

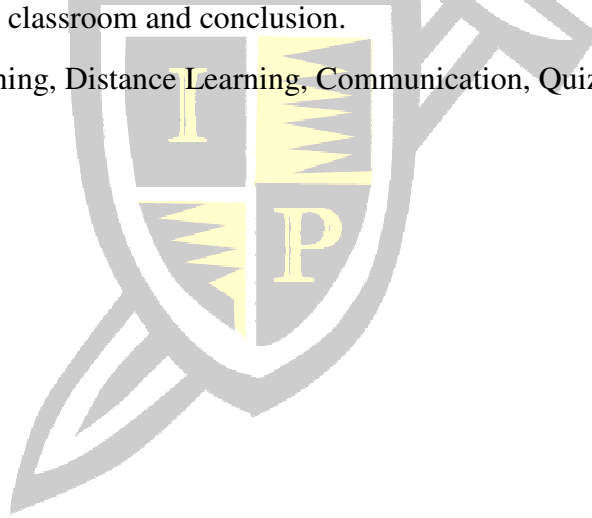
Wiki Based Dynamic Quizzes: A Bridge Between Online Students and Instructors?

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ABSTRACT

Constructing a meaningful learning network with online students can be challenging for many reasons. First, because there is literally a distance between the instructor and the student, and second, because the majority of online students rarely communicate specific details to their instructors about what aspects of the course are effective or ineffective. Without student observations or clear instructor/student communication, as distance educators, how do we know if our online classrooms are truly supporting our students' learning experiences? To address this concern and increase student engagement, Wiki based dynamic quizzes were designed and integrated into online classrooms. The following paper will discuss: history and definition of Wikis, review of literature, three case study experiences, suggestions for seamless dynamic quiz application in the online classroom and conclusion.

Keywords: Online Learning, Distance Learning, Communication, Quizzes, Wikis



INTRODUCTION

Constructing a meaningful learning network with online students can be challenging for many reasons. First, because there is literally a distance between the instructor and the student, and second, because the majority of online students rarely communicate specific details to their instructors about what aspects of the course are effective or ineffective. Without student observations or clear instructor/student communication, as distance educators, how do we know if our online classrooms are truly supporting our students' learning experiences? To address this concern and increase student engagement, Wiki based dynamic quizzes were designed and integrated into online classrooms. The following paper will discuss: history and definition of Wikis, review of literature, three case study experiences, suggestions for seamless dynamic quiz application in the online classroom and conclusion.

HISTORY AND DEFINITION OF WIKI

In many online classrooms, the instructor designs and delivers the content and students can choose to remain passive in their learning experiences. However, applying Web 2.0 technologies is one way to give students an opportunity to actively and collaboratively contribute to their training experience and ultimately to their own course content. "In the last few years, the emerging Web 2.0 technologies like blogs, wikis, social networking, media sharing, social bookmarking, podcasting, multiuser virtual environments etc. have received intense and growing educational interest as tools for supporting collaborative learning and knowledge construction," (Roussinos & Jimoyiannis, 2013 p. 1). Recall, Web 1.0, describes the first generation of the World Wide Web (WWW) which debuted on August 6, 1991 and is described as simply static websites (Bryant, 2011). Internet users of Web 1.0 were artlessly reviewing and gathering information. Web 2.0 is the second phase of the WWW and began with the advent of web based applications in 2002-2003. Web 2.0 is a shift from passive Internet reviews to dynamic, user generated content. With Web 2.0 users are actually creating content rather than simply receiving information (Stern, 2007) and there are several core characteristics of Web 2.0 tools which support dynamic and active participation: (1) user control, (2) sociability and (3) the harnessing of collective contribution. Web 2.0, includes the Wiki tool and is expected to contribute to an entirely new learning culture, characterized by active participation, collaboration and connectivity (Jimoyiannis, Tsiotakis, Roussinos, & Siorenta, 2013).

"Wikis are one of the most widely used tools of Web 2.0 technology and can create favorable conditions for the development of collaborative learning" (Etekoleous, 2014). Wikis specifically create:

- engagement and collaboration
- learning from other students
- group work
- community building
- critical thinking
- reflection
- construction of knowledge
- extending learning beyond the classroom

Wikis are particularly interesting in the academic environment as the tool supports collaborative writing, social communication and easy development of a public product (Zheng, Niiya & Warschauer, 2015). The Wiki was created in 1994 by Ward Cunningham and was made available to the public in 1995. Mr. Cunningham, a computer programmer with his Bachelors of Science and Masters of Science degrees from Purdue University, worked for a company called Tektronix, in 1994, and he found he could use a HyperCard more efficiently by creating links without checking first to see if a destination page existed (Rothman, 2016). This unique process allowed a user to tell the program to create a web page even if it did not already exist (Rothman, 2016). With his new tool, Cunningham asked his co-workers to make pages describing themselves and their workplace projects and ideas. Cunningham reported immediate interest, "People would get stuck at my desk," Cunningham recalls. "I couldn't use my computer because they wouldn't go away. They found the joy of authoring in this rambling space awe call hypertext, and that's because they had a memory and they were connecting their memory with all the other memories of the people who'd sat down at my desk in the week before," (Rothman, 2016, p. 1).

Cunningham named the tool, "WikiWikiWeb" after an experience from a vacation to Hawaii where he rode a bus named the "Wiki Wiki Bus." Wiki, meaning quick. The Wiki rapidly grew and in 2001, Ben Kovitz, a computer programmer and user of the new Wiki, mentioned the tool to Larry Sanger, a philosophy PhD, who was developing an online encyclopedia known as Nupdeia (Rothman, 2016). Larry Sanger, with Jimmy Wales created Wikipedia, the most recognized Wiki in the world. Dr. Sanger (1968-) obtained his BS from Reed College and his MA and PhD, from the University of Ohio. Jimmy Wales (1966-) earned his bachelor's from Auburn University, master's degree from the University of Alabama in Finance and his PhD from Indian University Bloomington. When Dr. Sanger first saw Cunningham's Wiki he believed he found the tool that would allow his online encyclopedia, Nupdeia to grow. Sanger said of his first review of the Wiki, "My first reaction was that this really could be what would solve this problem," Sanger explains, "because the software was already written and this community of people of WikWikiWeb had created something like 14,000 pages" (Moody, 2006). In contrast, Sanger's original Nupedia was lagging in interest generating only about 12 dozen articles. After reviewing the tool, Sanger immediately wrote a proposal for Wikipedia and sent the proposal to Jimmy Wales and by the evening Sanger had an initial Wiki tool prepared. Sanger named his wiki, Wikipedia and site went live on January 15, 2001 (Rothman, 2016). Today, Wikipedia is one of the most utilized sites on the web (Rothman, 2016).

