USING TECHNOLOGY TO INCREASE STUDENT ENGAGEMENT IN ACADEMIC WORK IN SPECIAL EDUCATION GRADUATE COURSES

By

YAOYING XU*

ABSTRACT

The purpose of this study was to examine the effects of using Tablet PC to increase student engagement in their academic work, especially non-traditional students in the field of special education, through technology in hybrid graduate courses. Student achievements were compared through pre- and post-tests on course content areas, pre- and post-surveys on course goals and objectives as well as open-ended interview questions. Findings from the surveys on feedback types indicated that the majority of students preferred digital feedback using Tablet PC and face-to-face conversation compared with other forms of feedback. Students' engagement level was significantly increased as measured by their participation in online Blackboard discussions. Eighty percent of their postings were related to the feedback on their assignments. This finding suggested that individualized feedback was related to student interactions and engagement. The pre- and post-test scores of the participating classes showed significant difference of student achievements in content area. There was no significant difference between the two classes in terms of achievement. Pre- and post-surveys showed that there was a significant change of students' goals and objectives throughout the period of taking the course. The interview results from the participating students confirmed this change.

Key words: Digital feedback, Engagement, Achievement .

INTRODUCTION

The number of students in the United States who are taking online or distance education courses continues to be increasing every year. According to Sloan Consortium (2006), in the fall of 2005 about 3.2 million students took at least a one online course and this is an 18.2% increase from the 2003-04 school year. Compared to private, non-profit institutions, public colleges and universities are more likely to be offering online courses or online degrees (programs). In many cases for educators it is not a question of whether or not to offer an online course or session, but a question of whether or not to ensure the quality and effectiveness of online learning (Nachmias, 2002; Peled & Rashty, 1999).

In addition to the fully online courses, blended or hybrid courses that consist of both face-to-face and online sessions have become the trend in instructional delivery, particularly at the graduate level that involves students who are full time employees. Consequently, the quality and effects of online courses have been studied in recent years. Some studies have been conducted to examine student learning and achievement in the virtual environment by analyzing students' behaviors online such as the number of online postings and amount of time spent on online reading (e.g., Morris, Finnegan, & Wu, 2005; Nachmias & Segev, 2003; Zaiane & Luo, 2001). Some other studies examined the level of student engagement in technology-supported environment in distance or face-to-face courses (e.g., Blood & Neel, 2008; Järvelä, Veermans, & Leinonen, 2008). Despite the different levels and formats of online or hybrid courses, it seems essential that the quality and effectiveness of online instruction is the key to effective learning.

1. The Role of Instructors in Online Learning

Different from traditional college course delivery which was typically teacher-centered, online instruction emphasizes student-centered learning. Therefore, the role of the instructor in this student-centered learning differs from the traditional role in that the instructor facilitates and supports students in their learning process

instead of directly delivering the information to students. Communication is a two-way interaction between the instructor and students and among students themselves. Students are active participants in the virtual learning environment. This is especially important for online learning in which the instructor usually is not physically present.

Undoubtedly technology plays an important role in this process, yet it is essential that the instructor prepare for interactive activities (e.g., online group discussion forums) that help to promote reflective thinking skills and problem solving skills. Studies have shown that activities that require different cognitive operations and activities with clear purposes could motivate students' engagement experiences (Järvelä et al., 2008). As shown in research, cognitive engagement in academic activities is the key to effective learning (e.g., Helme & Clarke, 2001; Montegomeryu et al., 2004; & Reed et al., 1996, 2002).

