ARTICLE

Mandatory Computer Purchases and Student Preparedness: Implications for New Student Orientation

Darla J. Twale and Molly A. Schaller

Although a computer in the classroom is not a new phenomenon, the mandatory purchasing of personal computers and common software by entering first year classes is a relatively recent expectation. Kenneth Green of the Campus Computing Project notes at present that approximately 50 colleges and universities require such purchases (Olsen, 2002). Mandatory computer programs specify that entering students must arrive on campus prepared to use a predetermined computer and its software applications. Universities are wiring their physical infrastructures and/or using wireless communication systems to increase student access to both on and off campus computer networks (Segawa, 1999). They have taken the stance that computer usage is not an option but an expectation (Levine & Donitsa-Schmidt, 1997). The university also assumes that all students have technological savvy (Cuban, Kirkpatrick, & Peck, 2001; Gumport & Chun, 1999; Mina, 2001; Schumacher & Morahan-Martin, 2001; Segawa, 1999). At most institutions computer usage and Internet access continues to become an integral facet of student coursework, assignment preparation, term paper research, and ultimate success (Furst-Bowe, Bolger, Franklin, McIntyre, Polansky, & Schlough, 1995; Griffith, 1999; Schumacher & Morahan-Martin, 2001). Due to a paucity of research on mandatory computer programs, little is known about student technical competence to use computers for academic tasks. The purpose of this investigation was to assess first and second year student perceptions of their preparedness and technical competence at entry to use the computer and its software applications.

Review of Literature

According to Chickering (1969) and Chickering and Reisser (1993), first-year students begin their psychosocial development with relatively little confidence in their ability and a lower level of competence than more seasoned college students. Embodied within the first of their seven vectors of student development is *Developing Competence*, that is, a student's need to assess entering skills and capabilities that assist in thinking critically, reasoning logically, and solving problems accurately. To develop competence with computers at an institution that mandates their purchase implies that competence is integral to a student's academic development, grades, self-confidence, and is perhaps significant at matriculation to subsequent persistence (Levine & Donitsa-Schmidt, 1997; Tinto, 1987). Initially first-year students need to feel they possess adequate computer skills when they matriculate which is contingent upon the depth and breadth of use in

Darla J. Twale is a professor and **Molly A. Schaller** is an assistant professor, both in the Higher Education Administration/College Student Personnel program at the University of Dayton.

high school and home (Cuban, Kirkpatrick, & Peck, 2001). However, all institutions do not mandate minimum levels of computer technical competence for incoming students. Therefore, mandatory purchase of a computer could raise concerns regarding persistence for less prepared students (Hawkins & Paris, 1997; Pascarella & Terenzini, 1991; Tinto, 1987), because students who lack strong computer skills would matriculate onto an uneven campus playing field (Furst-Bowe, et al., 1995; Karsten & Roth, 1998; Levine & Donitsa-Schmidt, 1997).

Traditionally new student orientation programs have sought to provide a variety of activities to help ease entering students into campus academic and social environments (Twale, 1989) and meet academic and career needs (Daddona & Cooper, 2002). The onslaught of mandatory computer purchase programs for first-year students raises the issue as to whether orientation programs should contain specific content to address technical competence (Miller & Viajar, 2001). For instance, research indicates that all students may not begin college with the same level of competence due in some cases to socio-economic level rather than intellectual ability (Sax, Ceja, & Teranishi, 2001).

McAulay (1993) reported that only 17.6% of the students at University of Massachusetts-Amherst had a great deal of familiarity with computers, while 51% reported having little or no exposure to computers. In a subsequent study, Furst-Bowe, et.al. (1995) found that students acquired familiarity with computers mainly at home (23%) or in high school (47%). In this Wisconsin-Stout (UW-S) study, faculty regarded student computer skills to be at least somewhat important to student academic success. Since then, UW-S has required laptop purchases and offers a 4 hour comprehensive training session for incoming students. Stout encourages integrated classroom use of laptops, collaboration, university services access, and on-lines courses.