So, Wikis are popular and experience wide usage, but what exactly is the tool? A Wiki is a web based social computing application characterized by a set of linked web resources that are incrementally created and edited by a group of collaborative users (Goldstein, O. & Peled, 2016). The tool is without constraints, open, adaptable, and supports stored shared knowledge originating from multiple sources. Wiki is also a website that allows users to add content that may be edited by other users (Nejkovic & Milorad, 2012). In addition, Wikis are flexible enough to support a variety of application domains including teaching, research, and academic administration (Nejkovic & Milorad, 2012).

According to Roussinos & Jimoyianis (2013) there are three key characteristics that explain why Wikis are gaining momentum in educational settings among researchers and teachers, specifically, the tool allows for web editing, revision history and discussion forums. First, web editing, a Wiki is a combination of text editor and Web site, where users can both read and author content. Second, revision history, a history of the changes made to Wiki pages can be

recalled, compared and presented. Third, discussion forum, a discussion forum tool is linked to every Wiki page and this board allows for debating, dialogue and exchange of ideas.

So, in conclusion, a Wiki is a collaborative web site, with perpetual information created by many authors, anyone can be permitted to edit or modify content. The Wiki is one of the most popular Web 2.0 tools and is gaining attention and interest in academics as tool supports dynamic learning by students. Specifically, in the online classroom, the Wiki has the ability to support student engagement by supporting communication between students and instructors.

REVIEW OF LITERATURE

E-learning has a growing market estimated to reach \$255 billion in 2017 (Yu and Hu, 2016). The 2016 report from the Babson Survey Research Group found that 5.8 million students nationwide are taking online courses (Online Learning Consortium, 2016). And in a report funded by the Online Learning Consortium (Allen & Seaman, 2013) of 2820 institutions, over 69% of chief academic officers felt that online learning was important for the future and 77% of the officers believe that online learning is as good as or better than traditional brick and mortar learning (Dixson, 2015). It can be concluding the online learning is in a growth phase. But, is growth in numbers of students also sustained by the creation of quality learning experiences?

Social constructivist theorists like Vygotsky (1978) and Bandura, Ross, and Ross (1961, 1963), contend that we learn through social interaction. “Student engagement is critical to student learning, especially in the online environment, where students can often feel isolated and disconnected,” (Dixson, 2015). It is hypothesized by Marcia Dixson (2015) that reported student engagement is significantly aligned with two types of student behaviors: application learning behaviors (posting to forums, writing e-mails, taking quizzes) and observational learning behaviors (i.e., reading e-mails, reading discussion posts, viewing content lectures and documents). To examine this idea further, Dixson developed an Online Student Engagement Scale (OSE) which measures online student learning experience (Appendix A). Dixson found the OSE was positively and significantly correlated with application learning behaviors.

Venkatesh, Morris, Gordon and Davis (2003) in their paper, “User Acceptance of Information Technology: Toward a Unified View,” are also measuring the quality of learning as aided through technology. Through a literature review, the authors compare eight models and formulate a comprehensive model with four core determinants of intention usage and up to four moderators of key relations. Next, the group formulates a unified theory of acceptance and use of technology model (UTAUT)(Appendix B), in which four constructs play a significant role as direct determinants of use acceptance and usage behavior: performance expectance, effort expectancy, social influence and facilitating conditions (Vankatesh et al., 2003). UTAUT, based decades of research on technology adoption and use posits that there is a positive direct effect of behavioral intention use (Brown, Dennis and Vankatesh, 2010).

Clearly, student engagement is important in face to face and distance learning courses, technology is becoming the tool that is expected to support and facilitate student communication and engagement, “even in face-to-face classrooms, technology necessitates emailing, using learning management systems and completing assignments with digital components (e.g. blogs, videos)” (Wombacher, Harris, Buchner, Frisby and Limperos, 2016). As described, technology

is comfortably applied to support communication, but not always optimized to support engagement. Without a proper structure, technology can even diminish student engagement. Sherblom, Withers, and Leonard (2013) assert that while “some students enjoy participating in CMC (computer mediated communication) many report being nervous, anxious, and not very motivated,” (p. 36). Frisby et al (2017) found that many online students can even experience computer mediated communication anxiety that if unmanaged can impact learning outcomes (Frisby et al., 2014).

What is needed so technology can be optimized to facilitate student engagement? Six research studies will be reviewed to answer this question.

In the article, “Attitudes toward learning oral communication skills online: the importance of intrinsic interest and student-instructor differences,” Harris et al, conducted a survey study of 255 participants, assessing their attitudes towards online oral communication skills. The researchers sought to understand perceptions essential for online learning success. They concluded that student perceptions essential for online success include: perceived usefulness, behavioral intentions and intrinsic interest (Harris, Phelan, McBain, Archer, Drew & James, 2016).

These results are supported by Carter et al. (2014) in their article, “Qualitative insights from a Canadian Multi-Institutional Research Study, in search of meaningful e-learning.” Carter and her research team, report qualitative findings of a mixed methods research study called the Meaningful E-learning or MEL project which explored the teaching and learning experiences of instructors and students as well as their perceptions of the challenges and benefits of e-learning. From this research four major themes regarding needs were identified, human connection, IT support, effective course instructional and design infrastructure (2014). The study recognizes that distance students do need connections with their classmates and instructors.

In a third study, “Factors Related to Cognitive, Emotional, and Behavioral Engagement in the Online Asynchronous Classroom,” the researchers assessed behavioral, emotional and cognitive engagement of students and teachers in asynchronous discussion forums through a series of measurements like class completion, discussion forum grades and class size from 303 online classrooms from a variety of disciplines. The study resulted in several interesting findings, for instructors, as class size increased, behavioral engagement decreased. For students, grades improved with students' emotional engagement but declined with instructors' cognitive engagement. These unusual conclusions, suggest the need for further study into unique aspects of online course development (Pilotti, Anderson, Hardy, Murphy & Vincent, 2017). The study concludes that the exact formula for student engagement is unknown and that the online classroom is a unique teaching and learning environment.

The article, “StatMediaWikiWikis in Teaching: An Experiment with WikiHaskell and StatMediaWiki,” by Palomo Duarte, Medina Buló, Rodríguez Posada and Palomo Lozano, (2012), describes the WikiHaskell project. This project was developed in a Computer Engineering degree course at the University of Cadiz. “WikiHaskell is a wiki for which students, organized into groups of three, create complementary materials on Haskell programming language libraries. The main objective of this project is to introduce open knowledge creation into the classroom, thus turning the students into the true protagonists of the course subject,” (Palomo Duarte, Medina Buló, Rodríguez Posada & Palomo Lorano, 2012). To

assess the Wiki, StatMediaWiki was developed and allows assessments to be performed transparently, through a generation of reports. With the assessment, clear review of active and inactive students was possible. The WikiHaskell project supports student collaboration and engagement and, in part, had a purpose of assessing and understanding student engagement.

