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Teleconference Sessions in Distance Learning Courses:
The Influence of Psychological Factors

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ABSTRACT

A teleconferencing learning environment has the potential to increase interaction between educators and learners. Interaction must be designed and continuously supported by the educator. When using teleconferencing in distance education, there is a set of psychological factors which may impact learner involvement. The objective of this study was to identify what psychological factors influence the learner involvement in distance learning courses during teleconferencing sessions. A questionnaire and a semi-structured interview were used as the research tools. The results show that anxiety, learner satisfaction, and expectation of success affect learners and educators in teleconferencing learning environments. Finally, concerning the interconnection of the psychological factors and the effectiveness in teleconferencing sessions as it appears, the main premise of a successful teleconferencing session is laying down the groundwork for adequate planning and preparation taking into account all the influencing psychological factors.

KEYWORDS

Distance Learning Courses, Learning Environments, Psychological Factors, Teleconference

INTRODUCTION

Teleconferencing refers to real-time communication via audio, live video and data (files, presentations, graphics, etc.) between two or more remote locations (Anastasiades, 2007; Anastasiades et al., 2012). Audio and video transfer is achieved by the transmission- reception of compressed video-audio signal (streaming video-audio) using appropriate software. Learners may ask questions, work in groups, interact at the same time, gain access to primary sources of information and combine electronic communication tools, to discuss and collaborate (Tomei, 2011; Panagiotakopoulos, Tsiatsos, Lionarakis, & Tzanakos, 2013).

Lack of familiarization with technology, lack of technological support, and limited network resources causing disconnect are important factors which may stress participants and impact

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the effectiveness of teleconferencing as an educational tool to support distance education (Panagiotakopoulos et al., 2013). The type of educational activities, techniques and tools that the educator uses during a teleconferencing session support the effectiveness of the session and the degree of communication among participants (Karvounis & Anastasiades, 2019).

The effectiveness of a teleconference session largely depends on the 'lesson plan' and the coordination of cooperative activities and communication by the educator (Alqurashi, 2017; Taskiran, 2019). The achievement of learning goals is not influenced by the type of technology used, but rather by the design of the teaching methodology (Lionarakis, 2006; Karvounis, & Anastasiades, 2019).

A wide range of technological, pedagogical, psychological and social factors affect teleconferencing environments in the literature review (Saade & Kira, 2009; Smith, 2011; Harrell & Bower, 2011; Penny, 2011; Hart, 2012; Mikroyannidis et al., 2014; Armakolas, Panagiotakopoulos, & Karatrantou, 2018). Additional challenging factors are the lack of personal contact and the long response time of both fellow students and tutors, leading to a situation where they feel unable to complete their studies without the appropriate support (Lionarakis, Niari, Apostolidou, Sfakiotaki, & Ligoutsikou, 2019).

Psychological factors mainly refers to anxiety, learner satisfaction, self-regulated learning, and expectation of success (Snyder, Shorey, Cheavens, Pulvers, Adams, & Wiklund, 2002; Cheawjindakarn, Suwannattchote, & Theeraroungchaisri, 2012). These factors outline a part of the psychological profile of learners that will help us understand his/her engagement during a teleconferencing session. In order to achieve a successful educational experience, the senses and actions of the participants in the teleconference should lead to a reduction in the perceived transactional distance between tutor and learner and enhance the motivation, emotion and will of the learners (Kanellopoulos, Koutsouba, & Giosos, 2020).

LITERATURE REVIEW

Stress is defined as the expected pressure that exceeds a person's perceived ability to cope with (Palmer, Cooper & Thomas, 2003). Stress is in any case a situation that concerns one person at a time and not all participants of a distance course (Allan & Lawless, 2003). Each factor that affects distance learning may result in different kinds of stress, such as computer anxiety or concept-specific anxiety (Saade & Kira, 2009). Research on online learning concludes that this practice may cause stress among learners when there are time constraints, high dependence on their performance or on the performance of their peers, and the co-dependence on assignments submission (Allan & Lawless, 2003). It is worth noting that computer anxiety may bring a significant disadvantage to the individual in relation to his/her peers (Saade & Kira, 2009) in order to complete the course. Sun, Tsai, Finger, Chen, and Yeh (2008) suggest that people who are familiar with technology will approach e-learning with a positive mindset, resulting in a less stressful experience. So, we can conclude in relation with the source of stress, its existence could have a negative influence on the learner. The provision of information, explanations and special tools adapted in the context of distance learning is considered as a fundamental element in the completion of studies. The need for interaction and communication is also highlighted (Lionarakis, Niari, Apostolidou, Sfakiotaki, & Ligoutsikou, 2019).

On the other hand, learner satisfaction is an important psychological factor for the successful completion of an online course (Chang & Fisher, 2003). It is defined as the perception of pleasure and accomplishment in the learning environment (Sweeney & Ingram, 2001). Moreover, in many cases, it contributes to the creation of motivation, an element that is necessary for the learner's success. As a result, the effort to measure satisfaction is complex and varies according to the nature of the learning experience (Shee & Wang, 2008). Similar to stress, satisfaction is a condition that is unique to the learner and influenced by a number of factors, which may differ depending on the situation. Hart (2012) ranked satisfaction and relevance as the main mediating factors of persistence in e-learning environments. She noted that the learners who persist derive satisfaction from the quality of the program, the interactions with their peers, the relevance of the course to individual's needs and the

web environment itself. In particular, learner satisfaction increases as the duration of study progresses, while the dissatisfaction related to teaching staff and learning leads to a higher rate of failure (Müller, 2008). Finally, Park and Choi (2009) and Levy (2007) found that learners who pursue e-Learning programs are significantly more satisfied than those who give up an online course.

Furthermore, the "success expectation" factor has been studied by Snyder, Shorey, Cheavens, Pulvers, Adams and Wiklund (2002), who suggest that learners are driven to the choice of learning goals and performance from the expectation levels that they form. That premise ranks objective academic achievement above intelligence, personality, and previous academic achievement (Day, Hanson, Maltby, Proctor, & Wood, 2010). The "success expectation" factor is not often found in literature, resulting in incomplete findings that prevent an in-depth understanding of the effect of this factor. However, it was considered that this factor would be very interesting to be studied. Success expectation is defined by the targeting process along with the person's motivation towards the achievement of his/her goals (SUN et al., 2002). Learners with high expectations are able to attempt many strategies to achieve their goals. They treat obstacles as challenges and focus on success. Alternatively, learners with a low success expectation levels give up easily when faced with challenges; they get disappointed and experience low self-esteem. Through this supported reasoning, the success expectation affects the persistence of participants in an e-learning program (Levy, 2007).

It is important to acquire know-how and technical support in case of technical issues which might arise during a teleconferencing session (Cavanaugh, Milkovich, & Tang 2000; Lawson & Comber 2014). Enhanced educator-learner communication, learner motivation development and management, alternative course design and an evaluation timetable help participant achieve a positive attitude and greater self-efficacy. In this case, learner satisfaction is considered to be a factor of effectiveness focused on these elements that affect the efficiency and creation of an appropriate learning environment (Achtemeier, Morris, & Finnegan, 2003; Wiesenberg, & Stacey, 2005; Garrison, & Cleveland-Innes, 2005; Welsh, 2007; Chaney, Eddy, Dorman, Glessner, Green, & Lara-Alecio, 2009; Dobbs, Waid, & Carmen, 2009; Smith, 2011). The effectiveness of the teleconference, is in relation with the preparation of both educator and learners (Armakolas, Panagiotakopoulos, & Magkaki, 2018). The teleconferencing environment is characterized by some specific elements, such as: chatroom, audio-visual material, good sound quality and excellent image. The audiovisual material and the use of the tools provided by the videoconferencing platform seem to contribute to stress relief and active participation (Armakolas, & Panagiotakopoulos, 2020).

Distance education creates an environment in which learners are not only self-directed at a meta-cognitive level, but are also self-motivated (Armakolas, Panagiotakopoulos, & Massara, 2015). Zimmermann & Schunk (2001) analyzed the main theoretical approaches to self-regulated learning and found research data on motivation and self-motivation. Self-regulated learning allows learners to become "metacognitively and behaviourally active and motivated participants in their own learning process" (Zimmerman, 1989; Armakolas, Mikroyannidis, Panagiotakopoulos, & Panousopoulou, 2016). Learner self-motivation encourages them to continuously change and adapt within the system to achieve predetermined goals (Armakolas, Skliva, Mikroyannidis, & Zotos, 2019). Educators can modify the curriculum according to learner self-regulation skills and personalize learning processes. Besides, researchers can explore the relationship between self-regulation and several factors such as social media use, learning outcomes, achievement, or motivation (Kocdar, Karadeniz, Bozkurt, & Buyuk, 2018). Motivation affects how people learn (Pintrich & Schunk, 1996) and trainers must be aware of the continuing support of the learner (Armakolas, Panagiotakopoulos & Vassilopoulou, 2014; Mikroyannidis et al., 2014; Panagiotakopoulos et al., 2013). The learners are proved to be in need of interacting both with their fellow students and their tutors. Not only do they often seek for academic support, but also for emotional and psychological support throughout their studies, not to mention the significance of feeling that they belong to a community. Effective tutor-student interaction and communication is also crucial in this respect. Tutors in distance learning environments are supposed

to continuously facilitate, encourage and foster quality communication and effective interaction among students (Fotiadou, Angelaki, & Mavroidis, 2017).

This research is a part of a wider study which investigated the factors that influence teleconferencing sessions and the effectiveness of experiential techniques upon learning in such environments. The aim of the present research is to identify what psychological factors influence learner involvement during teleconferencing sessions.

Research Questions

As previously noted, technological, social, psychological, and pedagogical factors affect participation, involvement and effectiveness in teleconferencing environments. This research focuses on the psychological factors and the research questions are:

1. What psychological factors affect learners in teleconferencing learning environments?
2. How psychological factors and effectiveness are related in teleconferencing sessions?

METHODOLOGY

For the purposes of the study, both quantitative and qualitative approaches were used. According to Mertens (2014, pp. 375), quantitative research is called "causal-comparative" or "correlation" research. This interpretive approach involves the comparison and correlation of variables. The results of quantitative research complemented the results obtained from the qualitative research. The use of mixed methods is more effective methodologically (Cohen, Manion, & Morrison, 2007).

A questionnaire and semi-conducted interview were the research tools of the study. The research tools of Smith (2011), Panagiotakopoulos et al., (2013) and Armakolas et al. (2018) formulated the basis of the questionnaire for this research. The questionnaire consisted of ten statements related to psychological factors. Variables were measured using a five (5) grade Likert scale (Strongly disagree, Disagree, Neither Disagree nor Agree, Agree, Strongly agree).

In order to check the content validity three experts in the field edited the questionnaire and the questions of the semi-structured interview. A pilot study followed, involving four participants with the characteristics of the sample to validate both the understanding of the statements and the settings of the research (Panagiotakopoulos & Sarris, 2015). The internal consistency coefficient Cronbach's α was used to identify the reliability of the answers against the scales.

The statements of the questionnaire were:

1. The more communicative and supportive the educator is, the less stressful is the learner's participation and involvement in a teleconference session.
2. Communication between learners helps to actively involve all participants.
3. I can deal with my stress during a teleconference.
4. Participating in a teleconference session is a pleasant experience.
5. During a teleconference session, I am motivated to work in a more effective way and to improve my learning performance.
6. The teleconference session can establish a supportive environment for the learner, in order to manage the way and the pacing for his/her study.
7. I participate "actively" during a teleconference session.
8. During a teleconference session I'm very attentive and concentrated.
9. My expectations for participating in a teleconference session were initially low.
10. The results of my teleconference participation fulfilled my expectations.

The questions of the interview were:

1. How much are you getting anxious during a teleconference session? When does it happen? How do you manage it?
2. Are you satisfied with the teleconference session' goals achievement?

The sample of our research consists of pre-service teachers, students in ASPETE (Higher School of Pedagogical and Technological Education). The teleconference sessions were held as part of the course "Educational Technology". The course consists of two parts: lectures and practice (laboratory sessions). The course includes the following lesson modules: *Distance Learning and the Role of the Internet*, *Learning Management Systems*, *Adaptive Learning Environments*, *Collaborative Environments*, *Teaching and Learning methods*. The teleconference sessions and their educational content were parts of the module: "Distance Learning and the Role of the Internet".

A trial multi-point teleconference was held before data collection to familiarize participants with the use of the platform and its tools. Big Blue Button (bigbluebutton.org) is an open source platform. It can be used on any computer regardless of its operating system. Big Blue Button has a user friendly and intuitive interface and successfully supports collaborative learning activities.

Eleven (11) teleconferencing sessions took place (from 4 December 2017 to 3 February 2018), and each lasted 60 minutes. During the teleconferencing sessions the educator was at the Computers and Educational Technology Laboratory (www.cetl.upatras.gr) of the Department of Education and Social Work of University of Patras and the participants were at the place of their choice. The educational content of the teleconference complemented the content of face to face courses. Experiential techniques such as brainstorming, teamwork, case study and simulation were used in order to engage students in a more interesting and engaging learning process.

Data collection was performed immediately after the end of the educational interventions and was anonymous and voluntary. A total of 121 questionnaires were collected.

For the interviews, a sample of nineteen (19) learners was used. The learners specialized in various fields (3 philologists, 5 information technology teachers, 3 engineering teachers, 3 social science teachers, 3 economic science teachers and 2 technology teachers). They were chosen by the researcher according to the following criteria: the interest they showed during teleconference sessions and their scientific interest in the future use of teleconference tools during face to face meetings.

FINDINGS

The internal consistency of the answers of the research tool was considered to be acceptable (*Cronbach´s a=.707*), according to Cohen et al., (2007, p. 506).

According to the close-ended answers of the participants, the following findings arose, as described below.

The more communicative and supportive the educator hosting a teleconference is, the lower stress levels learners have. Almost sixty percent (59.5%, n=72) of the participants claimed that they "strongly agree" whereas 33.9% (n=41) "agree" (Table 1).

The majority of the learners stated that communication helps to actively involve all participants. A percentage of 40.5% (n=49) "strongly agree" and a percentage of 44.6% (n=54) "agree" with the statement (Table 2).

The majority of the participants can manage their stress levels during a teleconferencing session; 28.9% (n=35) "strongly agree" and 53.7% (n=65) "agree" with this statement (Table 3).

However, there is a non-negligible percentage of participants (n=20, 16.5%) who are not certain regarding whether they could manage stress during a long teleconferencing session.

The majority of the learners stated that participating in a teleconferencing session is a pleasant experience; 53.7% (n=65) "strongly agree" and 38.9% (n=47) "agree" with the statement (Table 4).

Table 1. Answers to the statement: The more communicative and supportive the educator is, the less stressful is the learner's participation and involvement in a teleconference session.

	Frequency	Percent
Strongly disagree	1	0.8
Disagree	0	0.0
Neither agree nor disagree	7	5.8
Agree	41	33.9
Strongly agree	72	59.5
Total	121	100.0

Table 2. Answers to the statement: Communication between learners helps to actively involve all participants.

	Frequency	Percent
Strongly disagree	1	0.8
Disagree	4	3.3
Neither agree nor disagree	13	10.7
Agree	54	44.6
Strongly agree	49	40.5
Total	121	100.0

Table 3. Answers to the statement: I can deal with my stress during a teleconference.

	Frequency	Percent
Strongly disagree	1	0.8
Disagree	0	0.0
Neither agree nor disagree	20	16.5
Agree	65	53.7
Strongly agree	35	28.9
Total	121	100.0

Table 4. Answers to the statement: Participating in a teleconference session is a pleasant experience.

	Frequency	Percent
Strongly disagree	1	0.8
Disagree	2	1.6
Neither agree nor disagree	6	4.9
Agree	47	38.9
Strongly agree	65	53.7
Total	121	100.0

The majority of learners are motivated to work more efficiently and to improve their learning performance during a teleconference session; 28.9% (n=35) "strongly agree" and 52.9% (n=64) "agree" with the statement (Table 5).

