SURVEY OF TECHNOLOGY SKILLS OF INCOMING FRESHMEN: A LONGITUDINAL STUDY

Nancy Csapo, Central Michigan University, nancy.csapo@cmich.edu
Monica C. Holmes, monica.c.holmes@cmich.edu

ABSTRACT

The major objective of the initial study was to provide postsecondary faculty, especially those teaching computer literacy and introductory computer literacy courses, with an understanding of what computer skills and background the typical freshman student possesses when entering college. As a result of the initial study, a profile was developed to help identify the skill level of incoming freshmen students in a variety of computer-related areas, including software applications and hardware. In continuing the study, a comparison of the computer skills and backgrounds of freshmen students for two consecutive years provides additional insights for faculty regarding the differences between typical freshman students from year-to-year.

Keywords: Technology skills, computer literacy, computer skills, comparison of computer skills.

INTRODUCTION

With the increasing use of computers by students at home and at every grade level in our schools, the need for teachers to be able to determine the computer-related skills of their students is essential in providing the most relevant educational experiences. Nearly every K-12 student today has considerable access to technology and at earlier ages then ever before (2). Today's business education secondary curriculum includes web site development, multimedia, voice technology, network administration, and E-commerce. Many students are graduating from high school with industry certifications as well.

In addition, many states like Michigan, have developed curriculum for high school business education programs and pride themselves in addressing the volatility of the IT field by regularly revising their curriculum to reflect industry demands, the latest applications, and current trends. For the 2003-04 academic year, Michigan has implemented a totally revamped business education curriculum which includes a comprehensive IT program as a major component. Michigan's new business education curriculum has been aligned with not only state and national guidelines for IT but also partnering with the IT Career Cluster Initiative (ITCCI). ITCCI is sponsored by the U.S. Department of Education and the National School to Work Office whose goal it is "to create a national model and career cluster curricular framework for IT careers that involve the design, development, support and management of hardware, software, multimedia and systems integration services" (3).

PURPOSE OF THE STUDY

The primary purpose of the original study conducted in 2001 was to determine the computer skills and background of incoming college freshmen at a large mid-western university (2). As a

result of this study, a profile was developed to help identify the skill level of incoming freshmen students in a variety of computer-related areas, including software applications and hardware.

The primary purpose of the current study was to compare the computer skills and background of incoming college freshman for two consecutive years. In continuing the study in 2002-03, a comparison of the computer skills and backgrounds of freshmen students for two consecutive years provides additional insights for faculty in recognizing what, if any differences may exist from year-to-year.

Specific computer skills and the extent of these skills as perceived by students were determined as they related to:
1. Application software such as word processing, database, presentation, statistical, website development, and Windows.
2. Use of the Internet for conducting effective research, buying/shopping online, and various personal interests such as downloading music, games, and chat rooms.
3. How many students own a computer or have access to a computer at their campus home.
4. What one application students use most.

Additional demographic information was also gathered regarding gender, year graduated from high school, type and class of high school graduated from, age students first began using a computer, and number of computer classes taken in high school.

OBJECTIVES

The major objective of this study was to provide postsecondary faculty, especially those teaching computer literacy and introductory computer courses with an understanding of what computer skills and background the typical freshman student possesses when entering college. By identifying and comparing the technology skills and background of typical incoming freshmen for two consecutive years, faculty can accomplish the following objectives:
1. Update and improve the relevance of computer literacy and introductory computer courses and curriculum.
2. Incorporate learning experiences in these courses to address the different levels of skills.
3. Establish a better understanding of the K-12 technology curriculum, especially at the secondary level and how it impacts the post-secondary IT curriculum.
4. Understand the potential for differences in computer skills between students from year-to-year and identify trends and/or patterns.