The article, "Using Wikis for Online Group Projects: Students and Tutor Perspectives," by Kear, Donelan and Williams discusses the use of wikis to support online group projects. The researchers examine and discuss the experiences of online students and online tutors via a wide range of methods. Specifically, the research aimed to explore Wiki effectiveness in supporting student collaboration and the tutors' scoring of the students' collaborative work. To understand the collaboration process, data was collected from students through a survey and from tutors through a variety of channels. The findings suggest that, when an online discussion forum and the Wiki are used together, the Wiki is valuable for groups of students developing a shared resource. The researchers also conclude that when introducing collaborative technologies to support group projects, the perceptions and needs of the students should be carefully considered (Kear, 2014). The study views the Wiki as an effective tool to be used in a comprehensive distance learning course and that the perceptions of the participants will impact the effectiveness of the tool.

Globally, educators are seeking ways to develop more flexible approaches to delivering higher education (Jones, 2010), Wikis are gaining in consideration. Consider that traditionally, online students have little to no contact with each other. Wiki software is seen as creating opportunities for students to communication and collaboration. Jones wrote the article, "Collaboration at a Distance: Using a Wiki to Create a Collaborative Learning Environment for Distance Education and On-Campus Students in Social Work." In this study, students were separated into groups of 6 to 7, with a mix of online and on campus students, and asked to create a collaborative project explaining the major features of a particular practice theory. All 12 of the groups completed the assessment and produced a collaborative description of a social work practice theory using the wiki tool. Each group applied a little bit different strategy for completing the project, some groups used a single page and some used hyperlinks allowing for navigation between sections. It should be noted that the students reported a range of positive experiences and benefits from their involvement in the Wiki assignment. "A number of students commented on the fact that the Wiki had allowed them to build their knowledge of the actual assessment topic in a particular, collaborative manner, resulting in both a broader and deeper understanding of the material," (Jones, 2010). In this assignment and example, the Wiki was used as a bridge for student collaboration. "Wiki technology was used to create a collaborative learning environment where on-campus and distance students were able to work together to produce assessable material. Drawing on student comments regarding the process and outcomes of the Wiki assignment, a number of issues and benefits of the use of Wikis in social work education are identified and discussed" (Jones, 2010).

All six studies show that student engagement is one of the most important factors contributing to student success. But, the studies also indicate that the formula for creating an engaging online environment is somewhere between unknown to varies based on the environment, subject, students, instructor, etc. "Although e-learning has existed for some time now, there are still aspects that require exploration. Specifically, there is a need for more research that targets the

design, development, and delivery of exceptional e-learning experiences within institutional contexts and acknowledges teachers and students as persons who require, above all, the human connection that teaching and learning has always involved (Carter et al, 2014 p. 17).

Wiki contributing to the online classroom

Distance learning students benefit from opportunities to interact and communicate throughout their learning process, with this acknowledgement some online instructors are utilizing Wikis to foster cooperative learning that supports engagement. Cooperative learning is a socially oriented theory where individuals work together towards a common goal, students and faculty work collaboratively through learning content (Forehand, 2005) and students accomplish shared learning goals together (Johnson, Johnson, & Stanne, 2000). The value of cooperative learning is supported through a variety of learning theories (Johnson, Johnson & Stanne, 2000). As an example, Malcolm Knowles, adult learning theorist, states that adult learners have a wealth of knowledge, it is valuable to allow students to share their unique content knowledge with each other and significant learning can occur outside the four walls of a classroom (Scully, 2017). The Wiki, allows for boundryless, cooperative learning as students exchange information, learn from each other and work together to create ideas.

Among Web 2.0 applications, Wikis have received particular educational interest, with uses ranging from primary (Pifarré & Li, 2012)(Woo, Chu, Ho, & Li, 2011) and secondary education (Forte & Bruckman, 2007)(Grant, 2008)(Mak & Coniam, 2008) to higher education (Neumann & Hood, 2009)(Roussinos & Jimoyiannis, 2011)(Wheeler, Yeomans, & Wheeler, 2008)(Zorko, 2009) as well as teachers' professional development (Vratulis & Dobson, 2008)(Wheeler & Wheeler, 2009). The interest is present because the Wiki has the ability to support student engagement, communication, collaboration and exchange of unique experiences and ideas.

Application ideas for Wiki use in the online classroom

Wikis are often selected by educators for application because, the Wikis can be public or private, the Wiki software comes with most Learning Management Systems (LMS), contributors can participate independently to a group document and Wikis can build communities. So, the tool is easily available, but, how should instructors utilize the tool to support student engagement?

There are numerous application strategies that have fostered student learning. In broad terms, Hsu (2007) recommended a variety of learning activities suitable for Wikis, projects like, brainstorming, collaborative writing and creating a shared knowledge base or reference. While, Tonkin (2005) identifies four different forms of educational Wikis, single user, student learning notes, collaborative writing and knowledge bases.

Here are some specific examples of faculty using Wikis in their college classrooms.

Professor	Department	University	Project	Conclusion
Meghan McInnis-Dominguez	Foreign Language and Literature	University of Delaware	Used a Wiki to support in-class presentation in a foreign language.	She found presentations were better due to the Wiki discussion (Wikis in Higher Education, 2008).
Lou Rossi	Mathematical Sciences	University of Delaware	Used Wikis in his Calculus undergraduate course and his Applied Mathematics graduate course.	The Wikis help student spend time on solving problems (Wikis in Higher Education, 2008).
Carl Schmidt	Animal and Food Sciences	University of Delaware	Used Wikis to support team work development.	Helped prepare students to work in distributed teams (Wikis in Higher Education, 2008).
Chris Penna	English	University of Delaware	Used Wikis in three courses, Composition, Survey of Literature and Business Writing	Wikis caused students to be more aware of their writing process (Wikis in Higher Education, 2008).

These examples describe effective application of Wikis to support a productive educational experience and numerous research studies support that with proper application, Wikis can benefit both students and teachers (Chen, Jang & Chen, 2015).

Benefits of Wiki the online classroom

The most common identified benefits of Wiki application in the classroom are facilitation of active learning, support for student collaboration, facilitation of peer review, support for collective learning and engagement with course material. The following table, offers information, a summary review of literature, specific to the benefits of Wiki application in the learning environment. The left column describes the Wiki application benefit and the right column lists the authors whose research or writings align with the identified benefit.