Most of the learners stated that a teleconferencing session can establish a supportive environment for the learner, in order to manage the approach and pace for his/her study; 38.0% (n=46) "strongly agree" and 48.8% (n=59) "agree" (Table 6).

The correlation among statements/variables was examined by calculating the Spearman r_s coefficient. The most significant correlations are:

Stress levels are negatively strong correlated with the effectiveness of the teleconference ($r_s(119)=-.623$; $p<.001$). There is a strong correlation between the pleasure during participation in a teleconference and the motives for improved learning performance and effective studying.

Most of the learners stated that a teleconferencing session can establish an actively participatory environment; 32.2% (n=39) "strongly agree" and 48.7% (n=59) "agree" (Table 7).

The majority of the learners stated that during a teleconference session were attentive and concentrated; 28.1% (n=34) "strongly agree" and 55.4% (n=67) "agree" with the statement (Table 8).

Most of the learners stated that their expectations for participating in a teleconference session were initially low; 10.7% (n=13) "strongly agree" and 21.5% (n=26) "agree" (Table 9).

The majority of the learners stated that participation fulfilled their expectations; 25.6% (n=31) "strongly agree" and 41.3% (n=50) "agree" with the statement (Table 10).

Comparing the statements: a) "My expectations for participating in a teleconference session were initially low" and b) "The results of my teleconference participation fulfilled my expectations", we can conclude that participation exceeded initial expectations.

Table 5. Answers to the statement: During a teleconference session, I am motivated to work in a more effective way and to improve my learning performance.

	Frequency	Percent
Strongly disagree	4	3.3
Disagree	0	0.0
Neither agree nor disagree	18	14.9
Agree	64	52.9
Strongly agree	35	28.9
Total	121	100.0

Table 6. Answers to the statement: The teleconference session can establish a supportive environment for the learner, in order to manage the way and the pacing for his/her study.

	Frequency	Percent
Strongly disagree	0	0.0
Disagree	0	0.0
Neither agree nor disagree	16	13.2
Agree	59	48.8
Strongly agree	46	38.0
Total	121	100.0

Table 7. Answers to the statement: I participate "actively" during a teleconference session.

	Frequency	Percent
Strongly disagree	0	0.0
Disagree	4	3.3
Neither agree nor disagree	19	15.7
Agree	59	48.7
Strongly agree	39	32.2
Total	121	100.0

Table 8. Answers to the statement: During a teleconference session I'm very attentive and concentrated.

	Frequency	Percent
Strongly disagree	0	0.0
Disagree	6	4.9
Neither agree nor disagree	14	11.5
Agree	67	55.4
Strongly agree	34	28.1
Total	121	100.0

Table 9. Answers to the statement: regarding to the expectations before the teleconference.

	Frequency	Percent
Strongly disagree	8	6.6
Disagree	35	28.9
Neither agree nor disagree	39	32.2
Agree	26	21.5
Strongly agree	13	10.7
Total	121	100.0

Table 10. Answers to the statement regarding to the expectations after the teleconference

	Frequency	Percent
Strongly disagree	11	9.1
Disagree	17	14.0
Neither agree nor disagree	12	9.9
Agree	50	41.3
Strongly agree	31	25.6
Total	121	100.0

INTERVIEW ANALYSIS AND RESULTS

The main results of analyzing learner answers during interviews after transcription and thematically grouping the contents are presented (Cohen et al., 2007).

Answers to the question 'How much are you getting anxious during a teleconference session? When does it happen? How do you manage it?' highlight stress as a determining factor. At the beginning of the session, stress is more intense. However, during the session and throughout active participation and cooperation, stress can decrease. Familiarization with teleconferencing tools and procedures can reduce the stress of learners. Some characteristic responses include:

- "Lack of direct communication is what makes me more nervous, because I have no access to the non-verbal messages."
- "Teleconferencing, as a living, interactive process creates stress. I experienced stress especially at the beginning of the session. It has to do with the presence of the camera, Stress was managed successfully by both the educator and the learners."
- "The process creates a little bit of stress on whether the teleconference will be successful. The learner, due to the fact that there is no direct contact with his/her teacher, does not cease to be anxious about the course. Usually stress appears when there are technical problems or the lesson lasts too long. I dealt with it with patience and perseverance. The willingness of both educator and learner plays an important role."
- "I felt anxious when we had to announce the conclusion of our team project."
- "I believe that the stress during a teleconference session is the same with that during a lesson in a classroom. In my opinion, most of the stress appears when the educator askes for someone to speak. It was difficult for me to manage stress. I needed to have some time to think before I get to speak."

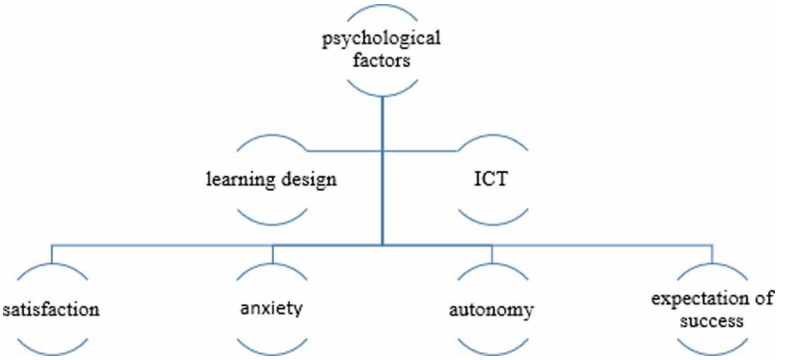
Answers to the question 'Are you satisfied with the teleconference session' goals achievement?' indicate high satisfaction. Learners answer that they achieved the learning goals during teleconferencing session and as a result, are satisfied. Some characteristic responses include:

- "I think the objectives of the course were achieved although teleconference was a relatively new experience for me."
- "Yes, the lesson was just as the lesson in a real classroom. The learning objectives have been achieved. I am more satisfied than I expected."
- "Yes. The educator's experience as well as our active participation have contributed to a better understanding of the concepts taught."
- "I am quite satisfied with the teleconference session and believe that the objectives of the course I attended have been achieved".

Outlining the major themes and sub themes that emerged from the interviews, we could be led to Figure 1.

Research indicates that, the learning process through a teleconference session is an interesting experience. Before the start of a teleconference session, the teacher should study the participants' specific characteristics, needs and expectations, their experience with ICT, and then proceed to formulate the purpose and objectives of the lesson, organize the learning activities, choice of appropriate educational techniques and teaching tools. Satisfaction is a multifactorial indicator, which ultimately reflects the whole complex structure of distance education and the several parameters, like stress and autonomy (Foutzopoulou, & Mavroidis, 2020). Through learning design, the appropriate conditions for the achievement of learning are created during teleconference which increase student participation and reduce stress.

Figure 1. The major themes and sub themes (interconnection between factors) that emerged from the interviews



CONCLUSION

According to the results of the first research question, we can conclude that anxiety and learner satisfaction affects learners in teleconferencing learning environments. Stress management is a parameter that depends on familiarity with this educational tool and procedure. Technical problems, such as lack of sound and internet connection problems increase learner anxiety when a teleconferencing session is in progress. In a teleconferencing environment, educators should promote student self-confidence in their ability to learn. With proper educational design, the educator can apply experiential educational techniques and methods to increase interaction and encourage collaboration between the participants. Teleconferencing supports the learners by increasing accountability in the learning process. Due to the concept that knowledge is socially negotiated (McLoughlin & Lee, 2010; Johnson, Smith, Willis, Levine, & Haywood, 2011), the pedagogical framework upon which a teleconference is built is considered to be a necessity. It is an imperative need for teleconferencing to determine a thorough educational plan that will eventually become the structural point of the learning process.

According to the results of the second research question, concerning the interconnection of the psychological factors and the effectiveness in teleconferencing sessions, we can conclude that one of the main prerequisites for a successful teleconferencing session is an effective 'lesson plan', which takes into account all of the psychological factors affect learners during a teleconference session. That needs to come both from the educators and learners, with an added emphasis on adaptability and support skills of educators. The role of the educator must be supportive and organizational, aiming to foster one's skills, such as critical thinking, communication and cooperation. In distance learning, educators should support the confidence of learners. Teleconference participants tend to develop a positive attitude towards learning, eventually resulting in more effective goal achievement. (Cavanaugh, Milkovich, & Tang. 2000; Lawson & Comber, 2014) In this case, personal satisfaction of learners arises as a valuable factor to measure performance effectiveness. This factor promotes communication and cooperation between learners, and offers the educator the ability to operate within a supportive environment. To communicate successfully, learners and educators have to take control of tools and adapt their ways of interacting (Hampel & Stickler, 2012; Armakolas Panagiotakopoulos, & Fragoulis, 2014). As Moore (1989) states, educators should aim to maximize effectiveness in any form of interaction and ensure that the tool they decide to utilize in each learning session fits the established learning goals and matches the different development stages of their learners (Lionarakis, 2006).

Constant motivation, a friendly and communicative attitude, preparation and excellent knowledge of the study material by the educator are factors that eventually result in a pleasant learner experience. At the same time, a teleconference is effective both by being a pleasant experience for the learners and controlling stress levels. The more communicative and supportive the educator is, the less stressful

learner participation and involvement in a teleconferencing session. Comparing the statements: a) "My expectations for participating in a teleconference session were initially low" and b) "The results of my teleconference participation fulfilled my expectations", we can conclude that participation exceeded initial expectations. Additionally, the implementation of work groups in a teleconferencing classroom influences how effectively learners tend to perform within the boundaries of a community that is founded upon the principles of cooperation, interaction and communication. Teleconferencing sessions using work groups can establish a supportive environment for the learner, to manage the approach and the pace of study.

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Designing Scholarly Conversations to Promote Cognitive Presence and Knowledge Building:

An Exploratory Study From an Online Graduate Course

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ABSTRACT

In this exploratory study, a pedagogical intervention, called Scholarly Conversation, was designed and implemented with 26 students in an online graduate course at a public, comprehensive university in the United States. Applying the frameworks of community of inquiry and knowledge building, this paper explains the specific learning goals and design features of Scholarly Conversation. A coding scheme was developed from the conversation text data generated by a high-performing and a low-performing group of the class to describe how learners carried out Scholarly Conversations. Through group comparison, several elements were identified to explain the between-group differences on performance. Particularly, it was found that the two groups distributed their efforts differently during Scholarly Conversations. This study has implications for the design principles for the future Scholarly Conversations.

KEYWORDS

Collaborative Learning, Community of Inquiry, K12 Teachers, Knowledge Building, Online Graduate Course, Scholarly Conversations

INTRODUCTION

In higher education, collaborative learning has often been adopted as an instructional approach to prepare students for their professional careers (Smith et al., 2011). This is particularly imperative for programs that support pre-service and in-service teachers because teachers are expected to model effective collaboration in order for their students to develop the 21st century skills (Trilling & Fadel, 2009, p. 49). However, many programs assume teachers or teacher candidates know how to collaborate, and therefore, do not provide sufficient opportunities to help them gain authentic understanding and skills of effective collaboration (Weiss et al., 2017).

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In order to improve collaborative learning, an essential challenge must be addressed in the design phase of collaboration. As researchers have pointed out (Inayat et al., 2013; Margaliot et al., 2018), collaboration should not be limited to communication and sharing of knowledge, but serve as a means for in-depth inquiry to co-construction of new knowledge. To achieve this goal, a pedagogical intervention, called Scholarly Conversation, was designed and implemented in an online graduate course at a public, comprehensive university in the United States. This course was mainly to support K-12 teachers to develop skills in designing online learning environments but the original course design did not include authentic collaborative learning opportunities. The goal of the study is to describe how online learners went about Scholarly Conversations, identify the patterns, if any, of their experiences and explore the design principles for online collaborative learning. In the rest of this article, a literature review on collaborative learning, Community of Inquiry and Knowledge Building will be presented. Next, the design of Scholarly Conversation, the research context, coding methods, and findings will be described, followed by discussions of this study.

LITERATURE REVIEW

Collaborative Learning

A common approach to designing collaborative learning is to develop highly structured group activities to guide students to complete pre-planned tasks and progress to the desired cognitive level (Gasevic et al., 2015). Another approach, called idea-centered collaboration (Hong & Chai, 2017), involves a less-structured process where groups of learners develop and refine ideas continually without any fixed format and pre-determined tasks. Many students do not know how to collaborate due to a lack of learning management skills and self-regulation skills (Bjork et al., 2013). Therefore, they tend to focus on low-level cognitive activities (Hong, 2014) rather than to continuously advance their conceptual understanding during collaboration. To address these challenges, it is pivotal to incorporate both the structured and idea-centered approaches to collaboration. The structured approach provides well-defined procedures that can help students regulate the group process. The idea-centered method can support learners to achieve higher levels of cognitive thinking (Hong & Chai, 2017).

However, current research focuses on either the structured (e.g., Scheuer et al., 2014) or the idea-centered method (e.g., van Aalst & Truong, 2011). There is little effort to apply both approaches to address the challenges facing learners and maximize the support for their collaboration. To fill this gap, this study aims to incorporate both the structured and the idea-centered approaches to guide the design of Scholarly Conversation. The Community of Inquiry (CoI) framework (Garrison & Anderson, 2003, pp. 27-31) is adopted to design the structured components of Scholarly Conversation. Knowledge Building pedagogy (Scardamalia & Bereiter, 2014) is used to embed the idea-centered principles into Scholarly Conversations.

Community of Inquiry Framework

The Community of Inquiry (CoI) framework has been used extensively for online collaborative learning (Halverson et al., 2014). Based on a constructivist view, the CoI framework consists of three essential elements: teaching presence, cognitive presence, and social presence (Garrison et al., 2010). Teaching presence is defined as "the design, facilitation and direction of … processes for the purpose of realizing … learning outcomes" (Anderson et al., 2001, p. 5). Cognitive presence refers to the extent to which learners are able to "construct meaning through sustained communication" (Garrison et al., 1999, p. 89). It is an inquiry process with four phases: i) triggering event — experiencing a dilemma or problem; ii) exploration — searching for relevant information or knowledge; iii) integration — making sense of information to develop a coherent idea or concept; and iv) resolution — applying an idea or developing a solution. Social presence is defined as the ability of learners to "identify with the community, communicate purposefully in a trusting environment, and develop relationships"

(Garrison, 2009, p. 352). Social presence is found to overlap with teaching presence and cognitive presence (Garrison et al., 2010).

Numerous studies have shown that teaching presence is critical for an effective online learning environment (e.g., Hosler & Arend, 2012; Preisman, 2014). Particularly, instructional design, as a key component of teaching presence, has a significant impact on whether online students reach high levels of cognitive presence (Gasevic et al., 2015). A meta-analysis finds that students in designed conditions, where pedagogy-driven interactions were intentionally implemented, outperformed those in contextual conditions, where learner interactions were unguided (Borokhovski et al., 2016). This suggests that online collaborative learning requires effective instructional design elements, such as establishing content and providing frameworks, directions or timelines for learning activities (Armellini & De Stefani, 2016; Garrison et al., 2010). Design elements may also include a process guide that leads learners to identify real-world situations, interpret external resources, explain ideas, and develop and justify solutions (Gasevic et al., 2015), which correspond to the four phases of an inquiry process that promotes cognitive presence and overlap with Knowledge Building principles (Scardamalia & Bereiter, 2010).

Knowledge Building Pedagogy

The term Knowledge Building refers to a social process focused on sustained advancement of community knowledge; during the process, new knowledge is regarded as being created, rather than, discovered (Scardamalia & Bereiter, 2014). Twelve Knowledge Building principles have been developed (Scardamalia & Bereiter, 2010) and implemented in various settings including teacher education programs (Hong & Chai, 2017). The specific principles incorporated in Scholarly Conversation of this study are listed in Table 1.

