The Role of Interactivity in Student Satisfaction and Persistence in Online Learning

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Abstract

Enrollment in online courses is rapidly increasing and attrition rates remain high. This paper presents a literature review addressing the role of interactivity in student satisfaction and persistence in online learning. Empirical literature was reviewed through the lens of Bandura's social cognitive theory, Anderson's interaction equivalency theorem, and Tinto's social integration theory. Findings suggest that interactivity is an important component of satisfaction and persistence for online learners, and that preferences for types of online interactivity vary according to type of learner. Student–instructor interaction was also noted to be a primary variable in online student satisfaction and persistence.

Keywords: social cognitive theory, interaction equivalency theory, social integration theory, interactivity

Introduction

Online learning holds great appeal to a large number of students because it offers flexibility in participation, ease of access, and convenience. Further, online learning is expected to continue to hold a major place in higher learning. In a recent report on the state of online learning in the United States, Allen and Seaman (2013) reported that over 6.7 million students were taking at least one online course during Fall 2012, representing 32% of all higher education students. This figure represents an increase of more than 570,000 students over the number reported the previous year, a 9.3% growth rate for online enrollment that far exceeds the less than 2% growth of the higher education student population. Therefore, online learning within institutions of higher education deserves immediate attention from university strategic planners, faculty members, and students.

Despite the rapid growth in student enrollment in online courses, persistence in such courses is often much lower than in traditional, face-to-face (F2F) courses (Carr, 2000; Chen & Jang, 2010; Jun, 2005; Rochester & Pradel, 2008). Rates of students who fail to complete their online courses range from as low as 10% to as high as 50% to 75% (Carr, 2000; Jun, 2005; Rochester & Pradel, 2008). These high attrition rates are costly to universities and deserve attention from university management, faculty members, and course designers (Liu, Gomez, Khan, & Yen, 2007).

External, internal, and contextual factors can influence a learner's decision to drop out of an online course. External factors are many and include family pressures, time constraints, lack of organizational support from the workplace, and finances (Park & Choi, 2009; Rovai & Downey, 2010; Tello, 2007). Internal student factors relate primarily to motivational issues and include self-regulation, self-determination, and self-efficacy (Gunawardena, Linder-VanBerschot, LaPointe, & Rao, 2010; Hill, Song, & West, 2009; Jun, 2005; Mahle, 2011; Offir, Lev, & Bezalel, 2008; Park & Choi, 2009; Tu & McIsaac, 2002). Finally, the context of the learning environment can play a significant role in a student's decision to drop out of an online course. Contextual factors may include poorly designed courseware, problems with technology, lack of accountability, lack of interactivity, feelings of isolation, and lack of instructor presence (Rochester & Pradel, 2008; Thurmond, Wambach, Connors, & Frey, 2002; Tu & McIsaac, 2002; Willging & Johnson, 2004). When any of these factors come into play, online learners' satisfaction, and consequently their decision to persist or drop out of an online course, may be affected (Levy, 2007).

Though each factor noted above is important, the focus of this review is on the role that social interactivity plays in online students' satisfaction and persistence. Building balanced and meaningful interactivity into online courses may also help to address many of the internal and contextual issues noted above.

Background, Purpose, and Theoretical Themes

A critical contextual factor that has been suggested to affect online student learning and satisfaction relates to interactivity (Anderson, 2003). *Online course interactivity* can occur either as formal interaction that is built into the overall course design or informal interaction that exists outside of the online course (Rhode, 2007). Primary forms of formal interactivity include student–student, student–instructor, and student–content (Moore, 1989). Informal course interaction includes the same elements of formal interaction. Rhode further has offered an E-Learning Interaction Matrix that includes two emerging catalytic components of informal student interaction: student–network and student–collective. Student–network interaction refers to the opportunity for learners to develop their own learning network outside the walls of the formal course enviornment, while student–collective interaction refers to the ability of online learners to "access a myriad of additional informal resources referred to as 'the Collective' in which the input of the many can have a signficant and dynamic contribution" (Rhode, 2007, "Informal Interaction," para. 8).

Formal interactivity, the focus of this review, is defined as either asynchronous or synchronous opportunities for communication between student–student, student–instructor, and student–content. Synchronous communication is that which takes place in "real time" and may include online chat and video conferencing. Asynchronous communication occurs over time and does not require simultaneous, "real-time" interaction. This form of communication may include email, participation in online discussion boards, blogs, and wikis.

When students have insufficient formal or informal interaction experiences in online courses, both learning and satisfaction may be compromised. Of the three types of interactivity that can occur online, student–content interaction has been found to be the strongest student-level predictor of student satisfaction in online courses (Chejlyk, 2006; Keeler, 2006; Kuo, Walker, Schroder, & Belland, 2014). Other studies have found that decreased social interactivity can lead to lowered satisfaction among students and increased feelings of isolation, disillusionment, and greater risk of dropping out of the online learning environment (Liu, Magjuka, Bonk, & Lee, 2007; Morris, Finnegan, & Wu, 2005; Tello, 2007). The purpose of this literature review is to examine the role that *formal social interactivity* (student–student and student–instructor) in online course design plays in overall student satisfaction and persistence.

