

IRMA 18th Annual Conference

May 19 - 23, 2007

Full Length Paper Submission

Information Technology Education Track

**Examining Instructional Interaction and
Student Persistence in Online Education**

Dr. Steven F. Tello
Assistant Professor
Management
University of Massachusetts Lowell
One University Ave.
Lowell, MA, USA

Steven.Tello@uml.edu

978-934-4240

Examining Instructional Interaction and Student Persistence in Online Education

ABSTRACT

Student dropout from online courses is often identified as a major problem in higher education. This study examines how online classroom communication factors impact a student's decision to persist in or dropout of an online course. A survey research methodology was used to examine the relationship between instructional interaction and student persistence among adult students in online courses. The results indicate that student perceptions regarding the contribution of asynchronous discussion forum use combined with frequent use of asynchronous discussion account for 26% of the variance in course persistence rates.

INTRODUCTION

As institutions of higher education launch or expand online course offerings, it is important to identify strategies and techniques that promote student participation in online courses and programs. One obstacle to student success in online courses is student dropout, a failure of students to complete a course and/or program of study. Research suggests that online courses have significantly higher dropout rates than face-to-face courses (Levy, 2005; Simpson, 2004). While numerous factors contribute to a student's decision to withdraw from an online course (McGivney, 2004; Simpson, 2003; Willging & Johnson, 2004) researchers have identified student satisfaction as one correlate of dropout in online education (Jun, 2005; Levy, 2005). More recently, researchers have identified a clear relationship between faculty interaction and student perceptions of learning and student satisfaction in online courses (Jiang & Ting, 2000; Roblyer & Wiencke, 2004; Swan, et. al., 2000; Shea, et. al., 2001). This research study examined the relationship between instructional interaction, student satisfaction and student persistence in online courses.

Interaction in Online Education

Instructional interaction between student and teacher is a critical aspect of this study. Moore (1989) identifies three types of interaction in distance education: learner-content, learner-instructor and learner-learner. Kearsley (2000) suggests a distinction must be made between immediate (synchronous) interaction and delayed (asynchronous) interaction. This distinction regarding the method of interaction is important since it affects the provision of feedback to the learner, a concept that many have identified as critical to the learning process (Freedman et. al., 2003; Smith and Dillon, 1999). For the purposes of this study, instructional interaction is defined as directed communication regarding course content and topics between the instructor and students or among students in the online course (Kearsley; Wagner, 1994).

A defining characteristic of online education is computer-mediated communication (CMC). CMC provides students and teacher with two-way communication methods based on the electronic transmission of text, images and more recently, audio and video data. CMC uses email, chat, discussion forums and other computer conferencing systems to facilitate communication between students and teachers and among students (Kearsley, 2000; Turoff & Hiltz, 1995). Communication methods that support synchronous interaction (e.g. text-chat, audio-chat, desktop video conferencing) can provide immediate feedback to learners, a feature that may serve to motivate some learners. Technologies that support asynchronous interaction (e.g., email, discussion forums) can provide the learner with more control over where and when the instructional interaction occurs as well as provide the learner with more time to reflect on and respond to course content and communications (Collison, et. al., 2000; Kearsley, 2000; Salmon, 2000).

Relationship between Interaction and Persistence

The importance of interaction between students and teacher in supporting positive learner outcomes among face-to-face undergraduate students is well documented. Numerous studies have found that the frequency and content of formal and informal interaction between instructors and undergraduate students in face-to-face courses are correlated to gains in student achievement (Kuh & Hu, 2001; Pascarella & Terenzini, 1991), student persistence (Pascarella & Terenzini) and degree completion (Tinto, 1987). More recently, a number of researchers examining online college students have found a positive relationship between instructor interaction and perceived student learning (Arbaugh, 2005; Shea et. al., 2001), student satisfaction (Arbaugh; Shea et. al.) and student ratings of online course effectiveness (Hay et. al., 2004).