Olsen (2000) reported that first-year students were not as familiar with basic computer software commonly used in entry-level courses. Schumacher and Morahan-Martin (2001) established a positive correlation between experience and competence. They found first-year student Internet competency greatly lacking as compared to basic computer application. As a result some students may experience higher anxiety and lower confidence levels in their ability than students whose computer skills are relatively strong (Ayersman, 1996; Zhang & Espinoza, 1998).

Studies have also shown that uneven distribution of computer resources, expectations, and interest levels have been coupled with race and gender differences (Hawkins & Paris, 1997; McAulay, 1993; Shashaani, 1997). More recent data show that computer usage among incoming students was high at 78.5%, with male usage slightly higher and female usage slightly lower. As a result, women's level of confidence in computer usage was lower than men's. In other studies, men were more likely than women to have computer and Internet experience, spend more time in front of the computer locating information, were encouraged by parents to use their computers, and developed higher levels of self-confidence (Schumacher & Morahan-Martin, 2001; Shashaani, 1997).

Differences in computer usage and technical competence also vary by major course of study. Mina (2001) found that minority business students at a large research institution expressed "frustration and unfamiliarity with technology" (p. 2). In addition, arts and

humanities majors were less likely than technical and pre-professional majors to use computers (Flowers, Pascarella, & Pierson, 2000).

Even though with each new academic year, university administration might presume that more students will be exposed to computers through home purchase and high school usage, concomitant levels of perceived preparedness, comfort with computers, and ability to use computers to achieve academic success cannot always be presumed to be equal. A survey of orientation professionals agreed that programs should consider student technical competence, include on-line demonstrations, and consider introducing students to campus technical support services, but they were slightly less agreeable on the matter requiring a technical component during orientation (Miller & Viajar, 2001).

The study was designed to answer the following questions: what is the perceived level of preparedness and technical competence for students participating in a mandatory personal computer purchase program? And, what are the differences in their perceptions based on sex, race, and year in school, and school?

Method

Procedures and Instrumentation

For the past four academic years, all freshmen at a private, religious, Midwestern university have been required to purchase a personal computer; the university stipulated the model and software. In the spring of 2000, a five-person focus group of first-year students judged by their hall directors to have a high degree of technical competence was assembled. They were asked about their experience with their new computer, the software, and the mandatory policy.

With their input and the existing literature on technical competence (Furst-Bowe, et. al., 1997; Hawkins & Paris, 1997; Jones & Pearson, 1996; Levine & Donitsa-Schmidt, 1997; Smith & Necessary, 1996), a two-part, survey instrument was developed that addressed student perceptions of technical competence, especially with regard to usage and application. The paper discusses only the items related to initial usage and academic application. Using a combination of 11 scaled items (5-point ordinal and interval scales) including one multi-item 6-point scale (daily to not at all) and one multi-item 5-point scale (very often to never), two nominal questions, and four demographic items, students were asked about their level of computer access, perceptions of technical competence, computer savvy, attitudes toward the mandatory purchase, familiarity with select computer applications at entry and currently, frequency of usage of specific software for academic purposes, faculty incorporation of the computer into coursework, and benefits derived, and problems encountered. Alpha reliability levels for the scales ranged from .82 to .86.

Participants

In the fall of 2000, resident students housed in three first-year halls and three sophomore halls were approached as they entered their hall or dining facility and asked

to complete the questionnaire. Each participant received a computer diskette and entered a prize drawing to win one of several $25 campus bookstore gift certificates. From a possible combined population of approximately 3300 first and second-year students, 338 students responded (167 first year and 169 second year) to the on-site request. Students were evenly distributed across both classes with regard to sex, race, and school and despite a slightly higher number of women in the sample, were representative of university demographics.