METHODOLOGY

This study was conducted at a Division I comprehensive public university in the Midwest with enrollments of 17,453 undergraduates. The freshmen class consisted of 4,652 students of which 3,553 were considered new freshmen attending school for the First Time In Any College (FTIAC). The university has students enrolled from 47 states and 63 countries. The average

ACT composite score for entering new freshmen for 2002 was 22.2. The average high school GPA of these new freshmen was 3.36. Gender and minority data of these new freshmen consisted of 37.3 percent male, 62.7 percent female, and 9.6 percent minority students.

A 22-item descriptive survey instrument was administered to all sections of a one-hundred level computer literacy class, *Computers and Society,* during the fall and spring semesters of 2002-03. While this class primarily targets freshmen, it may be taken by other students. A total of 499 students were surveyed. The ratio of females who completed the survey in 2001-02 (70.7 percent) versus males (29.3 percent) was significantly higher than in 2002-03 when the ratio was 49.1 percent females and 50.9 percent males.

Table 1 shows the classification of students for the 2002-03 study. Nearly 75 percent of the respondents were freshmen and 73 percent graduated in 2002. (Note: In 2001, only incoming freshmen students were surveyed at a freshmen event held on-campus one day prior to the beginning of fall semester classes.) The vast majority (93.9 percent) of the 497 students surveyed graduated from public high schools.

Table 1. Classification of Students for 2002-03 (n=498)

Classification	# Responses	% Responses
Freshmen	373	74.9%
Sophomore	96	19.3%
Junior	12	2.4%
Senior	17	3.4%
Total	498	100.0%

As shown in Table 2, the age at which students first began using a computer was similar for both years with the largest percentage of the respondents being 8-10 years of age (45.3 percent for 2001-02 and 42.4 percent for 2002-03).

Table 2. Age Students First Began Using a Computer for 2001-02 and 2002-03

	2001-02		2002-03	
Age	# Responses	% Responses	# Responses	% Responses
1-4	6	1.8%	8	1.6%
5-7	48	13.8%	91	18.5%
8-10	157	45.3%	208	42.4%
11-12	64	18.4%	103	21.0%
13 and above	70	20.1%	81	16.5%
Total	347	100.0%	497	100.0%

Table 3 compares the number of high school computer classes taken for both studies. The largest percentage (36.7 percent) of students in 2001-02 reported having taken two computer classes. In 2002-03 the largest percentage (31.4 percent) of students took one computer class, while 26.4 percent took two computer classes. Worth noting is the substantial increase in the number of students who took three computer classes (23.3 percent in 2002-03 versus 16.8 percent in 2001-02).

Table 3. Number of Computer Classes Taken in High School for 2001-02 and 2002-03

No. of Computer Classes	2001-02		2002-03	
	# Responses	% Responses	# Responses	% Responses

0	50	14%	94	18.9%
1	116	32.5%	156	31.4%
2	131	36.7%	131	26.4%
3	60	16.8%	116	23.3%
Total	357	100.0%	497	100.0%

As may be expected, the software application used most by student respondents for both years was Word (90.3 percent in 2002-03 and nearly 75 percent of students in 2001-02). Only 2.8 percent or 14 of the respondents indicated that they used WordPerfect while 32 or 6.5 percent stated that they used other software. Nearly 97 percent of students have access to a computer at their campus residence in 2002-03, compared with 92.2 percent in 2001-02. Table 4 shows the number of hours per week student respondents reported they use a computer for the 2002-03 study. The largest number of students (207 or 41.7 percent) reported using a computer five hours per week.

Table 4. Number of Hours per Week Student Uses a Computer in 2002-03

# Hours	# Responses	% Responses
0-4	98	19.8%
5	207	41.7%
5-7	95	19.2%
8-10	72	14.5%
13+	21	4.2%
Don't know	3	.6%
Total	496	100.0%

Students were asked to rate their skill levels in using a variety of applications on a five-point scale with one being "none" and five being "high". Tables 5a and 5b show the results of each study and provide a comparison of the responses. In 2001-02 (Table 6a) the largest percentage of students (48 percent) rated their skill level highest at "5" for Windows with the second largest percentage of students rating their skill level for word processing applications as a "4". In comparison, the largest percentage of students (56.5 percent) in the 2002-03 study (Table 6b) rated their skill as a "4" for word processing applications with the highest skill rating of "5" for any application being Windows (55.6 percent).