Student persistence addresses a student's commitment to complete a course and program of study. Persistence is considered a positive outcome measure as compared to dropout, which is the negative equivalent

outcome (Ormond, 2003). Much of the literature on persistence and dropout draws its theoretical framework from the research conducted by Vincent Tinto. Tinto's model of college student dropout suggests that persistence is an outcome of the student's academic and social integration into that institution's community (Tinto, 1987). While Tinto's research was conducted primarily on undergraduate students in residential four-year colleges and universities, later researchers applied a similar theoretical framework to different student groups including undergraduate commuter students (Pascarella & Chapman, 1983), undergraduate students enrolled in correspondence courses (Sweet, 1986), distance learners enrolled in video-based college courses (Towles, et. al., 1993) and online college students (Willging & Johnson, 2004). These studies suggest that Tinto's model of college student dropout provides a framework for understanding the relationship between student-faculty interaction and student persistence in environments beyond those examined by Tinto.

METHOD

Research Questions

A quantitative research study was conducted which examined the relationship between instructional interaction and student persistence in online education. Specifically, this non-experimental, correlational study asked:

1. Is there a relationship between the frequency of instructional interaction and levels of student persistence in online courses?
2. Is there a relationship between the method of instructional interaction and student persistence in online courses?
3. Do other variables emerge as correlates of persistence among students in online courses?

This study utilized a survey research methodology and records review to investigate the relationship between instructional interaction and student persistence in online courses.

Participants

The online learning program that participated in this study is operated by a public university located in New England. Online programs offered by the university include education, engineering, management, information science, liberal arts and health professions at the undergraduate and graduate level. The online program enrolled 7300 students in 375 course sections during the 2004 – 2005 academic year.

The online program uses a course management system (CMS) for the development and teaching of online courses. The CMS allows faculty to develop course materials that are then accessed by students online via a web browser. All faculty teaching in the online program participate in a training program that introduces online pedagogy and instructs faculty in how to use the CMS to develop and teach an online course. The CMS used by the program supports both asynchronous and synchronous communication methods. These methods include synchronous text-based chat, asynchronous text-based discussion forums and asynchronous email lists.

Sample

The population for this study included 1569 undergraduate and 51 graduate students enrolled in 76 online courses offered in the fall semester by the continuing education division of a public university. The unit of analysis for this study was the individual online course. Criteria for selection included:

1. The instructor agreed to allow presentation of survey tool to all students in the course.
2. The instructor agreed to allow researcher to review course communications.

Participating courses included all of the disciplines offered online by the program at the time of the study.

Response Rates

Survey data was collected at an individual student level, response rates were calculated and the percentage of students completing the survey data for each course ultimately determined whether course-level data was included in the study. A total of 714 student online surveys were returned for the 52 courses that met the participation criteria, representing an overall 64.0% response rate. Courses that met the response rate criteria closely reflected the distribution of disciplines in the overall online program and included four graduate and 48 undergraduate courses.

Instrumentation

This study utilized a survey research methodology to collect data regarding instructional interaction in online courses and student attitudes to their online course experience. An online survey was developed to collect data regarding the online course experience of students who maintained enrollment in their online course through the 14-week semester (<http://frontpage.uml.edu/faculty/stello/survey.htm>). This 37-item survey collected data regarding: (a) student demographics and characteristics, (b) the frequency of interaction in each online course, (c) the method of interaction in each online course, (d) student attitudes toward interaction, (e) student attitudes toward the courses, and (f) the contribution of interaction methods to the students' course experience.

During the 3-week survey period, students were presented with the option of completing an online survey for each registered online course. Individual student responses were used to create per course measures for each interaction and attitude variable described below. Students could only submit one online survey per registered online course, preventing repeated measures from skewing per course measures. In order to assure that the student reported interaction measures accurately reflected what occurred in each online course, the dataset was validated against the course interaction archives in 10 (20%) of the courses selected to participate in the study. Student reported data regarding the frequency and method of interaction within courses was found to accurately reflect the course interaction archives.

Independent Variable

The independent variable in this study is instructional interaction. This study examined the frequency of instructional interaction and the method of instructional interaction. Frequency of instructional interaction refers to how often students and instructors, and students and students, interact regarding course related materials. Frequency of instructional interaction was measured by two items on the student survey. One item asked students to report how frequently the course instructor used all course communications methods to interact with the students in the course. A second item asked students to report how frequently students used all course communications methods to interact with other students in their respective courses.

Method of instructional interaction refers to whether the interaction within a course occurred using the discussion forum, email lists, or the online chat tool. For each of the three methods of interaction, a series of items asked students to report the frequency of instructor use, the frequency of student use and the duration of student use. Student responses to these items were used to create three Method of Interaction Indexes, which provided interval level measures of the overall interaction in each course by each method of interaction.