2. Student Engagement and Achievement

The term "engagement" has been used by researchers as a construct that involves both cognition and motivation which are interdependent upon each other (Boekarts et al, 2000; Skinner & Belmont, 1993). In the academic field, cognitive engagement has been defined as "deliberate task-specific thinking that a student undertakes while participating in a classroom activity" (Järvelä et al., 2008, p. 302). In other words, it is the thinking process relevant to an activity that is the focus rather than the activity itself that makes the difference and this process involves both cognition (thinking) and motivation (the activity). For example, an activity that is fun and entertaining (motivational) may not engage students cognitively if it does not provoke deliberate thinking related to the activity. Therefore, research should examine both academic activities and academic achievement to determine the effects of student engagement on academic performance. According to goal theory (Ames & Archer, 1988; Pintrich & De Groot, 1990), student engagement could involve two types of goals: learning-focused goals and performance-focused goals. Learning-focused goals are oriented toward learning itself as the end, whereas the performance-focused goals are targeted learning as a means of demonstrating abilities (Ames, 1992; Dweck & Leggett, 1988). Järvelä et al. (2008) further described learning-focused goals as task involvement and performance-focused goals as ego involvement. It is understood that students who are task involved are more likely to take challenges for the tasks through the thinking process (cognition) and students who are ego-involved are more likely to focus on their performance which is more motivational. Since engagement is a multidimensional construct, it is important for researchers and instructors to examine both the cognitive and motivational components of the learning process.

3. The Use of Technology

Technology has been introduced into face-to-face classrooms and distance learning in the past several decades to increase students' cognitive engagement in academic activities. For example, interactive engagement has been developed with student response system (SRS) with the purpose to increase students' learning and achievement through interactive process during lecture time (e.g., Draper & Brown, 2004; Lopez-Herrejon & Schulman, 2004; Smialek & Boburka, 2006). In this process, student response and instructor feedback occur at the same time during the lecture instruction. The SRS was reported more effective in increasing class engagement and content achievements than the traditional lecture delivery (Blood & Neel, 2008).

Findings from research on distance education also suggested the critical importance of the quality of feedback on student engagement and achievement. For example, a recent study by Wallace, Grinnell, Carey, and Carey (2006) suggested that many students prefer personalized, specific, and helpful feedback in distance education courses. With more and more students taking university courses via distance education, hybrid courses, off course, the traditional on-campus instruction that involves typical face-to-face interaction and feedback are no longer the major option in many cases. On the one hand, students choose to take an online or hybrid course for its flexibility, on the other hand, they still prefer "human touch" feedback even from the distance (Steinweg,

Williams, & Warren, 2006). This need has created challenges for university instructors when developing and delivering an online or hybrid course. Assisted with technology such as Blackboard, D2L, or regular e-mails, written communication feedback has become the main form for almost all interactions between an instructor and students (Gray, 2002). However, in order to help students to maintain interest and to be successful with course content, high quality feedback is needed (Klinger & Connet, 1992). Quality feedback needs to be efficient (timely), effective (helpful), and individualized (personal). With less and less real paper-pencil and face-to-face communication, some students have reported that feedback has become mechanical and impersonal (Jennings & McCuller, 2004).

Despite the fact that online or hybrid courses have the risk for reduced meaningful feedback, the need for developing hybrid or 100% online courses is urgent. In the past three decades, teacher shortage in special education has been the challenge for teacher educators. The pass of federal law *No Child Left Behind* in 2001 and the new authorization of *Individuals of Disabilities Education Act* in 2004 have added more to this challenge because of the legal requirement for highly qualified teachers. As a result, like most other states, the state of Virginia has been offering provisional special education license that has put many special education students into full time employment, under a provisional condition - remain as full or part time students and full time teachers at the same time. While most graduate courses have been offered in the evenings to accommodate this need of students who are school teachers, there are some course sessions that students will have to miss as classroom teachers, such as parent conference, open house, staff training or workshops. Therefore, hybrid courses seem to be the most appropriate delivery format for most of the special education courses.

4. The Purpose of the Current Study

The goal of this project was to increase students' engagement in their academic work, especially non-traditional students in the field of special education, through technology in hybrid graduate courses. Specific objectives included: (a) to develop an effective, efficient, and individualized interaction model with students by using a tablet PC as one of the ways to provide feedback for students' assignments and projects, (b) to develop and implement a survey on examining students' perceptions on various formats of feedback including handwritten, electronic feedback by a tablet PC, and (c) to examine students' engagement level and achievements of two hybrid classes through pre- and post-tests. Specifically, three research questions were developed:

(1) What types of feedback do students prefer during online sessions?

(2) What are the effects of providing digital feedback on students' engagement in participating online discussions?

(3) Is increased student engagement associated with their improved achievement in content areas?