Campus Setting

The university does not have an orientation session on technology for all entering students. The university does offer students the Help Desk Hotline, a voice messaging system, and a residence hall floor technician, which according to a university computer satisfaction survey were not widely used by students. Currently, the university offers a Training Channel on cable television where students can view video sessions on Word, Excel, Windows, Lotus Notes, and FrontPage. The School of Business also offers a one hour, one semester computer course for students. Students in the other three academic schools were encouraged to visit the Training Channel, ask for help from roommates and classmates, or call the Help Desk.

Data Analysis

Means, standard deviations, frequencies, chi-square, and paired and independent t-tests were used to answer the first research question. Analysis of variance distinguished the differences in demographic data between groups with regard to technical competence to answer the second question. Significance levels were established at $p < .05$.

Results

The sample consisted of 65% women and 35% men. Ninety percent of the students indicated they were Caucasian and 10% were African-American, Asian American, Hispanic or other students. Representation among the four schools on campus included 14% from education, 21% from business, 50% in the arts and sciences, and 15% from engineering. As shown in Table 1, overall student access to computers either at home or high school or both was 98%. There was a significant difference as entering freshmen reported greater access than the previous class (__=11.48, df=4, p=.02).

At entry, first-year students reported a slightly higher level of perceived technical competence than the sophomores (43% and 35% respectively). More freshmen (57%) than sophomores (46%) reported setting up their own system, and this was true particularly of engineering versus other students (__=31.63, df= 12, p=.002). First-year students needed significantly less time getting set up (__=28.89, df=4, p<.000) than sophomores, and relied significantly less on others for additional help (F=30.84, df=1,331, p<.000).

Students rated their perceived familiarity with such computer applications as email, Excel, web pages, word processing software, Power Point, Claris works, Napster, Netscape/internet, and Lotus Notes (campus email). On all applications, t-tests showed a significant increase in familiarity over time. For instance, students who entered knowing little of the university email system, Lotus Notes (M=1.97) made notable strides in proficiency over time (M=4.42). While the first-year students consistently recorded higher mean scores at entry than did sophomores with regard to these computer applications, current proficiency levels for each class showed increased mean scores and no significant differences with the exception of excel usage. Mean scores for auxiliary academic applications such as bulletin boards (M=2.25), threaded discussions (M=2.0), and learning space (M=2.35) indicated infrequent student usage. Also infrequently used was library services such as on-line searches (M=2.34), e-reserve (M=2.78), or book renewal (M=1.86).

Due to the imbalance with regard to race, no calculations were performed. Significant differences, however, were found for gender. Females were significantly more pleased than males with the mandatory purchase (F=10.09, df=1,329, p=.002), but more women than men asked for help getting the computer set up (__=48.80, df=4, p<.000). Specifically, men needed less than a week to become familiar with the computer and applications and women typically needed more time (__=21.59, df=4, p<.000). Women were more likely than men to ask for additional assistance as the semester progressed (__=18.57, df=4, p=.001). Males were more likely than females to report a significantly higher rate of preparedness and technical competence at entry (F=35.73, df=1,331, p<.000), and indicted an overall higher degree of proficiency than female classmates during the semester (F=14.61, df=1,327, p<.000). Comparisons between mean scores indicted that male perceptions of preparedness and technical competence increased from M=3.72 at entry to M=4.13 currently, while female perceptions increased from an entry level of M=3.13 to a current level of M=3.84.

Significant school differences showed business and engineering students were more likely than education and arts/sciences majors to use certain types of software at entry such as Excel (F=5.28, df=3,321, p=.001) and Microsoft Word (F=2.93, df=3,321, p=.034). However, while business and engineering majors remained highly adept, all groups showed mean score increases in usage of all software applications over time. Students were asked to rate advice they might give to incoming students as to how they could become more technically competent. Women were significantly more likely than men to suggest asking for help from classmates (F=4.13, df=1,326, p=.043) or from university technical support services (F=24.44, df=1,327, p<.000). Being patient and learning how to use the software was also suggested by more women than men (F=8.91, df=1,324, p=.003). First-year (M=4.04) and second-year students (M=3.95) believed that taking a computer applications course in high school or at a community college would be helpful. Gleaned from the vast majority of written comments, students valued their computer either as a mode of convenience, a medium for communication, or a tool for ready access to people, places, and information.

