# *EXPLORING ADULT LEARNERS' PERCEPTIONS OF TECHNOLOGY COMPETENCE AND RETENTION IN WEB-BASED COURSES*

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The purpose of this study was to examine the self-reported technology competencies of adult online learners and whether self-reported technology competence was related to students' intent to continue learning via web-based courses. The results indicated that there was no relationship between self-reported level of computer competence and intent to continue taking web-based courses. However, adult learners participating in the study indicated that they continue to struggle with completion of assignments and managing time when taking web-based courses, and that students want more technical training.

## *INTRODUCTION*

Since the advent of the World Wide Web, distance education has shifted from a paper-based rather noninteractive learning experience to a widely varied and often highly interactive experience (Moore, 2003). This shift from paper-based distance education to web-based distance education has brought opportunity to many busy adults who wish to continue learning while managing work and family commitments. Adult learners continue to be the largest and fastest growing segment of the web-based distance education market (Derrick, 2003) and the Distance Education Report (2007) reported that more than 2,200 colleges and universities now offer courses via the web. This increase in the number and type of adult distance education opportunities is not without problems. One of the most persistent problems with web-based distance education is that the dropout rate of online students remains unacceptably high (Carr, 2000; Distance Learning Policy Laboratory, 2002; Park & Choi, 2009).

Moving to distance education via the Web shifted the focus of research from instruc-

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tional design that dominated correspondence distance education to a focus on technologies and the characteristics of learners who enrolled in web courses (Campbell-Gibson, 1995; Garrison, 2000). Based on the work of Tinto (1975), Kember (1989) developed a model of persistence in distance education based on learner characteristics. Kember's model is broad and difficult to test in total, and therefore, some researchers have focused on examining what Dupin-Bryant (2004) described as the "manageable area of pre-entry attributes, including skills, abilities and prior education" (p. 200).

Results of various studies examining computer skills, computer and Internet abilities, prior training on computers, and Internet use have been mixed. For example, Stein and Wheaton (2002) found no significant direct relationship between technology skills and completion of web-based courses. Dupin-Bryant (2004), on the other hand, found that previous training on specific computer and Internet skills can help explain course completion and that students wanted additional training. Calvin (2005) found a moderate relationship between computer technology skills and the student's belief that they could successfully complete a web-based course. While there was no direct relationship between level of technology skills and perception of learning outcomes in the course, the students' self-efficacy for the task of learning online was enhanced by higher technology skills. However, this was a very small study ($n = 79$) with low response rates (26%) and results were highly tentative.

Research continues to indicate that adult learners are fearful of using computer technologies (Saade' & Kira, 2007) and that many adult learners do not possess even basic computer skills (Yang, Shu, Lin, & Hsu, 2007). The purpose of this study was to examine the self-reported access to and competencies using technology by adult online learners and whether self-reported technology competence was related to students' intent to continue learning via web-based courses. A secondary purpose was to ascertain what students believe is necessary to improve success in web-based courses. Research questions developed for this descriptive study included:

1. What are the self-reported levels for specific computer competencies of adult distance learners?
2. What is the self-reported level of overall current technical competence of adult distance learners?
3. Do adult distance learners have access to the technology required for web-based distance learning?
4. What is the relationship between perceived computer technical competence of adult web-based distance learners and intent to continue learning at a distance?
5. What is the relationship between perceived specific technology competencies and intent to continue learning via the Web?
6. What types of services do adult web-based distance learners believe would improve success in web-based courses?

## *LITERATURE REVIEW*

For many decades, distance education was focused on the teacher-to-learner interactions that took place through correspondence, radio, and television (Moore, 2003; Moore & Kearsley, 1996; Thompson, 1998). During this long history of distance education, the technology skills required of distance learners were minimal. However, the technology skill requirement changed drastically with the advent of the Web in the 1980s and the subsequent push to place distance learning online. By the mid-1990s higher education was offering multiple online degree programs and thousands of individual online courses—and students enrolled by the thousands (Campbell-Gibson, 1998; Distance Education Report, 2007; Huber & Lowry, 2003). Derrick (2003) described web-

based distance learning as the fastest growing segment of adult education.

