

# First-Year Pharmacy Students' Computer Experience and Attitudes

James W. Tysinger

Office of Medical Education, University of Texas Southwestern Medical Center at Dallas, 5323 Harry Hines Boulevard, MC 9065, Dallas TX 75235-9006-9065

Edward P. Armstrong

College of Pharmacy, University of Arizona, Tucson AZ 85721

The purpose of this study was to determine first-year doctor of pharmacy students' computer backgrounds and attitudes. Fifty students completed a survey that assessed their computer experience, types of software used, and attitudes about computers. The majority of students (70 percent) had used a computer at least once a month in the previous year. Most (54 percent) had home computers; however, 40 percent said they relied on a school-based computer laboratory. Software use ranged from a high of 80 percent (word-processing) to a low of eight percent (statistical package). About half (46 percent) said they could use a spreadsheet. Regardless of software they used, students categorized themselves as novice users. Most indicated positive attitudes about computers, but 22 percent said they were apprehensive about learning to use computers. Students viewed computers as important parts of their professional education, but appeared to want courses that included both computer and human components. These findings suggest that faculty should consider differences in students' attitudes about and experiences with computers when planning computer-based course assignments and developing computer-based instructional innovations.

## INTRODUCTION

Pharmacists now use computers to perform many critical patient care tasks(1-2). For example, they rapidly access patient and medication data(3), perform critical non-distributive activities(4), and document their actions (1,5). The likelihood that pharmaceutical computer applications will expand in the future(6) has been reflected in curricular guidelines that suggest Doctor of Pharmacy graduates "apply computer skills and technological advances to practice"(7).

Several factors have increased pharmacy students' use of computers. Pharmacy faculty predicted how computers could be used in pharmacy practice and helped students acquire computer skills(8), assessed students' confidence using computers(9), developed computer software to enhance student learning(10,11), and integrated computers into courses and curricula(12,13). Pharmacy schools also recognized that their students needed computer skills and made computers accessible to students(14). Additionally, curricular standards emphasized that program graduates must be able to use computers in their future practice(7). Finally, an increased demand for certain types of professional services stimulated computer use in various types of pharmacy settings(1,2).

Other health professions also recognized that computers could play key roles in education and practice. In its section on medical information science skills, the 1984 *Physicians for the Twenty-First Century: The GPEP Report*(15) recommended that medical students possess specific computer skills. More recently, the *ACME-TRI Report*(16) exceeded earlier recommendations and emphasized that medical schools should develop the computer skills of students and faculty and suggested that institutions support integration of computers into instruction. That support is

evident in the widespread availability of computers in medical schools(17) and the plans of some seventy-three medical schools to include computer technology in their curricula(18).

Previous survey findings of learners' computer experiences and attitudes can be expressed in one word: diversity. Most studies found that the majority of learners had used computers: pharmacy students: 87.2 percent(19); first and second-year medical students: 87 percent(20); and medical residents: 91 percent(21). Surveys of pharmacy students found that they were moderately confident about using personal computers(9), most (92.5 percent) did not own personal computers(19), and less than half (43.4 percent) had taken a computer course(19). Respondents from various medical professions reported that they used a variety of software applications. Pharmacy students, for example, indicated that they used computers for prescription processing (76 percent), word processing, literature searches, and electronic games(19).

Other important issues with instructional implications also surfaced in these surveys. One, some learners appeared quite apprehensive about learning to use computers. A survey of 129 medical residents, for example, found that 18 percent were apprehensive about learning to use computers. Two, learner expertise was low with the software they used. For example, 91 of 127 (71 percent) medical residents said they could use a bibliographic retrieval program, but only three rated themselves as "expert" users(21). This diversity among learners indicates that some need computer skills training and support to accomplish computer-based assignments

Planned learning activities—within a course and across a curriculum—can help individuals acquire and polish computer skills that they can use throughout their careers.

**Table 1. First-year pharmacy students' reported software experience and expertise**

Software type	Number (percent) of respondents who said they could use it <sup>a</sup>	Number (percent) of user's reported level of expertise <sup>b</sup>		
		Novice	Intermediate	Expert
Word processing	40 (80)	18 (45)	18 (45)	4 (10)
Spreadsheet	23 (46)	14 (61)	7 (30)	2 (9)
Database	13 (26)	9 (69)	3 (23)	1 (8)
Bibliographical retrieval	10 (20)	6 (60)	3 (30)	1 (10)
Statistical	4 (8)	4 (100)	0 (0)	0 (0)

<sup>a</sup>N=50.