Discussion

This study explored the new computer mandate at one university in light of students' perceived technical competence to use personal computers and software. This study offered data to university officials for future planning regarding mandatory computer purchases for entering classes of students, to new student orientation directors who have been asked to consider incorporating computer sessions in their orientation programs, and to faculty who wish to incorporate technology into their curriculums and classes. Findings did not clearly determine, however, if in this study, this year's entering class is just savvier than last year's class, or if the university is simply more prepared each fall to deal with problems and concerns. Results also have implications for university support services, especially in the first several weeks of the term when, for some, technical competence is lower and for most, stress and anxiety run disproportionately higher than usual (Chickering, 1969; Chickering & Reiser, 1993). The results also have implications for ensuring that all students begin on a level playing field, especially women and non-business and science majors.

In response to the first research question, students indicate overall that regardless of their perceived level of technical competence at entry, they make gains over time in hardware and software usage. With the passage of time and increased exposure to the computer, the playing field appears to become more even, but students still indicated preparation prior to entry is a good idea. The fact that all students have the same computer, software, and access level increases the possibility that deficits at entry will diminish during the course of the first year. Increased usage implies easier acclimation to their computer which may contribute to increased competence, but in the meantime students risk falling behind other classmates who are more savvy and competent.

With regard to the second research question, gender differences appeared to parallel the Shashaani (1997) and Schumacher and Morahan-Martin (2001) studies where men indicated greater usage of software applications, the Internet and web, while women indicated more willingness to ask for help, such as tapping into more university help services. Daddona and Cooper (2002) found that women in general desire more information at entry than men. In addition, the first-year class appeared more prepared than last year's freshmen, which may stem from greater preparation on the part of the administration having worked through the inaugural year. This higher degree of preparation may also be due to incoming students' greater awareness of the mandate over the previous year's students and some having had an opportunity to increase their level of competence prior to matriculation. With increased knowledge of totally wired/wireless campuses, the computer mandates, and informative University websites, students are made aware of the expectations and could self-assess competence levels before applying as well as participate in computer instruction to reach a comfortable, acceptable level of competence. However, depending upon a chosen major, students may not know at entry what they will need to know to succeed in some courses. Even though this is a residential campus, first and second-year students reside in different residence halls or in one case, separate wings of the same hall, first-year students may not necessarily benefit from the sophomore's expertise and ability to mentor in close

proximity.

Because students new to college find the integration of computers into their class work may vary, especially across schools and majors, it may take more time to see the software as integral to their specific studies (Altschuler & McClure, 2002; Cuban, Kirkpatrick, & Peck, 2001; Furst-Bowe, Bolger, & Franklin, 1995; Griffith, 1999). Inability of students to reach adequate competence levels negatively impacts the mandate and perhaps curtails student learning. Perceptions of competence may be more compelling depending not only upon students' exposure to computers, but also the frequency and type of usage, including integration of computers by faculty in class. At present, integration level among faculty probably varies across the four schools helping explain the moderate level of perceived competence (see Olsen, 2002). How faculty members integrate computer usage into their courses is an area of future research that will again test student competence levels. Lynch (2002) reported from the Campus Computing Project that despite the technology available, only 20% of faculty members incorporate computer applications into their classes. More incorporation, while causing initial anxiety for some of the less prepared students, would mean more opportunities for students to gain or hone the skills they need to succeed in academically. This might also be an opportunity for faculty and computer professionals to work with new student orientation directors.