The empirical online learning literature relating to student interactivity, satisfaction, and persistence is reviewed through three theoretical lenses: Bandura's (2001) social cognitive theory, Anderson's (2003) interaction equivalency theorem, and Tinto's (1975, 1987, 1993) social integration theory. *Social cognitive theory* is used as a lens through which to examine the triadic relationship between person, behavior, and environment and the role this relationship plays in online students' acquisition of skills and knowledge, satisfaction, and persistence. Anderson's *interaction equivalency theorem* is used to examine the different types of formal interaction that occur online (student–student, student–instructor, student–content) and the role these types of interactions may play in student satisfaction and persistence. Finally, Tinto's *social integration theory* is used to examine the role that student integration plays in an online student's choice to persist or drop out of an academic environment. Each of these themes is discussed in greater depth below.

Social Cognitive Theory and Online Course Interaction

From a social cogitive perspective, knowledge is constructed while individuals are engaged in activities, receive feedack, and participate in other forms of human interaction in public, social contexts (Bandura, 2001). Because cognition is not considered an individual process, learning and knowledge are shaped by the kinds of interactions a student has with others and the context within which these interactions occur (Bandura, 2001). In the online learning context, some students anticipate a lack of interaction and perceive that this is an expected tradeoff of online learning experiences (X. Liu et al., 2007). According to the tenets of *social cognitive theory*, however, a well designed online course should not sacrifice interaction, but instead provide an active-learning environment in which students are highly engaged in the learning process through interactions with peers, instructors, and content. Active learning is that

which involves students in doing things and thinking about things they are doing and may include active discussions, cooperative learning, debates, role playing, problem based learning, and simulations (Braxton, Milem, & Shaw Sullivan, 2000; Schunk, 2012).

Research data suggest that online courses with high levels of interactivity lead to higher levels of student motivation, improved learning outcomes, and satisfaction over less interactive learning environments (Espasa & Meneses, 2010; X. Liu et al., 2007; Mahle, 2011; Park & Choi, 2009; Thurmond et al., 2002). In a study of 147 adult learners who either completed or dropped out of three online courses offered at a large university, Park and Choi found that online learners easily lose motivation and feel less satisfaction if courses do not stimulate their active participation and interaction. In support of these findings, the results from three separate studies (X. Liu et al., 2007; Mahle, 2011; Offir et al., 2008) noted significant, positive relationships between interactivity and perceived engagement, learning, confidence, relevance, and student satisfaction. In a separate study, Espasa and Meneses electronically surveyed 186 online graduate students in their last week of courses. The results of their study showed a statistically significant relationship between instructor feedback received and learning as measured by student satisfaction and final grades.

However, study findings by Thurmond et al. (2002) suggest that the relationship between interactivity in online courses and student satisfaction may be dependent, in part, upon whether the interaction is with an individual or a group. In a survey study of 120 students enrolled in seven web-based nursing courses in three separate universities, Thurmond et al. found that knowing how likely students were to work with teams/groups was a strong predictor of student satisfaction. There was a negative relationship between these variables, indicating that students who were more likely to participate in teams/groups also tended to be less satisfied. At the same time, the researchers found student satisfaction to be significantly positively correlated with receiving timely comments from the instructor, having a variety of ways of being assessed, and knowing the instructor.

The findings of these studies suggest that one-to-one interaction in online courses, particularly between student–instructor, is a key component of student learning and course satisfaction. Building the right blend of student–student and student–instructor interactivity into online course design has been suggested to not only improve student satisfaction and achievement, but motivation as well (X. Liu et al., 2007; Mahle, 2011; Offir et al., 2008; Park & Choi, 2009).

In many cases, the interactivity found in online courses is actually preferred over that found in F2F classrooms. Sun, Tsai, Finger, Chen, and Yeh (2008), in a survey study of 295 online students, found that online learning virtually eliminates the awkwardness that is often associated with F2F communication in traditional classrooms. Communicating asynchronously via online bulletin boards can offer learners the opportunity to express their thoughts without restraint and students are more willing to ask questions and participate through discussion groups. In an extensive review of literature concerning social learning theory and web-based learning environments, Hill et al. (2009) found that because asynchronous social interaction in web-based learning environments is not as immediate as that found in a physical setting, some learners use this delay in responses to reflect before they write. At the same time, other online students find themselves feeling impatient while waiting for others to respond (Hill et al., 2009).

While some students prefer the benefits of online interactivity, Biesenbach-Lucas (2003) found that the *quality* of the communication may be compromised in this environment. In a case study of 36 students enrolled in a methodology course who were required to make weekly contributions to an online discussion board forum, study findings suggested that although students generally reported that online discussions increased social interaction and facilitated assimilation of the course content, some perceived the interactions and discussions as forced and unnatural (Biesenbach-Lucas, 2003). These findings suggest that though asynchronous interactivity may help students to assimilate online course content, the interactions that occur online may feel quite different from those that occur F2F.

