNS). The SPSS computer program was used to perform the analysis and to calculate frequencies for each question. CNS also helped cross-tabulate survey data on experience, age, major and gender with computer attitude questions in an effort to understand factors influencing both student computer literacy levels and students' attitudes toward using computers when they entered the university. For the purpose of the cross-tabulation, experience was separated into three categories: low-, mid- and high-experience users. The categories are defined as having 0 to 12 months of experience, 13 to 36 months and more than 36 months, respectively. Because there was not a significant rage of ages, age data added little information to the study.

Computer Literacy

The results of the study indicate the majority of students surveyed had some degree of computer literacy when they entered the university. Nearly 90 percent (86.7) of respondents said they possessed some computer experience. More than 70 percent had three or more years of experience. Most cited word processing as providing their chief experience with computers. Approximately 66 percent said they had basic word processing skills, while 33 percent described their word processing skills as advanced.

The study found that when students were asked to assess their computer literacy with more specific skills, such as graphic, desktop publishing and spreadsheet programs, their literacy declined sharply. For example, 47 percent of students said they had no experience with graphic programs and nearly 75 percent reported less than a year of computer graphic experience. Roughly 66 percent said they had no desktop publishing experience and 85 percent had less than a year of desktop publishing experience. Spreadsheet program experience also was limited. Forty-two percent reported having no experience with computer spreadsheets and 78 percent said they had less than a year of experience with spreadsheets. Nearly all students (97 percent) listed high school as the source of their computer experience.

Computer Attitudes – Experience

Cross-tabulating survey data collected about students' levels of computer literacy with responses to attitude questions revealed that increased experience was not equated with higher confidence levels. Overall, greater computer literacy did not positively improve students' attitudes toward using computers. Indeed, it seemed that the old adage "familiarity breeds contempt" (or at least mistrust) applied. Nearly 61 percent of high-experience users (those with 36 months or more of experience) reported strongly avoiding computers, compared to 21 percent of students with no computer experience and 24 percent with less than a year of experience. According to the questionnaire categories, 72 percent (314) of students were classified as high-experience users (having 36 months or more

of experience); 9.6 percent (42) as mid-range users (having 13 to 36 months experience); and 18.3 percent (80) as low-experience users (having 0 to 12 months experience).

Confidence levels also appeared to slide as experience rates climbed. For example, 22.3 percent of high-experience users strongly agreed or agreed with the statement, "I feel confident using computers," compared to 35.8 percent of mid-range users and 45.8 percent of low-experience users.

High-experience users also were more critical of their computer abilities. Nearly 55 percent strongly agreed or agreed with the statement, "I am no good at using computers," compared to 30.9 percent of mid-range users and 29.2 percent of low-experience users. In addition, relatively few high-experience users said they enjoy using computers (8.6 percent strongly agree or agree with the statement, "I enjoy using computers," compared to 2.4 percent of mid-range users and 0 percent of low-experience users.

Computer Attitudes – Major

Intended major appears to play no significant role in shaping student attitudes toward computer technology. Students of all ages and majors indicated a desire to avoid using computers. For example, 63 percent of science majors, 56 percent of business majors and 50 percent of humanities majors reported avoiding computer use.

Confidence levels were highest among humanities majors, perhaps because these students are not required to have highly developed computer skills. Roughly 31 percent strongly agreed or agreed with the, "I feel confident using computers," statement. Approximately 23 percent of science majors and 20 percent of business majors responded positively to the question. Humanities majors also reported grater enjoyment regarding computer use (12 percent); while 8.6 percent of business majors and 3.6 percent of science majors agreed or strongly agreed that they enjoy using computers.

Science majors were most critical of their computer abilities, with 57 percent indicating they are "not good" at using computers, compared to 51 percent of business majors and 44 percent of humanities majors.

Computer Attitudes – Gender

Gender difference was found to be a factor in students' attitud[illegible]ward computers. Nearly 58 percent of women reported avoiding using computers compa[illegible]to 49 percent of men. Female students expressed less confidence in their computing abilities; 23 percent of women, as opposed to 34 percent of men, agreed or strongly agreed that they are confident using computers.

