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## Student demographics and success in online learning environments

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Understanding the role of student demographics in the online learning environment can assist institutions to make decisions regarding online programs. These decisions go beyond the initial question of whether to invest in online programs or whether to increase or decrease online course availability. This article discusses the relationship between student demographics and success in online learning environments as it relates to academic performance and the possession of self-regulated learning characteristics. Understanding the role of student demographics in the online learning environment also would help institutions understand what resources need to be allocated toward support of online learning programs in the form of online advising and technical support for students, course development support for faculty, and investing in learning-management software or collaboration software.

*Keywords: distance learning, student demographics, self-regulated learning, motivated strategies for learning questionnaire (MSLQ), online learning.*

### INTRODUCTION

Institutions are making decisions to invest in online programs despite many questions about the online learning environment (Virtual Schooling, 2002). Before making these decisions in response to economic pressure and learner demands, institutions need to identify characteristics and behaviors that enable students to be successful in an online learning environment. Defining these characteristics will influence institutions to make decisions about course offerings, but also student support services, online advising, faculty support services, and allocating resources for software and technology infrastructure.

According to Wood (2005), students who succeed in traditional settings may not do well in online courses. This could be attributed to student motivation, self-discipline, or any number of learner characteristics. Evaluating learner differences and how these differences affect one's academic performance is one way to understand the factors promoting success in the online learning environment.

The purpose of this article is to show how student demographics relate to one's success in the online learning environment. This article provides a brief history of distance learning as well as a description of the distance learning student. In discussing this issue, a research study involving online graduate students of a small midwestern university was examined.

### BACKGROUND

#### Brief history of distance learning

Distance learning (DL) can be defined as "institution-based, formal education where the learning group is separated, and

where interactive telecommunications systems are used to connect learners, resources, and instructors" (Schlosser & Simonson, 2006, p.1).

DL began in 1837 when Sir Isaac Pitman began delivering shorthand courses by mail. This form of DL became known as correspondence courses and over the next few decades spread to the United Kingdom, Germany, the United States, and Japan (Matthews, 1999). By 1892, the University of Chicago established a university extension with a correspondence teaching department (Simonson, Smaldino, Albright, & Zvacek, 2009).

From these beginnings emerged several stages, or generations of distance learning. The first generation consisted of correspondence study, followed by the emergence of Articulated Instructional Media (AIM) and open universities. The birth of Britain's Open University in 1969 introduced the first university system dedicated to distance learning students. Open University used a total systems approach to the design and implementation of distance learning in which correspondence was combined with different media such as broadcast video and audio. As technology developed during this second generation, video and audio were being combined to be delivered via television, videotape, teleconferencing, and satellite (Moore & Kearsley, 2005).

In the 1990s, a new generation of distance learning emerged in the form of computer-based instruction delivered over networks (Moore & Kearsley, 2005). Within this current generation of DL, the Internet would begin to serve as the main medium of delivery (Matthews, 1999). The interface of the World Wide Web enables the combination of text, graphics, audio, and video to form the components of a course. This type of DL course is often referred to as online learning.

### Online learning

Dabbagh and Bannan-Ritland (2005) define online learning as “an open and distributed learning environment that uses pedagogical tools, enabled by Internet and Web-based technologies, to facilitate learning and knowledge building through meaningful action and interaction” (p. 15). Online learning also may be referred to as e-learning, e-training, or web-based instruction.

According to Dabbagh & Bannan-Ritland (2005), key components of online learning include pedagogical models, instructional and learning strategies, and pedagogical tools. Pedagogical models are views about teaching derived from learning theory and enable implementation of specific instructional and learning strategies (Dabbagh & Bannan-Ritland, 2005). Instructional strategies are “the plans and techniques that the instructor/instructional designer uses to engage the learning and facilitate learning” (Jonassen, Grabinger, and Harris, 1991, p. 34). Instructional strategies are the means through which pedagogical models are put into practice.

Learning technologies such as asynchronous and synchronous communication tools, such as email and chat, and multimedia technologies, such as graphics, video, and animation, enable the implementation of these strategies (Dabbagh & Bannan-Ritland, 2005). With Internet connectivity and the universal browser protocol of the World Wide Web (WWW), these learning technologies have evolved to form online learning environments that facilitate collaborative activities and information sharing. Under a model such as the three-component model for online learning (Dabbagh & Bannan-Ritland, 2005), students can experience learning anytime, anywhere.