In summary, the study findings addressed above may be explained, in part, by Bandura's (2001) social cognitive theory. In short, this theory purports that people acquire knowledge and skills through a triadic reciprocal relationship between person, behavior, and environment. Active learning environments with high levels of interactivity between students and their environment (peers, instructors, and content) not only motivate students, but also improve overall learning achievement and satisfaction. For some, a highly interactive online learning environment is even preferred over a F2F course. However, care must

be taken to create interactive experiences that invite a natural and willing dialog (Biesenbach-Lucas, 2003; Hill et al., 2009; Sun et al., 2008).

Interaction Equivalency Theorem and Online Course Interaction

In online courses, formal course interactivity can occur between student–student, student–instructor, and student–content. Anderson (2003), in his *interaction equivalency theorem,* suggests that meaningful learning can occur when at least one of the three forms of interaction is present at a high level. When high levels of more than one type of interactivity are present, a more satisfying educational experience will be occur (Anderson, 2003). In the next section, this review will focus on what the online learning empirical literature suggests about interactvity between student–student and student–instructor and the role these types of interactions play in online student satisfaction and persistence.

Student–Student Interaction

Student–student interaction is an important aspect of online learner satisfaction. In support of student–student interactivity, Ivankova and Stick (2007), in a cross-sectional survey of 207 doctoral students, found that those who successfully matriculated in the program received more meaningful and constructive peer feedback than those who dropped out. In a separate qualitative interview study of 32 undergraduate and 22 graduate students, Hollenbeck, Mason, and Song (2011) found that participants indicated they relied on student–student connectivity because it reduced the perceived threat of poor performance in a course. Based on these findings, it appears that student–student interaction plays an important role in online learner satisfaction.

Despite findings highlighting the importance of student–student interaction, preferences for this type of interaction are not universal. In fact, Grandzol and Grandzol (2010), in a study of 349 online community college students across six colleges noted that student–student interaction was significantly, but negatively associated with course completion rates. Similarly, Arbaugh and Rau (2007), in a study of online MBA students (n = 575), found student–student interaction to be significantly, negatively correlated with satisfaction with delivery medium. While student–student interaction is an important component of learning, the findings of these two studies suggest that finding the right balance of interaction is critical to both student satisfaction and online course completion.

Satisfaction with student–student interaction has been found to vary depending upon the level and type of learner (Hollenbeck et al., 2011; Tu & McIsaac, 2002; Walker & Kelly, 2007). Findings in the literature suggest that undergraduate students value student–student interaction to a greater degree than graduate students or individuals participating in online professional development or corporate training programs (Gunawardena et al., 2010; Thurmond et al., 2002; Walker & Kelly, 2007). In a survey study of 304 online undergraduate and graduate students, Walker and Kelly found that undergraduates enjoyed sharing their work with other students more than graduate students. In further support of this finding, Gunawardena et al., in a survey of 19 engineers, technicians, group leaders, and managers participating in online corporate training programs, found that learner-learner interaction was negatively correlated with satisfaction, suggesting that less learner-learner interaction enhanced overall learner satisfaction for this population. Finally, in a mixed-methods study of adult learners in a self-paced online professional development certificate program, Rhode (2009) found that learners were willing to forgo interpersonal interactions with peers, deemed by some as tangential, in exchange for the flexibility afforded by a self-paced learning approach. The findings discussed above suggest that satisfaction with student–student online course interactivity varies according to level and type of learner (undergraduate/graduate and adult/traditional age), with undergraduate students giving greater value to this type of interaction than graduate students and adult learners. Online course designers and instructors should consider these preferences when preparing online courses.

- *Asynchronous versus synchronous student–student interactions.* Student–student interaction in online courses occurs either asynchronously or synchronously. While there is no single "best way" to implement course interactivity, online instructors should consider including interactive student–student opportunities which meet the different learning preferences of their students. Some students prefer asynchronous discussions, while others find greater value in synchronous interactions.

  Asynchronous online student–student interactivity is, perhaps, the most prevalent source of communication in online course environments. Both traditional and non-traditional online adult learners have been found to respond favorably to asynchronous communication (Hollenbeck et

al., 2011; Tello, 2007). This may be due, in part, to the flexibility afforded to students, allowing them to respond on their own time. This is illustrated in the findings by Tello in a study of 1,569 undergraduates and 51 graduate students enrolled in online courses at a public university. In this study, Tello found that learners, facing demands on their time from school, work, and family, responded favorably to properly structured course activities such as the asynchronous discussion forum. In further support of these findings, Hollenbeck et al. found that students may feel more comfortable and "free" to discuss their ideas and opinions in an online context. Additionally, students who use technology to communicate with friends and relatives on a daily basis may actually find asynchronous discussions about course topics more intriguing in an online context than in F2F (Hollenbeck et al., 2011).