5. Method

5.1 Participants

Forty students from two classes in special education were the participants of this study. Class 1 consisted of 16 students and class 2 had 24 students (Table 1). The demographics of the two classes were similar in terms of age, gender, ethnicity, and teaching background. In Class 1, 88% (14) were female, 75% (12) were between ages 30 to 49; 69% (11) were Caucasian, and 63% (10) had less than one year teaching experience. In Class 2,

		Class 1	Class 2
Age			
	20-29	2	3
	30-39	6	8
	40-49	6	10
	50 and above	2	3
Gender			
	Female	14	17
	Male	2	7
Ethnicity			
	African American	5	5
	Caucasian	11	17
	Asian	0	1
	Hispanic	0	1
Teaching experience			
	0-1 year	10	12
	2-3 years	4	9
	4 years and above	2	3

Table 1. Participants' Demographic Information

71% (17) were female, 75% (18) were between ages 30 to 49, 71% (17) were Caucasian, and 50% (12) had less than one year teaching experience. Fifty-three percent (21) students from the two classes were taking the course for obtaining a provisional license in special education. The rest (19) students were taking the course to meet the Master of Education degree requirement as well as licensure requirement in special education. The majority (38) of the two classes were part time students and full or part time employees.

5.2 Settings

Two sections of a graduate special education course offered by a major state university addressing trends, issues, and special education law were selected as the classroom setting for this study. One setting was off campus without internet access during lecture time and the other was on campus with internet access during lecture time. PowerPoint presentation was used for both classes during face-to-face sessions and online sessions. This course was one of the most enrolled courses because it was the only course required for students to take before they obtain a provisional special education license and it was also a required course for the Master of Education degree in high incidence disabilities and early childhood special education. One section was offered during a spring semester and one was offered during a summer term. The spring course was a hybrid off campus class using Tablet PC to provide feedback to students throughout the semester. The summer course was also a hybrid course using Table PC as part of feedback delivery, but it was offered on campus with a total of three weeks.

5.3 Materials

A Tablet PC (Lifebook T Series), the Adobe Professional software, and the Microsoft Office 2007 software were applied in this study. Combing these technologies, the instructor (researcher) provided variety of feedbacks for student assignments and for after-class research projects during the spring semester and summer term. Data on students' engagement, academic achievement, and perceptions on feedback were collected from both the spring course and summer course.

5.4 Measures

Four types of measures were conducted in this research. The first measure was the pre-and post-survey that included students' demographic information, their goals and objectives for taking the class, and their preferences for receiving instructor's feedback. The second measure was the pre- and post-test on the subject area of the course which included 20 multiple choice questions to examine learner outcomes from taking the course. The third measure was students' number of hits and postings on the online course discussion forums to examine students' online engagement behavior, by participating in feedback related online discussions. The last measure was a semi-structured interview examining students' perceptions of using technology, receiving feedback, in and out of class engagement and achievement.

5.5 Procedures

Tablet PC was incorporated into both participating classes for in and out of class activities. Using the Tablet PC, MS Word 2007 software, and Adobe Professional software the instructor created digital handwritten feedback directly on students' papers that were submitted to the Blackboard Assignment Folder and students' reflections that were submitted to the Exchange Files under Group Pages. Then the instructor converted those files to PDF documents so students could download and save them inorder to avoid keeping piles of hard copies. Surveys on different types of feedback formats were developed and distributed to students during spring semester and summer term on measuring students' perceptions and satisfactions. Six types of feedback were asked to students: numerical on work, types on document, handwritten on document, digital hand-written using Tablet-PC on document, e-mails, and face-to-face conversation. A 5-Likert scale was used to gather information from this survey with 1 as the least favorable and 5 as the most favorable.

Student engagement was measured by number of "hits" and number of postings on class wide and small group discussion boards via the Blackboard Course homepage. These questions were specifically related to the feedbacks provided from the instructor on course

assignments regarding legal aspects in special education and characteristics of disabilities with the purpose to examine the impact of feedback on students' engagement and behavior during online sessions. Therefore, discussion questions that were required and counted toward the course grade were not included for data analysis. Student achievements were compared through pre- and post-surveys on course goals and objectives, pre- and post-tests on content areas, as well as open-ended interview questions.