Benefit of Applying Wiki in the Learning Environment	Researcher/Author
Support for Student Collaboration	<p>(Alshalan, A., Tracey, Monica, Spannaus, Timothy, Walster, Dian, & Zhang, Ke., 2016) (Camacho, M., Carrión, E., Chayah, D., & Campos, M., 2016) (Celorrio-Barragué, L., Lopes-Ramvalho, A., & Calvete Gaspar, M., 2016) (De Arriba, R., 2016) (Lai, C., Lei, C., & Liu, Y., 2016) (Barrera, Alessandra L., 2015) (Chen, Y-H., Jang, S-J., & Chen, P-J., 2015) (Kim, N., 2015) (Kovač, P., & Stare, J., 2015) (Matthew J Salganik, & Karen E C Levy, 2015) (Yueh, Hsiu-Ping, Huang, Jo-Yi, & Chang, Chueh., 2015) (Katzlinger, Elisabeth, & Herzog, Michael A. 2014) (Page, K., & Reynolds, N., 2014) (Nejkovic, V., & Tomic, M., 2014) (Bowman, S., 2013) (Castañeda, D., & Cho, M., 2013) (Stoddart, A., Chan, J., & Liu, G., 2013) (Moskaliuk et al., 2012) (Palomo Duarte, M., Medina Buló, I., Rodríguez Posada, E., & Palomo Lozano, J., 2012) (Bradley, Lindstrom, Rystedt, & Vigmo, 2010) (Su & Beaumont, 2010) (Ruth & Houghton, 2009) (Xiao & Lucking, 2008) (Cress & Kimmerle, 2008) (Sheehy, 2008) (Forte & Bruckman, 2007) (Scandamalia & Bereiter, 2006) (Rick & Guzdial, 2006) (Raman, Ryan, & Olfman, 2005)</p>
Collective Learning	<p>(Camacho, M., Carrión, E., Chayah, D., & Campos, M., 2016) (Barrera, Alessandra L., 2015) (Kovač, P., & Stare, J., 2015)</p>

	<p>(Yueh, Hsiu-Ping, Huang, Jo-Yi, & Chang, Chueh., 2015) (Page, K., & Reynolds, N., 2014) (Caple & Bogle, 2013) (Castañeda, D., & Cho, M., 2013) (Biasutti & Deghaidy, 2012) (Falcó & Huertas, 2012) (Bulo, I., Rodríguez Posada, E., & Palomo Lozano, J., 2012) (Carr, Morrison, Cox, & Deacon, 2007) (Celorrio-Barragué, L., Lopes-Ramalho, A., & Calvete Gaspar, M., 2016) (Cress & Kimmerle, 2008) (Elgort, Smith, & Toland, 2008) (Forte & Bruckman, 2006) (Minocha & Thomas, 2007) (Nicol, Littlejohn, & Grierson, 2005) (Wheeler, Yeomans, & Wheeler, 2008)</p>
Support Students in Engaging in Deeper Learning	<p>(Kukkonen, J., Dillon, P., Kärkkäinen, S., Hartikainen-Ahia, A., & Keinonen, T, 2016) (Lai, C., Lei, C., & Liu, Y., 2016) (Salganik, M., & Levy, K., 2015) (Kovač, P., & Stare, J., 2015) (Nejkovic, V., & Tomic, M., 2014) (Bowman, S., 2013) (Moskaliuk et al., 2012) (Bradley, Lindstrom, Rystedt, & Vigmo, 2010) (Forte & Bruckman, 2007) (Xiao & Lucking, 2008) (Sheehy, 2008) (Forte & Bruckman, 2007) (Scandamalia & Bereiter, 2006)</p>
Collaborative Writing	<p>(Alshalan, A., Tracey, Monica, Spannaus, Timothy, Walster, Dian, & Zhang, Ke., 2016) (Page, K., & Reynolds, N., 2014) (Stoddart, A., Chan, J., & Liu, G., 2013) (Castañeda, D., & Cho, M., 2013) (Kim, N., 2015) (Palomo Duarte, M., Medina Bulo, I., Rodríguez Posada, E., & Palomo Lozano, J., 2012) (Lundin, 2008) (Ma & Yuen, 2008)</p>

	(Trentin, 2009) (Neumann & Hood, 2009) (Kessler, 2009) (Kost, 2011) (Li & Zhu, 2013)
Encourage Reflective Writing	(Alshalan, A., Tracey, Monica, Spannaus, Timothy, Walster, Dian, & Zhang, Ke., 2016) (Castañeda, D., & Cho, M., 2013) (Bradley, Lindstrom, Rystedt, & Vigmo, 2010) (Forte & Bruckman, 2007) (Moskaliuk, Kimmerle, & Cress, 2012) (Xiao & Lucking, 2008) (Ras, Carbon, Decker, & Rech, 2007) (Yukawa, 2006)
Facilitate Peer Review	(Salajan, F., Nyachwaya, J., Hoffman, J., & Hill, B., 2016) (Katzlinger, Elisabeth, & Herzog, Michael A. 2014) (Bradley, Lindstrom, Rystedt, & Vigmo, 2010) (Forte & Bruckman, 2007) (Moskaliuk, Kimmerle, & Cress, 2012) (Xiao & Lucking, 2008)
Active Learning	(De Arriba, R., 2016) (Katzlinger, Elisabeth, & Herzog, Michael A. 2014) (Mi, M., & Gould, D., 2014). (Nejkovic, V., & Tomic, M., 2014) (Prince, 2004) (Jacobson & Mark, 1995) (Wu, Chen, Wang & Su, 2010)
Project Development	(Alyousef & Picard, 2011) (Lin & Kelsey, 2009) (Molyneaux & Brumley, 2007) (Roussinos & Jimoyiannis, 2011)
Improved Course Performance	(Ma & Yuen, 2007) (Ravid, Kalman, & Rafaeli, 2008) (Rick & Guzdial, 2006)
Self-Guided Exploration	(Moskaliuk et al., 2012) (Scandamalia & Bereiter, 2006)

	(Sheehy, 2008)
Peer Assessment	(Celorrio-Barragué, L., Lopes-Ramalho, A., & Calvete Gaspar, M., 2016) (Salajan, F., Nyachwaya, J., Hoffman, J., & Hill, B., 2016) (Xiao & Lucking, 2008)
Enhance Student Interaction	(Camacho, M., Carrión, E., Chayah, D., & Campos, M., 2016) (Page, K., & Reynolds, N., 2014) (Lund & Smördal, 2006)
Interaction	(Moskaliuk et al., 2012) (Scandamalia & Bereiter, 2006) (Sheehy, 2008)
Dialogue	(Moskaliuk et al., 2012) (Scandamalia & Bereiter, 2006) (Sheehy, 2008)
On-line Teaching and Assessment	(Ingvill Rasmussen, Andreas Lund, & Ole Smørðal, 2012) (Bruns & Humphreys, 2005)
Wikibooks	(Kim, N., 2015) (Ravid, Kalman, & Rafaeli, 2008)
Course Management	(Bradley et al., 2010) (Zorko, 2009)
Convenient Group Work	(Kovač, P., & Stare, J., 2015) (Byron, 2005)
Generation of Teaching Material	(Shih, Tseng, & Yang, 2008)
e-portfolio	(Schaffert et al., 2006)
Research and Data Collection	(Hoffmann, 2008)
Clarity of Project Direction	(Naish, 2006)

Challenges of Wiki use in the online classroom

With broad application, not all Wiki learning experiences have been positive. It is important to understand both the benefits and the potential challenges of a technology tool prior to application. Some students and instructors have experienced significant challenges associated with Wiki application. Here are two specific examples where the instructors found the Wiki to create issues in the learning process.