<sup>b</sup>The levels of expertise were not operationally defined.

Within courses, linking computer use with assignments—with necessary support—helps students develop specific computer skills. For example, requiring students to identify references for a paper via a computerized literature retrieval program insures that students experience the benefits of this technology(12). Across a curriculum, planned integration of computers in courses at each level can help students simultaneously develop many skills. For example, when one college of pharmacy instituted curriculum changes that emphasized writing and critical thinking, it taught students to conduct literature searches using on-line and CD-ROM databases(13).

The purpose of this study was to evaluate first-year pharmacy students' computer experience and attitudes. Specifically, it sought to answer three questions:

1. What types of computer hardware do our students own and use?
2. What types of computer software do our students use and what is their self-assessed level of expertise in that software?
3. What attitudes and concerns about computers do our students possess?

The answers to these questions were important in two ways. One, the survey results would provide faculty and administration with specific information about students' computer backgrounds. Faculty could use that information to meaningfully integrate computer activities (*e.g.*, writing papers using word processing) into their courses. Administration could also use that information to allocate limited hardware and software resources. Two, the survey results would contribute to a growing body of knowledge about pharmacy students' computer experiences, skills, and attitudes. While this study addressed issues (*e.g.*, pharmacy students' possession of personal computers) that had been previously explored(19), it also examined student's use of and self-assessed expertise in specific types of software applications.

## METHODS

The Curriculum Committee of the University of Arizona College of Pharmacy was interested in the long-term development of students' computer skills. The committee chair requested information about entering students' computer experiences and attitudes. A computer background and attitudes questionnaire (available from the authors) was developed by revising a survey that had been used with medical residents(21).

The 42-item questionnaire contained three sections. Section One (14 items) focused on students' computer backgrounds. It included issues such as:

- computer ownership (options: yes or no)
- location of computer use (options: at home, Micro computer Learning Center, or at another location).
- type(s) of computers used (options: Apple, IBM or IBM clone, Macintosh, or other), and
- frequency of computer use within the past year (options: never, less than once a month, about once a month, about once each week, or at least four times each week).

Section Two (15 items) assessed students' level of expertise with software applications such as word processing, data-base management, spreadsheet, statistical, and bibliographic retrieval programs. For each application, students specified: (*i*) if they could use it; (*ii*) the specific name brand program that they used most often; and (*iii*) their level of expertise (options: novice, intermediate, or expert) with that program. (The levels of expertise were not operationally defined for these students. This response on the survey was later revised to include four levels of software expertise, each with a specific operational definition.) Section Three (13 items) dealt with students' attitudes about computers and their willingness to acquire computer skills. Students responded to items such as "Microcomputers are too complicated for me to use" and "I feel apprehensive about learning to use a microcomputer" using a five-point Likert Scale which ranged from "strongly agree" to "strongly disagree."

The entire first-year pharmacy class (N=50) completed the survey during the first class period of the 1992 introduction to pharmacy practice course. All students were enrolled in an entry-level doctor of pharmacy program and each had completed at least two years of pre-pharmacy coursework before entering the College of Pharmacy.

## RESULTS

### Computer Backgrounds

Responses to Section One items indicated that most students had some computer experience. Of the 50 students, 52 percent said that they had used a computer at least once a week during the previous year. Over half the students (54 percent) said they had a computer at home. Of those with home computers (25 students responded to these items), 60 percent owned DOS-based machines and 88 percent had possessed a computer for at least one year. Students' home

**Table II. Top two software packages by application type reported used by students**

Application	Software package	Number (percent) of class N=50
Word processing	Word Perfect <sup>®</sup>	28 (56)
	Microsoft <sup>®</sup> Word	5 (10)
Spreadsheet	Lotus 1-2-3 <sup>®</sup>	11 (22)
	Quatro Pro <sup>®</sup>	5 (10)
Database management	dBase <sup>™</sup>	7 (14)
	Microsoft <sup>®</sup> Works	3 (6)
Bibliographic retrieval	Medline CD-ROM	6 (12)
	Medline-Online	4 (8)
Statistical package	Not specified	3 (6)

computers were equipped with features such as a hard disk (69 percent) and a modem (42 percent). Students were almost equally divided when asked where they would use a computer while in pharmacy school: 44 percent said they would use a computer at home and 40 percent would use a computer in the university's Microcomputer Learning Center. Most (82 percent) reported that they could operate a microcomputer well enough to use a commercially-produced computer program. Few students (six percent) had used a computer drug simulation, and only 20 percent had used a main-frame computer, but a large number (40 percent) had completed a computer course or workshop/seminar.