5.6 Data Analysis

Descriptive data were conducted to analyze students' preferences of feedback and their engagement behavior during online sessions. T tests were applied to compare students' engagement levels between feedback-related questions and general topical questions. Correlations were conducted to determine the relationship between students' engagement and achievement in content areas.

6. Results

6.1 Perceptions on Feedback

Findings from the surveys on both the spring and summer courses indicated that the majority of students (37 out of 40) preferred digital feedback using Tablet PC and face-to-face conversation (36 out of 40) compared with other forms of feedback. The least preferred feedback was numerical on work, followed by e-mails. Although there was no significant difference of preference between face-to-face conversation and digital Tablet PC feedback, when students were asked to choose between these two, most of the students chose Tablet PC feedback because of its flexibility and timeliness. Table 2 shows students' perceptions of feedback types.

6.2 Students' Engagement

Students' engagement in this study was operationally defined as the number of hits in discussion forums (Table 3) and number of postings (Table 4) in each discussion question. Five discussion questions were posted under the Blackboard Discussion Forum. All these five questions were not part of the required assignments that would be counted toward the final grade. Instead, these were additional questions specifically designed to measure students' engagement during online sessions. Discussion 1 was a general question related to a lecture topic during face-to-face sessions. Discussions 2 through 5 were developed based on instructors' feedback on students' written assignments. Before responding to each discussion (2 to 5), students were assumed to have received and reviewed instructors' feedback using the Tablet PC digital handwriting on their electronic papers. Paired T-test was conducted to compare students' engagement level between Discussion 1 (not related to instructor's feedback) and Discussions 2 to 5 (related instructor's feedback). Results from the paired T-test indicated significant difference between Discussion 1 and Discussions 2 to 5 in both number of hits and number of postings (Tables 5 and 6).

6.3 Students' Achievement

Five overall goals/objectives were included in the pre- and post-survey, in addition to other specific goals/objectives that were not addressed here. In general, the goals and objectives that were identified

Types of Feedback	Preferences
Digital feedback	93% (37)
Face-to-face conversation	90% (36)
Handwritten on document	75% (30)
Types on document	60% (24)
Emails	60% (24)
Numerical on work	38% (15)

Table 2. Students' preferred feedback

Discussion Question	*Means of Hits	SD
Discussion 1	3.22	2.08
Discussion 2	15.68	5.74
Discussion 3	14.40	3.91
Discussion 4	13.40	5.11
Discussion 5	14.03	5.14

*N=40

Table 3. Mean of Hits on Blackboard Discussion Forum

Discussion Question	*Means of Postings	SD
Discussion 1	1.53	1.54
Discussion 2	4.65	2.11
Discussion 3	5.15	1.92
Discussion 4	5.68	1.89
Discussion 5	6.23	2.11

*N=40

Table 4. Mean of Postings on Blackboard Discussion Forum

Pairs	T-test	DF	P
Discussion 2 vs. 1	10.34	39	.00
Discussion 3 vs. 1	12.22	39	.00
Discussion 4 vs. 1	13.61	39	.00
Discussion 5 vs. 1	14.06	39	.00

N=40

Table 5. Paired T-test on Discussion Forum Hits

Pairs	T-test	DF	P
Discussion 2 vs. 1	10.60	39	.00
Discussion 3 vs. 1	9.99	39	.00
Discussion 4 vs. 1	8.58	39	.00
Discussion 5 vs. 1	9.17	39	.00

N=40

Table 6. Paired T-test on Discussion Forum Postings

during pre-survey were more on meeting their immediate needs, for example, goal 5: to prepare for a provisional licensure; and goal 3: to meet the program requirement. The goals and objectives on self-regulated knowledge and learning skills that had a long-term impact on the career received more attention in the post-survey. For example, goal 1: to learn skills in inclusive settings; goal 2: to be more aware of special education law and regulations; and goal 4: to broaden knowledge in special education and to meet students' educational needs. Figure 1 shows the goal comparisons between pre- and post-survey.