Scholars have developed different frameworks for analyzing online discussions facilitated by Knowledge Building principles. Examples include Knowledge Processing Activity Scale (Chan et al., 1997), knowledge building discourse scheme (Chuy et al., 2011), and three modes of online discourse (van Aalst, 2009). These frameworks include dimensions that reflect the varying degrees of cognitive presence demonstrated during discussions.

van Aalst's (2009) three modes of discourse – knowledge sharing, knowledge construction, and knowledge creation/building – is adopted in this study because it is comprehensive enough to address a range of cognitive levels in online discussions. Furthermore, each of the three modes

Figure 1. Community of Inquiry framework (Adapted from (Garrison et al., 1999))

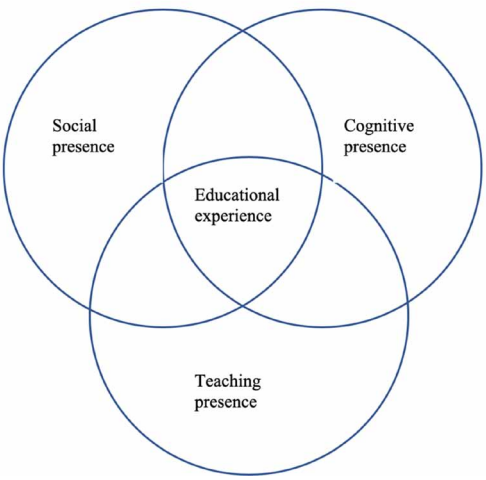

Table 1. Three phases of scholarly conversation

Conversation topic of this study: *How will you apply the major theories of online learning to design an online learning environment for your audience (mostly K-12 students)?*		
Alignment with van Aalst's (2009) model	Examples of suggested activities	Alignment with Knowledge Building principle(s) (Scardamalia & Bereiter, 2010)
Phase 1: Knowledge sharing	• Examine the topic by sharing relevant personal experiences, initial thoughts and/or questions • Creating a list of questions for further investigation.	• Authentic problems, real ideas that require efforts to understand the world
Phase 2: Knowledge construction and/or knowledge building	• Search for scholarly resources • Critically review the resources and evaluate how they address the specific questions about the topic • Identify the underlying theories, models, and main arguments about the topic • Apply various strategies to drive conversation to deeper levels: ask probing questions, provide analogies and real-life examples, etc.	• Constructive use of authoritative sources • Continual advancement of conceptual understanding
Phase 3: Knowledge building	• Synthesize the conversation to make conclusions about the topic • Create a digital artifact to illustrate the main aspects of the conversation	• Rise above which entails working toward more inclusive principles, or creating intellectual artifacts

is broad enough to allow flexibility for a new coding scheme to be developed specifically from this study. According to van Aalst (2009), knowledge sharing mainly refers to the transmission of information and ideas among people. Knowledge construction is concerned with how learners make sense of information and construct meanings. Knowledge building requires members engage in sustained inquiry to continuously develop and improve ideas to promote innovation (Scardamalia & Bereiter, 2014). Knowledge building emphasizes demonstrations of explanations, causal mechanisms, and the coordination of claims and evidence (Bereiter & Scardamalia, 2003).

In summary, the CoI framework and Knowledge Building pedagogy can help inform the design of online collaborative learning. Specifically, the CoI framework could be used to create a structure that guides learners through an inquiry process. Knowledge Building pedagogy can be applied to promote the continual improvement of ideas and understanding shared among learners.

RESEARCH QUESTIONS

With the above conceptual guidance, Scholarly Conversation was designed and implemented in an online graduate course. Data from the highest and lowest performing groups were analyzed to develop a coding scheme and identify the design elements crucial for the success of collaborative learning. The following research questions were investigated:

1. How did the students carry out Scholarly Conversations? To what extent were they engaged in knowledge sharing, knowledge construction, and knowledge building?
2. Were there any elements from Scholarly Conversations that could possibly explain the differences between the high- and low-performing groups?

DESIGN OF SCHOLARLY CONVERSATION

Scholarly Conversation is a required learning task completed by groups of three or four in an online graduate course, "*Developing Online Learning Environment (DOLE)*". A variety of scaffolding resources are provided: i) a five-minute, introduction video explaining how to conduct Scholarly Conversations, ii) an evaluation checklist highlighting the expected activities and achievement, and, iii) a process guide suggesting timelines and action steps around a three-phase structure:

In Phase 1, students are asked to address the instructor-developed prompts. Typically, they share relevant personal experiences to form initial ideas and questions around a topic. Learners will work collaboratively to identify a short list of questions of common interest for further investigation. They are suggested to spend the first 30% of time to complete Phase 1. For example, if Scholarly Conversation is supposed to be completed in one week, Phase 1 will take place in the first two days.

In Phase 2, learners try to find scholarly resources, particularly peer-reviewed journal articles, about their topic. They ask each other probing questions to interpret and evaluate the resources in order to construct new knowledge. There is an emphasis on moving beyond the instructor-initiated questions to deepen understanding. About 40% of time is suggested to be allocated for Phase 2.

In Phase 3, learners work collaboratively to synthesize the conversation into an intellectual, technology artifact. They can choose any digital tool available to create the product. Additionally, each student reflects on whether and how their understanding has evolved during the conversation. Phase 3 will take about another 30% of time.

CONTEXT AND PARTICIPANTS

This study was conducted in a 10-week, online graduate course, "*Developing Online Learning Environment (DOLE)*", offered through the Educational Technology program at a public, comprehensive university in the United States in 2016-2017. It was the first official implementation of Scholarly Conversation, which provided the opportunity to explore the participants' first experiences with Scholarly Conversation. In this course, 26 students were divided into seven groups (3 ~ 4 individuals per group) to complete a Scholarly Conversation in Week 3, counted as 10% of the course grade. The instructor asked the students to watch the introduction video and review the evaluation checklist (Table 3), and then follow the three-phase structure from the process guide to discuss how to apply the relevant theories to design online learning environments. The groups used Google Docs to have the one-week asynchronous conversation as part of the course requirements. Their conversation records were analyzed to generate the coding scheme after the course ended so the students were not aware of this study.

Learning outcomes of Scholarly Conversations were assessed using the evaluation checklist developed by the instructor. The checklist was designed to incorporate Knowledge Building principles and included 15 items addressing five aspects (Table 3). In this exploratory study, the highest (n_h = 4) and lowest (n_l = 4) performing groups were selected to capture the possible range of performance and various strategies used in Scholarly Conversations. Table 2 and Table 3 show a summary of the participants and their learning outcomes.

CODING OF SCHOLARLY CONVERSATION

Due to the resource constraints, only one researcher coded the text data from Scholarly Conversations using Transana Professional 3.1. A coding scheme was developed with the goal of describing how learners carried out online conversations and identifying the cognitive levels demonstrated. The scheme initially included three main codes, *Share Knowledge*, *Construct Knowledge*, *Build Knowledge*, reflecting van Aalst's (2009) framework and emphasizing cognitive presence (Garrison et al., 1999), but the coding process was flexible to allow new, relevant themes to emerge (Glaser, 2005).

Table 2. Participants of the study

High group ($n_h = 4$)			Low group ($n_l = 4$)		
Group members	**Gender**	**Background**	**Group members**	**Gender**	**Background**
DOLE_high_01	Male	College instructor	DOLE_low_01	Female	K12 teacher
DOLE_high_02	Male	K12 teacher	DOLE_low_02	Female	K12 teacher
DOLE_high_03	Male	K12 teacher	DOLE_low_03	Female	K12 teacher
DOLE_high_04	Female	K12 teacher	DOLE_low_04	Female	K12 teacher

Table 3. Performance of the high and low groups

Evaluation Checklist	High group	Low group
Processing content (3 points total, 1 point each item) • Identify relevant and important issues and questions around the topic and address these issues and questions thoroughly. • Find and share numerous relevant resources from sources outside the course, including at least 4 peer-reviewed scholarly works published within the past 8 years. • Synthesize the conversation to make a conclusion about the issues you previously identified around the topic.	3	3
Demonstrating critical thinking (6 points total, 1 point each item) • Critically review the resources you find to determine whether they are relevant, valid, or helpful for your conversation. • Accurately identify arguments from external resources, particularly from those scholarly works. • Make significant efforts to drive your conversation to deeper levels through various strategies. For example, asking probing questions, using analogies, sharing examples to explain, extend or contrast. • Make significant efforts to connect your ideas, examples, and the arguments you find from other sources with relevant theories or conceptual frameworks. • Make significant effort to develop and explain your own ideas, assumptions, and/or hypotheses to create new knowledge around the topic. • Make significant effort to use theories or research-based evidence to justify the importance of your own ideas, assumptions, and/or hypotheses.	5	3
Building a learning community (3 points total, 1 point each item) • Everyone from your team has made substantial contributions. • Everyone is engaged and actively helps each other to enhance the development of a learning community. • There is mutual respect and understanding among the team members.	3	2.5
Presenting and communicating (2 points total, 1 point each item) • Presentation is clear. • Use creative methods to present and communicate effectively.	2	2
Reflecting on learning growth (1point total, 1 point each item) • Provide evidence on whether and/or how much your knowledge and understanding have expanded, deepened, or changed around the topic.	1	1
Total	14	11.5

The researcher first read the groups' conversations, identified text segments, called quotes, to be associated with the main codes. If any text segment did not seem relevant to the main codes but reflected how the group conducted the conversation, a new code would be created to capture the activities or levels of thinking students demonstrated. Three new main codes were developed: *Build*

Community reflected the group's effort to establish social presence (Garrison et al., 2010). *Manage Project* described how learners addressed the logistics issues, such as planning, tool selection, and division of work. *Deepen Understanding* indicated the strategies leaners used to promote cognitive presence. Next, the researcher looked more carefully into the quotes to analyze how the main codes were exemplified. Sub-codes and the corresponding sub-quotes were generated to describe the specific activity, strategy, and/or outcome within each main code (more below). In the following step, the researcher reflexively checked the code definitions and the relevance and accuracy of the quotes. Immediately after that, this step was repeated to refine the coding scheme.

Since there was no second coder, the researcher returned to the data after approximately three months and completed a second round of coding using the same process above. The code allocations were overall consistent between the two rounds, with about 15% of the quotes needing to be recoded. The finalized coding scheme includes six main codes and 20 sub-codes (Table 4). There are 144 and 99 quotes from the high- and low-performing groups, respectively.

FINDINGS

Research Question 1

A frequency analysis was conducted to address the first research question. The code frequencies are shown in Table 4.

The following patterns can be discovered for both groups. First, students invested most effort to *Share Knowledge* (60), *Manage Project* (58), and *Deepen Understanding* (52). There were relatively fewer code instances under *Construct Knowledge* (41). Code frequencies for *Build Knowledge* (20) and *Build Community* (12) were the lowest. Second, analysis of the sub-codes revealed that the top five activities learners did were "*share interest, feelings, emotions*" (24), "*identify relevant factors and relationships from readings*" (21), "*elaborate*" (21), "*monitor or report progress*" (19), "*rephrase or summarize information from readings*" (18). The bottom five were "*connect personal experiences to theories*" (5), "*develop original explanations or predictions*" (5), "*ask probing questions*" (3), *"synthesize to make conclusions*" (2), and "*provide examples to illustrate a counter point*" (1).

To gain more understanding of the nature of the groups' conversations, the codes and the associated quotes were further analyzed. Examples of quotes for each sub-code are listed in Table 4.

Share Knowledge

One of the main aspects of the groups' Scholarly Conversation was sharing knowledge: information, ideas, or feelings were transmitted among the group members but not much effort was made to interpret, develop, or evaluate what was shared (van Aalst, 2009). As reflected by the sub-codes, learners were engaged in four types of activities when sharing. Particularly, they spent substantial time sharing their feelings and emotions (24) about the topic discussed. For example, when asked to study the relevant theories, one student stated "*If I am being totally honest, the word 'theory' makes me a little nervous, but I am excited to learn more.*"

Students also shared relevant personal experiences (17). They often described their experiences with their school districts, but there was not much elaboration or interpretation. Other activities (sub-codes) included sharing or citing resources (12), when students shared citations or external materials but did not analyze or explain those resources. Learners also shared descriptive comments or questions (7), which were relatively simple statements about facts, opinions or "what" questions demonstrating little higher-order thinking.

Construct Knowledge

This code suggests a higher level of cognitive presence. In this study, students were interacting with the readings to construct conceptual understanding around the topic. Their knowledge construction

Table 4. Code frequencies and examples of quotes

Main Code	Sub-code and examples of quotes	High Group	Low Group	Both Groups
Share knowledge		**38 (26.4%)**	**22 (22.2%)**	**60 (24.7%)**
	Share interest, feelings, emotions - "*I like theory so I am excited! The different ways of conceptualizing online learning will be interesting to know about.*"	18	6	24
	Describe relevant personal experiences - *"I remember an online class where two of us were actively participating in the discussions, whereas the other students were falling behind."*	11	6	17
	Share or cite resources - *"Here is an article that I found…"*	5	7	12
	Share descriptive comments or questions - "*Teachers video record the lecture portion of the class for students to watch at home beforehand.*"	4	3	7
Construct knowledge		**30 (20.8%)**	**11 (11.1%)**	**41 (16.9%)**
	Identify relevant factors and relationships from readings - *"A large number of recent research studies have indicated that social presence is one of the most significant factors in improving learners' satisfaction, enhancing instructional effectiveness and building a sense of community."*	16	5	21
	Identify main ideas, findings or significance from readings - *"The study found instructor who were most comfortable with technology and confident in online teaching were able to make use of the flipped classroom. "*	10	5	15
	Connect personal experiences to theories or concepts - *"I have been working with Schoology for 3 years now, been in multiple classes with D2L, for me, I have the grit and ability to create my social presence to be successful. I am a tactical learner, this style assists me greatly in technology…"*	4	1	5
Build knowledge		**20 (11.1%)**	**4 (4.0%)**	**24 (8.2%)**
	Develop original ideas about real-life implications - "*Cognitive learners require strategies that allow them to perceive and attend to the information so that it can be transferred to working memory. Information should be chunked and strategies used should promote deep processing. Learners should be able to select activities that meet their varying learning styles. Textual, verbal, and visual information should be presented to encourage encoding. Finally, cognitive learners need to be motivated to learn.*"	12	1	13
	Develop original explanations or predictions about relationships among variables - *"I remember an online class where two of us were actively participating in the discussions, whereas the other students were falling behind. I'm unsure if the discussions are correlating with or causing these differences, but the theories say students who engage do better with learning outcomes than when students attempt to learn independently."*	2	3	5
	Synthesize to make conclusions - *"I can think of a lot of students who would be just as successful in an OLE as they would be in a classroom. I can also think of a lot of students who would be a complete dumpster fire if they had to participate online or at their own pace. While I am not questioning the benefits of OLE, I think that it is important to remember that there are no "one size fits all" answers."*	2	0	2

continued on following page

Table 4. Continued

Main Code	Sub-code and examples of quotes	High Group	Low Group	Both Groups
Share knowledge		**38 (26.4%)**	**22 (22.2%)**	**60 (24.7%)**
Deepen understanding		**36 (25.0%)**	**16 (16.2%)**	**52 (21.4%)**
	Elaborate - *"Online learning is not a perfect system yet in my mind. I think that the technology needs to get to a point where we can interact synchronously and asynchronously on the same platform for it to be better. If we were all full time students and could collaborate all day every day that would be a major plus as well. Since we are all busy professionals I feel that our opportunities for collaboration are more limited."*	14	7	21
	Rephrase or summarize information from readings - *"The study found instructor who were most comfortable with technology and confident in online teaching were able to make use of the flipped classroom."*	14	4	18
	Provide examples to confirm - *"Regarding the theory of online learning as online participation, I can definitely attest how more learning takes place when students are actively involved in the course. The discussions are much richer, which engages them more in the assignments outside of the discussions as well. "*	6	3	9
	Ask probing questions - *"It seems like online learning has really came about because of our new technology in the internet, 1 to 1 devices, ...but is this a practice we should be endorsing?"*	1	2	3
	Provide examples to illustrate a counter point - *"However, yes, kids have been immersed with technology most of their lives, but as a high school teacher...we do see kids leave for the "online-school" environment, but yet return 6 months later because they don't have the drive, grit, … to build their social presence and be successful by being motivated."*	1	0	1
Manage project		**15 (10.4%)**	**43 (43.4%)**	**58 (23.9%)**
	Monitor or report progress - *"Hopefully you have seen some communication … stating they have busy weekends and are pretty much unavailable- that is why we were trying to dig deep into our conversation early in the week. Hopefully we can all get some more good discussion added tonight."*	4	14	19
	Clarify or confirm project expectations - *"We need to locate some scholarly articles that define the theories for online learning."*	7	7	13
	Divide tasks - *"He has offered to create a website using Wix…I will try to help out with this creation over the weekend."*	1	10	11
	Select tools for managing resources or creating presentations - *"I think we voted on a Prezi again, which received great reviews from our professor and classmates."*	3	12	15
Build community		**9 (6.3%)**	**3 (3.0%)**	**12 (4.9%)**
	Provide emotional support to group member(s): praise, agree, give credit, etc. - *"Dumpster fire is a great analogy!! I can't wait to break that one out in my classroom. I also agree that we need to remember that OLE may not be the answer for all our students."*	9	3	12
Total		**144**	**99**	**243**

was exemplified by three types of evidence (i.e., three sub-codes). First, students were able to identify the main ideas from the readings or summarize the significance (15). When discussing "online participation", one student shared the main conclusions of a research article: "*Online learning takes place within the interactions and participation of learners. Therefore, learning online takes place within the online social world. Students who participate more online tend to have better learning outcomes … in their courses.*" This quote suggests the learner developed a deeper understanding of the potential impact of online participation, beyond the superficial knowledge of what "online participation" is.