Although early research in web-based distance learning focused on access to computers and the Internet (Burge; 1998; Taylor, 2001), the focus in the United States quickly moved to characteristics of online learners (Ally & Fahy, 2002; Campbell-Coggins, 1988; Davidson-Shivers, Nowlin, & Lanquette, 2002; Harrison, Andrews, & Saklofske, 2003).

For students with access to the Internet, researchers have attempted to explain the high dropout rate. Researchers have investigated persistence (Shin, 2003; Stein & Wanstreet, 2005), social presence (Lee & Nass, 2005; Salinas, 2005; Tu, 2002; Tu & McIsaac, 2002), learning styles (Sabry & Baldwin, 2003), cognitive styles (Liu & Ginther, 1999; Nachmias & Shany, 2002), and student attributes (Dupin-Bryant, 2004; Huett, Kalinowski, Muller, & Cheaves Huett, 2008) in an attempt to explain why some students succeed and persist in online distance courses and other students do not.

However, results continue to be mixed as to why some students are successful (usually defined as passing course grades or average GPA) online and others are not and, why some students complete online courses and others do not (sometimes defined as a single online course and other times defined as an online program of study). Stein, Wanstreet, Calvin, Overtoom, and Wheaton (2005) defined success in online and blended courses through student perceptions of learning, rather than through grades and GPA. However, they too found no significant relationship between self-reported competence with computer and web technologies and success in online courses (defined as self-reported perceptions of learning), or persistence (defined as intent to continue taking online courses).

Recently, Saade' and Kira (2007) examined perceived ease of use for technologies utilized in education. Using a rather small sample ($n$ = 114), the study examined both computer and Internet technologies and whether learners experienced anxiety as a result of perceived ease of use of the technology. A small relationship between anxiety and perceived ease of use was found ($\beta = -0.300$, $t = -4.078$, $p = 0.000$); however, no direct relationship between computer experience and perceived ease of use was found in the study. The results were surprising given that earlier studies on anxiety indicated a stronger relationship should have been found.

Dupin-Bryant (2004) found that although years of computer experience did not relate to course completion, Internet searching training, Internet applications training, and previous online course completion did. Combining training and previous course experience with four other variables, Dupin-Bryant was able to explain 9% of the variance in course completion. Aragon and Johnson (2008) examined reasons that students complete or do not complete online courses at a community college. Of the students in the study who did not complete their online course, 18% of the open responses given as reasons for noncompletion indicated that technology or the WebCT Tutorial played a role. The authors concluded that course designers and instructors should "examine the pathways students are required to travel—from orientation to instruction to course completion—with special regard for students' different skill levels and academic histories" (p. 155). Another study in 2008, however, indicated that self-efficacy for online technologies was not related to student performance in online courses (Puzziferro, 2008).

As a result of these conflicting findings, a decision was made to examine whether adult learners have adequate access to online technologies, what specific computer competencies adult web-based learners believe they have, which competencies the students believe are most important in online learning, whether or not there is a relationship between computer competence and the intent to continue enrolling in online courses and, finally, what these adult students believe would help make them more successful in web-based courses.

## *METHODS*

### *Participants*

Participants were recruited from a group of 1,000 working adults enrolled in a bachelor's program delivered by a Midwestern university on 16 military installations and one community education center across the United States. While many of the courses in this program are taught face-to-face, the students are required to take several courses via the Web. This population of distance learners consisted of working adults with a minimum of 2 years full-time work experience.

### *Data Collection Instrument*

A pencil and paper questionnaire was developed consisting of two sections. The first section collected demographic information including age, gender, ethnicity, work sector, and educational goals. Socioeconomic status was indicated by qualification for the federal Pell Grant Program that provides need-based grants to low-income undergraduates to promote access to postsecondary education. Web-based distance education experience was indicated by responses to two questions: participants indicated the nature of their experiences with Web-based distance learning courses and their plans to take web-based distance learning courses in the future.