Students' achievement in content areas was examined by comparing the pre-test and post-test scores (Table 7). Significant difference was found between the post-test and pre-test on the same questions, but in different sequence between and within questions.

Correlations between students' participation in non-required online discussions and students' post-test scores were conducted to examine the relationship between students' engagement and achievement. Significant correlations were found between post-test scores and number of hits for discussions 2 to 5 and between post-test scores and number of postings for all discussions 1 through 5 (Tables 8 and 9).

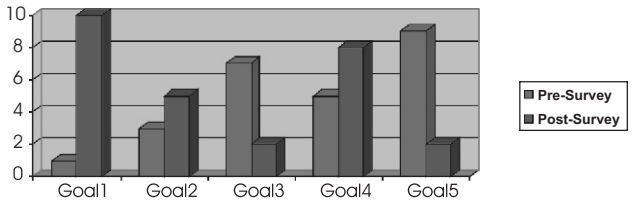

Figure 1. Goals/Objectives on Pre- and Post-Survey

Test	*Mean	SD	T-test	DF	P
Pre-test	25.13	11.30			
Post-test	89.88	8.05			
Post-test vs. Pre-test	64.75	10.19	40.20	39	.00

*N=40

Table 7. Pre- and Post-Tests in Subject Areas

7. Discussion

With the rapid growth of distance education or online courses on university campuses throughout the world, taking an online or hybrid course has become the norm for many college students. Most studies in the past few decades on distance learning have demonstrated that different instructional delivery formats are not predictive of learning effectiveness (Wallace et al., 2006). The key to distance learning effectiveness is the quality of instruction that involves evidence-based instructional strategies (e.g., Dick, Carey, & Carey, 2005) and effective feedback provided to students (Gagné, 1985). Traditional feedback typically involves face-to-face communication during lecture time (immediate) or handwritten comments on students' written assignments (personal). In an online course or distance education class, however, the format of feedback has to be changed, but the quality of feedback is still critical for effective learning. With the advances of technology, providing effective, efficient, and individualized feedback is not only possible, but also applicable. The tablet PC is a tool that has the potential for developing effective, efficient, and individualized feedback with its multiple functions. With a tablet ink PC, comments can be marked directly in the text. Reading

	Dis. 1	Dis. 2	Dis. 3	Dis. 4	Dis. 5
Post-Test	.19	.57**	.80**	.65**	.68**

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

Table 8. Correlations between Post-Test and Number of Hits

	Dis. 1	Dis. 2	Dis. 3	Dis. 4	Dis. 5
Post-Test	.39*	.45**	.68**	.68**	.77**

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

Table 9. Correlations between Post-Test and Number of Postings

with a tablet PC with a pen in hand makes it more likely to focus both on the content as well as the structure (Foster, 2005). In addition, inserting comments using a pen-based computer helps to bring in a more human touch (Gray, 2002). Hand-written electronic feedback can be provided on assignments through the use of a tablet PC. This enables the instructor to write with digital ink on student document files and return them to students as email attachments or via the Blackboard communication. With current tablet PC technology, it is possible to write digitally directly on a MS Word document and be viewed by anyone using MS Word. If students do not have MS Word, a PDF file with feedback can be provided.

The ease of doing this with a tablet PC has reduced the amount of instructor's time required to provide precise feedback. This technology also enables instructors to provide more detailed feedback on papers submitted via emails or to the Blackboard. Because it is evident that a person has read their paper and actually written comments on it, students may feel more connected and personally interacted with the instructor. The survey findings from Steinweg and colleagues (2006) have indicated that both students and instructors are satisfied with digital ink of a tablet PC because of its efficiency as well as the "human touch" that many online communications do not provide. The finding from this study on students' perceptions on feedback further supports previous findings on digital feedback using a tablet PC (Table 2). The potential benefit of using a technology such as tablet PC is significant for both instructors and students. With more and more non-traditional students taking an online or hybrid course to meet licensure or program requirement, the quality of feedback is the key to students' engagement in academic activities.