Intervening Variables

Four items on the survey examined student attitudes to: timeliness of instructor feedback, utility of instructor feedback, amount of instructor communication, and amount of student communication. A reliability analysis conducted with these four items resulted in a coefficient alpha of .91, with item to total correlations ranging from .55 to .86, suggesting a high degree of reliability. Student responses to these items were summed at the course level and a mean student Attitude to Interaction value was calculated for each course.

Three items on the survey examined student attitudes toward their overall course experience. These items asked students if the course contributed to their knowledge regarding the subject matter, the course met students' expectations, and they would recommend the course to another student. A reliability analysis conducted with these three items resulted in a coefficient alpha of .89, with item to total correlations between .56 to .92, suggesting a high degree of reliability. Student responses to these three items were summed at the course level and a mean Attitude to Course value was calculated for each course.

A third intervening variable, Course Contribution by Method, examined student attitudes toward the use of each method of interaction. These items examined the strength of student agreement with the following statement, "Overall, would you say (method) contributed to your online learning experience?" Student responses for the three Contribution by Method items were grouped at the course level and descriptive statistics were calculated. An initial review of the distribution of per course responses for each item approximated a normal distribution, supporting the use of these items for correlational analysis.

Dependent Variable

Student persistence, the dependent variable in this study, addresses a student's commitment to complete a course and program of study. A persistence rate was constructed for each course by subtracting the number of

students who administratively withdrew from a course along with students who failed or took an incomplete in the course from the total enrolled in the course at the end of the two-week Add/Drop period. The resulting difference was then divided by the total enrollment, creating the course persistence rate. The per course persistence rate provided a useful measure of what percentage of students completed each online course. The 52 courses which met the response rate criterion for this study had a mean persistence rate of .80 (SD = .11), meaning 80% of the students enrolled in online courses selected to participate in this study completed the course with a passing grade. Persistence rates among courses ranged from a low of 42% to a high of 100%.

DATA ANALYSIS

Research Question I

The first research question asked if there is “a relationship between the frequency of instructional interaction and levels of student persistence in online courses?” A series of scatterplots were conducted between the dependent variable, Course Persistence Rate and each of the frequency of interaction variables (Instructor, Student, Interaction Index). A review of the scatterplots did not indicate a linear relationship between the Course Persistence Rate and any of the three interaction variables.

This research did identify significant differences between how frequently instructors interacted with students and how frequently students interacted with other students within each online course. Per course Frequency of Instructor Interaction scores ranged from 2.12 to 4.00, with a mean score of 3.10 (SD = .41) while per course Frequency of Student Interaction scores ranged from 1.25 to 3.86, with a mean score of 2.59 (SD = .54). A paired samples t-test was conducted using the mean Frequency of Instructor Interaction scores and the mean Frequency of Student Interaction scores for each course. The results of this t-test indicated that per course Frequency of Instructor Interaction scores were significantly greater than per course Frequency of Student Interaction scores, $t(51) = 9.125$, $p = .000$, with a mean difference of 0.51. This finding indicates that overall, instructors used the online communications tools to interact with students more frequently than students used these tools to communicate with other students within each course.

A strong positive correlation was observed between the frequency of instructor-to-student interaction and the frequency of student-to-student interaction within the online courses participating in this study. A Pearson Product Moment Correlation conducted between the course scores for Frequency of Instructor Interaction and Frequency of Student Interaction confirmed a positive correlation between frequency of instructor-to-student and student-to-student interaction, significant at $r_{50} = .68$, $p < .001$. The strength of this correlation suggests that as the frequency of instructor-to-student interaction increases in a course, the frequency of student-to-student interaction also increases.

Research Question II

The second research question asked if “there is a relationship between the method of instructional interaction and student persistence in online courses?” Correlational analysis between the method of instructional interaction and persistence required the creation of three method of interaction indexes. These three indexes, the Chat Method Index, Discussion Method Index, and Email Method Index, reflected the overall interaction on the part of instructors and students within each method of interaction per course. A reliability analysis of the three items composing each index revealed coefficient alphas of .92 for the Chat Method Index, .93 for the Discussion Method Index and .77 for the Email Method Index. Once the three Method of Interaction Indexes were calculated, the distribution of course scores and descriptive statistics were reviewed for each index. Table 1 contains the mean and standard deviation for each of the three indexes.