Gender appears to play less of a role in determining students' enjoyment of using computers than does choice of major. Roughly 9 percent of women and 8 percent of men strongly agreed or agreed that they enjoy using computers. Women, however, were more likely (55 percent) to describe themselves as "not good" at using computers, compared to 41 percent of men.

Conclusions

The study provides useful information about the computer literacy and attitudes of students entering the University of Wisconsin-Eau Claire. Approximately 90 percent of respondents have some computer experience. Nearly 70 percent said they had used word processing. Such news should be encouraging to instructors who plan to use computers as part of their instructional methodology. It appears reasonable to expect most incoming students to have some level of computer literacy, particularly in the area of word processing.

However, a lower number of students report having experience with graphic, spreadsheet or desktop publishing programs. Instructors who plan to incorporate these

computer applications into their classroom likely will need to spend more time on computer training for students or identify other opportunities for students to improve literacy with classroom specific programs.

The response to the attitude questions indicate an area of challenge and opportunity for educators. While a number of studies indicate that students' attitudes improve and anxieties decrease with greater computer experience (Lee, 1986; Loyd & Gressarde, 1984), it appears more needs to be done to lessen students' fears about computer use, to help them build confidence in their abilities and to see the connection between computer use and success in the workplace.

A number of approaches may help achieve these goals. Mandatory training is one method which could be used to increase students' computer literacy and allow them to build confidence. Computer courses could become a required part of the curriculum, just as math and English are mandatory classes for most students.

A second approach would involve developing training to address students' anxiety levels. For example, the curriculum for a publication production class in which most students were familiar with desktop publishing could be taught differently than a class in which few of the students had computer experience or in which experience levels varied widely. In a Kent State University study of computer anxiety considerations related to the design of introductory computer courses, Howard, Murphy, and Thomas, 1987) found that initially segregating low-experience and high-experience users during the training process had beneficial outcomes for both students and instructors. For example, students with less computer experience could receive introductory information while more advanced students could work on enrichment exercises. Another option would be to allow more experienced students to serve as mentors or tutors to less experienced students.

The information gathered in the study offers some indication that gender differences do affect students' attitudes toward computers. An understanding of the differences in these attitudes and how they affect literacy rates could help educators make better educational choices about the selection of teaching methods and curricula. In a study of sex differences in attitude and computer use among college students, Arch and Cummins (1989) found women were more likely to improve their computer literacy and attitudes if they were required to participate in a structured, classroom-integrated approach to computer use. Such evidence may prompt instructors to design methodological approaches that accommodate the learning needs of both men and women, giving specific attention to students who would benefit from more structured training.

Other studies support the tenet that men and women may view computers differently and may require varied forms of training in order to be successful in computer use. A Bryant College study (Morahan-Martin, Olinsky, & Schumacher, 1992) found that females perceived computer skills as more useful for their careers than did males, but males were more willing to purchase computers than were women. Such evidence of gender differences suggests that determining the reasons behind the gender differences and developing alternate approaches may be required to help male and female students improve computer literacy and attitudes toward computers.

It is hoped the results of the study can be used to help educators conduct the task of curriculum planning and to develop courses that take into consideration students' attitudes and computer literacy. Additional research is recommended to further identify trends and patterns regarding college students' computer literacy and attitudes.

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Abstract

A study was done at the University of Wisconsin-Eau Claire in April 1992 to assess the computer skills of freshmen. Information about students' computer skills was obtained through the use of a questionnaire. The questionnaire was distributed in four sections of a mass media writing class in the UW-Eau Claire Journalism Department.

Information was gathered about the amount and type of students' previous computer experience, the source of the experience, and their attitudes toward using computers. Demographic information, such as age, sex, and major, was also collected.

The study found that 98 percent of the students surveyed possessed some computer experience, with 80 percent of the respondents reporting more than a year of computer experience. Ninety percent of the students had used word processing, and most of the students (94 percent) reported gaining computer experience in high school.

Over half the students who reported a high level of computer experience (more than one year) also stated that they look forward to using computers and that they have confidence in their computer abilities. Students with less experience more frequently reported avoiding computers and lacking confidence in their computer abilities.

The findings of the study suggest that most students entering the university will have some computer experience, with word processing being the most commonly occurring computer skill. Increased experience seems to create a positive attitude toward computer use and to improve students' confidence about their computer skills.

This study was a pilot study for a research project that will be performed later in 1992.