Professor	Department	University	Project	Conclusion
Ralph Begleiter	Communication	University of Delaware	Used Wikis in a class in the honors program.	Grading was difficult, the process time consuming and students did not work collaboratively (Wikis in Higher Education, 2008).
Mark Serva	Accounting & MIS	University of Delaware	Used Wikis in his Emerging Technologies class where students completed a Marriott Corporation case study	The grading process was difficult and overachievers who “killed” the discussion (Wikis in Higher Education, 2008).

The following table offers information, a summary review of literature, specific to the challenges of Wiki application in the learning environment. The left column describes the Wiki application challenge and the right column lists the authors whose research or writings align with the identified challenge.

Challenges of Applying Wiki in the Learning Environment	Researcher/Author
High Instructor Work Load	(De Arriba, R., 2016) (Castañeda, D., & Cho, M., 2013) (Mitchell, C., 2013) (Palomo Duarte, M., Medina Bulo, I., Rodríguez Posada, E., & Palomo Lozano, J., 2012) (Chen & Beebe, 2010) (O’Connor, 2010) (Rubel, Wallace & Adams, 2010)

	(Robertson, 2008)
Need for Personal (Instructor and Student) Negotiation Technology Knowledge	(Bowman, S., 2013) (Eastham, N., Williams, Mia Kim, Gall, James E., Lalonde, Trent, & Lohr, Linda, 2013) (Chen & Beebe, 2010) (O'Connor, 2010) (Rubel, Wallace & Adams, 2010) (Robertson, 2008)
Dissatisfaction with Tool	(Rodham, K., Gavin, J., Coulson, N., & Watts, L., 2016). (Eastham, N., Williams, Mia Kim, Gall, James E., Lalonde, Trent, & Lohr, Linda, 2013) Ma and Yuen (2008)
Reluctant to Use	(Rodham, K., Gavin, J., Coulson, N., & Watts, L., 2016). (Mitchell, C., 2013) (Carr, Morrison, Cox, & Deacon, 2007) (Cole, 2008)
Limited Student Participation	(Rodham, K., Gavin, J., Coulson, N., & Watts, L., 2016) (Mitchell, C., 2013) (Castañeda, D., & Cho, M., 2013) Cole (2008)
Managing the Equality in Workplace Among Participants	(Rubel, Wallace & Adams, 2010) (Chen & Beebe, 2010) (O'Connor, 2010) (Robertson, 2008)
Seeing Cultural Differences Among Group Members	(Chen & Beebe, 2010) (O'Connor, 2010) (Rubel, Wallace & Adams, 2010) (Robertson, 2008)
Need for Detailed Timetable	(Chen & Beebe, 2010) (O'Connor, 2010) (Rubel, Wallace & Adams, 2010) (Robertson, 2008)
Edit Wars- Abuse of Collaborative Editing	Grant (2009)

	(Duffy & Bruns, 2006) (Viégas et al., 2004)
Public Writing Can Be Intimidating	(Goldstein & Peled, 2015) (Castañeda, D., & Cho, M., 2013)
Challenge of Unifying Content, Technology and Pedagogy	(Nejkovic, V., & Tomic, M., 2014) (Mishra & Koehler, 2006)
Prefer Independent Work	(Castañeda, D., & Cho, M., 2013) Elgort, Smith, and Toland (2008)
Trust in accuracy of Wiki Information is Low	(Eastham, N., Williams, Mia Kim, Gall, J. E., Lalonde, T., & Lohr, L., 2013)
Students Prefer a Reduced Grade Rather Than Use Wiki	(Rick & Guzdial, 2006)
Students Having Disagreements and Deleting Work	(Grant, 2009)
Students Need Training	(Bowman, S., 2013)
Limited IT Skills	(Mitchell, C., 2013)

THREE CASE STUDY EXPERIENCES

Preparation and review of existing Wiki learning models

In preparation to design a dynamic Wiki based quiz, the author reviewed and studied previous and current online classroom Wiki projects. Several projects were selected as aligned with the goals of the dynamic quiz Wiki development.

From significant review, it was noted that projects based in inquiry support collaboration, participation and knowledge construction (e.g. Beach et al., 2009)(Pifarré & Li, 2012). Also, projects that have clear weekly goals and deliverables experienced greater student success. Based on these two ideas and researcher experience, the third and final Dynamic Wiki Quiz model framework was developed:

- Preparation- assignment introductory meeting
 - Specific learning goal of the project are discussed.
 - The goals and discussion can occur synchronously or asynchronously.
- Introduction (1 week)
 - Assign team members.
 - Time to get to know team members.
- Exploration (1 week)
 - Teams are given time to practice using the Wiki tool.

- Implementation (3 weeks)
 - Time spent created and collaborating within the requirements of the project learning objectives.
- Wrap Up (1 week)
 - Team review and discussion of project experience.
- Reflection (1 week)
 - Team reflection on learning.

In the literature, one wiki example was particularly aligned with this project and will be discussed. In this example, Van Rosmalin (2012) describes the development of Wiki-games.

- The teacher draws up an argument directly aligned to the relevant course of study.
- Then a four around argument:
 - In round 1, the learners within their teams write a paragraph on the argument either pro or con.
 - In round 2, the teams write four or five arguments supporting their team's position. Teams can use one fake argument, one that sounds valid but is not.
 - In round 3, the teams challenge the arguments of the other teams.
 - In round 4, the teams write a summary of their arguments, supporting their position.
 - Teams gain points when they win each round and the team scores can be posted.

Based on Van Rosmalin's example and reviews of other wiki classroom projects, the Dynamic Wiki Quizzes assignment was created.

Description and development of dynamic quizzes

The Wiki tool was selected for this quiz assignment for many reasons. First, online students benefit from engagement and collaboration with their peers and instructors. Second, the Wiki application is aligned with quiz assignment outcomes as a quiz should be an exploration or opportunity to look at an idea intently and in-depth. Third, students must build a skill set of online communication and collaboration to prepare to work effectively in the global business market. Finally, the Wiki is aligned with the dynamic quiz learning objective of creating, collaborating and developing a unique perspective to a course content issue. Over a period of three semesters, three phases, the author tried various Wiki formats to support student engagement and active learning. The following will describe the three different phases, the benefits and challenges of each phase and the outcomes.