Other studies, however, have raised negative aspects of student–student asynchronous communication in online courses. As noted previously in this review, findings by Biesenbach-Lucas (2003) suggest that some students perceived the asynchronous student–student online bulletin board discussions to be forced and unnatural. As explained by Biesenbach-Lucas, "The requirement to react to and expand on an existing topic may stifle students' motivation to initiate new topics or raise alternative issues" (p. 91). Therefore, care must be taken to implement asynchronous discussion assignments that are natural and promote critical thinking. Further, based on findings from a survey study of participants in a corporate training program, Gunawardena et al. (2010) suggested that dissatisfaction with asynchronous student–student interaction on course discussion boards might be due in part, to limited guidance on how to interact with other learners in this context. This finding suggests that, as in any learning context, modeling by the instructor may be beneficial for students.

Like asynchronous online student–student interaction, synchronous communication is favored by some students and less preferred by others. In a phenomenological study of 23 graduate students, Glassmeyer, Dibbs, and Jensen (2011) found students were satisfied with synchronous online discussions, benefitting in particular when the students were broken into small groups of two to four. All participants in this study also indicated they felt more comfortable in small groups and some said speaking to the small group was less intimidating and offered the opportunity to hear ideas from classmates who don't speak up to the whole group as much.

However, other studies have found that students are not always satisfied with synchronous student–student interaction. Tu and McIsaac (2002), in a mixed-methods study of 51 graduate students enrolled in an online course, found that the more assertive students, who may not be aware of their communication styles, can create a negative impact on other students' abilities and willingness to communicate, resulting in unequal participation in real-time discussions. In a separate study, Offir et al. (2008) noted that some students' involvement and their motivation to participate in synchronous online discussions actually decreased because they felt they could not speak freely. One study participant explained, "I deliberate before asking a question because I feel that I am disturbing the lecture as well as other students in the class" (p. 15).

- *What is the best model for student–student interaction?* As highlighted in the research findings above, there are positive and negative aspects with online student–student interactivity. Student preferences for and satisfaction with student–student interactivity vary according to the level and type of learner and whether interactivity is either asynchronous or synchronous. Course designers and online instructors must take into consideration the interaction preferences of traditional undergraduates versus graduate, professional development, or corporate learners and include the types of interactive activities that most closely match the needs and preferences of these distinct student groups (Glassmeyer et al., 2011; Hollenbeck et al., 2011; Offir et al., 2008; Tello, 2007; Tu & McIsaac, 2002).

Student–Instructor Interaction

While student–student interactivity plays an important role in online student satisfaction, one of the greatest predictors of student satisfaction is the prevalence, quality, and timeliness of student–instructor communication. Illustrating this point, Thurmond et al. (2002), in a study of 120 online graduate nursing students, found student satisfaction to be significantly correlated with receiving timely feedback from the instructor, having a variety of ways to be assessed, and knowing the instructor. In this same study, the researchers noted that those who responded most positively about knowing the instructor reported actively participating more in web-based discussions. Reporting similar findings, Walker and Kelly

(2007), in a survey study of 304 online undergraduate and graduate students, found timeliness of instructor feedback to be a significant predictor of overall course satisfaction, with feedback preferred within two to three days and never longer than seven. The findings of these two studies affirm the importance of encouraging contact between students and instructors in order to encourage active learning.

In support of the findings noted above, Rhode (2009) conducted a qualitative interview study with ten online adult learners. In this study, interactions with the instructor and quality course content were rated as the most important aspects of a self-paced course over student–student interaction. Similarly, in a quantitative survey of 186 online graduate students, Espasa and Menses (2010) noted a statistically significant relationship between instructor feedback to students after performing assignments and learning results, measured by student satisfaction and final grades. These research findings further highlight the important role that student–instructor interaction plays in student achievement and satisfaction in online learning.

In the online learning context, lack of student–instructor interactivity can lead to student dissatisfaction. In a survey and interview study with 77 university students enrolled in an online, synchronous videoconference course, Offir, Belazel, and Barth (2007) found that 47% (*n* = 51) of interviewees indicated dissatisfaction with the fact that they had no personal contact with their lecturer. Additionally, lack of quality and timely asynchronous feedback from instructors was a significant pet peeve among the 304 undergraduate and graduate students who responded to a quantitative survey about their online course experiences (Walker & Kelly, 2007).

In review, it is important for students to feel they have easy access to their instructors and to receive timely and quality feedback throughout the duration of a course. Establishing an interactive connection between student–instructor may help to provide students with a sense of stability and integration into the online learning environment. This interactivity can occur both as one-to-one interactions and between the instructor and student groups (Hollenbeck et al., 2011).

Returning to the interaction equivalency theorem, while all three types of formal interaction (student–student, student–instructor, and student–content) are conducive to learning and satisfaction, deep and meaningful formal learning is more likely to occur when at least one of these three forms of interaction is present at a high level (Anderson, 2003). While student–content interaction has been found to be a strong predictor of student satisfaction in online courses (Chejlyk, 2006; Keeler, 2006; Kuo et al., 2014), social interactivity, particularly between student and instructor, appears to be a primary factor in satisfying student needs.