Table 5a. 2001-02 Student Ratings of Skill Level in Using Applications (n=353-356)

Application	Rating *"none"* # / %	Rating # / %	Rating # / %	Rating # / %	Rating *"high"* # / %	Total # Responses/%
	1	*2*	*3*	*4*	*5*	
Word Processing	2 .6%	13 3.7%	82 23%	167 46.9%	92 25.8%	356 100%
Database	52 14.6%	86 24.2%	134 37.6%	64 18%	20 5.6%	356 100%
Presentation	25 7.1%	78 22.1%	110 31.2%	99 28%	41 11.6%	353 100%
Statistical	115 32.3%	87 24.4%	81 22.8%	55 15.4%	18 5.1%	356 100%
Website Dev.	85 23.9%	92 25.8%	93 26.1%	58 16.3%	28 7.9%	356 100%
Windows	0 0.0%	11 3.1%	42 11.8%	132 37.1%	171 48%	356 100%

Students rated their skill level lowest as a "1" (or none) for statistical software in both studies (32.3 percent in 2001-02 and 47 percent in 2002-03). Although only statistical software skills were rated as a "1" (or none) in 2001-02, two applications were rated as "1" (or none) by students in 2002-03; statistical software and website development (34.1 percent). When comparing the two studies, it is noteworthy to report students in the 2002-03 study rated their skill level for four applications (word processing, database, and presentation, and Windows) as "4" or "5" compared to only two applications (word processing and Windows) being rated this high in the 2001-02 study.

Table 5b. 2002-03 Student Ratings of Skill Level in Using Applications (n=482-499)

Application	Rating "none" # / %	Rating # / %	Rating # / %	Rating # / %	Rating "high" # / I	Total # Responses
	1	2	3	4	5	
Word Processing	4 .8%	10 2%	33 6.6%	282 56.5%	170 34.1%	499 100%
Database	38 7.9%	104 21.6%	109 22.6%	211 43.8%	20 4.1%	482 100%
Presentation	58 11.6%	73 14.6%	73 14.6%	215 43.1%	80 16.1%	499 100%
Statistical	234 47%	120 24.1%	73 14.7%	59 11.8%	12 2.4%	498 100%
Website Dev.	169 34.1%	84 17%	60 12.1%	139 28.1%	43 8.7%	495 100%
Windows	2 0.4%	10 2%	21 4.2%	188 37.8%	276 55.6%	497 100%

Statistical analysis was also conducted to answer the following questions:

1. **Does the type of high school (public versus private) graduated from correlate to the computer skills of the students?**
    The type of high school does not impact the computer skills of the respondents. There was no significant difference between the two groups of students.

2. **Does the "class" of the high school classification correlate to the computer skills of the students?**
    *Note: Michigan uses a classification system (A, B, C, and D) for high schools based on enrollment as determined by the Michigan High School Athletic Association with "A" being the largest (1,008 students and above) and class "D" being the smallest (242 and below).
    The word processing skill reported by students who graduated from class A schools was significantly different from that reported by students from class B schools. The technology skill of using the Internet for shopping online was different between students from the A and D schools as well as between B and D schools. In each case, students who graduated from the larger school (i.e. A is larger than B; B is larger than D, etc.) rated their computer skills higher overall.

3. **Does the number of computer classes taken in high school correlate to the computer skills of the students?**

There was significant difference in the technology skills reported by the students who had taken varying numbers of computer classes in high school. There was significant difference in the word processing skills between those students taking zero or one computer classes and those who took three. The mean skill level for those who took three computer classes was higher than the mean skill level for those who took zero or one computer class.

There was also a significant difference in the spreadsheet skills of those who took zero, one, or two computer classes and those who had taken three computer classes. The mean skill level for those who took three computer classes was higher.