First evolution- semester one

Instructor placed students in teams of 3-4 students and asked a series of course content related, open ended question and the group answered the question on their group Wiki board. This initial strategy was clear and students understood expectations. Instructor asked questions like the following:

1. What is the role of human resources? Create a group working definition.
2. How can an organization design an attractive benefits package for employees? Create a sample benefits package.

3. Describe effective interview questions and interview procedures for an entry level management position at Google. Explain why the interview process was created and explain why the interview questions were selected. Offer at least five sample interview questions.

Wiki teams had two weeks to create a collaborative final answer. The first question, “What is human resources?” was broad and received high involvement for initial responses, but the question did not lend itself to high energy, ongoing student dialogue and editing. The second question, “How can an organization design an attractive benefits package for employees?” was more specific and generated initial interest but did not generate long term dialogue and edition. The third discussion prompt, “Describe effective interview questions and interview procedures for an entry level management position at Google,” was specific, open ended and gained student interests. For all three questions, the student dialogue and editing sustained during two week project and the wiki groups received a collective Wiki grade.

The format of introducing a question and asking students to discuss a solution had several observable positives outcomes as the process gained interest and the students worked to create a collective solution. This strategy also had observable negative outcomes as some students contributed more than others and while participation continued, participation slowed as the weeks continued.

Second evolution- second semester

Instructor placed students in teams of 3-4. Each Wiki team was asked to create a team question they would like explore, discuss, answer and/or resolve. Students were told the question had to relate to the course content, specifically, management issues and effective support of employee’s workplace activities. The instructor did offer support and feedback in terms of developing a meaning and relevant wiki discussion question. Groups identified questions like:

- Create a workplace policy to support gender equality. The policy should include information regarding recruitment, hiring, development and promotion. List at least three solutions, steps or policies based on peer reviewed research
- Is executive compensation fair? Why or why not and what can be done to maintain an equitable executive compensation programs. List at least three solutions based on resources.
- Should organizations monitor their employee’s electronic activities? As a group, decide, yes or no based on resources. As a group, create at least three management policies that either support employee electronic freedom or communicate management’s electronic screening procedures. The policies should be based on peer reviewed articles.

The students had one week to create their group question and the groups had one week to create a solution. Having the group select their own questions resulted in observable positive outcomes. First, this strategy, generated immediate dialogue, the groups felt pressure to quickly identify a question and then begin a solution process. Also, the group appeared interested in the discussion topic as it was self-directed. This process had several observable negative outcomes. The groups had difficulty coming to a consensus on their topic and all groups required instructor support to create a question that would allow for a lengthy discussion. The Wiki groups received a collective group grade.

Third evolution – third semester

Students were assigned to teams of 3-4 students. For the third evolution of the dynamic quiz process, the positive aspects of evolutions 1 and 2 were combined to create an effective third model. With the third evolution, it became clear that two weeks was not enough time for a thoughtful collaborative Wiki project. Timing is important when incorporating technology into a learning experience. With this understanding, on the third phase, the following time table was implemented:

- Thorough directions given to individual students in writing.
- Students informed of and broken into groups of 3-4.
- Each group assigned their own Wiki room on Blackboard.
- Each group is given the identical issue, strategies or projects to solve.
- Practice Wiki (1 week).
- Create solution (2 weeks).
- Instructor introduces new information regarding the issues, procedure or strategy in discussion. The groups are asked to adjust their policy based on the new information. (2 weeks).
- Wiki teams share solutions on course discussion board (2 weeks).
- Groups offer solutions and feedback to each other (1 week).
- Feedback scored and returned to teams.

Each team had their own Wiki board and all teams received the same case study question. The project length was expanded to 8 weeks and included an introduction week. The teams were given the following case information:

- Consider you are hired to create a Lunch and Learn series for your financial services organization. The goal of the lunch and learn is to give to provide financial advice and to generate business for the organization's financial representatives. The series will last three months. As a team, create your series development plan. Be sure your plan answers the following questions.
 - Who is the target market?
 - How many individuals can attend the meetings?
 - How will the events be marketed?
 - What will be served at the meetings (lunch, snacks)?
 - How will this be paid?
 - What will the topics be and why?
 - How will you find speakers?
 - What will you do to drive customers toward the financial representatives?
 - How will you evaluate the success of the seminar series?

In week four, additional information was added to the assignment directions, “the seminar series is performing well and the financial firm's broker dealer has now decided to cover the cost of the marketing and the food for seminar guests. How can you use this support to grow the seminar series? What will you add to the series now that marketing and food costs are not an issue?”

The third evolution had numerous four observable positives. First, the extended length of the project allowed time for students to become familiar with the wiki prior to starting the graded portion of the project. Student valued time to practice with the tool and their team prior to working on the assignment solution. Second, each student received an individual grade, rather than each group receiving a group grade. Individual grades fostered student motivation. Each student had the ability to either work to earn a high grade or offer minimal information for a minimal grade. Third, the increased complexity of the issue supported higher student engagement. Fourth, a peer review assessment was added as part of the assignment grading process. The peer review allowed teams to hear feedback, not only from their instructor, but from their peers, knowing that their classmates would score their contribution, motivated active and highly visible participation on the wiki board.

There were a few observable cons, not all students participated equally. Also, some students appeared to have anxiety about working in the wiki, this manifested in sending numerous emails or asking numerous questions about the project prior to engaging in the project. Finally, some students expressed interest in completing projects on their own rather than in groups.

Outcomes

From the three evolutions some observable outcomes can be described:

- Student participation increased as the wiki boundaries were clarified. The greatest participation was with the third wiki evaluation.
- Student participation increased with the third evolution as there was an opportunity to discuss real world application.
- All teams were able to developed collective projects, answers, solutions.
- All teams were able to dialogue and collaborate to create on the wiki.
- The editing format generated a type of discussion that was different from the traditional discussion board. The wiki generated collaboration.
- Students were engaging at a higher level and getting to know each other from professional and academic perspective.

STRATEGIES FOR APPLICATION

Wikis have the potential to facilitate collaborative learning because, every student can participate as they want, the instructor can track of each phase of the work process and the class can assess individual contributions of every group member (De Arriba, 2016). Based on the review of literature and the author's observations, there are several important application strategies to consider. First, from the literature the following points should be noted:

- The instructor should have detailed instructions and support students during their initial week or weeks working with a Wiki (Cowan, J., Astall, C., Walker, L., & Mardle, D., 2011)
- Wiki assignments must be well-structured, include step-by-step directions and include clear evaluation criteria (usually based on a rubric) (Choy & Ng, 2007)(Heather, 2004)(Hughes & Narayan, 2009) (Judd et al., 2010)(Goldstein & Peled, 2013) (Zheng, Niiya & Warschauer, 2015)

- Clear instructions and modelling rules of Wiki etiquette are essential (Zheng, 2012). In agreement with the identified points and researchers, the author recommends:
 - Well designed and well defined Wiki project.
 - Design the project and test on a pilot group before adding to the class.
 - Introduction lab or time for students to practice with the Wiki prior to graded deliverables.
 - Individuals graded based on the contribution to the group.
 - Using grading rubrics help clarify individual student assignment responsibilities.
 - Peer review supports individual accountability and collaboration.
 - Progressive grading, grades or scores for each week of work.
 - Instructors must monitor and participate in each Wiki each week to maintain momentum.
 - Instructors must plan extra time to support students in learning to use the tool and to answer instructor questions.