Findings from the current study also indicate that students' engagement level was significantly increased as measured by their online participation in Blackboard discussions (in number of hits and number of postings). For the purpose of identifying students' motivational engagement during online sessions, those discussions used for data analysis did not include students' responses to required discussion questions that were counted toward their final grades. Except for Discussion 1, all the other 4 discussions were related to the instructor's feedback on students' papers and reflections. The results show that students' number of hits and number of postings were significantly increased with the feedback-related discussions. This finding suggests that individualized or personal feedback was related to student interactions and engagement. The paired T-test between discussion 1 and other feedback-related discussions further indicates significant difference between these two types of discussions in both number of hits and number of postings (Tables 5 & 6).

Significant difference was found between students' pre- and post-test scores in target subject areas for both classes. There was no significant difference between the two classes in terms of achievement, indicating that the two classes achieved similarly in terms of target content areas. Pre- and post-surveys showed that there was a significant change of students' goals and objectives throughout the period of taking the course, for both classes. This change reflects a trend: Students changed their goals/objectives from immediate needs such as meeting program requirement or licensure condition to long term goals towards their career development such as learning knowledge and skills to meet students' educational needs. This finding is meaningful in at least two ways. First, it provides valuable information for instructors in preparing this or similar course to meet students' short term objectives and long term goals, through in and out of class activities. Second, it helps to motivate students to engage in not only academic tasks and but also promote their professional development. The interview questions confirmed this change. For example, one student stated, "I took this class because it was required for my provisional license. But now I think I understand better about inclusion and special education law and I want to know more in this area."

It was expected that students' engagement would be associated with their academic achievement, as supported from previous studies (e.g., Blood & Neel,

2008; Morris et al., 2005). The correlations between post-test and students' discussions were statistically significant with all feedback-related discussions. This finding suggests that the more active students were in participating in online discussions, the better they achieved in the content area. This result supports previous studies that it was the quality of instructional strategies rather than the format of instruction that contributes to the effectiveness of learning (e.g., Wallace et al., 2006).

Conclusion and Future Direction

The current project examined two classes using hybrid and Tablet PC as part of instructional strategies. Because of the continuous growth of distance education in various formats, future studies can compare classes that are delivered via 100% online, hybrid, and face-to-face across courses and instructors. Further research can be conducted to examine instructional strategies for effective learning by incorporating technology in all levels of university courses in different content areas.

References

[1]. **Ames, C. (1992).** Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261-271.

[2]. **Ames, C., & Archer, J. (1988).** Achievement goals in the classroom: Goals, structures, and student motivation. *Journal of Educational Psychology, 80*, 260-267.

[3]. **Blood, E., & Neel, R. (2008).** Using student response systems in lecture-based instruction: Does it change student engagement and learning? *Journal of Technology and Teacher Education, 16*(3), 375-383.

[4]. **Boekarts, M., Pintrich, P. R., & Zeidner, M. (Eds.) (2000).** *Handbook of self-regulation*. San Diego, CA: Academic Press.

[5]. **Dick, W., Carey, L. M., & Carey, J. O. (2005).** The systematic design of instruction. (6th Ed.) *New Research,* 53(4), 445-459.

[6]. **Draper, S. W., & Brown, M. I. (2004).** Increasing interactivity in lectures using an electronic voting system. *Journal of Computer Assisted Learning, 20*(2), 81-94.

[7]. **Dweck, C. S., & Leggett, E. L. (1988).** A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256-273.

[8]. **Foster, A. L. (2005, June 24).** Mark essays electronically: A professor uses tablet PC's in a composition course. *The Chronicle of Higher Education*, p. B18.

[9]. **Gagné, R. M. (1985).** *Conditions of learning*. (4th Ed.) New York: Holt, Rinehart, and Winston.

[10]. **Gray, R. (2002).** Assessing students' written projects. *New Directions for Teaching and Learning, 91*, 37-42.

[11]. **Helme, S., & Clarke, D. J. (2001).** Cognitive engagement in the mathematics classroom. In D. Clarke (Ed.), *Perspectives on practice and meaning in mathematics and science classrooms* (pp. 131-154). Dordrecht: Kluwer.

[12]. **Järvelä, S., Veermans, M., & Leinonen, P. (2008).** Investigating student engagement in computer-supported inquiry: A process-oriented analysis. *Social Psychology of Education, 11*(3), 299-322.