There was significant difference in the database skills and presentation software skills of those students who took one computer class versus those who took two or three computer classes. There was also significant difference in the database skills and presentation software skills of those who took zero computer classes versus those who took three computer classes. The mean skill level for those who took more computer classes was higher for each application.

There was significant difference in the Windows skills and web site development software skills between those who took one computer class versus those who took three computer classes. The mean skill level for those who took more computer classes was higher for each application.

4.   **Does the number of computer classes taken in high school correlate to the "total" computer skills of the students?**
The total skills of the respondents were calculated by summing the skill levels each respondent self-reported for seven software applications (word processing, spreadsheet, database, presentation, statistical, Windows, and web site development) and a variety of Internet skills (research, e-mail, shopping online, personal interests, and computer games). Then statistical analysis was conducted to see if there was significant difference between those who took varying numbers of computer classes in high schools. There is significant difference in the total skills of the respondents who took one versus those who took three computer classes. There is also significant difference in the total skills of those who took one versus those who took two or three computer classes. The mean skill level for those who took more computer classes was higher in each instance.

5.   **Does the age at which the students began using computers correlate to their computer skills?**
There appears to be significant difference between the various age groups of the students who began using a computer at younger than 13+ years versus those who began using a computer at 13+ years of age. Significant difference was found in the following cases:

Skill using word processing and database software: between the 5-7 and the 13+ age groups.
Skill using spreadsheet and statistical software: between the 8-10 and 13+ age groups.
Skill using presentation software: between the 5-7 and the 13+ age groups; between the

8-10 and 13+ age groups.
Skill using Windows: between the 5-7 and the 13+ age groups; between the 5-7 and the 11-12 age groups.
Skill using the Internet for research and for shopping online: between 5-7 and the 13+ age groups.
Skill using the Internet for personal interests: between 5-7, 8-10, and 11-12 versus the 13+ age groups (all the first 3 age groups differed from the 13+ age groups).

6.   Does gender make a difference in the reporting of computer skills?
There was significant difference in the skill level using the Internet for email and shopping reported by female respondents versus that reported by the males. Females rated themselves higher than the males. On the other hand, as may be expected, males rated themselves higher than the females in their skill level with computer games.

SUMMARY AND CONCLUSIONS

It is important to keep in mind that since the skill level data in this study was self-reported, the potential for respondents to overstate or understate their skills is inherent in these results. This may explain some of the outcomes. Based on the 2002-03 study it can be concluded that those students who began using computers at age 13 or later rated their overall skill level lower than those who started younger than age 13. As logical as it would be that the number of computer classes that the respondents took in high school would contribute to their skill levels, those who took zero computer classes rated their skill level higher than those who took only one computer class.

As a result of this study, one could develop a profile of a typical incoming college freshman for this university. The following list provides this profile information for 2002-03 with the 2001-02 results in parenthesis:

Age First Began Using Computers: 8-10 years old (10)
Number of Computer Classes Taken in High School: 1 (2)
Classification of High School Graduated From: "A"
Own/Have Access to Computer at (Campus) Home: Yes (gift from parents) (same)
Most Used Application: Word Processing – Microsoft Word (same)
Skill Level for Application Software *on scale of 1-5 (1= none; 5=high):*
Word Processing – 4 (4)   Database – 3 (3)   Spreadsheets – 4 (n/a)
Presentation – 4 (3)   Statistical – 1 (4)   Web Site – 1 (3)   Windows – 5 (5)

REFERENCES

1. Holmes, M. and Csapo, N. (2002, October). Survey of technology skills of incoming freshmen. Issues in Information Systems, International Association for Computer Information Systems Vol. III, pp. 288-294.
2. Plotnick, E. (1996). Trends in educational technology 1995. ERIC Digest. ERIC No. ED398861.
3. www2.edc.org/ewit/itcci.asp. Retrieved July 7, 2003, from the Educator's Website for Information Technology.