The second type of evidence is that students could identify the relevant factors from the readings and explain their relationships (21). When discussing flipped classrooms, a student stated: "*Technology in itself was not enough to bring the benefits of the flipped classroom, but along with student engagement in the classroom, the efforts went well.*" Another student said: "*Learner satisfaction is an important indicator of the effectiveness of learning … and tends to predict loyalty to the program or institution.*" These quotes show that students identified the critical factors (i.e., engagement, learner satisfaction) that could impact the effect of flipped classrooms or program effectiveness.

The third type of evidence suggests that students constructed knowledge by connecting real-life experiences to concepts or theories (5). One student reflected on his course experience and related it to "social presence": "*Our Professor certainly has used a great deal of Social Presence in this course. The welcome letter, the creative use of Technology Web 2.0 Tools, utilizing the discussion boards.*"

Build Knowledge

In order to build knowledge, students need to develop and investigate original ideas or questions. A major difference between *Construct Knowledge* and *Build Knowledge* is that when constructing knowledge, students use higher order thinking to explain existing situations, which is quite similar to the integration phase of the inquiry process - making sense of information to develop a coherent idea. However, building knowledge requires learners develop original ideas to explain new scenarios, design solutions to problems, or initiate changes to improve current situations, which is more aligned with the resolution phase of the inquiry process (Garrison et al., 1999).

In this study, learners' knowledge building efforts were mostly reflected in their discussions of original ideas about real-life implications (13). When discussing learning theories, a student elaborated on cognitive learning: "*Cognitive learners require strategies that allow them to perceive and attend to the information so that it can be transferred to working memory. Information should be chunked and strategies used should promote deep processing. Learners should be able to select activities that meet their varying learning styles. Textual, verbal, and visual information should be presented to encourage encoding. Finally, cognitive learners need to be motivated to learn.*" Through this quote, the student not only demonstrated her understanding of the theory, but developed her own ideas about how to use the theory to guide learning design.

Learners also achieved knowledge building by providing original explanations or predictions about relationships among different variables (5), and synthesizing information to make conclusions (2). These typically require deep understanding of the theories and concepts, as well as synthesis thinking, which are essential to the "rise above" principal in knowledge building (Scardamalia & Bereiter, 2010).

Deepen Understanding

Sub-codes under this category were often used together with those under *Construct Knowledge* and *Build Knowledge*. *Deep Understanding* sub-codes indicate the specific strategies or behaviors to enhance cognitive presence whereas *Construct Knowledge* and *Build Knowledge* indicate the actual level of cognitive presence achieved. In this study, students concentrated their effort to elaborate (21), and rephrase or summarize information (18). Students also tried other strategies, but to a much less

extent, including using real-life examples to confirm a point (9) or illustrate a counterpoint (1), and asking probing questions to encourage more in-depth responses (3).

Among all code instances under *Deepen Understanding*, about 83.3% were also coded with the sub-codes under *Construct Knowledge* or *Build Knowledge*, suggesting a possible relationship among these main codes: implementing the strategies under *Deepen Understanding* may help promote cognitive presence. The following quote provides an example:

One student said: "*Today's young learners will likely have little to no trouble with online learning as they have literally been immersed in technology their entire lives.*" Another student responded: "*You make a great point... However, yes, kids have been immersed with technology most of their lives, but as a high school teacher...we do see kids leave for the 'online-school' environment, but yet return 6 months later because they don't have the drive, grit, whatever you want to call it to build their social presence and be successful ...*" Two sub-codes were applied to the conversation: *Providing examples to illustrate a counter point* under *Deepen Understanding*, and *identifying relevant factors from the readings* under *Construct Knowledge*. The second student provided an example to challenge the first student's argument, and explained his example by identifying the key elements that he believed were critical for successful online learning.

Manage Project

Students were performing the following tasks when managing the logistics of their conversations. They discussed with each other to clarify the project process and expectations (13), divided tasks (11), monitored progress (19), and made decisions on what technology tools to use to present or manage the resources (15).

Build Community

Twelve quotes were coded under *Build Community*. Students tried to build a learning community mostly by providing emotional support to each other: showing agreement and appreciation, giving praises, credits or encouragement, etc.

Research Question 2

To answer the second research question, Table 4 compares the amount of code instances generated by the two groups, as well as how the groups distributed their efforts during Scholarly Conversations. Overall, the high group had about 45% more code instances than the low group, suggesting the high group generated more evidence measured by the coding scheme. Specifically, the high group had more evidence than the low group across all the main codes but *Manage Project*. The low group seemed to concentrate their efforts in *Manage Project* (43.4% of their code instances) in contrast to 10.4% from the high group. Given the performance gap between the two groups, this seems to suggest that focusing on project management may not necessarily lead to better learning outcomes. This also shows that it seems necessary to provide more support for lower-performing groups on how to efficiently manage the logistics of the collaborative process so that they can spend more time working on the cognitive aspects of their conversation.

For the low group, their percentage of code instances (11.1%) was about half of the high group (20.8%) in knowledge construction, and about one third (4.0%) of the high group (11.1%) in knowledge building. Even if their percentage in knowledge sharing (22.2%) was comparable with the high group (26.4%), the low group seemed to have more difficulties processing their shared knowledge to construct deeper understanding or build new knowledge probably because such a process requires higher order thinking. This could also explain the achievement gap in "*demonstrating critical thinking*" from the evaluation checklist between the low group (3 points) and the high group (5 points).

In *Deepen Understanding*, the low group also produced less evidence (16.2%) than the high group (25.0%). Similarly, the low group distributed less effort in *Build Community*, resulting in their lower score (2.5 points) on "*building a learning community*" of the evaluation checklist than the

high group (3 points). Since the quotes in *Build Community* reflected how learners promoted social presence, which correlates with cognitive presence (Garrison et al., 2010), it is plausible to conjecture that groups investing less effort to construct a learning community may find it more difficult to demonstrate cognitive presence, knowledge construction or knowledge building.

A further analysis of the sub-codes reveals that the high group implemented more strategies for deepening understanding and constructing knowledge. They showed evidence, though minimal, in *synthesize to make conclusions* and *provide real-life examples to illustrate a counter point*. The low group, however, did not generate any quote in these two sub-codes. In several sub-codes under *Construct Knowledge* and *Build Knowledge*, the high group had at least twice as many quotes as the low group. The largest contrast was found in *develop original ideas about real-life implications* in under *Build Knowledge*: the low group had one quote whereas the high group had 12.

In summary, the following elements seem associated with the between-group difference in their Scholarly Conversations. First, how to distribute effort during online conversations plays a pivotal role. The high group invested higher percentage of their effort in the cognitive aspects of conversations while the low group concentrated on discussing the logistics aspects. Second, it would be worthwhile to make intentional effort to build and maintain relationships among group members, as it may create stronger social presence which could potentially promote cognitive presence. Third, the high group had substantially more quotes than the low group in several sub-codes, which may suggest that the strategies or activities reflected by these sub-codes might be crucial for knowledge construction or knowledge building.

DISCUSSION

In this exploratory study, a pedagogical intervention, Scholarly Conversation, was designed and implemented in an online graduate course mainly taken by in-service teachers. Guided by the Community of Inquiry (CoI) framework and Knowledge Building principles, Scholarly Conversation provided a clear, three-phase process that engaged learners to perform tasks to promote cognitive presence (Borokhovski et al., 2016). A coding scheme was developed to expand van Aalst's (2009) framework, as it not only captured learners' achievement in knowledge sharing, knowledge construction, and knowledge building but also reflected the specific activities for deepening understanding, building a community, and managing the logistics of their online conversations.

Through comparison between the high-performing and the low-performing groups, this study identifies several principles for designing effective online conversations. First, it seems necessary to provide more guidance for the online groups to manage the logistics of their collaborative work efficiently. For example, students may benefit from a warm-up activity designed for them to negotiate their roles and responsibilities before they start the first phase of Scholarly Conversation. The warm-up activity could enhance the group members interrelationships and increase their social presence, which could positively impact their cognitive presence (Garrison et al., 2010). Second, it might be helpful to suggest a list of specific strategies to promote cognitive presence during Scholarly Conversations. These strategies could come from the coding scheme of this study, particularly those sub-codes where the high group invested more effort than the low group, such as *develop original ideas about real-life implications*, *connect personal experiences to theories, synthesize to make conclusions*, *provide real-life examples to illustrate a counter point*, etc. In the future design, it might be necessary to provide explicit opportunities that prompt online learners to implement these strategies during Scholarly Conversations. Also, it would be helpful to leverage the role of instructor to increase teaching presence (Preisman, 2014) to ensure students are given formative feedback during Scholarly Conversations so that they can select the strategies or regulate their group process more effectively.

LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. Due to the constraints in time and resources, a small sample of discussion data, including the highest and lowest achieving groups, was analyzed to capture the possible range of learning performance and activities. However, in order to improve validity and representation of the research findings, it is crucial to recruit more participants. It is also necessary to have the data cross-examined by different researchers. Additionally, more data would make it possible for future studies to investigate the role of other factors that potentially account for the variations in collaborative learning, such as learners' gender (Morante et al., 2017). Since several preliminary design principles have been identified from this exploratory study, it is critical to further evaluate the effectiveness of the design of Scholarly Conversation. One possible next step is to collect data from a larger sample and compare the groups who conduct Scholarly Conversations that implement those design principles with the discussion groups where the design principles are missing.

In light of the above discussion, the design of Scholarly Conversations will be continuously refined and implemented to support in-service teachers' learning and experiences in online collaboration. The coding scheme will also be revisited and modified depending on the new data generated from future implementations of Scholarly Conversations. In order to achieve higher levels of cognitive presence and knowledge building, learners need to be thoughtful about how to distribute their effort and what strategies to use to deepen understanding. The potential of Scholarly Conversations lies not only in the structured process that could scaffold learners but in the coding scheme and the design principles generated that could inform the future design and investigation of online conversations.

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Creating Authentic Learning Through Online Personal Learning Networks

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ABSTRACT

As educators face challenges in creating and cultivating authentic learning experiences in online education, a new paradigm for peer-to-peer learning has emerged: personal learning networks (PLNs). This article outlines autoethnographic research conducted in summer 2019, in which six participants from distinct virtual PLNs reflected on the benefits of PLNs as a model of peer-to-peer learning, how their experiences within PLNs aligned with Rule's themes of authentic learning and ways PLNs can be incorporated into online programming to create deep, authentic learning environments. The study findings align with the core principles of authentic learning: (a) real-world scenarios, (b) inquiry and thinking skills, (c) discourse with the community, and (d) empowerment. The study makes a strong case for the incorporation of PLNs into traditional online programming as a means to create unique and authentic learning experiences.

KEYWORDS

Authentic Learning, Co-Curricular Learning, Community of Practice, Online Courses, Peer-to-Peer Learning, Personal Learning Networks

INTRODUCTION

With advances in technology and rapidly changing societal needs, and the growth of online programs, educators are challenged with creating learning experiences that are authentic, relevant and meaningful to students (Ashbaugh, 2013). In order adapt to the learning expectations of students as well as evolving pedagogies and technologies, educators have a responsibility to shift learning dynamics from traditional schemas to approaches that provide enhanced learning capabilities to students,

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particularly regarding new strategies and models for online course and program design (Ashbaugh, 2013). One such model is peer-to-peer learning, a known critical aspect of online learning (Adams, 2016; Garrison, 2016; Nussbaum-Beach, 2012). Peer-to-peer learning can take many forms in an online course though online educators are now paying more attention to personal learning networks (PLNs) as a practical means to enhance learning as well. In a discussion of adult learning, Moreillon (2016) identified "a 'connected' community [that] provides support for getting specific needs met, solving personally relevant and meaningful problems and developing professional expertise" (p. 65). PLNs challenge traditional, highly structured and formalized education and guide educators toward informal, constructivist learning models. While few studies have made the direct connection of personal networks as a model of peer-to-peer learning, this connection is alluded to in existent literature and through the use of adjacent learning theories and models such as alignment to the community of inquiry framework (Garrison, 2016), as well as through social learning theory (Bandura, 1971) and in the rise of social media for professional growth (Kukulska-Hulme, 2012; Wenger, 1998). The authors used PLNs as a model of peer-to-peer learning in this study.

PLNs are ideal scenarios for fostering authentic learning (Bowers et al., 2014; Cooke, 2012; Kennedy, 2018; Rajagopal et al., 2011; Robertson, 2017; Sie et al., 2013; Tu et al., 2012). PLNs allow learners to achieve a deeper understanding of course material by applying newly acquired knowledge directly to complex challenges rather than to simple challenges constructed for a classroom (Hung et al., 2006) and to develop the critical thinking and collaboration skills necessary to successfully engage in their professional field (Herrington et al., 2014). PLNs also create authentic learning experiences in online programming by connecting learners to each other and creating personalized and intentional dialog to deepen learning (Bowers et al., 2014; Herrington et al., 2014; Wagner & McCombs, 1995).

Authentic learning is "student work that is 'real, actual, genuine' in all aspects experienced by students" (Knight, 2013, p. 225). The framework of authentic learning serves as the conceptual framework for this study. Specifically, the four themes Rule (2006) found through a content analysis of 45 authentic learning journal articles. These four ways in which authentic learning occurs are: (a) real-world scenarios, (b) inquiry and thinking skills, (c) discourse with community and (d) empowerment. Together, these themes promote active and engaged learning contexts that help students acquire relevant knowledge and skills. These four themes of authentic learning align with key qualities of PLNs.

Real-World Scenarios

PLNs offer personalized guidance and allow participants to obtain key pieces of information to resolve personal or professional challenges. PLNs provide opportunities for individuals seeking continuing education options in informal learning environments (Agbesi Wornyo et al., 2018; Hung et al., 2006; Robertson, 2017). Each PLN member can gain knowledge specific to their needs regardless of considerations that often limit the ability to engage in professional development, such as location, financial resources and time limitations (Cooke, 2012). This informal approach to personal improvement offers access to knowledge that can be applied directly to real-world challenges. Students who engage in this type of authentic learning are able to more effectively transfer acquired knowledge from the classroom and apply it to a wider range of real-life contexts (Agbesi Wornyo et al., 2018). Furthermore, PLNs can be used for training, development and advancement within a student's organization or upon graduation (Kennedy, 2018; Robertson, 2017; Sie et al., 2013; Tu et al., 2012; Wenger, 1998).