[13]. **Jennings, S. E., & McCuller, M. Z. (2004).** *Meeting the challenges of grading online business communication assignments*. Paper presented at the 69th Annual Convention: Association for Business Communication, Cambridge, Massachusetts. Retrieved July 24, 2008, from http://www.businesscommunication.org/conventions/Proceedings/2004/PDFs/02ABC04.PDF

[14]. **Klinger, T., & Connet, E. (1992).** Designing distance learning courses for critical thinking. *T.H.E. Journal, 20*(3).

[15]. **Lopez-Herrejon, R., & Schulman, M. (2004).** Using interactive technology in a short java course: An experience report. *ACM SIGCSE Bulletin, Proceedings of the 9th Annual SIGCSE Conference on Innovation and Technology in Computer Science Education*, (pp. 203-207), Leeds, UK.

[16]. **Montgomery, H., Sharafi, P., & Heman, L. (2004).** Engaging in activities involving information technology: Dimensions, modes, and flow. *Human Factors, 46*, 334-348.

[17]. **Morris, L. V., Finnegan, C., & Wu, S. (2005).** Tracking student behavior, persistence, and achievement in

online courses. *Internet and Higher Education, 8*, 221-231.

[18]. Nachmias, R. (2002). Research framework for the study of a campus-wide web-based academic instruction project. *Internet and Higher Education, 5*, 213-229.

[19]. Nachmias, R., & Segev, L. (2003). Students' use of content in Web-supported academic courses. *Internet and Higher Education, 6*, 145-157.

[20]. Peled, A., & Rashty, D. (1999). Logging for success: Advancing the use of WWW logs to improve computer mediated distance learning. *Journal of Educational Computing Research, 21*, 413-431.

[21]. Pintrich, P., & De Groot, E. (1990). Motivated and self-regulated learning components of academic performance. *Journal of Educational Psychology, 82*, 33-40.

[22]. Reed, J. L., Hagen, A. S., Wicker, F. W., & Schallert, D. L. (1996). Engagement as a temporal dynamic: Affective factors in studying for exams. *Journal of Educational Psychology, 88*(1), 101-109.

[23]. Reed, J. H., Schallert, D. L., & Deithloff, J. F. (2002). Investigating self-regulation and engagement processes. *Educational Psychologist, 37*(1), 53-57.

[24]. Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85*, 571-581.

[25]. Sloan Consortium (2006). *Making the grade: Online education in the United States, 2006*.

[26]. Smialek, T., & Boburka, R. R. (2006). The effects of co-operative listening exercises on the critical listening skills of college music-appreciation students. *Journal of Research in Music Education, 54*(1), 57-72.

[27]. Steinweg, S. B., Williams, S. C., Warren, S. H. (2006). Reaching through the screen: Using a tablet PC to provide feedback in online classes. *Rural Special Education Quarterly, 25*(2), 8-12.

[28]. Wallace, T., Grinnell, L., Carey, L., & Carey, J. (2006). Maximizing learning from rehearsal activity in web-based distance learning. *Journal of Interactive Learning Research, 17*(3), 319-327.

[29]. Zaiane, O. R., Luo, J. (2001). *Towards evaluating learners' behavior in a web-based distance learning environment*. Available online at http://www.cs.ualberta .ca/~zaiane/postscript/icalt.p.

ABOUT THE AUTHOR

** Associate Professor, Early Childhood Special Education, Virginia Commonwealth University.*

Dr. Yaoying Xu is an Associate Professor in Early Childhood Special Education at Virginia Commonwealth University. She is a strong advocate for inclusion and family involvement. Her research has been centered on social aspects of children with culturally and linguistically diverse backgrounds. Her specific research interests involve culturally appropriate learning contexts for young English language learners, impact of social interactions of young children on their school performance, empowering culturally diverse families of young children with disabilities, and linking assessment and intervention for infants and young children who are at risk for disabilities/delays. She has numerous articles published by peer-reviewed journals in areas of early child education and development, special education, community education, and language development and instruction. She can be reached at yxu2@vcu.edu.