The advantages of online learning are similar to those that generalize across all distance learning. Advantages include accessibility, convenience, and flexibility (Killion, 2000) as well as financial benefits in the form of increased efficiency and increased student enrollment. According to Khan (1997), a well-designed online learning program has the potential to provide numerous features conducive to learning and instruction that can address pedagogical, technological, organizational, institutional, and ethical issues. In reference to Howard Gardner’s multiple intelligences, Nelson (1998; as cited in Osciak & Milheim, 2001) states that the flexibility provided in online learning provides the potential for all intelligences to be represented and cultivated regardless of the physical location of the student. The role of the WWW in instruction has the potential for “novel learning strategies which will eventually be embedded in cognitive, social, and cultural contexts” (Relan & Gillani, 1997, p. 45).

### The distance learning student

In the past, students who enrolled in distance learning courses enrolled for reasons that ranged from preferences to study in a self-paced environment to geographical isolation (Guri-Rosenbilt, 1999). These students were generally adults who voluntarily enrolled for specific and clear reasons, such as enrolling for college credit or taking a course for personal interest (Moore & Kearsley, 2005). In comparison to adult learners, younger students tend to have difficulties in distance learning courses. Guernsey (1998) compared student behavior of a class that was offered in a traditional face-to-face format to student behavior of a class in an online format. Out of 10 students who opted to take the course online, six of the students were older than most of the other students and had full-time jobs or had families with young children. These students did well in the course; however, the other four younger students had difficulties and ended up moving to the traditional face-to-face format of the course.

Student readiness is also a concern for K-12 virtual schools. According to Collins (2002), appropriate students for K-12 online courses should be able to prioritize work and balance the demands of online coursework with other activities, have the ability to work independently, approach online courses with same commitment and motivation as conventional classes, be able to dedicate eight to 10 hours a week for each online course, and reserve a class period a day for online coursework. Students who do well in traditional face-to-face classes may not do well in an online environment. The online learning environment requires the students to take responsibility for their learning (Wood, 2005).

In a report sponsored by the Alfred P. Sloan Foundation, Allen and Seaman (2010) stated that from fall 2002 to fall 2008, there was a compounded annual growth rate of 19 percent of students taking at least one online course. As the demand for online courses increases, will institutions of higher education invest more in online courses than traditional face-to-face courses? If so, will resources be pulled away from traditional face-to-face courses and only provide courses in an online environment? If these decisions are made, what implications does this have for student achievement in online courses? What additional resources are necessary to support students enrolled in online courses? If there are specific learning characteristics that allow some students to succeed more than others, is there a way to support, teach or enhance those particular characteristics to enable other students to succeed in the online course?

Research studies have identified certain student demographics that may be related to success in distance learning courses. Student demographics such as age, extracurricular activities

such as work and family status, as well as educational background, have been studied (Moore & Kearsley, 2005, Guri-Rosenbilt, 1999; Tsay, Morgan, & Quick, 2000).

Most distance education students are adults with age ranging from 25 to 50 (Moore & Kearsley, 2005). Guri-Rosenbilt (1999) reported that the median age for a distance teaching university ranges from age 30 to 34. As most distance learning students tend to be adult learners, Kaye and Rumble (as cited in Moore & Kearsley, 2005) stated that the more one understands about the nature of adult learning, the better one can understand the nature of distance learning.

One significant predictor of student achievement and completion rate is a student's educational background (Moore & Kearsley, 1996; Nesler, 1999). Adult students with previously obtained degrees are sometimes interested in receiving a degree in a different field to advance their careers (Nesler, 1999). One possible explanation may be that those students with more educational experience have had more experience with success, and thus, have a higher confidence level (Burt, 1996).

In one study, Coggins (1989; as cited in Moore & Kearsley, 2005) not only found significant differences in completion rate in terms of educational level, but he also found differences in completion rate by the length of time since the student's last course taken. In other words, the longer the time since completing a course, the less likely the student would be to complete the distance learning course (Moore & Kearsley, 2005).

Another way of looking at individual student characteristics, is to look at his or her use of self-regulated learning strategies. Self-regulated learning theory and research developed in the mid-1980s to address how students become masters of their own learning processes (Zimmerman, 2001). According to Pintrich (1995) self-regulated learning must include three components of student behavior in conjunction to their behavior and use of cognitive strategies. Students must actively control their behavior by monitoring progress and adjusting the use of a strategy to assist with the task. The second component of self-regulated learning is the degree to which this task is completed, or the goal. The student must adjust the use of a cognitive strategy in order to achieve his or her objective. The third component is that the individual student must control his or her actions. A student may change a behavior in reaction to an instructor requirement; however, after the requirement is removed, the student may no longer engage in the behavior. These three self-regulated learning components are necessary to regulate student behavior and use of cognitive strategies.