The second section of the instrument collected information on self-perceived technical competence. To measure individual technology competencies, participants used a 4-point Likert-type scale to rate their technology competency (no computer experience; minimal computer experience; intermediate computer user; advanced computer user). To further evaluate technology competency, participants were asked to use a 4-point Likert-type scale (*none; low; medium; high*) to rate their skill level with 10 components of computer use. Components included items such as: "Use of a personal computer for word processing;" "Use of PowerPoint to create a presentation;" and "Use of search engines (such as Yahoo, Google) to search for and obtain topic information."

Validity of the instrument was determined through review by several researchers with expertise in the areas of distance learning and educational technology. Consensus of these experts was that the questions adequately addressed the technology competencies that would be required of students taking an online course. A pilot study was not conducted therefore the reliability of section two of the instrument was not calculated until the study was completed.

The reliability for section two (technology competence) was calculated after data collection using Chronbach's alpha ($r$ = .876), indicating that the instrument was sufficiently reliable for purposes of this study.

### *Procedures and Data Analyses*

Participants were asked to volunteer to complete the questionnaire while attending face-to-face classes in the program. A statement regarding the approval by human subjects and the voluntary nature of the study was read to each class by the instructor. A cover page attached to the survey questionnaire explained the study, defined distance learning, and the explained the three categories for types of distance learning that were established for the study. Questionnaires were then passed out to all students who wished to participate. The questionnaire took approximately 10 minutes to complete. Completed paper copies were collected by course instructors and mailed to the researchers for data analysis. Random entries were audited to ensure that the data had been entered correctly.

Descriptive statistics were calculated to report participants' demographic characteristics and level of technical competence on various computer competencies (research questions 1-4). A correlation was then calculated in order to answer research question 5. Finally, responses were categorized to answer research question 6.

## *RESULTS*

Completed questionnaires were received from 510 students for a response rate of 51%; however, a few questionnaires were missing some data. It was determined that the missing data did not disqualify these questionnaires from most analyses. However, as a consequence, the number of responses varies for some analyses as mean values were not entered for the missing data points. Demographic characteristics of the participants were as follows. Males comprised 66% of the sample; females 34%. The average age was 36 years with the largest percentage (39%) in their 30s. Ethnicity of participants was 44% Caucasian, 24% African American, 22% Other, 8% Hispanic, and 2% not reported. Work sector classifications included 57% active duty military, 39% civilians, and 4% reservists. Socioeconomic status was indicated by qualification for Pell Grant assistance, indicating an adjusted gross family income of less than $40,000 ("Pell Grant: Does every student qualify?," n.d.). Thirteen percent of the respondents qualified for Pell Grants. The majority of participants indicated their primary educational goal was to obtain a college degree (96.1%).

### *Computer Competence and Current Technology Levels*

Participants indicated both number and types of distance education courses previously taken. Two thirds of the 510 respondents (67%) reported taking 1 to 4 distance education courses. Seventy-one respondents (13%) reported no previous experience with a distance education course. The most frequently taken type of distance education course was online/Internet courses (84.2%), with an additional 15.1% taking courses through videoconferencing, 25.7 % via individual computer-based learning education programs, while 4.6% had not taken any of these three types of distance education courses. Participants were asked to indicate all that applied.

Participants' also indicated self-perceived technology competency. Three of 504 respondents (.6%) reported no previous computer experience. Eighty-one (16%) reported minimal, 384 (68.8%) reported intermediate, and 80 (16%) reported advanced computer experience. Next, participants' indicated self-perceived current technology competency levels on specific computer skills. The possible range on the specific competencies was 1 to 4 individually and 1 to 40 in aggregate. The mean score for aggregate technology competency was 33.23 ($n$ = 507). See Table 1 for specific computer skill competencies. There was a small but statistically significant relationship between self-perceived computer expertise and self-perceived current technology competency level ($r$ = .259; significant at the 0.01 level, two-tailed). A two-tailed test was conducted, as the researchers did not assume that high skill levels (intermediate and advanced) would include every skill listed in computer competency.