### Software Experience

Two aspects of student software experience—range of use and level of reported expertise—merit attention (see Table I). First, while 40 students (80 percent) stated that they could use a word processing program, only four (10 percent of reported users) said that they could use the program at an "expert" level and most (45 percent) rated themselves as intermediate-level users. Likewise, of the 23 who said they could use a spreadsheet, 61 percent classified themselves as novices and only nine percent said that they were experts. Thirteen (26 percent) of the students said they could use a database management program, and 10 (20 percent) reported they could use a bibliographic retrieval package. Statistical package experience was much lower, with eight percent of students reporting they had used this software. Consistently, students reported a novice level of expertise in the programs they used: data-base management programs (nine novices of 13 users), spreadsheets (14 novices of 23 users), statistical packages (four novices of four users). Students reported using a variety of name-brand software packages among the types of software applications (see Table II).

### Attitudes about Computers

Students, in general, reported favorable attitudes about computers (see Table III). Almost all (96 percent) agreed or strongly agreed that they were interested in learning to use a microcomputer. However, some students expressed reservations about using computers. When asked if they enjoyed using microcomputers, 38 (76 percent) agreed or strongly

agreed, nine (18 percent) indicated they were undecided, and three (six percent) disagreed. That diversity is also reflected in student apprehension about learning to use microcomputers. The majority (66 percent) disagreed that they were apprehensive, six were undecided, and 11 agreed or strongly agreed that they were apprehensive. If the "undecided" respondents are grouped with the apprehensive, a total number of 17 students (34 percent) could have some level of apprehension. This same trend is reflected in the five students (10 percent) who agreed or strongly agreed that microcomputers were too complicated for them.

While students appeared to view computers as an important part of their professional education, they voiced reservations about totally replacing faculty with computerized instruction. Most students (84 percent) reported that they enjoyed new and innovative learning techniques. Only four (eight percent) students said they would rather use computer-delivered instruction than other instructional modes. Three (six percent) said they preferred microcomputers to lectures and 20 (40 percent) students said they preferred to read texts and journals rather than attend lectures.

Students voiced a desire for computer training: 96 percent agreed that they were interested in learning to use a microcomputer. Most (74 percent) said that they would attend computer training sessions scheduled during lunch or after classes. Fewer, but still a large number (50 percent) said they would attend such training at night or on weekends.

### DISCUSSION AND RECOMMENDATIONS

The following key points were identified from the survey results:

- *Most students (70 percent) had used a computer before they entered pharmacy school.* These students had at least been exposed to computers during the last year, and over half (52 percent) had used a computer at least once a week. This finding suggests that some students begin pharmacy school with computer skills that can be enhanced during their professional education. These skills could give them a distinct advantage in completing course assignments that use computers.
- *Most students have favorable attitudes toward computers.* Students responded to attitude items (see Table III) positively. For example, 76 percent of these students said that they enjoyed using a microcomputer. This finding should encourage faculty to support student use of computers when possible. Integration of computers within and across courses can foster these positive attitudes and help students realize the benefits of using computers. For example, conducting a literature search using a bibliographic retrieval database could be introduced in one course and reinforced in others. Writing could also be integrated in numerous courses, and papers could be revised and improved as students progress through their training.
- *Some students (22 percent) said they were apprehensive about learning to use microcomputers.* This finding suggests that some students may need special attention and support to complete computer-based assignments. First-year students struggling

