

Online IS Education for the 21st Century

Wu He

Department of Information Technology & Decision Sciences
Strome College of Business
Old Dominion University
Norfolk, VA 23529, USA
whe@odu.edu

Guandong Xu

Advanced Analytics Institute
Faculty of Engineering & IT
University of Technology
Sydney, Australia
Guandong.Xu@uts.edu.au

S. E. Kruck

Computer Information Systems Department
College of Business
James Madison University
Harrisonburg, VA 22807, USA
kruckse@jmu.edu

ABSTRACT

Online teaching and learning have become increasingly common in higher educational institutions. These higher educational institutions realize the growing importance of online learning in information systems/information technology (IS/IT) education and are now offering online IS/IT courses and programs to students. However, designing, developing, teaching, and assessing an online IS/IT course effectively is often a challenge. Many IS/IT instructors are new to online teaching and need orientation and training for their own readiness in designing, developing, teaching, and assessing IS/IT courses in the online environment. It is recognized that effective faculty are key to student success in online courses and to the success of online programs (Meyer and Jones, 2012). Therefore, it is imperative that administrators and instructors of IS/IT courses and programs learn more of the best practices of online teaching for high student success. This support to instructors and administrators is the purpose of the Special Issue of the Journal of Information Systems Education.

Keywords: Online education, Distance learning, Web-based learning, Learning Management System (LMS)

1. INTRODUCTION

Online learning has become an important way to deliver courses in higher education. According to a recent SLOAN-C annual report (Allen and Seaman, 2013), over 6.7 million students were taking at least one online course and 32% of current higher education students have taken at least one course online. Furthermore, over 69% of higher education institutions now say that online learning is a critical part of their long-term strategy (Allen and Seaman, 2013).

In the area of information systems, more and more information systems (IS), information technology (IT), and Management Information Systems (MIS) (collectively referred to as IS/IT) programs in the world are offering online courses to their students. About 14 year ago only 2 online programs existed that did not have a campus attendance requirement. At that time email was the primary communication method that was supplemented with web sites, electronic bulletin boards, web boards, listservs, and chat rooms. (Reif and Kruck, 2010). A current internet search indicates that many universities (such as Washington State

University and Oklahoma State University) are offering their IS/IT programs completely through online formats. These online programs offer IS/IT students the opportunity to earn degrees without having to come to the physical university campus location (Chong, et al., 2012; He and Yen, 2014).

As online learning becomes more prevalent and higher educational institutions continue to expand their online programs, more and more educators and organizations have become concerned with the quality of online courses (Abdous, 2010; Rovai and Downey, 2010; Yang, 2010). In 2007, the AACSB (Association to Advance Collegiate Schools of Business) had recognized the growing importance of distance learning, in particular online courses and programs in business schools and had formed a task force to develop guidelines. Currently, one of the items they look closely at during their accreditation visit is if the school has adequate financial resources to provide technology support for students and faculty appropriate to its online programs (AACSB, 2013).

Designing, developing, teaching, and assessing an online IS/IT course effectively is often a challenge. Many IS/IT instructors are new to online teaching and need orientation and training for their own readiness in designing, developing, teaching, and assessing IS/IT courses. It is recognized that effective faculty are key to student success in online courses and to the success of online programs (Meyer and Jones, 2012). Therefore, it is imperative that instructors and administrators in schools of information systems learn more of the best practices and issues of designing, developing, teaching, and assessing online IS courses and programs.

2. ONLINE COURSES VS. FACE-TO-FACE COURSES

As more and more administrators and instructors are interested in developing and delivering online courses or programs, the awareness of the quality of online learning is getting more and more important. There are substantial concerns with the quality of online education compared with face-to-face classes (Abdous, 2010; Rovai and Downey, 2010; Yang, 2010).

Jahng, Krug and Zhang (2007) conducted a meta-analysis of student achievement comparison-related research and did not find any significant difference between online courses and face-to-face courses in terms of student achievement. Larson and Sung (2009) assessed the effect of three delivery methods (i.e., face-to-face, blended, and online) on student grades in an introductory MIS course taught by the same instructor. They found that student grades were not significantly different across the three delivery modes. Carrol and Burke (2010) compared the final exam and course evaluations of two sections of an MBA course: an online section and a face-to-face section. They only found trivial differences in the final exam scores and student course evaluations. They concluded that neither delivery method was more effective than the other with regard to students' achievement or their perceptions of course effectiveness.

On the other hand, Means, Toyama, Murphy, Bakia, and Jones (2009) examined the comparative research on online-versus-traditional classroom teaching from 1996 to 2008 and found that "on average, students in online learning conditions performed better than those receiving face-to-face instruction."