### *Access*

Access to a computer and the ability to enroll in web-based courses was indicated by four items in the demographic section of the instrument. Four hundred ninety-four (97.6%) of the students have a computer in their home ($n$ = 507) and 94.5% have Internet access at home. Slightly over half have cable/broadband access (58.8%), about one fourth (24.5%) have dial-up access, while 11.6% did not know what type/speed Internet access they have at home. The remaining 4% have ISDN.

### *Computer Skills That Make Up Computer Expertise*

Students reported their self-perceived level of computer expertise (no experience, minimal experience, intermediate experience, advanced experience) along with their self-perceived level of competency on ten typical computer skills on a 4-point scale (*1 = none, 2 = low, 3 = medium, 4 = high*; $n$ = 507; see Table 1). For students who reported intermediate or advanced computer experience, correlations were calculated for each of ten typical com-

TABLE 1
Computer Skills That Make Up Computer Competence

| | *Descriptive* | | *Correlations* | |
|---|---|---|---|---|
| *Computer Competence* | *Mean* | *SD* | *Intermediate* | *Advanced* |
| Word Processing | 3.55 | .613 | .063 | .261** |
| Accessing/creating email | 3.73 | .535 | .110* | .177** |
| Online discussion groups | 2.68 | .974 | –.043* | .254** |
| Navigating a PowerPoint presentation | 3.44 | .771 | –.022 | .229** |
| Creating a PowerPoint presentation | 3.24 | .855 | .005 | .247** |
| Surfing the Internet | 3.63 | .580 | .099* | .176** |
| Use of search engines | 3.63 | .597 | .061 | .186** |
| Use of online research databases | 2.67 | .959 | –.013 | .239** |
| Uploading/downloading Web files | 3.18 | .850 | .007 | .310** |
| Use of a CD-ROM drive | 3.44 | .795 | .044 | .274** |

**Correlation significant at the 0.01 level (2-tailed).
*Correlation significant at the 0.05 level (2-tailed).

puter technology skills. For students reporting intermediate experience, there were very few statistically significant relationships at the .01 level, and the significant relationships that were found were extremely small (accessing/creating email, $r$ = .110; surfing the Internet, $r$ = .099; $n$ = 348). For students who reported advanced computer experience, all ten typical computer skills had statistically significant relationships (word processing, $r$ = .261; accessing/creating e-mail, $r$ = .110; online discussions, $r$ = .245; navigating a PowerPoint presentation, $r$ = .229; creating PowerPoint presentations, $r$ = .247; surfing the Internet, $r$ = .176; using search engines, $r$ = .186; using online databases, $r$ =.239; uploading and downloading web files, $r$ = .310; using a CD-ROM drive, $r$ = .247; $n$ = 80), but again, most were low to moderate.

## *Relationships Between Competencies and Persistence*

In examining the relationship between self-perceived computer technical expertise and intent to take web-based courses, no statistically significant relationship was found. In addition, when examining the relationship between self-perceived expertise in various specific technology competencies and intent to take web-based courses, no statistically significant relationships were found. Finally, no statistically significant relationship was found between self-perceived overall computer competence and intent to take web-based courses.

## *Services to Improve Success in Web-Based Courses*

Students were also asked to indicate what they believed would improve their own success and persistence in web-based courses. First, students were asked what the primary obstacles were for successful completion of web-based courses ($n$ = 510). Participants indicated that assignments were too difficult (3.7%); assignment directions were unclear (35.7%); they had trouble managing time (19.9%); they lacked technical skills (4.7%); they couldn't get help when needed (17.4%); some took too many classes that semester (3.7%); distance education courses were not a high priority (3.7%); a few indicated other (12.1%); while nearly a fourth indicated no

obstacles (24.8%). Participants were asked to select all obstacles that applied. Second, participants were asked what services would have made the web-based course easier ($n$ = 510; counseling/advising—42.2%; technical training/tutoring—35.5%; disability assistance services—3.3%; orientation—15%). A large group of students did not indicate any of the options provided (21.4%). Again, participants were asked to select all services that would have helped.