Self-regulated learning characteristics include (a) students' use of metacognitive strategies, (b) students' management and

control of their effort on classroom academic tasks, and (c) the specific cognitive strategies students use to learn, remember, and understand content (Zimmerman & Martinez-Pons, 1986). Pape, Zimmerman & Pajares (2002) consider students' level of self-regulation highly predictive of academic performance in typical learning circumstances as well as those learning circumstances that are more difficult, such as having a learning disability or learning in an unsupported academic environment.

The Motivated Strategies for Learning Questionnaire (MSLQ) measures self-regulated learning characteristics in two categories: learning strategies and self-regulated learning. Many studies have used this instrument to study self-regulated learning characteristics of students in traditional face-to-face courses (Pintrich & DeGroot, 1988; Zimmerman & Martinez-Pons, 1990).

The learning strategies subscales include rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning and help seeking. Pintrich, Smith, Garcia, and McKeachie, (1991), defined these variables as the following:

1. Rehearsal strategies, such as reciting or naming items from a list to be learned, are used for activation of information in working memory rather than the acquisition of new information in long-term memory
2. Elaboration strategies allow the building of internal connections between items to be learned. Elaboration strategies include paraphrasing, summarizing, and creating analogies.
3. Organization strategies help learners select and construct connections between information items to be learned. Organization involves active processing and should result in increased performance.
4. Critical thinking refers to the level to which students report they apply previous knowledge to new situations in order to solve problems and reach decisions.
5. Metacognitive self-regulation refers to the awareness, knowledge and control of cognition. This includes planning, monitoring, and regulating activities.
6. The time and study environment variable refers to the degree to which students manage their time and set up a study environment conducive to learning.
7. Effort regulation refers to students' ability to control their effort and attention when faced with distractions and uninteresting tasks.
8. Peer learning refers to the degree to which a student will collaborate with peers.
9. Help seeking refers to a student's tendency to seek assistance from peers, instructors, or colleagues.

Past research studies concluded it is possible to predict student achievement based on student demographics and self-

regulated learning characteristics. Confirming whether these characteristics also predict achievement in online courses could allow educational organizations to advocate instructional design and support services to address students with these demographics.

#### STUDENT DEMOGRAPHICS AND SUCCESS IN ONLINE LEARNING ENVIRONMENTS

Researchers collected demographic and self-regulated learning strategy use data from graduate students enrolled in online courses at a Midwestern university during the spring 2005 and summer 2005 semesters. The MSLQ was administered in an online format. The online survey provided a secure, anonymous method of sharing information. Students initially encountered a letter describing the study, asking for their agreement to be used as human subjects as well as asking for permission to release their final grade in the course. Clicking on the “agree” button indicated students gave their permission. The students were then led to a student demographic sheet where they entered identification information, and student entry characteristic information. The identification information was only used to obtain the students’ final course grades to match specific MSLQ scores with academic performance. Students were also given the opportunity to receive the results and an analysis of their individual scores from the MSLQ. The students completed 76 items about their motivational orientation and use of learning strategies. The instrument was estimated to take approximately 20-30 minutes to complete (Pintrich, et al., 1991).

#### Participant profile

Data on six demographic variables were collected. These variables included age, student enrollment status, work status, GPA, the number of past educational degrees or certifications, and the time since last enrolled course (Table 1). These variables were gathered from 170 graduate students enrolled in online courses during the spring 2005 and summer 2005 semesters.

The majority of the respondents were between the ages of 30 or younger (47.6%). There were more respondents in the 31 to 45 age group (35.9%) than the 46 or older group (16.5%). Most students were enrolled as part-time status (63.1%), while students enrolled full-time made up 36.9% of the respondents. The majority of the respondents worked 30 to more than 40 hours a week for pay (81.7%). Eighty-three percent of respondents had a GPA of 3.6 to 4.0. Most students had attained two past educational degrees (63.3%), and the majority of students had enrolled in a course in the previous semester (72.4%).

Table 1. Demographic information of participants.

Demographic factors	Frequency	% of total	
Age (n = 170)	30 or younger	81	47.6
	31 to 45	61	35.9
	46 or older	28	16.5
Enrollment status (n = 168)	full-time	62	36.9
	part-time	106	63.1
Working status: Hours for pay (n = 169)	0-10 hours	11	6.5
	11-30 hours	20	11.8
	31 to >40 hours	138	81.7
Grade point average (n = 169)	2.1 to 3.0	8	4.7
	3.1 to 3.5	20	11.8
	3.6 to 4.0	141	83.4
Number of past educational degrees (n = 166)	1 degree	20	12.0
	2 degrees	105	63.3
	3 degrees	34	20.5
	4 degrees	7	4.2
Time since last enrolled class (n = 170)	last semester	123	72.4
	1 to 3 years	33	19.4
	4 or more years	14	8.2

#### Student demographics and academic performance

For characteristics involving more than two independent categories, one-way analyses of variance were conducted to compare the variable with academic performance. Independent sample t-tests were used for variables using two categories.