Inquiry and Thinking Skills

PLNs offer students the ability to explore, think critically and collaboratively establish meaning based on their own needs and interests. Personal learning environments provide students with an alternate way of engaging in learning. Students can use technology to create environments that support personal and meaningful learning experiences (Kennedy, 2018; Robertson, 2017). These experiences allow

students to develop skills and draw connections between concepts and resources that further support and deepen their learning (Tu et al., 2012). Students participating in PLNs are engaged in authentic learning by way of critical thinking, reflection and metacognition.

Discourse with Community

As native community of practice, PLNs can be an effective way to expand one's knowledge within educational and professional contexts (Kennedy, 2018; Robertson, 2017; Wenger, 1998). Wenger (1998) shared insights on how communities of practice offer more in-depth and more effective learning opportunities than traditional teaching or training methods. Individuals who engage in communities of practice create nodes of knowledge for their institutions or organizations (Wenger, 1998). Engaging in a community of practice, like a PLN, can provide students with the ability to not only expand learning opportunities but also to share knowledge and expertise with others in peer-to-peer learning. Through this type of informal learning, students acquire new knowledge and skills by engaging with their peers, fellow researchers and friends (Tu et al., 2012). Students can be actively engaged in their networks not only when they need support, but also when they can offer something in return to the community (Sie et al., 2013). This allows students to explore learning in a way that deviates from traditional academic instruction (Agbesi Wornyo et al., 2018). The exchange of knowledge that occurs in PLNs further supports the concept of constructivist learning, as participants share life experiences with an engaged community of learners that has a shared purpose (Bowers et al., 2014).

Empowerment

PLNs provide students with a unique opportunity to learn new information and to expand skills. However, these connections need to be cultivated and cannot occur without attitude, intention, activity and skill. Individuals need to build and maintain active collaboration with their PLN peers (Rajagopal et al., 2011). Barber and Buchanan (2015) observed that students developed deeper and more meaningful connections when they collaborated with their peers to solve problem-based scenarios. This created a deeper and more textured learning experience. Barber and Buchanan (2015) saw the connection between authentic learning and PLNs as a way to equip students with skills they needed in their chosen professions.

Significance of the Study

There exists a gap in the literature to formally link peer-to-peer learning to personal learning networks. Additionally, limited research has been conducted to explore PLNs as an example of authentic learning. This study fills a gap between the benefits of a personal learning network and the themes of authentic learning that lead to meaningful construction of knowledge and mastery of core concepts in a course and program of study. The results of this study illuminated how the formal and informal connection of peers is a perfect example of authentic learning that can deepen the learning of college students. In addition, this study adds to the growing body of literature into authentic learning experiences in online programming by highlighting the affordances of this type of peer-to-peer learning (use of PLNs), as well as in providing an early, practical framework for implementing effective co-curricular personal learning networks.

RESEARCH QUESTIONS

This study used self-reflection to understand the benefits of PLNs and how they might be incorporated into online programs to build authentic learning experiences. The research questions were:

RQ1: What are the benefits of peer-to-peer learning?
RQ2: How are PLNs models of authentic learning?
RQ3: How can the benefits of peer-to-peer learning be used to deepen the learning of online students?

METHODOLOGY

The study used a collaborative autoethnographic design, in which the participants kept self-reflection journals of their experiences within a PLN. Autoethnography is related to ethnography and narrative inquiry in that it explores "how people understand relationships between human and their sociocultural contexts" (Hughes & Pennington, 2017, p. 5). The goal of autoethnography is to make participants aware of how they witness or experience a reality through interpreting their own self-reflections (Spry, 2006). Autoethnography focuses on the participants' context and relationship with the community being studied (Hughes & Pennington, 2017). Autoethnography can take the form of action research, research that addresses real-world problems "through a process of collaboration in which researchers and the researched initiate and evaluate interventions. Such research is intended to be educational and empowering for all who choose to participate" (Hughes & Pennington, 2017, p. 145).

Participants

The participants were members of separate PLNs operating in online environments. In using a collaborative autoethnographic methodology, the researchers are also the participants of the study. Two of the researchers contacted alumni of an online leadership program to inquire whether they would be willing to collaborate in the research. Due to the nature of the methodology and the purpose of the research, the researchers sought out collaborators who were participants in PLNs, experts in online learning, and willing to explore their own experiences with critical self-reflexivity. Inherent subjectivity and bias resides in all qualitative research, this is especially true for autoethnography because of the level of critical self-reflection that is required (Kelley, 2014). The researchers sought out collaborators who understood the purpose of the study and intent of the methodology in hopes for in depth self-reflection. Purposeful sampling contributes to credibility because participants are selected based their ability to develop an understanding of the phenomenon (Creswell, 2013; Tuckett, 2005). The participation criteria included: (a) being a member of at least one PLN for at least one year, (b) being a professional (either administrator or faculty) in online education for at least one year and (c) not reflecting on the same PLN as another participant. The sample included six participants representing six PLNs; a small set of participants is common in qualitative research (Creswell, 2008, 2013). The sample was predominately female (five females and one male) and had robust geographical representation, which in order to maintain confidentiality is not detailed. The participants' demographics and type of PLN membership are shown in Table 1.

Data Collection

Journaling is a reflective practice that takes a variety of forms depending on its purpose. The significance and value of journaling lies within its "potential to enable heightened reflexivity, through

Table 1. Participant demographics

Participant Code	Gender	PLN type
1	F	Professional distributed nationwide
2	F	Professional within a single institution
3	M	Professional distributed nationwide
4	F	Professional distributed nationwide
5	F	Academic program
6	F	Professional distributed nationwide

* PLN types in the study were: (a) *professional distributed nationwide*, a PLN with a professional purpose spanning multiple states; (b) *professional within a single institution*, a PLN existing across an institution of higher education; and (c) *academic program,* a PLN built around an a single program at one institution.

both the writing and reading process" (Reece, 2014, p. 472). Reflective journals, as used in this study, are the most common type of journaling in action research. They enable a practitioner to critically reflect on phenomena within their practice and often generate new realizations (Reece, 2014).

Participants were asked to engage in a self-reflective journaling exercise. They were provided with six writing prompts that guided them to reflect on the benefits of participating in a PLN, ways in which their experiences within PLNs were models of authentic learning according to Rule's (2006) definition and on models for fostering authentic learning communities within online programs by using PLNs. The prompts focused on the purpose, origin and benefits of their PLN; ways PLNs are authentic learning experiences and considerations for incorporating them into online or hybrid educational programs. Prompts from the journaling exercise are outlined in Table 2.

Data Analysis

The self-reflection journals were collected, de-identified and assigned a participant number. Patterns and themes were teased out from the six journals using the five steps of Creswell's (2013) qualitative data analysis spiral: (a) organizing the data; (b) reading and memoing; (c) describing, classifying and interpreting the data into codes and themes; (d) interpreting the data and (e) representing the data to conceptualize and validate findings. The organization of the data involved de-identifying the journals and assigning participant codes. Then two of the researchers read through the journals to get an overall sense of the data and took preliminary notes. This phase occurred more than once, in order to describe, classify, and interpret the data in order to categorize the data into codes and themes. Then the researchers found meaning and drew connections between the findings to interpret the data. Lastly, the representation of the data took place through offering hypotheses that describe the relationships between the themes. This process was conducted by two of the researchers individually and then they compared their findings with one another to validate and solidify the themes through an internal audit (Rodgers, 2008). A third researcher reviewed the themes and the de-identified journals to further validate the findings and avoid bias.

Table 2. Reflection journal prompts

Prompt	Prompt language
1	Provide a description of your personal learning network (e.g. purpose, membership).
2	Describe the origins of the network (e.g. the development of the PLN, how did you become a member, who connected you to it, length of time you have been involved or it has existed, etc.?).
3	Reflect on your personal learning network. Discuss the benefits it has had on your personal and professional life. Please provide examples
4	Our study is an analysis of how PLNs are forms of authentic learning experiences. Authentic learning describes learning through applying knowledge in real-life contexts and situations. A content analysis found four themes that consistently emerge in research of authentic learning: a) "the activity involves real-world problems that mimic the work of professionals in the discipline with presentation of findings to audiences beyond the classroom; b) open-ended inquiry, thinking skills and metacognition are addressed; c) students engage in discourse and social learning in a community of learners; and, d) Students are empowered through choice to direct their own learning in relevant project work" (Rule, 2006, p. 2). Considering these themes, reflect on how your experience in a personal learning network fostered an authentic learning experience. Provide examples.
5	How could PLNs be incorporated into an online educational program to create a sense of community and authentic learning for online students?
6	Are there other things you would like to share about your experience in a PLN?

Table 3. Alignment of research questions and themes

Research Questions	Themes
RQ1: What are the benefits of peer-to-peer learning?	1) Friendships and connections 2) Personal and professional transformation and growth 3) Supportive network 4) Fosters leadership potential 5) Role models and insight into other's experiences
RQ2: How are peer learning networks (PLNs) models of authentic learning?	1) Sets intentional direction for learning 2) Community of learners 3) Deep conversations for exploration 4) Supports individual learning and research 5) Safe space for critical inquiry 6) Focus on real world problems
RQ3: How can the benefits of peer-to-peer learning be used to deepen the learning of online students?	1) Authentic learning experiences with meaningful connections 2) Cross-cohort connections 3) Self-selection and buy-in
Additional findings of interest	1) Formal and intentional genesis 2) Intentional group of people with a clear purpose 3) Inclusive and collaborative learning community 4) Engages in deep discussions and problem solve

FINDINGS

The six participants were asked to describe their PLN's origin and membership and then to reflect on the benefits of their participation on their personal and professional growth, how these PLN experiences fostered authentic learning experiences and how online learning environments could leverage PLNs to cultivate authentic learning. Table 3 shows the emergent themes related to each research question.

Research Question 1: Benefits of Peer-to-Peer Learning Within a PLN

The first research question was: What are the benefits of peer-to-peer learning? This was addressed using PLNs as a type of peer-to-peer learning. The benefits of PLN membership were reiterated through the participants' journals. Five themes emerged regarding the benefits for personal and professional growth: (a) an enjoyable, deeply satisfying experience that can result in long-term friendships and connections; (b) a community that pushes members' personal and professional transformation and growth; (c) a support network that inspires creativity, provides encouragement and celebrates individuals' wins; (d) fosters leadership potential outside of the traditional workplace setting and (e) includes role models and a place to gain insight into other's experiences and perspectives.

Friendships and Connections

Each participant described the value of personal connections among PLN members. They described participation in PLNs as enjoyable and deeply satisfying, mentioning the opportunity to form long-term friendships and connections. Participant 4 reflected, "As we worked, we became friends. As we became friends, we made more friends." Participant 5 noted, "My personal tendency is to go at things alone - through these groups, I have found the power in relationships when it comes to research, academics and work. These relationships extend to personal life and have become friendships."

Personal and Professional Transformation and Growth

These connections were described as having a direct impact on the members' personal and professional growth. Participant 6 stated:

This network saved me. I'm not the same person I was three years ago. I was trapped in a box with nowhere to turn. No opportunities to renew me or energize me. [This] network opened doors that have literally changed my life.

Participant 1 articulated how personal connections formed through the PLN helped to ease the transition to a new position:

I changed jobs [recently]. Having a consistent group that meets every week to discuss our projects, but most importantly, who cares about the life transitions that most of us are going through, has made a big difference in the way I have been experiencing this change. It has been helpful to talk through the challenges and opportunities that this new job has created in my personal life.

Supportive Network

Participants frequently described the supportive nature of the PLNs as inspiring creativity, providing encouragement and celebrating individual successes. Participant 5 stated the PLN "provided me a small group to meet with, collaborate with and cheerlead for one another...and celebrate wins along the way." Participant 1 stated:

This network has pushed me to do work that I have always wanted to do, but for one reason or another I felt as I was not capable of doing… Since I started working with this group, I feel more inspired and creative. This group has given me the chance to think about challenges as new opportunities.

Participant 3 stated, "I legitimately enjoy connecting with each member and I respect the values our group represents: its members are committed to keeping an open mind, listening respectfully and supporting one another."

Fosters Leadership Potential

Participants described how engagement and support within their respective PLNs pushed their leadership potential outside the traditional workplace setting. Participant 6 stated:

My institution is a great place to work, unfortunately there are limited opportunities to pursue leadership and little support to pursue other professional goals. My personal experience has presented a number of encounters in which I was told, "You're not leadership material." Yet through my engagement with my PLN I have repeatedly been told that I am a strong leader. Further positive reinforcement has come in the form of being invited to participate in leadership roles [in professional associations].

Participant 5 stated:

The PLN challenged me to grow as a leader - to incorporate the theory of leadership into practice and expand my toolbox of skills... This was a group of people that I could raise questions to and they would challenge me in how I wanted to be a leader... We could reframe for one another situations that arose professionally and provide a larger perspective and scope in which to work.

Furthermore, Participant 4 stated, "Distributed leadership can be tricky, and that means sometimes making yourself a little more invisible so that others can run. But, as people and careers evolve, so must their support systems. Distributed leadership allows this to be true."

Role Models and Insight Into Other's Experiences

Participants frequently described how critical discourse within their PLNs fostered opportunities to gain insight into others' experiences and perspectives. All participants echoed the value of learning from others. For example, Participant 6 described the opportunity to both learn from "role models" and to practice leadership skills outside of the traditional workplace setting. Participant 3 stated:

I see this vulnerability modeled within my PLN as our comfort sharing personal challenges has grown, along with a willingness to change course, grow in our perspectives and integrate the challenges we receive from others as an important part of thinking through problems.

Participant 3 added, "working with the group has continued to give me a better sense of what challenges are pervasive across the field and which may be more context specific. This has helped me feel empowered in my career in an important way."

Research Question 2: PLNs as Models of Authentic Learning

Participants were provided with Rule's (2006) definition of authentic learning experiences and asked how their PLNs fostered such experiences. Six themes emerged: (a) sets intentional direction for learning; (b) is a community of learners who are willing to learn from one another and share experiences; (c) is a place to engage in deep conversations and opportunities for creativity, new possibilities and troubleshooting; (d) provides a place to share ideas, shape the direction and support individual learning and research; (e) creates a safe space for critical inquiry through vulnerable and open dialogue that challenges assumptions and pushes individuals' thinking and (f) focuses on real-world problems connecting theory to practice through collaborative engagement.

Sets an Intentional Direction for Learning

The participants stated PLNs set intentional direction for learning and addressed real-world problems and challenges. The authenticity of the challenges addressed by the PLNs was noted by Participant 5:

The PLN creates a community of learners who discuss and engage with theoretical and practical material with the intent to become better leaders in their lives…be it in their classrooms, schools, school districts, universities, police departments, small and large businesses, etc. This group embodies theory to practice, which is authentic learning.

Community of Learners

The PLNs were characterized as communities of learners who were willing to learn from one another and share experiences, which provided opportunities for troubleshooting and fostering creative ideas. Participant 3 stated this collaboration helped support the members' learning and research: "My PLN has really leveraged its different experiences to refine research questions and pursue different levels of inquiry." Participant 1 stated, "We have created a strong community of learners. Neither of us would ever assume that we know more than the other person, and we are all willing to learn from each other." Participant 4 wrote, "We've met amazing people, harnessed incredible brain power and expanded our learning and minds in ways that we never expected."

Deep Conversations for Exploration

All participants said conversations held with their PLN colleagues helped expand their thinking, experiences and practice. These conversations occurred formally, through face-to-face or virtual meetings or monthly salons, and informally, through Twitter conversations, individual calls and cocktail hours. Participant 6 reflected, "We have had deepened conversations regarding leadership."

Participant 3 reflected, "Having these discussions pushes my thinking, engaging in a strong dialectical form of learning… [which] requires I think through my arguments, listening and synthesize their perspectives, and critically engage, creating a level of desirable difficulty."