Table 1
Means and Standard Deviations for Three Method of Interaction Indexes

Index	<u>M</u>	<u>SD</u>
Chat Method Index	8.08	1.66
Discussion Method Index	9.00	2.00
Email Method Index	6.97	1.02

A series of scatterplots were constructed pairing each of the Method of Interaction Indexes to the Course Persistence Rates. An examination of scatterplots comparing persistence with each of the method of interaction indexes did not identify a linear relationship between these variables; however, a review of the mean Method of Interaction scores suggests some differences in how each course used each method of interaction. This difference is explored further below.

Research Question III

Research Question 3 asked if “other variables emerge as correlates of persistence among students in online courses?” The student survey asked respondents to consider how other aspects of interaction contributed to their online course experience. These data, collected at the course level, were used to examine the relationship between persistence and student attitudes to interaction, student attitudes regarding their online course experience, and student perceptions regarding the contribution of a specific interaction method.

Two attitude indexes were created which examined student attitudes to interaction within their online course and to their online course experience. Strong, positive correlations were observed at the course level between Student Attitudes to Interaction and the Frequency of Instructor-to-Student Interaction, $r_{52} = .62$, $p < .001$, the Discussion Method Index, $r_{52} = .55$, $p < .001$ and the Email Method Index, $r_{52} = .43$, $p < .01$. Similar positive correlations were observed at the course level between Student Attitudes to Online Course Experience and the same three variables. These findings suggest a strong, positive relationship between the use of asynchronous methods of interaction by the instructor within a course (i.e., discussion forum, email lists), and positive student attitudes toward that course. A modest, positive correlation was observed between Student Attitudes to Interaction and Course Persistence Rates, $r_{52} = .30$, $p < .05$.

Three course level measures were created to examine students’ perceptions regarding the contribution each method of interaction made to their online learning experience. An initial scatterplot of course scores for each of these three items suggested a positive relationship existed between the discussion contribution item and persistence. A Pearson Product Moment Correlation was conducted to examine the strength of these relationships. A strong positive correlation was observed between Course Persistence Rates and the Contribution by Discussion Method scores, $r_{52} = .41$, $p < .01$.

A multiple regression analysis was conducted to evaluate how well the contribution by method variables and method of interaction indexes predicted persistence. The predictors included the three contribution of method variables and the three method of interaction indexes. The Course Persistence Rate was the criterion variable. A stepwise multiple linear regression analyses was conducted. The Contribution by Discussion Method variable and the Discussion Method Index were significantly related to the Course Persistence Rate, $F(2, 48) = 8.87$, $p = .001$. The sample multiple correlation coefficient was .51, indicating that approximately 26% of the variance in the persistence rate in the sample can be accounted for by the linear combination of these two measures. The remaining Contribution by Method and Method of Interaction variables did not add to the predictive value of the equation.

CONCLUSION

The data suggest that student attitudes to interaction and student perceptions regarding the usefulness of particular methods of interaction offer the only statistical evidence of a relationship to persistence in this study. In regard to student attitudes to interaction, the data indicate that positive student ratings regarding the timeliness of instructor feedback, appropriateness of instructor feedback and amount of course communications increased in courses as the use of asynchronous methods of interaction increased (i.e., discussion forum, email lists). Likewise, as the frequency of instructor-to-student interaction in a course increased, student attitudes to interaction and to the online course experience improved. This positive correlation to student attitudes was not observed in courses where the primary method of instructor interaction was synchronous chat.

Student perceptions regarding the contribution that the use of discussion forums made to their online course experience were strongly correlated to course persistence rates. This was not observed for student perceptions regarding the contribution the use of chat or the use of email lists made to the students’ online course experience.

Given the positive relationship observed between student attitudes to interaction and student persistence; and between student perceptions regarding the use of the discussion forum and student persistence; this study suggests that frequent use of the asynchronous discussion forum by the instructor and students to share course related materials is one factor contributing to student persistence. These findings also reinforce emerging research which identifies a relationship between positive student attitudes toward their online course experience and a student’s decision to persist in, or drop out of the course. While an online instructor cannot necessarily control factors outside of the classroom setting, this study suggests instructional interaction strategies that have a positive impact on persistence within the online classroom.