## *DISCUSSION*

The purpose of this study was to examine the self-reported access to and competencies using technology by adult online learners and whether self-reported technology competence was related to students' intent to continue learning via web-based courses. A secondary purpose was to ascertain what students believe is necessary to improve success in web-based courses. Results indicate that over half of this group of working adults had previous web-based course experience and that the majority of the group believed they had only intermediate computer competence. Nearly all participants had a computer at home and over half had high-speed Internet access through broadband. Therefore, access was not an issue for this group of students.

Over one third of these students reported that assignment directions were unclear. This is a common problem in web-based courses and has been found even in courses that are considered highly structured (Bohlin & Hunt, 1995; Smith, Murphy, & Mahoney, 2003). One fifth of the participants had trouble managing their time in web-based courses, which is also a common problem for online learners (Smith et. al, 2003). Nearly half of the participants reported that counseling or advisement would have made participation in a Web-based course easier and over a third reported that additional technical training would have helped.

These findings support the need to focus on the pedagogical issues of distance education as Garrison (2000) suggested, rather than continuing a focus on the technical problems that students report they encounter in web-based courses. On the other hand, although this group of working adult students indicated that they did not feel a lack of technical skills was a primary obstacle, nearly half of the group indicated that technical training or technical tutoring would make it easier to complete web-based courses successfully. This apparent contradiction may indicate that although students do figure out how to cope with the technical aspects of an online course, additional training on using the technologies required would make it easier for busy adults to complete their web-based courses. This finding is consistent with the findings of Dupin-Bryant (2004) in that students believe that additional technical training would be helpful.

Lower levels of computer competence did not relate to the intent to take, or continue to take, web-based courses. Even for those participants who reported advanced computer competence, there are only very small relationships between self-perceived individual computer competencies and intent to continue taking web-based courses. These findings support previous studies that found no direct relationship between computer competence and success in web-based courses or intent to take web-based courses. It must be noted that these findings may have been influenced by the fact that over half of this group is active military and the provision of web-based courses allows these students to continue progress in a degree program while deployed.

Finally, participants reported that clearer assignment instructions were the most important improvement that could be made to increase overall success in web-based courses, while learning to manage their own time and access to help when needed were also reported as important to improving overall success. These problems have been evident in research on online learning since the inception of Internet tools that allowed web-based courses to be

delivered (Thompson, 1998; Webb & Chiarelli, 2004). Students continue to want more guidance and help when learning online.

## *CONCLUSIONS AND RECOMMENDATIONS*

Previous studies have shown equivocal results regarding computer technology competence and success and persistence in web-based courses. However, most studies investigating computer expertise as a factor of distance learning did not investigate the specific computer competencies that learners might regard as necessary for success in web-based courses. Calvin (2005) found that rather than a direct relationship between computer competence and learning online, computer competence moderated the ability to self-regulate learning in web-based courses. The results of the current study supported Calvin's finding that there is no direct relationship; however, the possibility that computer competence may moderate self-regulation in web-based courses remains to be further investigated.

Participants in the current study indicated relatively low levels of computer competence, which was somewhat surprising given that previous studies have indicated that students have a tendency to over state their abilities with computer technologies (Distance Learning Policy Laboratory, 2002; O'Lawrence, 2006). Overstatement of computer competence may explain participants' indication that clearer assignment instructions, assistance when needed and help managing time are needed, as lack of computer skills may increase cognitive load (Schunk & Zimmerman, 2001), thereby increasing the need for guidance and help with assignments. This aspect also requires further investigation.

In order to better assist online learners, instructional designers and instructors should re-evaluate the directions provided for assignments and the frequency and type of guidance being provided to online learners. Further, online instructors should provide examples of how students can best manage their time in web-based courses, and may want to consider directing some of the course assignments toward managing time for the students. Finally, instructors and designers should find ways to include training on specific technical skills required for the specific course in response to students' continued requests for additional technical training.

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