Students’ age did not significantly affect academic performance in online courses,  $F(2, 167) = 1.46, p = 0.235$ . The effect size was small at  $r = 0.13$ . Students enrolled full-time ( $M = 8.15, SE = 0.24$ ) in online courses performed slightly higher than those students enrolled part-time ( $M = 7.98, SE = 0.2$ ); however, this difference was not significant  $t(166) = 0.512, p > 0.05$ . In addition the effect size was small at  $r = 0.04$ . The number of hours worked for pay per week did not significantly affect academic performance in online courses,  $F(2, 166) = 0.465, p = 0.629$  with a small effect size where  $r = 0.08$ . Students’ grade point averages did not significantly affect academic performance in online courses,  $F(2, 166) = 0.291, p = 0.748$  with a small effect

size of  $r = 0.06$ . Academic performance was not significantly affected by the number of educational degrees attained,  $F(3, 162) = 1.69$ ,  $p = 0.171$  with a small effect size of  $r = 0.17$ . Finally, the time since the student was last enrolled in a course did not significantly affect academic performance,  $F(2, 167) = 0.226$ ,  $p = 0.798$ . The effect size was small at  $r = 0.05$ .

### Findings for one-way analysis of variance and t-test

The five one-way analyses of variance and the one t-test comparing the means of student characteristics and academic performance clearly showed that age, student enrollment status, work status, GPA, the number of past educational degrees or certifications, and the time since last enrolled course did not affect academic performance.

The analyses of variance and t-test comparing the means of student characteristics and academic performance showed that age, student enrollment status, work status, GPA, the number of past educational degrees or certifications, and the time since last enrolled course did not affect academic performance. Therefore, according to these data, it is concluded that there is no relationship between student entry characteristics and academic performance for graduate students enrolled in online courses.

### Implications

According to Moore and Kearsley (2005), most distance learning students are adults with past achievements in education and extracurricular concerns such as work status. Although results indicate there are no relationships between student entry characteristics and academic performance for graduate students, it appears that these student entry characteristics did indeed influence academic performance. All subjects were adult learners with past educational degrees. In addition, 81.7% of the subjects worked for pay 30 or more hours per week. The average final course grade for the subjects was equivalent to an A- ( $M = 8.05$ ) and the 83.4% of students had a GPA falling between 3.6 and 4.0.

Although there was low variance in the differences of student entry characteristics and low variance in the final course grades, and thus no significant differences, graduate students had high final course grades. This high academic performance indicates that demographics of graduate students can assist in identifying the profile of a successful online student.

The greatest limitation of this analysis was the focused area of the participants. However, several studies have identified certain student demographics that may be related to success in distance learning courses. Student entry characteristics such as age, extracurricular activities such as work and family status, as well as educational background, have been studied

(Moore & Kearsley, 2005, Guri-Rosenbilt, 1999; Tsay, Morgan, & Quick, 2000).

### STUDENT DEMOGRAPHICS AND SELF-REGULATED LEARNING CHARACTERISTICS

To determine if there was a relationship between student entry characteristics and self-regulated learning characteristics, the data used to determine whether student demographics affected academic performance were examined. These data included the student characteristics age, student enrollment status, work status, GPA, the number of past educational degrees or certifications, and the time since the student was enrolled in a course. Self-regulated learning data were collected using the MSLQ (Table 2). This questionnaire measured students' use of learning strategies including rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning, and help seeking.

One-way analyses of variance and t-tests were used to determine if there was an effect between each student entry characteristic and self-regulated learning characteristics. Forty five one-way analyses of variance were run comparing each student entry characteristic (age, work status, GPA, the number of past educational degrees or certifications, and the time since the student was enrolled in a course) to each self-regulated learning characteristic (rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning, and help seeking). The effect of enrollment status was measured using independent sample t-tests for each self-regulated learning characteristic.

### Findings for one-way analyses of variance and t-tests

Overall, some student entry characteristics were related with self-regulated learning characteristics. The student entry characteristics where differences were found included age, enrollment status, the number of educational degrees attained, the time since the last enrolled class, and GPA. The number of hours worked for pay per week was the only student entry characteristic that did not relate to self-regulated learning characteristics.