Specific populations such as students with learning disabilities, first-generation college students, transfer students, or those from lower socio-economic backgrounds (Lehnig, 2000A, 2000B), however, may also experience different levels of perceived competence which may pose additional challenges to universities instituting mandatory computer policies. Integrating computer usage into academic areas and support services and its impact on special populations remains an area for further study into student technical competence. Because of the small number of students of color represented in the survey, further study with a larger, more diverse population is recommended. Given that female students lag behind males in computer savvy and they report asking classmates for help more often, specific services targeted to women may be useful. Only one school on campus pays specific attention to their student's computer competence. Other schools might evaluate their students' computer needs and consider if remedies should be sought in-house or in collaboration with new student orientation directors and computer personnel. Additionally, virtual orientation programs can be conducted through campus websites prior to students arriving on campus.

With wired/wireless campuses, on-line applications, and computer mandates as marketing tools used by admissions offices, inquiries from less technically competent students are likely to diminish. By the same token, students who wish to matriculate to this type of environment should be encouraged to demonstrate a reasonable level of technical competence at entry to compete with other more competent students, especially in majors that rely more on computer applications. As faculty members learn more about and experiment with computers in the classroom, there may be a need to adjust the time allotted and the content needed to help all entering students in achieving computer competence. Limited funding, time, and human resources may preclude structured offerings but individual campus assessments need to be made to determine the degree,

student groups, and type of computer information required such that time, money, and personnel can be allocated when, where, and how needed. Perhaps the university feels that with the on-line only application process, high home/school access, and current offerings, campus wide computer orientation is not a priority. However, the need for structured orientation sessions will likely change as students' needs change and as technology becomes a more integral part of the campus and the curriculum (Miller & Dyer, 2002). Needs may move beyond technical competence to spatial and ethical issues associated with usage, downloading from the Internet, and bandwidth capacities. All areas warrant further investigation.

References

Altschuler, G., & McClure, P. (2002, January 18). And colleges must create technology plans. *The Chronicle of Higher Education, 48*(19), B16-17.

Ayersman, D. (1996). Effects of computer instruction, learning style, gender, and experience on computer anxiety. *Computers in Schools, 12*(4), 15-30.

Chickering, A. (1969). *Education and identity*. San Francisco: Jossey-Bass.

Chickering, A., & Reisser, L. (1993). *Education and identity (2nd ed.)*. San Francisco: Jossey-Bass.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*, 813-834.

Daddona, M., & Cooper, D. (2002). Comparison of freshmen perceived needs prior to and after participation in an orientation program. *NASPA Journal, 39*, 300-318.

Flowers, L., Pascarella, E., & Pierson, C. (2000). Information technology use and cognitive outcomes in the first year of college. *Journal of Higher Education, 71*, 637-667.

Furst-Bowe, J., Bolger, C., Franklin, T., McIntyre, B., Polansky, J., & Schlough, S. (1995). An analysis of required computer competencies for university students. *Journal of Research on Computing in Education, 28*, 175-89.

Griffith, R. (1999, April). Connecting students and faculty through technology, collaboration, and globalization at Wake Forest. *Case Studies*. Retrieved September 23, 2002 (http://www.horizon.unc.edu/TS/Cases/1999-04.asp)

Gumport, P., & Chun, M. (1999). Technology and higher education: Opposition and challenge for the new era. In Altbach, P., R. Berdahl, & P. Gumport (Eds.), *American higher education in the twenty-first century, (pp. 370-395)*. Baltimore, MD: Johns Hopkins University.

Hawkins, R., & Paris, A. (1997). Computer literacy and computer use among college students: Differences in black and white. *Journal of Negro Education, 66*, 17-158.

Jones, M., & Pearson, R. (1996). Developing an instrument to measure computer literacy. *Journal of Research on Computing in Education, 29*,17-28.