Social Integration Theory and Online Course Interaction

Student integration plays a significant role in the choice to persist or dropout of an academic environment. As explained in Tinto's (1975, 1987, 1993) *social integration theory,* students need integration into formal (academic performance) and informal (faculty/staff interactions) academic systems and formal (extracurricular activities) and informal (peer-group) social systems (Rovai, 2003). Melguizo (2011) further explained, "At its core this [social integration theory] is a model of educational communities that highlights the importance of student engagement or involvement in the learning communities of a College" (p. 399). Therefore, in an online learning context, persistence or attrition may be attributed, in part, to interactivity (or lack of) between students and their online educational environment, including that which occurs between students and student–instructor.

When online students feel a sense of community in their online course environments, likelihood of persistence is strengthened (X. Liu et al., 2007; Morris et al., 2005; Tello, 2007). In a case study of 28 faculty members and 20 online MBA students, X. Liu et al. noted a relationship between students' sense of community and lowered feelings of isolation as well as reductions in likelihood that they will drop out of their online courses. Looking at the relationship between course interactivity and persistence from a different angle, Morris et al. reviewed asynchronous online course participation data of 354 undergraduate students, of whom 284 persisted and 70 withdrew. Participation included viewing course content, viewing discussions, creating new discussion posts, and responding to discussion posts. Statistical analyses of student participation data showed significantly higher engagement in completers over withdrawers in all of the variables that measured frequency of participation.

Finally, Tello (2007), in a study of 1569 undergraduate and 51 graduate students observed a strong, positive relationship between the use of asynchronous methods of interaction by the instructor within a

course (i.e., discussion forum and email) and positive student attitudes toward that course. A modest, positive correlation was observed between student attitudes to interaction and course persistence. Further analysis of the study data suggested that instructor interaction (or lack of) accounted for a modest percentage (11%) of the reasons students provided for dropping out or not enrolling in a future online course.

In alignment with Tinto's (1975, 1987, 1993) social integration theory, the findings from these studies help to affirm that integration into informal (faculty/staff interactions) academic systems and informal (peer group) social systems is a key factor in student persistence. Online course interactivity, particularly between student and instructor, plays an important role in a student's choice to persist in an online course. Consequently, in university-wide efforts to retain students, online instructors must take care to design courses that provide many opportunities for students to interact both with each other as well as with the instructor in meaningful and supportive ways.

Conclusion

Online learning in higher education has become a major instructional modality in today's technology focused world. At the same time, attrition rates in online courses remain high (Carr, 2000; Jun, 2005; Rochester & Pradel, 2008). Findings highlighted in this online learning literature review suggest that interactivity in online courses, particularly between student–instructor, can play an important role both in student satisfaction (Espasa & Meneses, 2010; X. Liu et al., 2007; Mahle, 2011; Park & Choi, 2009; Thurmond et al., 2002) and persistence (Morris et al., 2005; Rovai, 2003; Tello, 2007). Further, research data suggest that preferences for types of online interactivity vary according to level and type of learner (Glassmeyer et al., 2011; Hollenbeck et al., 2011; Offir et al., 2007; Tello, 2007; Tu & McIsaac, 2002). Consequently, colleges and universities must take great care to create satisfying learning environments that provide opportunities for rich and meaningful interactions with students, instructors, and content.

A Framework for Course Interactivity

Ultimately, college and university administrators, instructors, and course designers need to provide online learning opportunities for students that are satisfying, promote deep and meaningful learning, and create environments in which students choose to persist. The online course interactivity framework proposed here (Figure 1), which includes key elements of social cognitive theory, interaction equivalency theorem, and social integration theory, can help to increase the likelihood of creating a learning environment that promotes deep and meaningful learning, is satisfying, and is one in which students will choose to persist.
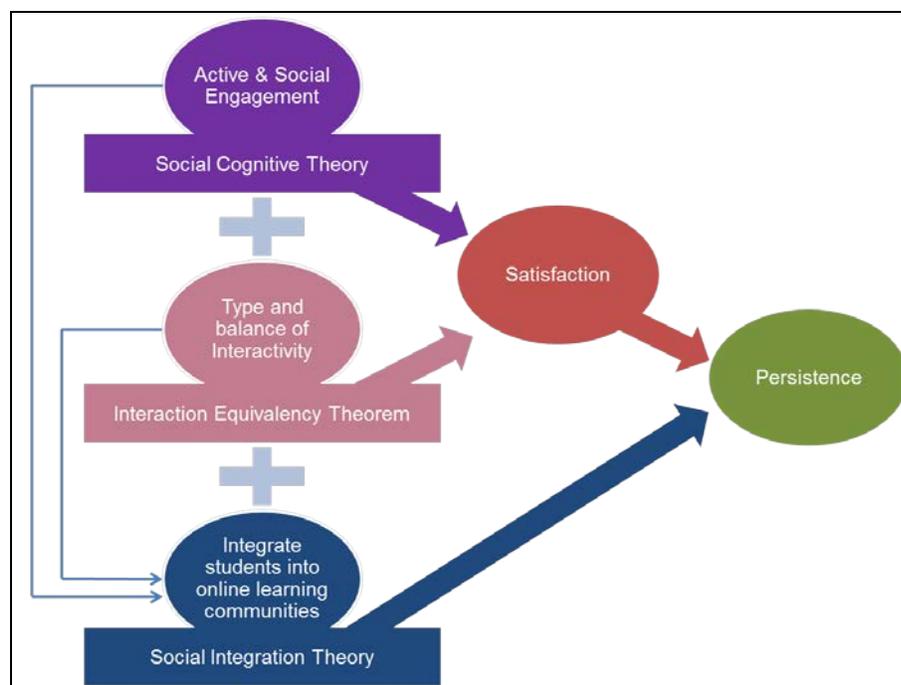