REFERENCES

- Arbaugh, J. B. (2005). Is there an optimal design for on-line MBA courses? *Academy of Management Learning & Education*, 4 (2), 135-149.
- Collison, G., Elbaum, B., Havind, S., & Tinker, R. (2000). *Facilitating Online Learning: Effective Strategies for Moderators*. Madison, WI: Atwood.
- Freedman, S. C., Tello, S. F., & Lewis, D. (2003). Strategies for Improving Instructor-Student Communication in Online Education in *Virtual Education: Cases in Learning & Teaching Technologies*, Fawzi Albalooshi (ed.). IRM Press: Hershey, PA. 156-168.
- Hay A., Hodgkinson, J., Peltier, W., and Drago, W. A., (2004). Interaction and virtual learning. *Strategic Change*, 13: 194-204.
- Jiang, M. and Ting, E. (2000). A study of factors influencing students; perceived learning in a web-based course environment. *International Journal of Educational Telecommunications*, 6 (4), 317-338.
- Jun, J. (2005). Understanding E-dropout. *International Journal of E-Learning*, 4(2): 229-240.
- Kearsley, G. (2000). *Online Education: Learning And Teaching In Cyberspace*. Belmont, CA: Wadsworth/Thomson Learning.
- Kuh, G. D. & Hu, S. (2001). The Effects of Student-Faculty Interaction in the 1990's. *The Review of Higher Education*, 24(3): 309-332.
- Levy, Y. (2005). Comparing dropouts and persistence in e-learning courses. *Computers & Education*, 48 (2): 185-204.
- McGiveny, V. (2004). Understanding persistence in adult learning. *Open Learning*. 19(1): 33-46.
- Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education* 3(2): 1-6. University Park, PA: Pennsylvania State University.
- Pascarella, E. T. & Chapman, P.W. (1983). A multi-institutional, path analytic validation of Tinto's model of college withdrawal. *American Educational Research Journal*, 20: 87-102.
- Pascarella, E. T. & Terenzini, P.T. (1991). *How College Affects Students: Findings and Insights from Twenty Years of Research*. San Francisco: Jossey-Bass.
- Roblyer, M. D. & Wiencke, W. R. (2004). Exploring the interaction equation: validating a rubric to assess and encourage interaction in distance education. *Journal of Asynchronous Learning Networks*, 8(4): 25-37.
- Salmon, G. (2000). *E-Moderating: The Key to Teaching and Learning Online*. London: Kogan Page.
- Shea P., Frederickson, E., Pickett, A., Pelz, W. and Swan, K. (2001). Measures of learning effectiveness in the SUNY Learning Network. In J. Bourne and J. Moore (eds.) *Elements of Quality online Education, Volume 2*, Needham, MA: Sloan-C Press, 31-54.
- Simpson, O. (2003). *Student Retention in Online, Open and Distance Learning*. London: Kogan Page.
- Simpson, O. (2004). The impact on retention of interventions to support distance learning students, *Open Learning*, 19(1): 79-95.
- Smith, P. & Dillon, C. (1999). Comparing distance learning and classroom learning: conceptual considerations. *The American Journal of Distance Education* 13(2): 6-23.
- Swan, K., Shea, P., Frederickson, E., Pickett, A., Pelz, W. and Maher, G. (2000). Building knowledge building communities: consistency, contact and communication in the virtual classroom. *Journal of Educational Computing Research*, 23 (4), 389-413.
- Sweet, R. (1986). Student drop-out in distance education: an application of Tinto's model. *Distance Education*, 7(2): 201-213.
- Tinto, V. (1987). *Leaving College: Rethinking The Causes And Cures Of Student Attrition*. Chicago: University of Chicago Press.
- Towles, D. E., Ellis, J. R. & Spencer, J. (1993). *Student Persistence in a Distance Education Program: The Effect of Faculty-Initiated Contact*. Lynchburg, VA, EDRS. 2001.
- Turoff, M. & Hiltz, R.S. (1995). Designing and evaluating a virtual classroom. *Journal of Information Technology for Teacher Education* 4(2): 197-215.
- Wagner, E. D. (1994). In support of a functional definition of interaction. *The American Journal of Distance Education* 8(2): 6-28.
- Willing, P. A. & Johnson, S. D. (2004). Factors that influence students' decision to dropout of online courses. *Journal of Asynchronous Learning Networks*, 8(4): 105-118.