Karsten, R., & Roth, R. (1998). The relationship of computer experience and computer self-efficacy to performance in introductory computer literacy courses. *Journal of Research on Computing in Education, 31*, 14-24.
Lehnig, E. (2000a). First generation college students: A courageous group in transition. *Journal of College Orientation and Transition, 7*(2), 21-26.
Lehnig, E. (2000b). The influence of student development services in articulation agreements. *Journal of College Orientation and Transition, 7*(2), 33-40.
Levine, T., & Donitsa-Schmidt, S. (1997). Commitment to learning: Effects of computer experience, confidence, and attitudes. *Journal of Educational Computing Records, 16*, 83-105.
Lynch, D (2002, January 18). Professors should embrace technology in courses. *The Chronicle of Higher Education, 48*(19), B15-16.
McAulay, K. (1993). Computer use among college undergrads. *Journal of College Student Development, 34*, 230-1.
Miller, M., & Dyer, B. (2002). New student satisfaction with an orientation program: Creating effective learning transitions. Paper presented at the annual meeting of the Eastern Educational Research Association, Sarasota, FL.
Miller, M., & Viajar, P. (2001). The integration of technology in new student orientation programs. *Journal of College Orientation and Transition, 9*(1), 33-40.
Mina, L. (2001, November). Technology in the classroom: The experiences of minority business students. Poster session presented at the annual meeting of the Association for the Study of Higher Education, Richmond, VA.
Olsen, F. (2000, November 3). Campus newcomers arrive with more skill, better gear. *The Chronicle of Higher Education, 47*(10), A39, 43.
Olsen, F. (2002, January 11). Duke U. decides against requiring freshmen to own laptops. *The Chronicle of Higher Education, 48*(18), A44.
Pascarella, E., & Terenzini. P. (1991). *What matters in college?* San Francisco: Jossey-Bass.
Sax, L., & Ceja, M., & Teranishi, R. (2001). Technological preparedness among entering freshmen: The role of race, class, and gender. *Journal of Educational Computing Research, 24*, 363-384.
Schumacher, P., & Morahan-Martin, J. (2001). Gender, internet and computer attitudes and experiences. *Computers in Human Behavior, 17*, 95-100.
Segawa, M. (1999). Are we missing technology opportunity? *Journal of College and University Student Housing, 28*, 3-6.
Shashaani, L. (1997). Gender differences in computer attitudes and use among College students. *Journal of Educational Computing Research, 16*, 37-51.
Smith, B., & Necessary, J. (1996). Assessing the computer literacy of undergraduate college students. *Education, 117*, 188-193+.
Tinto, V., (1987). *Leaving college*. Chicago: University of Chicago Press.
Twale, D. (1989). Social and academic development freshman orientation: A time\ frame. *NASPA Journal, 27*, 160-167.

Twale, D., & Schaller, M. (2001, November). Perceptions of technical competence among first and second year students participating in a mandatory computer purchase program. Poster presented at the annual meeting of the Association for the Study of Higher Education, Richmond, VA.

Zhang, Y., & Espinoza, S. (1998). Relationships among computer self-efficacy, attitudes toward computers, and desirability of learning computing skills. *Journal of Research on Computing in Education, 30*, 420-436.

TABLE 1

Demographic Information of Respondents I

	First Year		Second Year	
	N	*%*	*N*	*%*
Sex				
Male	56	(33)	59	(36)
Female	111	(66)	107	(64)
Race				
Caucasian	150	(90)	152	(90)
African-American	8	(5)	7	(7)
Asian American	5	(3)	0	(0)
Hispanic	1	(1)	4	(2)
Other	2	(1)	2	(2)
School				
Education	22	(13)	25	(14)
Business	32	(20)	37	(22)
Arts and Sciences	84	(51)	81	(48)
Engineering	26	(16)	23	(14)
Computer access				
Home & school	165	(99)	168	(99)
No access	2	(1)	1	(1)
Computer set up				
Self	93	(57)	73	(46)
Others	69	(43)	86	(54)
Perceived competence				
More prepared than others	72	(43)	59	(35)
Less prepared than others	27	(16)	25	(15)