Dutton, Dutton, and Perry (2002) compared two large sections of a computer programming course and found that online students differed from lecture students in a number of important characteristics. In particular, they found that online students earned significantly higher exam grades than lecture students. In intro to Java program courses, Settle and Settle (2007) found distance-learning students were less satisfied than either traditional students or their peers in live sibling sections based on the course evaluation.

Naaj, Nachouki, and Ankit (2012) conducted a survey to understand students' satisfaction with blended learning courses that use two delivery methods (i.e., face-to-face and videoconference). They found that students preferred face-to-face courses even though they were satisfied with their grades and performance in blended learning courses. Swan (2001) found that distance-learning students would rate the course poorly if excellent course organization did not compensate for a lack of interaction.

The above literature review reveals that existing published research on the effectiveness of different delivery methods used in the same course is sometimes contradictory in its conclusions.

3. ONLINE INTERACTION

Social interactions in class mainly include student-instructor interaction and student-student interaction (Moore, 1989). The student-student interaction is also called peer interaction, which refers to the interaction between one student and another individual student or group of students (Zha and Ottendorfer, 2011). It is generally recognized that social interactions make positive contributions to students' learning (Tu and McIsaac, 2002; Zha et al., 2006; Zha and Ottendorfer, 2011). Collaborative learning theory stresses that students can broaden their knowledge base through interactions with other learners (Roberts, 2004; Macfadyen and Dawson, 2010). Many studies in the area of online learning found that social interaction is important in online learning environments. For example, Shea, Fredericksen, Pickett, Pelz, and Swan (2001) found that the quality and quantity of interactions are important to students' satisfaction in online courses. Hrastinski (2009) proposes a theory of online learning as online participation and suggests that "*online learner participation is a complex process of taking part and maintaining relations with others, is supported by physical and psychological tools, is not synonymous with talking or writing, and is supported by all kinds of engaging activities*".

On the other hand, there is a growing body of research showing that online participation alone is not sufficient to achieve deep and meaningful learning. Garrison, Anderson and Archer (2000) propose the well-known Community of Inquiry (CoI) framework which views the online learning experience as a function of three elements: social presence, teaching presence, and cognitive presence. According to Garrison and Arbaugh (2007) and Swan, Shea, Richardson, Ice, Garrison, Cleveland-Innes, and Arbaugh (2008), *Social presence refers to the degree to which learners feel socially and emotionally connected with others in an online environment; teaching presence is defined as the design, facilitation, and direction of cognitive and social processes for the realization of personally meaningful and educationally*

worthwhile learning outcomes; and cognitive presence describes the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse.

Studies show that social presence is an important factor in improving instructional effectiveness and building a sense of community (Tu and McIsaac, 2002). Furthermore, studies found that teaching presence in the form of facilitation is also crucial to the success of online learning and thus suggest that instructors play a leadership role in triggering discussion and facilitating higher levels of thinking and knowledge construction (Garrison, and Cleveland-Innes, 2005). Furthermore, Wu and Hiltz (2004) suggest that online teachers need to structure the interaction and give students more guidance and devote sufficient time to ensure that students can reach a high level of critical thinking and knowledge construction. Garrison, Anderson, and Archer (2001) suggest that cognitive presence can be created and supported in online environments with appropriate teaching and social presence.

4. ABOUT ONLINE STUDENT RETENTION

With the exponential growth of online courses in higher education, retention is an area of great concern. Online student retention has been suggested as one of the greatest challenges in online education (Herbert, 2006; Heyman, 2010). The attrition rates for online courses are frequently higher than for their campus-based counterparts (Bos and Shami, 2006; Heyman, 2010). Studies show that the dropout rate for online courses is 10 to 20% higher than for courses in traditional classroom environments (Frankola, 2001; Patterson and McFadden, 2009). Thus, it is imperative for higher educational institutions to develop practices and interventions that can contribute to student retention in online courses and programs (Pullan, 2011).

One of the approaches is to harness the predictive power of most Learning Management System (LMS). Using data to develop an early warning system and tools that identify at-risk students and allow for more timely pedagogical interventions to improving student retention is important (Macfadyen and Dawson, 2010). An effective early warning system could provide formative grade feedback to online students and could help online programs take proactive steps to intervene before a student drops out or falls behind in the course. By improving the retention of online at-risk students, educational institutions can bolster student satisfaction, increase student success, and raise graduation rates.