Figure 1. *Framework for course interactivity*

First, in accordance with Bandura's (2001) social cognitive theory and affirmed by the online learning literature (Espasa & Meneses, 2010; X. Liu et al, 2007; Mahle, 2011; Park & Choi, 2009; Thurmond et al., 2002), to promote achievement of learning outcomes, satisfaction, and persistence in online courses, instructors and course designers must create online learning environments that promote active student engagement with course material and meaningful interactions with both instructors and peers. Instead of passive contact with course material, active, socially engaged learning not only helps to promote student learning and satisfaction, but also plays an important role in the integration of students into the formal and informal academic and social systems of college and university life which, according to Tinto's (1975, 1987, 1993) social integration theory, is an important factor in student persistence (Rovai, 2003). Active, socially engaged learning can take many forms, but may include active discussions, cooperative learning, debates, role playing, problem based learning, and simulations (Braxton et al., 2000; Schunk, 2012).

Second, in support of Anderson's (2003) interaction equivalency theorem and affirmed by the findings in the empirical online learning literature (X. Liu et al., 2007; Mahle, 2011; Offir et al., 2007, 2008; Park & Choi, 2009), instructors must consider the different learning styles and preferences of their students and work to create a balance of interactivity (student–student, student–instructor, student–content) that will best promote student learning and satisfaction. To design and teach courses that match student preferences, online instructors may find it useful to better understand who their students typically are and design course interactions based on the overall demographics of their students. Further, online course designers and instructors should consider integrating the three Universal Design for Learning (UDL) principles that address providing multiple means of representation, action and expression, and engagement into their lessons in order to meet the needs of all learners from the start (National Center on Universal Design for Learning, 2013). As affirmed by the research findings highlighted in this review, however, while all three types of interactivity are important, it is critical that student–instructor communication plays a central role in course design for all learners (Espasa & Meneses, 2010; Thurmond et al., 2002). Since many instructors may be new to online teaching, professional development training that incudes practical suggestions and strategies for promoting course interactivity that is both satisfying and reinforces learning should be encouraged. Building a balance of interactivity into online course design that is tailored to the preferences of particular learner groups may both promote student learning and satisfaction as well as contribute to the *social integration* of students that, according to the social integration theory, is critical to student persistence (Rovai, 2003).

Finally, as explained by Tinto's (1975, 1987, 1993) social integration theory (Rovai, 2003) and affirmed by the empirical literature (X. Liu et al., 2007; Morris et al., 2005; Tello, 2007), online instructors must recognize the critical importance their interactions with students and the interactivity between students play in a student's choice to persist. Creating opportunities for purposeful, meaningful interactivity as central to online course design may help to promote persistence by addressing the need for students to become integrated into both formal and informal academic and social systems of an academic community.

Recommendations for Future Research

There are many opportunities for future research relating to the impact interactivity has on student satisfaction and persistence in online course environments. Empirical evidence regarding the importance of online interactivity is limited, thus additional studies on this topic should be undertaken. Because many of the reported studies generalized findings across distinct student groups (e.g., undergraduate, graduate, and adult learners), studies that explicitly address different learning motivations, learning needs, and preferences of these student groups would be useful. It is also recommended that future research be conducted that examines the relative importance of Bandura's (2001) social cognitive theory, Anderson's (2003) interaction equivalency theorem, and Tinto's (1975, 1987, 1993) social integration theory to these distinct student groups.

Further, many studies have attempted to find definitive reasons for the high level of online student dropout. This issue has been difficult to comprehend because reasons are numerous and complex. However, considering the immediate importance this issue holds for institutions of higher education, additional studies should be undertaken to continue investigations of the reasons online students either dropout or persist. Finally, in order to generalize the findings in the existing literature, replication studies should be undertaken in a variety of settings with increased sample sizes.

A future direction for research is that which includes the study of a relationship between learner variables, such as student demographics and learning styles, to online student satisfaction and persistence. Further, looking into the types of interactions distinct student groups prefer may provide a useful contribution to the field of online learning. By developing a clearer understanding of their students' demographics and learning styles and how these styles relate to interaction preferences, online course instructors will have the knowledge to tailor their instructional strategies and tasks in ways that will best meet their learners' needs.