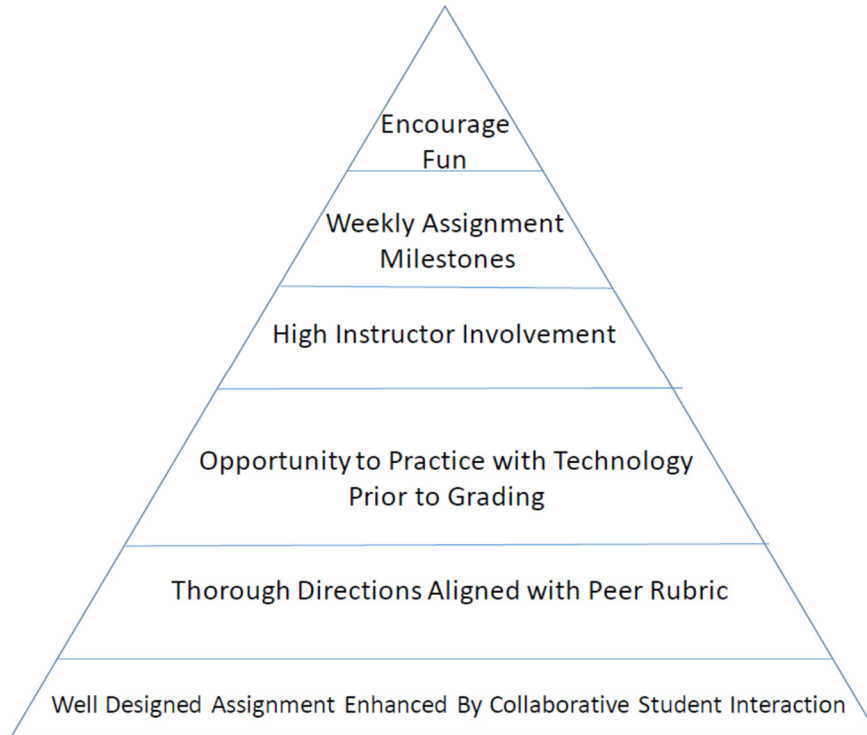
Assessment Recommendations

Various methods for assessing the Wiki participation and the quality of the student's work have been proposed. Some recommendations include teacher rubrics (Lai & Ng, 2011) to peer assessment (De Wever, Van Keer, Schellens, & Valcke, 2011) built-in wiki features such as user pages and revision history to track participation (Trentin, 2009)(Warschauer & Grimes, 2007). For the dynamic quizzes, rubrics were utilized. The instructor offered individual student feedback based on the contribution to the Wiki board and peers offered individual feedback to their classmates based on their contribution the Wiki board. The instructor rubric (Appendix C) and peer rubric (Appendix D) are both on 100 point scales and offer an opportunity to quantify participation, substantive contribution, active learning and grammatical performance. The combination of rubrics is recommended. The instructor rubric supports communication regarding student expectations. The peer rubric encourages participation and allows students to communicate directly regarding accountability and contribution.

Dynamic Quiz Application and Assessment Model

As a conclusion, based on an extensive review of literature and three case study applications, Dynamic Wiki Quizzes can support student engagement and learning, when the quizzes have the following six characteristics:

- As a foundation there must be a well-designed assignment enhanced by collaborative student interaction
- Thorough assignment directions aligned with clear instructor and peer rubric
- Students given a period of time to practice with the Wiki technology without assignment or grade constraints.
- High instructor involvement monitoring student behavior and answer student questions.
- Weekly milestones to support student engagement.
- Encourage brainstorming and fun.

Figure 1: Strategies for an Effective Dynamic Wiki Quiz Design

CONCLUSION

In general, higher education reports mostly positive evaluations for Wiki implementation in the learning experience (e.g. Elgort, Smith, & Toland, 2008)(Ravid, Kalman, & Rafaeli, 2008)(Robertson, 2008)(Theng et al., 2006)(Wheeler, Yeomans, & Wheeler, 2008). However, it is clear, that Wiki implementation requires significant up-front preparation from the instructor, ongoing instructor engagement and feedback alongside the student participants and the students must be willing to interact and collaborate online. Collaborative creativity promises to be a desirable and necessary business skill for the future. “Educational institutions can offer immense value to their students by familiarizing them with the simple technologies that make collaborative networks possible,” (Parker & Chao, 2007, p. 67). For many years, Wikis have been accepted in educational settings (Bruns & Humphreys, 2005) (Motteram & Sharma, 2009) and are now becoming very popular among researchers and instructors alike (Roussinos & Jimoyiannis, 2013).

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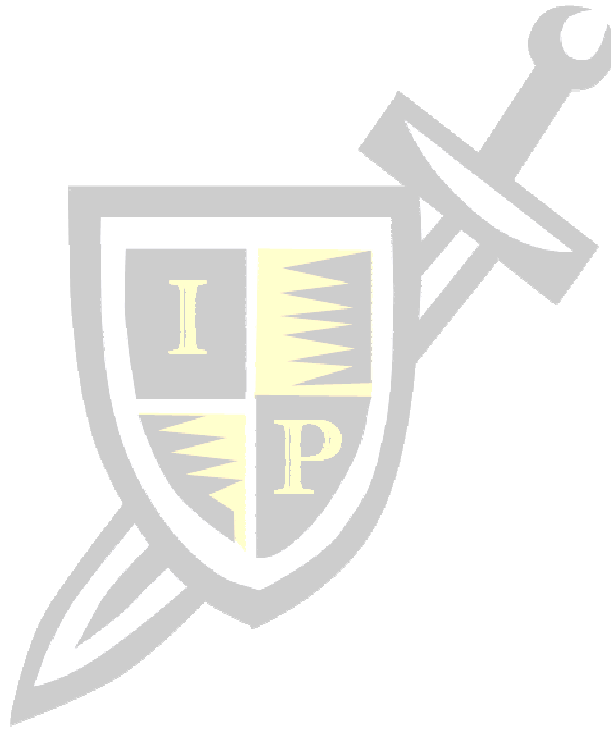
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APPENDIX**Appendix A Online Student Engagement Scale (OSE) (Dixson, 2015)**