The strongest relationships were between age and elaboration, age and critical thinking, and age and metacognitive self-regulation. In each of these pairs, the relationship was significant at the  $p < 0.01$  level and had moderate effect size estimates, where  $r > 0.20$ . The number of educational degrees attained and the time since the last enrolled class appear to have a significant effect on critical thinking. These relationships were significant at  $p < 0.01$  level and had moderate effect size estimates of  $r = 0.27$  and  $r = 0.24$  respectively.

Table 2. Means, standard deviations, sample sizes of the final course grade sorted by age, enrollment status, work status, GPA, number of educational degrees attained, and the time since last enrolled class.

Demographic factors		M	SD	n
Age	30 or younger	8.25	1.62	81
	31 to 45	7.70	2.56	61
	46 or older	8.25	1.43	28
Enrollment status	full-time	8.15	1.90	62
	part-time	7.99	2.07	106
Working status: Hours for pay	0-10 hours	7.64	2.80	11
	11-30 hours	7.80	1.99	20
	31 to >40 hours	8.12	1.93	138
Grade point average	2.1 to 3.0	8.38	1.19	8
	3.1 to 3.5	8.30	1.42	20
	3.6 to 4.0	8.01	2.10	141
Number of past educational degrees	1 degree	8.45	1.39	20
	2 degrees	7.82	2.29	105
	3 degrees	8.56	1.02	34
	4 degrees	7.43	2.23	7
Time since last enrolled class	last semester	8.07	1.98	123
	1 to 3 years	8.12	1.82	33
	4 or more years	7.71	2.55	14

Note: The final course grades were recoded to accommodate for plus and minus scores as well as withdrawals (W). Grades were recoded so that A = 9, A- = 8, B+ = 7, B = 6, B- = 5, C+ = 4, C = 3, D = 2, F = 1, and W = 0.

There were also significant relationships between GPA and metacognitive self-regulation, GPA and time and study environment, and GPA and effort regulation. These relationships were significant at the  $p < 0.01$  level and had moderate effect size estimates of  $r > 0.20$ . Student entry characteristics did not have any significant relationships with rehearsal, organization, peer learning and help seeking.

### Implications

The results from this analysis are more in line with results from past research studies (Moore & Kearsley, 2005, Guri-Rosenbitt,

1999; Tsay, Morgan, & Quick, 2000). Previous research findings indicate older students, with full-time enrollment status, and more educational experience tend to perform better academically (Moore & Kearsley, 1996; Guri-Rosenbitt, 1999; Nesler, 1999). Graduate students, the sample of the current study, tend to be older and have more educational background. These results indicate that most graduate students have high levels of self-regulated learning characteristics, especially in the areas of rehearsal, elaboration, critical thinking, and metacognitive self-regulation.

As these findings are supported by past research, it is safe to conclude that graduate students have high levels of self-regulated learning characteristics. At the same time, as undergraduates were not included in this study, this information needs to be confirmed with a similar study including both graduate and undergraduate students as well as students enrolled in online K-12 programs. In *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*, the United States Department of Education (2009) reported online learning practices may have different levels of effectiveness with K-12 students than with graduate and undergraduate students. Including a variety of groups in a replicated study would allow confirmation of the relationships among student demographics and self-regulated learning characteristics.

### FUTURE TRENDS

In survey results about the future of online teaching and learning, Kim and Bonk (2006) reported participants predicted a growth in online certification and recertification programs as well as some growth in online master's and doctoral programs. Participants also identified factors improving online student success as 1) teaching students to self-regulate their learning, 2) better measures for student readiness, and 3) better learning management systems to track student learning (Kim & Bonk, 2006). Examining student demographics prior to online program enrollment can help predict student success in the online learning environment.

### CONCLUSIONS

Further study analyzing how the entry characteristics of undergraduate students and K-12 students enrolled in online courses and how these characteristics relate to academic performance, is recommended. A study including these two additional populations would allow a comparison of students with greater ranges of entry characteristics to academic performance. Despite the low variance in the differences of student entry characteristics and low variance in the final course grades, graduate students had high final course grades. This high academic performance indicates that entry characteristics of graduate students may assist in identifying

the profile of a successful online student. Further study comparing similar entry characteristics in undergraduate and K-12 online students to academic performance could confirm these findings and encourage the design and development of an instrument used to measure a student's potential to succeed in an online learning environment. It is further suggested that perhaps the final course grade is not an adequate measure for academic performance. Research should be conducted to explore other methods for gauging the degree to which students learn course content.

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