As higher education institutions scale up their student data systems, all interaction are recorded and can be mined during and after the course. During the online instruction, students can choose to interact with course materials, and with instructors or other students via multiple communication channels. All related information (including every click, post, response, and login) are tracked and are stored in back-end database systems and server logs. The stored data offers a great opportunity for data mining. The literature shows that, in general, students' performance is highly related to their engagement level in any given course (Hung and Crooks, 2009; He, 2013). Macfadyen and Dawson (2010) found that students' participation and contribution to discussion boards in the LMS remain some of the strongest predictors for online

students' success. In a case study conducted by He (2013), there was a strong correlation between the number of online questions students asked and students' final grades in two online upper-level undergraduate technology courses. Herbert (2006) found that both students' engagement and student's personal variables (e.g., demographics, prior academic records) are important predictors of their completion of online courses.

5. SPECIAL ISSUE OVERVIEW

This special issue "Online IS Education for the 21st Century" contains five interesting papers. The first article, "Anchoring for Self-Efficacy and Success: An Anchored Asynchronous Online Discussion Case" by Nimer Alrushiedat and Lorne Olfman, employed two forms of online discussions: 1) standard online discussions that tend to have long threads, and 2) anchored asynchronous online discussions that the student were required to create reference points between parts of a document and comments in the discussion space to prevent drifting from the context, thereby creating a focus. They found that anchored asynchronous online discussions were more likely to help increase students' self-efficacy than standard online discussions. Plus, the students that participated in the anchored asynchronous online discussions scored statistically significant higher on exam.

The second article, "Game-Based Experiential Learning in Online Management Information Systems Classes Using Intel's IT Manager 3" by Michael Bliemel and Hossam Ali-Hassan, used Intel's flash-based game "IT Manager 3: Unseen Forces." They used this experiential learning tool in online management information systems class and found that this experience was useful for students to reflect upon and apply several IT management theories. Their paper demonstrates how to adapt an existing simulation game, freely available on the Internet, to create a meaningful learning experience for students.

The third article, "A Case Study Of Instructor Scaffolding Using Web 2.0 Tools To Teach Social Informatics" by Catherine McLoughlin and Sultana Lubna Alam, demonstrates that technological innovations which are accompanied by pedagogical scaffolding promote effective teaching of social informatics. The case study found that Twitter and blogs were able to engage students' in real-world activities to learn key concepts, and that task scaffolding was an effective pedagogical approach.

The fourth article, "Lessons Learned from Migrating to an Online Electronic Business Management Course" by Kent Walstrom, describes a course that teaches students to manage the linkage between organizational strategy and enterprise information technologies, including e-commerce architecture. Walstrom covers development from traditional face-to-face delivery to online delivery across a six and a half year time frame with lessons learned while migrating the course. Most issues were pedagogical that manifest themselves differently in different teaching environments. The good news is that student performance and satisfaction remained mostly consistent across delivery methods. The author's reflections include lessons learned and suggestions to aid in developing a course for online delivery.

The final article, "Developing and Applying Smartphone Apps in Online Courses" by Gongjun Yan, Danda Rawat, Hui Shi, and Awny Alnusair, describe practical experience in designing and developing a smartphone platform for accessing online courses. The authors present the main technical issues of applying smartphones to online courses and discuss several key factors of designing, developing and delivering online courses that support smartphone access.

The papers presented in this special issue illustrate the extensiveness and potential of online IS educational research. As an emerging research area, there is still much work to do to improve online IS education with new methods, techniques, and emerging technologies.