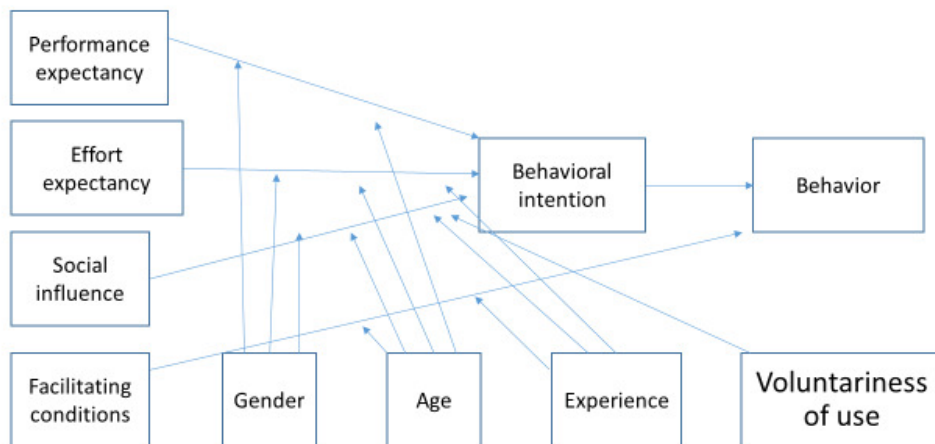
Within that course, how well do the following behaviors, thoughts, and feelings describe you? Please answer using the following scale: 1. not at all characteristic of me 2. not really characteristic of me 3. moderately characteristic of me 4. characteristic of me 5. very characteristic of me

1. Making sure to study on a regular basis
2. Putting forth effort
3. Staying up on the readings
4. Looking over class notes between getting online to make sure I understand the material
5. Being organized
6. Taking good notes over readings, PowerPoints, or video lectures
7. Listening/reading carefully
8. Finding ways to make the course material relevant to my life
9. Applying course material to my life
10. Finding ways to make the course interesting to me
11. Really desiring to learn the material
12. Having fun in online chats, discussions or via email with the instructor or other students
13. Participating actively in small-group discussion forums
14. Helping fellow students
15. Getting a good grade
16. Doing well on the tests/quizzes
17. Engaging in conversations online (chat, discussions, email)
18. Posting in the discussion forum regularly
19. Getting to know other students in the class

Appendix B

UTAUT Model (Vankatesh, V., Morris, M.G., Davis, G.B., and David, F.D., 2003)

UTAUT Research Model



Appendix C
Instructor Dynamic Quiz Rubric

Name

Instructor Feedback Dynamic Quiz

Description

Weekly instructor feedback reviewing weekly individual responsibilities for the Dynamic Quiz.

Rubric Detail

110 points

Criteria	Levels of Achievement				
	Novice	Competent	Proficient	Good	Expert
Contributed to the discussion twice in the week.	0 Points Not clearly included.	5 Points Response with 1 or 2 key points.	10 Points Thorough description and overview of the article.	15 Points Thorough and thoughtful description and overview of the article.	20 Points Thorough and uniquely thoughtful description and overview of the article.
Discussion contribution was substantive and a minimum of 300 words.	0 Points Not clearly included.	5 Points Response with 1 or 2 key points.	10 Points Thorough response with at least three key points.	15 Points Thorough and thoughtful response with at least three key points.	20 Points Thorough and uniquely thoughtful response with at least three key points.
Offered feedback on teammates' solutions.	0 Points Not clearly included.	5 Points Response with 1 or 2 key points.	10 Points Thorough response with	15 Points Thorough and thoughtful	20 Points Thorough and uniquely thoughtful

Criteria	Levels of Achievement				
	Novice	Competent	Proficient	Good	Expert
Offered feedback to alternative team solution.	0 Points Not clearly included.	5 Points Response with 1 or 2 key points.	10 Points Thorough response with at least three key points.	15 Points Thorough and thoughtful response with at least three key points.	20 Points Thorough and uniquely thoughtful response with at least three key points.
Contributed at least 300 words to team summary.	0 Points Not clearly included.	5 Points Discussion of two ideas about organizational innovation.	10 Points Thorough response with at least two unique ideas about organizational innovation.	15 Points Thorough and thoughtful response with at least three key points.	20 Points Thorough and uniquely thoughtful response with at least two unique ideas about organizational innovation.
Grammar/Spelling/Format	0 Points Numerous errors.	4 Points Multiple grammatical, spelling and formatting errors.	6 Points 3-4 grammatical, spelling and formatting errors.	8 Points 1-2 grammatical, spelling and formatting errors.	10 Points No grammatical, spelling or formatting errors.

Appendix D
Peer Feedback for Dynamic Quiz

• **Name**

Peer Feedback for Dynamic Quiz

• **Description**

Weekly instructor feedback reviewing weekly individual responsibilities for the Dynamic Quiz.

• **Rubric Detail**

110 points.

Criteria	Levels of Achievement				
	Novice	Competent	Proficient	Good	Expert
Contributed to the discussion twice in the week.	0 Points Not clearly included.	5 Points Response with 1 or 2 key points.	10 Points Thorough description and overview of the article.	15 Points Thorough and thoughtful response with at least three key points.	20 Points Thorough and uniquely thoughtful description and overview of the article.
Discussion contribution was substantive and a minimum of 300 words.	0 Points Not clearly included.	5 Points Response with 1 or 2 key points.	10 Points Thorough response with at least three key points.	15 Points Thorough and thoughtful response with at least three key points.	20 Points Thorough and uniquely thoughtful response with at least three key points.
Offered feedback on teammates' solutions.	0 Points	5 Points	10 Points Thorough response with	15 Points Thorough and	20 Points Thorough and uniquely

Criteria	Levels of Achievement				
	Novice	Competent	Proficient	Good	Expert
Offered feedback to alternative team solution.	Not clearly included.	Response with 1 or 2 key points.	at least three key points.	thoughtful response with at least three key points.	thoughtful response with at least three key points.
	0 Points	5 Points	10 Points	15 Points	20 Points
Contributed at least 300 words to team summary.	Not clearly included.	Response with 1 or 2 key points.	Thorough response with at least three key points.	Thorough and thoughtful response with at least three key points.	Thorough and uniquely thoughtful response with at least three key points.
	0 Points	5 Points	10 Points	15 Points	20 Points
Grammar/Spelling/Format	Numerous errors.	Discussion of two ideas about organizational motivation.	Thorough response with at least two unique ideas about organizational motivation.	Thorough and thoughtful response with at least three key points.	Thorough and uniquely thoughtful response with at least two unique ideas about organizational motivation.
	0 Points	4 Points	6 Points	8 Points	10 Points
		Multiple grammatical, spelling and formatting errors.	3-4 grammatical, spelling and formatting errors.	1-2 grammatical, spelling and formatting errors.	No grammatical, spelling or formatting errors.