Supports Individual Learning and Research

Five participants discussed how participation in a PLN supported their individual learning and research. Participant 5 stated, "A good percentage of the PLN's time and focus is on the individual pursuit of research learning." Participant 6 spoke of how other members helped her identify the skills needed to improve: "In serving with other leaders who have more experience than I do, it helps me understand how I need to improve upon my skills for the future." Participant 2 echoed this theme: "The opportunity to learn about instructional design decisions and to talk through pedagogical challenges, ideas and solutions has transformed the way I design and teach."

Safe Space for Critical Inquiry

The participants also noted how PLNs served as a "safe space" that promoted social learning through critical open-ended inquiry and discourse, which helped them challenge assumptions and reflect on their how their experiences impacted their perspectives. Participant 5 stated, "members ask questions of one another and challenge one another's thinking and ideas through open and facilitated dialogue." Participant 2 stated, "I think some of the work we have done early to share our own expertise and professional background/goals has helped us to get what we need out of the PLN... We have found strategies to encourage sharing."

Focus on Real World Problems

All participants emphasized the focus on real-world problems as a core aspect of their PLN. Participant 3 reflected:

Our PLN's membership works in a variety of context. We represent very different institutions in terms of size, control and mission. We also occupy different roles in those institutions. It has been incredibly helpful for me to have a better understanding of how those differences shape our perspectives and inform our practice. These insights have helped me better identify different systems or organizational challenges.

Participant 2 reflected, "We have shared ideas and strategies focused on accessibility, inclusion, UDL and engagement and talked about how to facilitate co-construction of knowledge. This has led to specific discussions regarding group projects and how to help students work collaboratively."

Research Question 3: Benefits of PLNs, as Peer-to-Peer Learning in Online Education

The third research question was: How can the benefits of peer-to-peer learning be used to deepen the learning of online students? Using PLNs as an example of peer-to-peer learning, the participants, as experts in online learning and members of PLNs, were prompted to speculate about how PLNs could be used to promote a sense of community and foster authentic learning in online learning environments. All participants noted that PLNs could be valuable authentic learning models within online programs; instead of concrete suggestions, participants focused on possibilities that should be considered if PLNs were created. Participant 4 framed this as the need to assess the "why" of the community:

It depends on the community, the goals of the community, the outcomes of the community… How can we connect students in meaningful ways to both content and colleagues? PLNs must be flexible,

agile and ever evolving. Each group of humans is different - what do networks look like for different group dynamics?

The following themes emerged: (a) co-curricular PLNs should be authentic learning experiences with meaningful connections; (b) they create opportunities for cross-cohort connections, augmenting the academic experience and expanding one's network and (c) co-curricular PLNs should be topical, allowing for self-selection and more buy-in in participation.

Authentic Learning Experiences with Meaningful Connections

The opportunity to engage in PLNs as part of the online learning experience was extolled as an opportunity to form meaningful connections and foster authentic learning experiences for online learners. For example, Participant 2 emphasized the value of the social learning that PLNs foster: "A cornerstone of our program has been facilitating opportunities for students to co-construct knowledge so I think that creating formal PLNs at the beginning of their program that carry through their experience could be invaluable." Participant 6 stated, "Authentic learning that is intended to be transformational cannot occur without authentic connections. Allowing students to find deeper and more meaningful ways to connect with one another is key." Participant 5 reflected, "In a curricular model, a PLN would need to have authentic meaning in order to be value added. Whether through book reads, collaborative projects or research, it is about creating the authentic dialogue and relationships."

Cross-Cohort Connections

Mirroring the value they placed on the interdisciplinary or cross-institutional makeup of their own PLNs, some participants pointed out the benefits of creating cross-cohort PLNs in online learning programs to augment the academic experience and expand the students' professional network. Participant 5 stated, "A PLN gives students an opportunity to build cross-cohort relationships, provide support to one another both academically and emotionally through coursework and the dissertation research/writing." Participant 2 discussed their program's cohort model and that a PLN could "provide opportunities for them to learn alongside/with/from one another in a learning community."

Self-Selection and Buy-In

Some participants highlighted the importance of student buy-in for participation (e.g., allowing students to self-select membership into topical PLNs). For example, Participant 6 stated, "If we want them to be authentic, there needs to be a certain degree of choice on the student's part. When students are assigned to a team or to collaborate as a group, it's a forced choice." Participant 1 noted, "To be successful in a PLN, one needs to find a common theme. I think that helps keeps the group together. Being able to create a list of topics and have people sign up to those networks might help learners get started."

Final Reflections From Participants

Participants were given the opportunity to provide additional thoughts on PLNs as part of their own professional practice and in terms of fostering authentic learning experiences in online learning environments. Participant 5 stated, "I find PLNs to be some of the greatest authentic learning opportunities out there - a group of people coming together for a purpose(s), engaging in dialogue and practice together and achieving something greater than the sum of its parts." Most participants mentioned belonging to more than one PLN and mentoring and encouraging others to find PLNs.

Yet, even while prompted to focus on the benefits, participants acknowledged that building and sustaining PLNs requires collaboration, intentionality and shared responsibility. These can be challenging within PLNs. Participant 4 stated, "A good PLN takes work - it won't grow itself, and it won't just be what you want or need it to be. It requires intentionality and participation." Participant

2 stated, "I have been startled by some of the challenges to communication- as in, some people are apt to take over the conversation, and others, despite being asked to participate, choose to use the chat feature during the meeting, rather than speaking up. These different styles absolutely impact how engaged folks are and how much their voice is heard." Participant 2 also asked: "The lingering issue for me is how do we create and sustain processes and procedures while ensuring equitable membership and participation for all members?"

Four themes emerged from the analysis of the final PLN writing prompt: (a) have a formal and intentional genesis, (b) are an intentional group of people with a clear purpose, (c) are an inclusive and collaborative learning community and (d) engage in deep discussions to share information and problem solve.

Formal and Intentional Genesis

Four participants described the formal and intentional genesis of their groups, as a shared experience served as the formation of the network. These origins were described as: "after the members met at a [leadership development] program," a part of the curricula in a doctoral program and as a result of needing to "build capacity" around instructional and programmatic issues.

Intentional Group With a Clear Purpose

All but one PLN were comprised of higher education online learning professionals (e.g., instructors in an online education program or online learning administrators). Four PLNs consisted of members from different institutions. The membership of all PLNs had a degree of intentionality. The members were described as "scholars and practitioners in educational technology, digital learning and online education;" "students in their first, second and third years" of a doctoral program; "full-time lecturers and program associates in the School of Education at the university" and "participants [in a leadership program who] identified shared interests in research." All participants reflected on the PLN having a clear purpose. Participant 4 stated, "A core group of people found themselves working together... and worked to build networking opportunities and connection-making mechanisms." Participant 5 stated, "to provide support for doctoral students during their hybrid EdD program." Participant 3 stated, "shared interest in research and practice."

Inclusive and Collaborative Learning Community

Regardless of their structure and composition, the PLNs were all characterized as inclusive, collaborative communities committed to supporting the members' personal and professional growth through information sharing and problem-solving. Participant 4 stated, "We work hard to provide a community where people can feel safe and loved, ask questions, seek ideas, share excitement or ask for help. The purpose: inclusion." Participant 6 reflected:

I leave the conversation with a greater sense of confidence, a renewed passion for the profession, a stronger understanding of growth opportunities and a clearer pathway for my professional future... My fellow [members] are always interested in collaborating on projects that are highly beneficial for both of us.

Engages in Deep Conversation and Problem Solving

All participants discussed the value of engaging in deep conversation and problem solving. Participant 4 reflected: "I know I have backup when I'm low on inspiration, and smart people to ask questions of when I'm lost or need help. There are always people to challenge me, to help me and to troubleshoot with me." Participant 3 added, "We are all deeply committed to identifying how to do 'the work' well and ultimately advocating for practices and strategies that will set institutions and the communities they serve up for success." Participant 6 reflected, "I have connected with several individuals who I

feel confident reaching out to when I encounter challenges and know they will likely have a highly valuable perspective on how to resolve the challenge."

The results of this study illuminated how formal and informal connections among peers are examples of authentic learning that can deepen the learning of college students. This study adds to the growing body of literature into authentic learning experiences in online programming by highlighting the benefits of this type of peer-to-peer learning, as well as by providing a practical framework for implementing effective co-curricular PLNs.

DISCUSSION

Educators in the digital age are challenged to create authentic, relevant and meaningful learning experiences for their students (Moreillon, 2015). This study used self-reflection to understand the benefits of PLNs and how they might be incorporated into online programs to build authentic learning experiences.

Given the connections found in the peer-to-peer learning literature regarding PLNs as examples of authentic learning (Bowers et al., 2014; Cooke, 2012; Kennedy, 2018; Rajagopal et al., 2011; Robertson, 2017; Sie et al., 2013; Tu et al., 2012), the researchers designed a writing prompt so participants could provide more formal connections. The writing prompt defined authentic learning (Rule, 2006) as the foundation for their reflection. This scaffolding may have created bias, though each participant also independently highlighted Rule's (2006) key qualities of authentic learning as present in their PLN: real-world scenarios, inquiry and thinking skills, discourse with community and empowerment. The six themes that emerged from Research Question 2 solidified the connection between PLNs and authentic learning: (a) sets intentional direction for learning matches empowerment; (b) is a community of learners who are willing to learn from one another and share experiences matches inquiry and thinking skills; (c) is a place to engage in deep conversations and opportunities for creativity, new possibilities and troubleshooting matches inquiry and thinking skills; (d) provides a place to share ideas, shape the direction and support individual learning and research matches empowerment; (e) creates a safe space for critical inquiry through vulnerable and open dialogue in which challenges assumptions and pushes individuals' thinking matches discourse with community and (f) focuses on real world problems connecting theory to practice through collaborative engagement matches real world scenarios.

Themes from other research questions also bolstered the connection between PLNs and authentic learning, as shown in Table 4. The findings support the notion that educators can create authentic learning experiences in online programming by connecting learners to each other and creating personalized and intentional dialog to deepen learning (Wagner & McCombs, 1995). The findings

Table 4. Connections between themes and authentic learning

Authentic Learning Theme	Themes from Study
Real-world scenarios	Focus on real-world problems
Inquiry and thinking skills	Community of learners Deep conversations for exploration
Discourse with community	Safe space for critical inquiry Role models and insight into others' experiences A supportive network
Empowerment	Sets intentional direction for learning Supports individual learning and research Personal and professional transformation and growth Foster leadership potential

align with other research on student-to-student learning in online courses (Adams, 2016; Garrison, 2016) and extend our understanding that individualized learning and critical inquiry outside of the classroom are critical to enabling deep learning.

The benefits of this type of learning are also illuminated through the journaling related to Research Questions 1 and 3. The themes related to Research Question 1 highlight the need to create connections and relationships that build leadership potential and support professional development. These themes align with the literature supporting the use of PLNs for training, development and advancement (Kennedy, 2018; Robertson, 2017; Sie et al., 2013; Tu et al., 2012; Wenger, 1998). They further identify the importance of friendship as a foundation to realizing one's own leadership potential and as a means of creating safe and open dialogs that serve as platforms for transformation and growth. Findings from Research Question 3 form a framework for creating the best possible learning environment for co-curricular PLNs. These themes were: (a) co-curricular PLNs should be authentic learning experiences with meaningful connections; (b) that they create opportunities for cross-cohort connections, augmenting the academic experience and expanding one's network and (c) co-curricular PLNs should be topical, allowing for self-selection and more buy-in in participation. These conditions align with the literature, supporting co-curricular dialog and opportunities to discuss course content outside of the classroom as ways to create and master knowledge (Bowers et al., 2014; Herrington et al., 2014; Wagner & McCombs, 1995). They also provide the beginnings of a model that online educators and administrators could emulate for effective PLN integration.

Finally, the findings related to the last, open-ended writing prompt pertain to the benefits of PLNs and their design. Participants benefited from the opportunity to engage in deep self-reflection and free thought. The four themes suggested that PLNs benefit from having a formal and intentional genesis with a clear purpose. Furthermore, PLNs should be inclusive and collaborative in nature so that members can engage in deep discussions. These themes align with literature on authentic learning environments, the benefits of PLNs and add to the suggested framework for a successful co-curricular PLN.

LIMITATIONS AND FUTURE RESEARCH

As in all studies, limitations exist. The size of the sample makes the findings not generalizable to the general population. Additionally, all the participants had positive experiences and continue to be members in PLNs. The study did not address those people who once were members of a PLN and then quit participating. Perhaps most notably, this research is based on the critical examination of the researchers' experiences within PLNs. The very nature of the methodology of autoethnography means that the researchers are reflecting on their own experiences and the reflections of those experiences, and thus has a level of bias and inherent subjectivity. Thus, the research requires the researchers to be honest and willing to self-disclose within their journal, as well as self-awareness through epoche (or bracketing) in the analysis to see outside of their own experience. Autoethnography has been criticized as it is focused on the self, and yet as also a methodology that can produce critical social and educational research due to the focus on self-reflection.

Future research into the formation, integration and cultivation of PLNs in online programming could focus on sustainability and the level of inquiry and overall purpose. PLNs must be driven by a sense of shared purpose, though it is unknown whether that purpose would change along with a student's level of self-efficacy and maturity. The participants consistently referred to PLNs as a place that they could share ideas and challenge assumption, this concept and components of PLNs as a safe space deserves further exploration. A longitudinal study of a co-curricular PLN would illuminate how a PLN would need to mature and change over time to meet the needs of students, as well as measure the efficacy and potential connections to student satisfaction and educational outcomes. Furthermore, a formal framework for integrating a PLN into an online program could be developed that would guide and elevate online programming across institutions of higher education.

IMPLICATIONS AND CONCLUSION

This ethnographic study of the members of group of distinct virtual PLNs, leads to the following conclusions and implications: (a) PLNs are, indeed, authentic learning experiences, (b) PLNs are a helpful and important means of creating connections and community where traditional coursework in an online education program may not and (c) a framework of conditions or rules for the creation of effective co-curricular PLNs is needed.

Moreover, these findings suggest that the integration of PLNs into online education can break the isolation that online students sometimes feel due to being physically separated from a campus community. As educators seek ways to create authentic learning experiences in online programming, formal and informal PLNs can provide a platform for peer-to-peer learning, networking and support that could improve student outcomes and satisfaction. In doing this, educators would benefit from the following conditions or rules for designing effective co-curricular PLNs: (a) possess a formal genesis with a clear purpose, (b) create cross-cohort connections and relationships, (c) be topical and optional to create solid buy-in and deep engagement and (d) should be inclusive and collaborative to create sustainability.

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Enhancing E-Learning Through Integration of Online Formative Assessment and Teaching Presence

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ABSTRACT

The proliferation of information communication technologies (ICT) continues to increase opportunities for effective pedagogical approaches and online learning. This paper reports a study on integration of online formative assessment from a teaching presence perspective of the community of inquiry (CoI) framework. The effects of this integrative pedagogical approach on students' learning experiences are explored. The study was conducted in a post graduate online course. Case study research design was utilized. The study exemplified the core elements of formative assessment including integration of authentic assessment activities within teaching and learning processes, explicit learning goals, formative feedback, and documentation of evidence of learning. These elements were aligned to the functions of teaching presence, namely design, facilitation, and direct instruction. This approach enhanced meaningful engagement with critical learning experiences including interactive collaboration, critical thinking, reflective thinking, multi-dimensional perspectives, and self-regulation.