Finally, university administrators, faculty and instructional staff, and course designers must closely watch the rapidly evolving landscape of online learning. As massive open online courses proliferate as a model for delivering course content online to any person who wants to enroll with no limit on attendance (EDUCAUSE, 2013), online course interactivity between students and student–instructor will need to be adapted to meet the learning needs of potentially thousands of students who may be enrolled in a single course at any given time. At the same time, online personal learning environments (PLEs) are on the horizon and will allow learners to take control of their learning by leveraging technology beyond learning management systems. PLEs will support "individual choices about access to materials and expertise, amount and type of educational content, and methods of teaching" (Johnson et al., 2013, p. 10). As PLEs allow students choice, control, and differentiated instruction, new models for online course interactivity will be required to meet the evolving needs of online learners.

References

Allen, I. E., & Seaman, J. (2013). *Changing course: Ten years of tracking online education in the United States.* Babson Park, MA: Babson Survey Research Group and Quahog Research Group. Retrieved from http://www.onlinelearningsurvey.com/reports/changingcourse.pdf

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *The International Review of Research in Open and Distance Learning, 4*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/149/230

Arbaugh, J. B., & Rau, B. L. (2007). A study of disciplinary, structural, and behavioral effects on course outcomes in online MBA courses. *Decision Sciences Journal of Innovative Education, 5*(1), 65- 95. doi:10.1111/j.1540-4609.2007.00128.x

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52,* 1-26. doi:10.1146/annurev.psych.52.1.1

Biesenbach-Lucas, S. (2003). Asynchronous discussion groups in teacher training classes: Perceptions of native and non-native students. *Journal of Asynchronous Learning Networks, 7*(3). 24-46. Retrieved from http://www.sloanconsortium.org/sites/default/files/v7n3_biesenbach-lucas_2.pdf

Braxton, J. M., Milem, J. F., & Shaw Sullivan, A. V. (2000). The influence of active learning on the college student departure process: Toward a revision of Tinto's theory. *The Journal of Higher Education, 71*(5), 569-590. doi:10.2307/2649260

Carr, S. (2000, February 11). As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education*, pp. A39-A41. Retrieved from http://www.chronicle.com/article/As-Distance-Education-Comes-of/14334

Chejlyk, S. (2006). *The effects of online course format and three components of student perceived interactions on overall course satisfaction* (Doctoral dissertation). Available from ProQuest Dissertations & Theses database. (UMI No. 3213421)

Chen, K.-C., & Jang, S.-J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior*, *26*(4), 741-752. doi:10.1016/j.chb.2010.01.011

EDUCAUSE. (2013). Massive open online course (MOOC). Retrieved from http://www.educause.edu/library/massive-open-online-course-mooc

Espasa, A., & Meneses, J. (2010). Analyzing feedback processes in an online teaching and learning environment: An exploratory study. *Higher Education*, *59*(3), 277-292. doi:10.1007/s10734-009-9247-4

Glassmeyer, D. M., Dibbs, R. A., & Jensen, R. T. (2011). Determining utility of formative assessment through virtual community: Perspectives of online graduate students. *Quarterly Review of Distance Education*, *12*(1), 23-35.

Grandzol, C. J., & Grandzol, J. R. (2010). Interaction in online courses: More is NOT always better. *Online Journal of Distance Education Administration, 13*(2). Retrieved from http://www.westga.edu/~distance/ojdla/summer132/Grandzol_Grandzol132.html

Gunawardena, C. N., Linder-VanBerschot, J. A., LaPointe, D. K., & Rao, L. (2010). Predictors of learner satisfaction and transfer of learning in a corporate online education program. *American Journal of Distance Education, 24*(4), 207-226. doi:10.1080/08923647.2010.522919

Hill, J. R., Song, L., & West, R. E. (2009). Social learning theory and web-based learning environments: A review of research and discussion of implications. *American Journal of Distance Education, 23*(2), 88-103. doi:10.1080/08923640902857713

Hollenbeck, C. R., Mason, C. H., & Song, J. H. (2011). Enhancing student learning in marketing courses: An exploration of fundamental principles for website platforms. *Journal of Marketing Education, 33*(2), 171-182. doi:10.1177/0273475311410850

Ivankova, N. V., & Stick, S. L. (2007). Students' persistence in a distributed doctoral program in educational leadership in higher education: A mixed methods study. *Research in Higher Education*, *48*(1), 93-135. doi:10.1007/s11162-006-9025-4

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). *NMC Horizon Report: 2013 Higher Education Edition.* Austin, TX: The New Media Consortium. Retrieved from http://www.nmc.org/pdf/2013-horizon-report-HE.pdf

Jun, J. (2005). Understanding e-dropout? *International Journal on E-Learning, 4*(2), 229-240. Available from EdITLib Digital Library. (4620)

Keeler, L. C. (2006). *Student satisfaction and types of interaction in distance education courses* (Doctoral dissertation). Available from ProQuest Dissertations & Theses database. (UMI No. 3233345)

Kuo, Y.-C., Walker, A. E., Schroder, K. E. E., & Belland, B. R. (2014). Interaction, Internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *The Internet and Higher Education, 20*, 35-50. doi:10.1016/j.iheduc.2013.10.001

Levy, Y. (2007). Comparing dropouts and persistence in e-learning courses. *Computers & Education*, *48*(2), 185-204. doi:10.1016/j.compedu.2004.12.004

Liu, S., Gomez, J., Khan, B., & Yen, C.-J. (2007). Toward a learner-oriented community college online course dropout framework. *International Journal on E-Learning, 6*(4), 519-542. Available from EdITLib Digital Library. (21789)

Liu, X., Magjuka, R. J., Bonk, C. J., & Lee, S.-H. (2007). Does sense of community matter? An examination of participants' perceptions of building learning communities in online courses. *Quarterly Review of Distance Education, 8*(1), 9-24.