6. REFERENCES

- AACSB (2013). Quality Issues In Distance Learning. Retrieved January 18, 2015, from <http://www.aacsb.edu/~media/AACSB/Docs/Accreditation/Standards/2013-business-standards.ashx>
- Abdous, M. (2010). Operationalizing Quality Assurance in E-learning: A Process-Oriented Lifecycle Model. *Proceedings of Global Learn Asia Pacific 2010*, 731-736.
- Allen, I. E., & Seaman, J. (2013). *Changing Course: Ten Years of Tracking Online Education in the United States*. Sloan Consortium. PO Box 1238, Newburyport, MA 01950.
- Bos, N., & Shami, N. S. (2006). Adapting A Face-To-Face Role-Playing Simulation For Online Play. *Educational Technology Research and Development*, 54(5), 493-521.
- Carrol, N., & Burke, M. (2011). Learning Effectiveness Using Different Teaching Modalities. *American Journal of Business Education*, 3(12), 65-76.
- Chong, D.Z., He, W., & Wu, H. (2012). Leveraging Cloud Computing to Support Experiential Learning in Distance Education. *IEEE Technology and Engineering Education*, 7(2), 17-19.
- Dutton, J., Dutton, M., & Perry, J. (2002). How Do Online Students Differ From Lecture Students. *Journal of Asynchronous Learning Networks*, 6(1), 1-20.
- Frankola, K. (2001). Why Online Learners Drop Out. *Workforce*, 80 (10), 53-59.
- Garrison, D. R., & Arbaugh, J. B. (2007). Researching The Community Of Inquiry Framework: Review, issues, and future directions. *The Internet and Higher Education*, 10(3), 157-172.
- Garrison, D., Anderson, R., T. & Archer, W. (2000). Critical Inquiry In A Text-Based Environment: Computer Conferencing In Higher Education. *The Internet and Higher Education*, 2(2-3), 87-105.
- Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical Thinking, Cognitive Presence, And Computer Conferencing In Distance Education. *American Journal of Distance Education*, 15(1), 7-23.
- Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating Cognitive Presence In Online Learning: Interaction Is Not Enough. *American Journal of Distance Education*, 19(3), 133-148.
- He, W. (2013). Examining Students' Online Interaction in a Live Video Streaming Environment Using Data Mining and Text Mining. *Computers in Human Behavior*, 29(1), 90-102.
- He, W. & Yen, C. J. (2014). The Role Of Delivery Methods On The Perceived Learning Performance And Satisfaction Of IT Students In Software Programming Courses: A Case Study. *Journal of Information Systems Education*, 25(1), 23-34.
- Herbert, M. (2006). Staying The Course: A Study In Online Student Satisfaction And Retention. *Online Journal Of Distance Learning Administration*, 9(4). Retrieved February 13, 2015 from <http://www.westga.edu/~distance/ojdla/winter94/herbert94.htm>
- Heyman, E. (2010). Overcoming Student Retention Issues In Higher Education Online Programs. *Online Journal of Distance Learning Administration*, 13(4). Retrieved February 10, 2015 from <http://www.westga.edu/~distance/ojdla/winter134/heyman134.html>
- Hrastinski, S. (2009). A Theory Of Online Learning As Online Participation. *Computers & Education*, 52(1), 78-82.
- Hung, J. L., & Crooks, S. (2009). Examining Online Learning Patterns With Data Mining Techniques In Peer-Moderated And Teacher-Moderated Course. *Journal of Educational Computing Research*, 40(2), 183-210.
- Jahng, N., Krug, D., & Zhang, Z. (2007). Student Achievement In Online Distance Education Compared To Face-To-Face Education. *European Journal of Open, Distance and E-Learning*. Retrieved January 5, 2015 from http://www.eurodl.org/materials/contrib/2007/Jahng_Krug_Zhang.htm
- Larson, D. K., & Sung, C. H. (2009). Comparing Student Performance: Online versus Blended versus Face-to-Face. *Journal of Asynchronous Learning Networks*, 13(1), 31-42.
- Macfadyen, L. P., & Dawson, S. (2010). Mining LMS Data To Develop An "Early Warning System" For Educators: A Proof Of Concept. *Computers & Education*, 54(2), 588-599.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies. *US Department of Education*. Retrieved February 5, 2015 from <http://files.eric.ed.gov/fulltext/ED505824.pdf>
- Meyer, K. A., & Jones, S. J. (2012). Graduate Students Rate Institutional Websites: The Must Have, Nice to Have, and Delighted to Have Services. *Journal of Asynchronous Learning Networks*, 16(1), 5-18.
- Moore, M. G. (1989). Three Types of Interaction. *The American Journal of Distance Education*, 3(2), 1-6.
- Naaj, M., Nachouki, M., & Ankit, A. (2012). Evaluating Student Satisfaction With Blended Learning In A Gender-Segregated Environment. *Journal of Information Technology Education: Research*, 11(1), 185-200.
- Patterson, B., & McFadden, C. (2009). Attrition In Online And Campus Degree Programs. *Online Journal of Distance Learning Administration*, 12(2). Retrieved January 18, 2015, from <http://www.westga.edu/~distance/ojdla/summer122/patterson112.html>
- Pullan, M. (2011). Online Support Services for Undergraduate Millennial Students. *Information Systems Education Journal*, 9(1) 67-98.