**Table III. Student responses to computer attitudes and scheduling of training items**

	Number (percent) of respondents (N = 50)				
	SA <sup>a</sup>	A	U	D	SD
I enjoy using my microcomputer	13 (26)	25 (50)	9 (18)	3 (6)	0 (0)
Microcomputers can help improve the quality of my professional education	30 (60)	18 (36)	1 (2)	1 (2)	0 (0)
Pharmacy students should be computer literate when they graduate from pharmacy school	36 (72)	12 (24)	2 (4)	0 (0)	0 (0)
I enjoy using new or innovative learning techniques	26 (52)	16 (32)	8 (16)	0 (0)	0 (0)
I feel apprehensive about learning to use a microcomputer	6 (12)	5 (10)	6 (12)	16 (32)	17 (34)
Microcomputers are too complicated for me to use	1 (2)	4 (8)	2 (4)	10 (20)	33 (66)
I prefer learning from a computer rather than from a lecture	1 (2)	2 (4)	16 (32)	17 (34)	13 <sup>b</sup> (26)
I would rather use computer-delivered instruction to obtain the information that I need to learn	3 (6)	1 (2)	19 (38)	18 (36)	9 (18)
Patient drug therapy simulations are an effective way for me to learn certain types of information	8 (16)	23 (46)	19 (38)	0 (0)	0 (0)
I would rather attend lectures and read journals and texts to learn information rather than use a computer	9 (18)	11 (22)	18 (36)	6 (12)	6 (12)
I am interested in learning to use a computer	29 (58)	19 (38)	1 (2)	0 (0)	1 (2)
I would rather attend computer workshops (e.g., on word-processing) during lunchtime or after class	16	21 (32)	5 (26)	4 (10)	3 <sup>b</sup> (8)(6)
I would rather attend computer workshops (e.g., on word-processing) at night or on weekends	12 (24)	13 (26)	10 (20)	7 (14)	8 (16)

<sup>a</sup>SA=Strongly Agree; A=Agree; U=Undecided; D=Disagree; SD=Strongly Disagree.

<sup>b</sup>One response was unavailable.

with content demands of pharmacy courses may experience additional stress if they must also learn to use a computer. Requiring these students to complete a computer-based assignment (e.g., paper) without adequate instruction and follow-up could frustrate them and adversely affect their attitudes toward computers.

- *While many students (54 percent) have a computer at home, some students (40 percent) need access to a school-based computer facility.* Computer access is becoming increasingly important as faculty require students to conduct literature searches, write papers, and complete other computer-based assignments. Computer hardware and software are expensive, and many students may lack the financial resources to purchase computer equipment. Even if they can purchase the equipment, they may become frustrated with commonly-encountered computer problems. Therefore, institutionally supported computer laboratories that provide hardware, software, and human assistance are important parts of a computer-literacy strategy. When these facilities exist, students should be oriented to the area, its resources, and policies.
- *Most students (80 percent) said they could use a word processing program.* This finding suggests that many students may be able to use a word processing program to write a paper with minimal

support. Conversely, since 20 percent of the class said they could not use a word processing program, faculty should carefully evaluate computer-based course assignments to insure that students possess the computer expertise required to complete them. A planned orientation to a campus computer facility, coupled with faculty/laboratory personnel support, should provide the assistance many students need to complete assignments. Students who are very apprehensive about computers may need additional support (e.g., structured instruction combined with one-on-one support).

- *Many students rated themselves as novices in the software programs they could use.* While self-rating of expertise is open to interpretation, the survey findings that students rate themselves as novices in the software they use could indicate that some students may be unable to use certain program features without assistance.
- *Most students say that they would attend extracurricular computer workshops to improve specific computer skills.* Workshops presented at convenient times, especially if they focus on particular skills needed for certain assignments, might be well-attended.

#### STUDY LIMITATIONS

Certain limitations pertain to this study. One, the survey results are based on a population of 50 students in one college of pharmacy located in the Southwestern United States. Two, student responses to the level of software expertise were limited to expert, intermediate, or novice and were not operationally defined. (The survey was later revised to address this issue.) Three, it was beyond the scope of this survey to verify students' self-reported computer skills or expertise.

## CONCLUSION

The majority of these first-year pharmacy students had used a computer at least once a month during the previous year. Over half of the students (54 percent) had a home computer, and 40 percent relied upon a school-based computer laboratory. Software use ranged from a high of 80 percent with word-processing to a low of eight percent with statistical packages. Regardless of software used, many students categorized themselves as novice users. Most indicated positive attitudes about computers, but 22 percent said they were apprehensive about learning to use computers. Although students felt computers were important in their professional education, they appeared to want courses that included both computer and human components. These differences in students' attitudes about and experience with computers should encourage faculty to assess their students' computer experience and attitudes when planning course assignments or developing computer-based instructional innovations.

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