Mahle, M. (2011). Effects of interactivity on student achievement and motivation in distance education. *Quarterly Review of Distance Education*, *12*(3), 207-215.

Melguizo, T. (2011). A review of the theories developed to describe the process of college persistence and attainment. In J. C. Smart & M. B. Paulsen (Eds.), *Higher education: Handbook of theory and research* (Vol. 26, pp. 395-424). Dordrecht, The Netherlands: Springer. doi:10.1007/978-94-007-0702-3_10

Moore, M. G. (1989). Three types of interaction [Editorial]. *American Journal of Distance Education, 3*(2), 1-7. doi:10.1080/08923648909526659

Morris, L. V., Finnegan, C., & Wu, S.-S. (2005). Tracking student behavior, persistence, and achievement in online courses. *The Internet and Higher Education*, *8*(3), 221-231. doi:10.1016/j.iheduc.2005.06.009

National Center on University Design for Learning. (2013). *UDL Guidelines 2.0.* Retrieved from
    http://www.udlcenter.org/aboutudl/udlguidelines

Offir, B., Belazel, R., & Barth, I. (2007). Introverts, extroverts, and achievement in a distance learning
    environment. *American Journal of Distance Education, 21*(1), 3-19.
    doi:10.1080/08923640701298613

Offir, B., Lev, Y., & Bezalel, R. (2008). Surface and deep learning processes in distance education:
    Synchronous versus asynchronous systems. *Computers & Education, 51*(3), 1172-1183.
    doi:10.1016/j.compedu.2007.10.009

Park, J.-H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in
    online learning. *Educational Technology & Society*, *12*(4), 207-217. Retrieved from
    http://www.ifets.info/journals/12_4/18.pdf

Rhode, J. F. (2007, November 18). E-learning interaction matrix [Web log post]. Retrieved from
    http://www.jasonrhode.com/interactionmatrix

Rhode, J. F. (2009). Interaction equivalency in self-paced online learning environments: An exploration
    of learner preferences. *The International Review of Research in Open and Distance Learning, 10*(1).
    Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/603/1178

Rochester, C. D., & Pradel, F. (2008). Students' perceptions and satisfaction with a web-based human
    nutrition course. *American Journal of Pharmaceutical Education*, *72*(4). doi:10.5688/aj720491

Rovai, A. P. (2003). In search of higher persistence rates in distance education online programs. *The
    Internet and Higher Education*, *6*(1), 1-16. doi:10.1016/S1096-7516(02)00158-6

Rovai, A. P., & Downey, J. R. (2010). Why some distance education programs fail while others succeed
    in a global environment. *The Internet and Higher Education*, *13*(3), 141-147.
    doi:10.1016/j.iheduc.2009.07.001

Schunk, D. H. (2012). *Learning theories: An educational perspective* (6th ed.). Boston, MA: Pearson.

Sun, P.-C., Tsai, R. J., Finger, G., Chen, Y.-Y., & Yeh, D. (2008). What drives a successful e-learning?
    An empirical investigation of the critical factors influencing learner satisfaction. *Computers &
    Education, 50*(4), 1183-1202. doi:10.1016/j.compedu.2006.11.007

Tello, S. F. (2007). An analysis of student persistence in online education. *International Journal of
    Information and Communication Technology Education*, *3*(3), 47-62. doi:10.4018/jicte.2007070105

Thurmond, V. A., Wambach, K., Connors, H. R., & Frey, B. B. (2002). Evaluation of student satisfaction:
    Determining the impact of a web-based environment by controlling for student characteristics.
    American Journal of Distance Education, *16*(3), 169-190. doi:10.1207/S15389286AJDE1603_4

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of
    Educational Research, 45*(1), 89-125. doi:10.3102/00346543045001089

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition.* Chicago, IL: The
    University of Chicago Press.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.).
    Chicago, IL: The University of Chicago Press.

Tu, C.-H., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes.
    American Journal of Distance Education, 16(3), 131-150. doi:10.1207/S15389286AJDE1603_2

Walker, C. E., & Kelly, E. (2007). Online instruction: Student satisfaction, kudos, and pet peeves.
    Quarterly Review of Distance Education, *8*(4), 309-319.

Willging, P. A., & Johnson, S. D. (2004). Factors that influence students' decision to dropout of online
    courses. *Journal of Asynchronous Learning Networks, 8*(4), 105-118.
    http://www.sloanconsortium.org/sites/default/files/v8n4_willging_2.pdf