KEYWORDS

Embedded Assessment, Higher Education, Information Communication Technology, Meaningful Learning, Online Learning, Pedagogical Strategy

INTRODUCTION

E-learning can potentially transform higher education to meet the emerging needs of the knowledge society whose goal is to move beyond mastering standard content domains to applying knowledge in rapidly changing multifaceted environments (Cole et al., 2017; Gikandi, 2019; Preisman, 2014). ICT is perceived as a catalyst in the transformation to engaged learning ideal for 21st century, as well as an element for sustaining and coping with change. E-learning as a sub-component of ICT represents a perspective that has led to a paradigm shift in learning perspectives (Cole et al., 2017; Garrison & Akyol, 2009; Rodrigues et al., 2019). Previous research on e-learning has shown its great potential in enhancing learning experiences (Gikandi & Morrow, 2016). However, it is important to realize that e-learning on its own is unlikely to be adequate to the needs of 21st century education that require learner-focused and formative approaches to learning (Garrison & Akyol, 2009; Glassmeyer et al., 2011).Enabling effective e-learning environment calls for purposeful and conscientious effort towards

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facilitating adequate social and teaching presence as a requisite to meaningful learner engagement (Nortvig et al., 2018; Rodrigues et al., 2019). The term e-learning as used in this paper refers to online learning that is enabled by ICT (Internet and/or mobile based); that does not require the teacher and the learner to be available at the same time and place; whereby 80% or more of learning and teaching activities are conducted through ICT (Gurley, 2018).

Based on the viewpoints from related literature, the current author infers that integration of online formative assessment from a teaching presence perspective can offers effective pedagogical strategy that befits 21st century education. This approach is also informed by the viewpoint that higher levels of engagement in e-learning contexts are achieved when the following dimensions are adequately addressed: "(a) students develop strong relationships with their teachers and peers; (b) teachers support students' autonomy; (c) teachers have high expectations and give clear feedback to students; and (d) tasks are challenging and interesting" (Rodrigues et al., 2019, p. 93).

There is considerable evidence about online formative assessment as a powerful lever of change that can enhance student learning towards what is valued as achievements in higher education for 21st century (Glassmeyer et al., 2011; Khare & Lam, 2008; Peculea & Peculea, 2019; Simon, 2019; Vonderwell & Boboc, 2013). Online formative assessment is conceptualized in this paper as the use of ICT to support the iterative processes of establishing what, how much and how well students are learning. These processes are aimed at informing tailored formative feedback and scaffold learning with respect to the learning goals and expected outcomes (Gikandi & Morrow, 2016; Peculea & Peculea, 2019). Online formative assessment can influence the way we conceptualize and design for learning and teaching particularly in e-learning environments (Glassmeyer et al., 2011; Peculea & Peculea, 2019; Vonderwell & Boboc, 2013). Drawing from previous research, online formative assessment can promote learning experiences through increased engagement. Integrating interactive formative assessment in online learning using variety of ICT tools (both asynchronous and synchronous) can support students to become more autonomous towards developing skills for engaging in deeper inquiry and reflective practice (Nortvig et al., 2018; Peculea & Peculea, 2019). Such an environment when well facilitated through adequate online teaching presence in form of sustained communication and tailored feedback stimulate learners to engage in critical discourse, acquire skills and beliefs that will enable them to respond to dynamic professional demands and constraints (Lara et al., 2020). As articulated in following sub-section, this is particularly relevant in higher education (Cole et al., 2017; Hakkarainen et al., 2009; Simon, 2019).

BACKGROUND OF THE STUDY

Relevance of Online Formative Assessment in Higher Education

While many higher learning institutions acknowledge the potential of e-learning in transforming higher education, its effects on the quality of the learning process must be reconsidered to ascertain its adequacy in meeting the educational needs of the 21st century (Garrison et al., 2000). This implies that learners in higher education are required to have skills that enable them to respond to rapidly changing situational demands and constraints (Vonderwell & Boboc, 2013).

As previous research suggests, teachers (educators) play a crucial role in educational change (Davis, 2008; Garrison & Akyol, 2009; Garrison et al., 2010). Educators must therefore first recognize the need for change as a precursor to the desirable change process. They must view the change as something that addresses an important need (Ellsworth, 2000). In justifying the need for change of perspective on the role of ICT in higher education, it is agreeable to note that "the current use of new technologies [to a greater extent] have not fundamentally reorganised the way we teach and learn as we have not yet discovered how to make new technologies transformative" (Garrison & Akyol, 2009, p. 22). This implies the need to go beyond change of format resulting from use of ICT to being cognizant of other factors that influence e-learning outcomes by adopting a more holistic model of

combined influence of implementation, context and learner characteristics (Nortvig et al., 2018; Rodrigues et al., 2019). In the same vein, effective online teaching redefines the role of a teacher in terms of rethinking the course design, communication strategies, reconstructing student-teacher relationships, time management, dealing with technology itself among other issues (Gurley, 2018; Kyei-Blankson et al., 2016).

Online formative assessment has been identified as a lever to achieve a paradigm shift in pedagogical approaches in order to meet the changing needs of higher education (Glassmeyer et al., 2011). The concept of (online) formative assessment is anonymous to assessment for learning which entails: embedding of assessment activities within (online) teaching and learning processes, continuous monitoring and assessing learning for the purposes of modifying the assessment to inform further learning (Gikandi et al., 2011; Oosterhof, et al., 2008; Peculea & Peculea, 2019). This is ultimately achieved through continuous and timely formative feedback until the desired level of knowledge has been achieved (Cole et al., 2017; Rensburg, 2018; Simon, 2019).

Online formative assessment creates enhanced learning environments by engaging learners with authentic assessment activities and formative feedback in ways that support them to continuously refine their understanding (Cole et al., 2017). As previous research indicates, online formative assessment provide enriched opportunities to monitor students' progress and achievement through documentation of evidence of learning processes and products (Gikandi & Morrow, 2016). Moreover, it provides opportunities for shared understanding of expected levels of learning outcomes (Cole et al., 2017). However, there is little evidence from empirical studies on how to effectively embed online formative assessment in the e-learning contexts (Gikandi & Morrow, 2016).

Furthermore, recent studies underscore the need to innovate variety of strategies in order to actualise envisaged benefits from online formative assessment (Gikandi, 2019; Lara et al., 2020; Martin et al., 2019; Simon, 2019). Consequently, there is need to explore various strategies that can enhance embedding of online formative assessment in e-learning environments. In light of this, it is important to consider how adequately such new pedagogical strategies fit the 21st century higher educational needs particularly in e-learning contexts that call for congruent theoretical approaches (Cox et al., 2015). According to Shepard (2001) social-constructivist perspectives, among other collaborative constructivist proponents, CoI represents a congruent theoretical perspective. For instance, one of the important dimensions of congruency between formative assessment and COI particularly in e-learning contexts is recognition of social presence as a mediating variable between teaching presence and cognitive presence (Kilis & Yildirim, 2019). This implies that it is important to underpin pedagogical strategies on congruent conceptual principles in order to facilitate social construction of knowledge, authenticity, metacognition and scaffolding (Elbasri et al., 2018; Kilis & Yildirim, 2019). These principles have been recognized as instrumental in aligning instruction, learning and assessment (Gikandi et al., 2011; Shepard, 2001). It is therefore justified to explore integration of online formative assessment within CoI framework as a congruent theoretical perspective and in particular the teaching presence function. Teaching presence function has been identified as a key factor that influence students learning experiences in online learning (Kyei-Blankson et al., 2016). Such an integrative pedagogical approach can potentially promote meaningful learning experiences including active, collaborative, contextual, reflective and self-regulated learning. These experiences manifest deep learning approaches and offer means to assess products and processes of learning.

Specifically, this paper exemplifies how embedding online formative assessment within teaching presence perspectives can enhance higher education. The next section outlines the study purpose and research questions; which is followed by rationale for the articulated conceptual perspective. The rest of this paper details study methodology, review and alternative interpretation of selected case study findings based on the articulated pedagogical perspective followed by a discussion that critically re-examines the learning experiences and issues of concern. Finally, conclusions and implications are offered.

Purpose of The Study

The aim of this paper was to investigate the evidence of synergic integration of online formative assessment and teaching presence perspectives; as well as to assess the influence of this approach on learning experiences. The paper sought to derive an alternative interpretation of a previous study findings through a critical review of the selected case study. The ultimate purpose was to offer insights that can inform the design and implementation of online formative assessment guided by the identified teaching presence perspectives and related themes. Further, the paper purposefully re-examines the issues that may hinder realization of effective online formative assessment in order to gain pragmatic insights on effectiveness of this integrative pedagogical approach within e-learning contexts. Specifically, this study was guided by the following research questions:

- Which online formative assessment strategies were evident in the course?
- In what ways were these formative assessment strategies aligned to the three teaching presence functions?
- What was the influence of this integrative pedagogical approach on students' learning experiences?

THEORETICAL FRAMEWORK

Online Formative Assessment From a 'Teaching Presence' Perspective

As online and blended learning increasingly become widespread, it calls for purposeful re-alignment of pedagogical approaches to fit the needs of the non-traditional learning spaces. In the same vein, there is also need to underpin these pedagogical strategies within congruent theoretical frameworks in order to facilitate desirable interactivity and learning engagement. The CoI framework offers a suitable conceptual framework to serve this purpose because of its underlying classical theoretical foundation on collaborative constructivist theories (Garrison et al., 2000). More importantly, CoI framework offers congruent theoretical basis for understanding dynamics of learning and teaching in e-learning contexts (Fiock, 2020). That is, it can adequately guide integration of online formative assessment as an ICT-based pedagogical strategy as well as offer relevant themes in analysis of text-based discourse that characterize e-learning environments.

Based on the CoI framework, learning is framed within three key elements: teaching presence, cognitive presence and social presence (Garrison et al., 2000). It is important to note that these elements are inherently interdependent (Fiock, 2020). In particular, previous research underscores the relevance and centrality of teaching presence theoretical perspective on effective use of instructional technologies in e-learning (Akyol et al., 2009; Garrison & Akyol, 2009; Garrison et al., 2000; Richardson et al., 2015). Teaching presence is a means to an end as it offers essential leadership and cohesiveness that are necessary in influencing effective learning experiences. It offers a means for establishing desirable cognitive and social presence; the other 2 essential elements of CoI framework (Anderson et al., 2001; Kilis & Yildirim, 2019). Teaching presence which is fundamentally a responsibility for the online educator also sustains collaborative community of inquiry which is core to positive learning experiences in e-learning environments (Dyer et al., 2018; Martin et al., 2019). Through critical review of related literature, the current study identified some two important dimensions that manifest congruency between formative assessment and COI in relation to enhancing meaningful learning engagement in online learning environments (Elbasri et al., 2018; Fiock, 2020; Kilis & Yildirim, 2019). Firstly, recognition of social presence as a mediating variable between teaching presence and cognitive presence. Secondly, authentic learning activities characterized by real-life scenarios and reflective activities stimulates social presence and cognitive presence.

Drawing from previous research, teaching presence is defined through its three main constituent functions: design, facilitation and direct instruction (Akyol et al., 2009; Garrison et al., 2000). Teaching presence plays a controlling and mediating role to bring together the other elements in ways that

form a functional relationship aligned to the expected learning outcomes and needs of the learners (Akyol et al., 2009; Martin et al., 2019). While acknowledging the diverse opportunities to establish and sustain teaching presence, it is equally important to recognize that the asynchronous nature of e-learning settings present unique challenges to the development of effective teaching presence (Cox et al., 2015; Garrison et al., 2000; Martin et al., 2019, Simon, 2019). Teaching presence is one of the key factors that influences quality of course delivery and learning experiences whether on face-to face, blended or online learning environment (Dyer et al., 2018; Gurley, 2018. Teaching presence is crucial for meaningful engagement and deep learning especially in online contexts (Gurley, 2018; Kilis & Yildirim, 2019; Kyei-Blankson et al., 2016). In online learning, teaching presence is different from other modes of delivery especially due to the requirement to communicate and interact when separated from learners by time and place (Gurley, 2018; Rensburg, 2018). This implies the need to purposefully devise strategies for addressing potential challenges through synergetic integration of congruent pedagogical strategies. In view of the aforementioned opportunities and challenges in relation to achievement of effective e-learning environments, synergetic integration of online formative assessment from a teaching presence perspective offers a suitable pedagogical strategy. The core elements of formative assessment (embedded assessment, shared meaning and role, continuous monitoring and formative feedback) can be aligned to fit the 3 teaching presence functions. Firstly, the design function (instructional management) focuses on structural issues such as curriculum setting, course design and assessment methods and defining medium and time parameters (Kilis & Yildirim, 2019).

Secondly, facilitation (building understanding) may entail ensuring an enabling environment as well as ensuring cohesion and encouraging students to participate in the discourse (Kilis & Yildirim, 2019). Facilitation is crucial in stimulating learners' interest, motivation and engagement. It is also crucial to purpose for shared responsibility among teachers and students particularly in e-learning settings in order to promote active and engaged learning. Facilitation is a process of creating effective learning environment focused towards promoting shared meaning and common understanding. The facilitative role also entail moderation of the discourse, stimulating passive participants, as well as acknowledging and reinforcing individual contributions.

The third function; direct instruction, is teacher's responsibility; it is concerned with more specific pedagogical issues includes lecturing, diagnosing and correcting misconceptions. This function also includes assessment of students understanding, injecting new knowledge from diverse sources, summarizing discussions and providing formative feedback (Kilis & Yildirim, 2019). Integrating online formative assessment within the aforementioned teaching presence functions can form a synergy that enhances teaching, learning and assessment in e-learning settings. For instance, emerging affordances provide expanded opportunities for interaction among students and teachers which enhance quality and immediacy of formative data and immediacy of formative feedback (Cole et al., 2017; Gikandi, 2019). Effective direct instruction therefore requires the teacher to constantly monitor and assess students' achievements in order to inform timely and tailored formative feedback. Online formative feedback should also be critical towards encouraging meaningful reflection on own understanding (Elbasri et al., 2018; Gurley, 2018). This also means that online educators must establish innovative ways to communicate timely feedback effectively in a manner that stimulates exploration (Kilis & Yildirim, 2019; Gikandi & Morrow, 2016). Furthermore, affordances within this new approach can provide information rich databases/resources with diverse exemplars and simulation tools through which the teacher and/or students can share to provide further support for enhanced understanding of content.

METHODOLOGY

Case study research design was adopted to evaluate evidence of implementation of online formative assessment framed within teaching presence perspective. This paper sought to derive an alternative interpretation of a previous study findings through a critical review of a selected case study. The

selected case was therefore part of a broader recent multi-case study. To the theme of this paper, the selected course was considered a suitable case because of pedagogical approach in the course design based on preliminary analysis. The studied course was part of teacher education programme within an e-learning environment. Study participants comprised postgraduate students enrolled in an educational course and the course designers/teachers. The course was hosted on the University learning management systems (LMS) and was offered in online mode. There were 16 participants: 2 teachers/ course designers and 14 students.

Qualitative techniques were applied in data collection and analysis. Participant observation, document analysis (archived online course discourse) and interviews were utilized as data collection tools. Archived discourse from the LMS provided rich and extensive evidence of course learning processes and products. Systematic analysis of the online discourse as a source of evidence in e-learning research has previously been underscored by Garrison et al. (2000). Systematic selection of the online course discourse and analysis was done guided by the research question to ensure usefulness and focus of the findings to the purpose of the current study. Content analysis technique was applied in order to draw relevant themes and related evidence of elements of online formative assessment and the extent to which this was aligned to the 3 functions of teaching presence as described earlier. Interview data provided in depth evidence to corroborate data from other sources. To address potential ethical concerns, informed consent was sought. Anonymity and confidentiality of all participants was also assured and maintained using pseudonyms.

During the study period, the researcher was a participant observer in which she participated as a teaching assistant. The researcher observed, reflected and documented her observations on the learning processes and products. The benefit of multiple roles as a researcher and participant observer include opportunities to perceive reality from an insider viewpoint as opposed to external viewpoint thus enhancing reliability and accuracy of data obtained. Despite being a participant researcher, care was taken to maintain rigour and reduce bias.