- Reif, H. L. & Kruck, S. E. (2000). Towards An Understanding Of Information Systems Related Disciplines And Online Degree Programs. *Journal of Computer Information Systems*, Spring, 40(3), 58-61.
- Roberts, T. S. (2004). *Online Collaborative Learning: Theory And Practice*. Information Science Publishing.
- Rovai, A. & Downey, J. (2010). Why Some Distance Education Programs Fail While Others Succeed In A Global Environment. *The Internet and Higher Education*, 13(3), 141-147.
- Settle, A., & Settle, C. (2007). Distance Learning and Student Satisfaction in Java Programming Courses. *Journal of Universal Computer Science*, 13(9), 1270-1286.
- Shea, P., Fredericksen, E., Pickett, A., Pelz, W., & Swan, K. (2001). Measures Of Learning Effectiveness In The SUNY Learning Network. In *Online Education: Proceedings of the 2000 Sloan Summer Workshop on Asynchronous Learning Networks*, 31-54.
- Swan, K., Virtual Interaction: Design Factors Affecting Student Satisfaction And Perceived Learning In Asynchronous Online Courses, *Distance Education*, 22(2), 306-331.
- Swan, K., Shea, P., Richardson, J., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating A Measurement Tool Of Presence In Online Communities Of Inquiry. *E-Mentor*, 2(24), 1-12.
- Tu, C. & McIsaac, M. (2002). The Relationship of Social Presence and Interaction in Online Classes, *American Journal of Distance Education*, 16(3), 131-150.
- Wu, D., & Hiltz, S.R. (2004). Predicting Learning From Asynchronous Online Discussions. *Journal of Asynchronous Learning Networks*, 8(2), 139-152.
- Yang, Y. (2010). Roles Of Administrators In Ensuring The Quality Of Online Programs. *Knowledge Management & E-learning: An International Journal*, 2(4), 363-369.
- Zha, S., Kelly, P., Park, M. K., & Fitzgerald, G. (2006). An Investigation Of ESL Students Using Electronic Discussion Boards. *Journal of Research on Technology in Education*, 38(3), 349-367.
- Zha, S. & Ottendorfer, C. (2011): Effects of Peer-Led Online Asynchronous Discussion on Undergraduate Students' Cognitive Achievement. *American Journal of Distance Education*, 25(4), 238-253.

AUTHOR BIOGRAPHIES

Wu He received the B.S. degree in Computer Science from DongHua University, China, in 1998, and the Ph.D. degree in Information Science from the University of Missouri, USA, in 2006. He is an Assistant Professor of Information Technology at Old Dominion University. His research interests include Data Mining, Information Security, Social Media, Knowledge Management and Computing Education.



Guandong Xu is a senior lecturer and Analytics Education Program Leader in the Advanced Analytics Institute, University of Technology Sydney and he received PhD degree in Computer Science from Victoria University, Australia in 2009. His research interests cover Web Data management and Web Analytics, Data Mining, Recommender Systems, Text Mining, Social Analytics, especially Social Network Analysis and Social Media Mining. His research has gained funding from Australian governments and universities. In last ten years, he has had over 90+ publications: He has published three authored monograph books with Springer and CRC press, one edited scientific book with IGI-global publisher, and seven conference proceedings along with dozens of journal and conference papers including CJ, WWWJ, KAIS, CCPE, KBS, ESWA, JIIS, IICAL, AAAI, WWW, ICDM, CIKM, DASFAA, WISE, and PAKDD. He has been serving on editorial boards or as guest editors for several international journals, such as the Computer Journal, Journal of Systems and Software and World Wide Web Journal, and he is the assistant Editor-in-Chief of World Wide Web Journal. He is also active in organizing or serving for international conferences and workshops. He is a PC Co-Chair of 2014 IEEE/ACM ASONAM conference. He holds IEEE and ACM membership.



S. E. Kruck is a Professor of Computer Information Systems at James Madison University. Dr. Kruck received her BBA in Accounting and Computer Information Systems and her MBA from James Madison University. She went on to complete doctoral studies and earn her Ph.D. in Accounting and Information Systems from Virginia Polytechnic Institute and State University. Dr. Kruck was selected as the Madison Scholar for the College of Business in 2006, the JMU Distinguished Faculty Award in 2007, one of the JMU Be the Change World Changers in 2008, and the Accenture Professional Service Awards in 2011-12. She has published in the *Journal Information Systems Education*, *Journal of End User Computing*; *College Teaching*; *Journal of Marketing Education*; *Information Management and Computer Security*; *Journal of Virtual Worlds*; *Journal of Accounting Education*; *International Journal of Information Security and Privacy*; among others. Dr. Kruck is also a CPA in the state of Virginia.





No matter how sophisticated the technology, it still takes people!™



STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

Copyright ©2014 by the Education Special Interest Group (EDSIG) of the Association of Information Technology Professionals. Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to Dr. Lee Freeman, Editor-in-Chief, Journal of Information Systems Education, 19000 Hubbard Drive, College of Business, University of Michigan-Dearborn, Dearborn, MI 48128.

ISSN 1055-3096