Overview of The Course Design and Procedure For Data Collection and Analysis

The course teacher in the selected cases had purposefully designed for embedded assessment. That is, the assessment in the selected courses was continuous and seamlessly integrated within teaching and learning processes in ways that served both formative and summative purposes. The course assessment activities entailed four assignments that were clearly spelt out and shared from the onset of the course. Therefore, the processes and products that resulted from students' engagement in a variety of learning and embedded assessment activities formed the basis for the online discourse.

Guided by theoretical propositions and key themes, course assessment processes and products were analysed to obtain evidence of formative assessment which were mainly based on key aspects represented in Table 1. This implies that the identified characteristics can be integrated to achieve effective online formative assessment. As well, they provided a framework to evaluate the influence of online formative assessment on students' learning experiences. This approach enabled gathering and analysis of formative assessment evidence from the learning/assessment processes and products.

RESULTS AND DISCUSSION

Evidence of formative assessment from the perspective of teaching presence was guided by the indicators described in Table 1. Formative assessment was therefore coded for formative feedback, analytical rubrics, nature of assessment activities, documentation of evidence of learning, and emergent process characteristics. In addition, the evidence of elements of formative assessment were further reviewed to establish the extent to which they aligned to the 3 functions of teaching presence. This entails establishing how and to what extent formative assessment fitted into and manifested the design function, facilitation and direct instruction.

Table 1. Criteria for analysing the evidence of formative assessment

Element of formative assessment	Criteria/indicator	Tools and strategy utilized
Nature of assessment activities/tasks	Ø Are the assessment activities authentic? Ø Are they flexible— are there alternative approaches or activities? Ø Are they integrated into learning? Ø Are they distributed throughout the course? Ø Are they integrating reflective discourse	Ø Incorporating alternative activities/ options for students Ø project Ø Assessment activities were integrated into learning activities Ø Authentic and appropriately complex
Rubrics and expected learning outcomes	Ø Openness and transparency of rubrics: Are rubrics shared and common understanding promoted? Ø Flexibility of rubrics—negotiable and clarity enhanced over time. Ø Are the rubrics Analytic: comprehensive criteria and standards (indicating the range of performance preferably assigning scores) in relation to specific levels of achievement expected (predetermined qualities). Ø Availability of exemplars where applicable	Ø Sharing of learning goals and expected outcomes with students Ø Sharing and Reviewing rubrics Ø Annotating rubrics through illustrations and exemplars Ø Negotiating deadlines Ø Encouraging students to seek further clarity
Feedback	Ø Formatively useful (tailored to student needs) Ø Immediacy/ timeliness Ø Easy to understand Ø continuous and integrated feedback Ø Direct answers withheld –offering indirect answers such as offering references and hints as well as asking leading questions Ø Teacher role as a facilitator through provision of essential leadership, cohesiveness and scaffolded interventions as well as consideration of prior knowledge and experiences and mentoring evidence (at least for students with intensive difficulties).	Ø Teacher's feedback Ø Peer-peer feedback
Documentation of evidence of learning	Ø Availability of learning/assessment products accumulated over time. Ø Processes can be monitored, students work easily accessible, compact, flexible and shared learning processes and products	Using tools provided by Learning Management System (LMS)
Derived Process characteristics *(assessing effectiveness of online formative assessment)*: Ø Active engagement Ø Interactive collaboration Ø Contextual Ø Reflective Ø Multiple perspective orientation Ø Self-regulated learning	Ø Students' active participation Ø Development of student understanding over time Ø Authentic and appropriately complex assessment activities relevant to the domain being studied. Ø Collaborative learning and assessment activities through feedback to and/or from participants Ø Alternative/flexible assessment activities Ø Motivating and emotionally involving activities that sustain students' engagement over time. Ø Students involvement in reflective practice Ø Evidence of student development towards self-regulated learning.	online forums, critical writing, engagement in authentic projects, peer feedback, open and transparent rubrics, reflective writing, student directed online discussion forum, private and open sharing and questions forum

Aligned to the design function, the teacher planned, designed, implemented and directed the course learning and assessment activities through the semester. Learner-focused approach and formative online assessment strategies were evident from the onset of the course. Various strategies and elements of online formative assessments are evident. These include peer assessment and self-

assessment. Other evident elements of online formative assessment included formative feedback; open and transparent rubrics; integrated authentic assessment activities; reflective processes as well as opportunities to document and monitor students' progress and achievements.

Other evident dimensions of design and instructional management relate to the way the assessment activities were distributed throughout the course. The rubrics were open, transparent and negotiable. That is, they were reviewed periodically and students were encouraged to seek clarification of what was unclear to them. Exemplars were provided where applicable. As previous research indicate, effective use of rubrics in online assessment provided students with opportunities to clearly understand the expected competences and criteria to achieve them (Cole et al., 2017; Cox et al., 2015; Martin et al., 2019). In addition, explicit scaffolding of online learning and authentic assessment activities is important towards fostering dialogic and meaningful engagement (Kilis & Yildirim, 2019; Martin et al., 2019). Explicit scaffolding techniques include providing direct instructions from the outset, online tutorials and proactive learner support on appropriate use of digital tools, and regular communication with less active students. This in turn enabled learners to monitor their achievements and progress (Nortvig et al., 2018). Self-monitoring and assessment was also encouraged through personal reflections which was facilitated through reflective writing and shared understanding of rubrics.

Another element of design function that was evident is that the teacher recognized the need to become visible from the outset by creating a conducive class environment to ease adjustment process. This aligns to the viewpoint of various researchers (Akyol et al., 2009; Richardson et al., 2015). In the studied course, conducive learning environment was achieved through setting up an introduction section that was defined by the course teacher as the main activity for the first week. In this activity the students were required to detail their profile. From observations, this activity elicited social interests where students posted queries and comments in response to the participants' biographies. This is consist with previous researchers (Glassmeyer et al., 2011). These scholars observed that creating a conducive classroom environment at early stages through activities that promote interpersonal relationships is particularly paramount in promoting social interactivity in e-learning environment.

In relation to facilitation role, the teacher monitored students' progress as they engaged in various learning and assessment activities and provided desirable guidance, support and feedback. During the interview, the teacher explained how constant monitoring was done to ensure adequate facilitation. The teacher noted that the LMS provided tools that enabled documentation of students work over time, thus manifesting a learning portfolio that supported monitoring and assessment of evidence of learning. As Bhattacharya (2009) suggests, in a learning portfolio, structure of work evolves as the products get developed. Students documented work including the reflective journals were archived in the LMS. Similar to Gikandi (2019) suggestions, reflective writing promoted deep understanding of content and reflective practice in ways that supported learners towards self-directed learning. Documentation of learning processes and products also enabled the teacher to demonstrate supportive leadership actions by fostering group consciousness towards shared meaning, reinforcing participants' contributions in the discussion forums and prompting in less active participants. The relevance of reflective and metacognitive engagement has been underscored because it fosters learner's autonomy, self-assessment and motivation; among other dispositions of self-regulated which are critical success factors in e-learning (Elbasri et al., 2018). These elements are integral to the function of facilitation.

Through monitoring the learning processes, the teacher ensured cohesiveness and corrected the misconceptions that arose within the discourse. This represents an aspect of direct instruction function. This is consistent with previous research that teacher leadership role is essential as students undertake formative assessment activities (Cole et al., 2017; Cox et al., 2015; Glassmeyer et al., 2011). For instance, below is an instance of misconception which the teacher corrected; and at the same

time stimulated connections to participants' prior experiences as well as injected new knowledge from diverse sources:

Thank you for sharing this analysis … is relevant to many students, not just those who have English as a second language. As you'll see from my news message shortly I liked the clarification of Rogers' characteristics or attributes in Straub's June 2009 review of educational research to inform technological adoption. He states on p 631: "Compatibility is the perception that a particular innovation is similar and congruent with existing understandings of similar and past ideas. Innovations that fit with an individual's existing understanding or schema will be more easily adopted." I think I had a less clear view of that. Given this clarification, would you, or another student, please reply to rephrase the analysis of compatibility into this conceptual rather than behavioural view? (Course Teacher).

Additionally, direct instruction function was revealed by the evidence on how the teacher took advantage of diverse ICT tools to provide expanded opportunities for students' active participation and enhanced learning experiences. More importantly, the teacher fostered shared role through stimulating and encouraging peer-peer formative feedback. This enhances immediacy and diversity of feedback, interactive collaborations, contextualization, reflectivity and self-regulation among the students (Dyer et al., 2018). These experiences manifest achievement of desirable learning experiences in relation to the needs of 21st century higher education (Peculea & Peculea, 2019; Rodrigues et al., 2019). To this end, the students therefore benefited from shared role within the integrative pedagogical approach. However, 15% of the students had some difficulties in engaging online productively, a situation that called for tailored intervention from the course teacher. This also represents an element of direct instruction.

As discussed this far, this integrative pedagogical approach facilitated important learning experiences including active learning, interactive collaboration, critical thinking, reflectivity, multi-dimensional perspectives, and self-regulation. Based on the analysis of archived course discourse and students' interview responses, integration of formative assessment from a teaching presence perspective promoted students' active engagement. Students' level of participation (frequency of interactions, quality of work, time of stay on task, timeliness) within learning and embedded assessment activities was assumed to be an indicator of active engagement.

Student engagement within discussion forums also revealed collaborative learning and peer formative feedback. Confirming previous findings, collaborative learning can enhance engagement and provide students with opportunities to achieve deep understanding (Fiock, 2020; Gikandi & Morrow, 2016). Below is a part of a discussion forum which had a total of 27 entries where more than 50% of the participants contributed. This illustrates interactions among students that promoted collaborative learning and sustained engagement:

I have just been going through the readings and multimedia for The Organisation. Brigid Eikelmann study highlights that it is a good idea to swap information with a partner in order to have someone objectively look at the analysis of data…This past week I interviewed the leader of the primary school in the school that I work at. The school is at the early stages of using IT. I have been following the CREATER model, but I think my findings may also fit into other models…Is anybody else following similar lines and want to give/swap feedback, or not following similar lines but still interested in an exchange of ideas?...That's where I am at the moment and I'd love to make some direct correspondence concerning this project. It's too easy to miss the woods for the trees!... (Student 4).

I'm trying to get a group pinned down to a definite time for my interview, and meanwhile am at sea with formulating the questions. I'd like to share some thoughts on this with you, and start by considering

how you have gone about this. I'm playing with various tools using appropriate parts of more than one model as Brigid Eikelmann does…If you use the Creater model what kind of questions do you ask to ascertain 'care'? (Student 5).

In addition, 21% of students exceeded expected level of participation in the course activities. This is manifested by the complex nature of the tasks that some students chose, the quality of students' learning products, level of engagement and self-directed activities. Eight percent of the students choose complex tasks for their class projects while others demonstrated shared leadership role by initiating change with digital technologies at individual level within their organizations. Additionally, some students were stimulated to initiate discussion topics and this further enhanced peer interactions. For instance, 79% of students participated in one such self-motivated discussions; which demonstrated students drive towards self-regulated learning (Cole et al., 2017; Cox et al., 2015; Glassmeyer et al., 2011). This finding confirms that online discussion forums founded on appropriately complex real-life scenarios, learner autonomy and reflective activities stimulates social presence and cognitive presence (Kilis & Yildirim, 2019). This also confirms the viewpoints of Nortvig et al. (2018) that, while cognitive effectiveness peer feedback and support may be dependent on students' level of knowledge and experiences, collaborative online discourse and peer support promotes satisfaction and motivation among online learners. Learner motivation in online learning is integral to sustained and meaningful engagement (Rensburg, 2018; Simon, 2019). As well, peer learning and support fosters learner's identify formation and sense of belonging as members of meaningful learning community. However, teaching presence is crucial in terms of moderating collaborative online discourse appropriately in order to ensure a conductive and safe environment especially for less confident learners ((Dyer et al., 2018; Kilis & Yildirim, 2019; Nortvig et al., 2018). This in turn supports development of strong positive online identity which fosters learner's disposition towards self-reflection and independent inquiry.

Consistent with previous research, the findings further show that students are likely to pay more attention to formative assessment if it is also scored for summative purpose as this may motivate learners (Gikandi & Morrow, 2016). Additionally, increased level of participation in class activities may have resulted from well-defined and interpreted rubrics and explicit teacher facilitation for the class activities. This is because, clearly defined and shared rubrics enable students to clearly understand the expected outcomes and become responsible for their learning (Cox et al., 2015). These elements of participation therefore confirm that formative assessment framed within shared role in teaching presence functions promoted active engagement in the studied course. However, 15% of the students had considerable difficulties that called for tailored intervention from the course teacher. Through direct instruction and support from the teacher, these students were able to engage more productively.

To further confirm the evidence discussed this far, the following excerpts from students' feedback (mid-course evaluation) using anonymous questionnaires explicitly illustrate elements of teaching presence within formative assessment processes and their influence on students' learning experiences:

Student 1

I think the course is well structured and now that some of the topics and discourses are not so unfamiliar I feel that I know where I'm going and am happy about seeking guidance at any stage. Something about the regular communication with some students who are clearly expert in their field is not only very helpful, but is an incentive to always be learning more. I think the course encourages enquiry based learning and the co-construction of knowledge. [Course design function]

Student 2

Good prompt feedback on questions from the lecturer. Also helping with possible directions and focus for discussion around the topic…[Direct instruction function]

Student 3

The structure of the course, the resources being online, and that include text, video and audio. The forums, being able to read all, even though not always responding. The degree of flexibility in Ass 3... [Course design function]

The above excerpt reveal that the students acknowledged the core elements of formative assessment that were facilitated within the learning and embedded assessment activities. These elements included increased opportunities for formative and timely feedback, multiple perspective orientation, flexibility and collaborative learning. However, one student expressed some challenges in the course. From the mid-course evaluation, the student noted:

I sometimes feel overwhelmed trying to keep up with all the dialogue as well as readings and links which constantly proliferate. (I realise now that I need to only dwell on what is relevant to me). I'm ambivalent about the 'best of ...) as I sometimes am challenged to do better but think it encourages a competitive spirit that might produce anxiety. I would like to spend more guided time on the wiki [facilitation function] (Anonymous).

Further, this particular student in the course stood out as an outlier as he demonstrated serious challenges even after being mentored individually. As the teacher expressed when responding to her approach to patient teaching:

Yes patience is part of the process necessary, and was particularly necessary with the student who dropped out. I had to let him choose to drop and that led to telling myself that I had to step back and give it time on several occasions. Talking with experienced colleagues about his past performance was extremely helpful in that case…(Course Teacher).

This aspect reveals that the teacher also played the role of a mentor which is a function of direct instruction. As research previous suggests, this implies that tailored mentorship is part of effective formative assessment (Cox et al., 2015; Ladyshewsky, 2013; Nortvig et al., 2018; Vonderwell & Boboc, 2013). Teachers should be able to identify and reflect on the needs of their students particularly those with learning difficulties and respond by providing necessary guidance and encouragement (Kilis & Yildirim, 2019). This in turn, may help students to acquire positive dispositions towards learning and enhance their confidence as capable learners.

IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

Through this study, it is apparent that realization of effective pedagogical approach in e-learning setting calls for a variety of congruent pedagogical strategies with ultimate goal to facilitate effective teaching and learning. This also implies that teaching, learning and assessment processes need to be well aligned in ways that enable assessment to be seamlessly integrated to form a continuum between formative and summative assessment. Moreover, it calls for authentic and continuous assessment activities that are open-ended to stimulate learners' active engagement and connections to existing

knowledge and real-life contexts. Such an e-learning context will potentially facilitate desirable interactivity and sustain meaningful engagement.

Moreover, effective learning and assessment in online setting is determined by effectiveness of teaching presence. For this to be attained, shared meaning and role in enabling teaching presence functions of design, facilitation and direct instruction are necessary. This implies creating opportunities for sharing learning goals and expected outcomes by purposefully designing for learners' active participation, interactive collaborations and peer-peer formative feedback from the outset of the course. The ultimate purpose is to stimulate learner as a key learning resource and to sustain meaningful engagement. This therefore calls for online educators to exploit diverse ICT affordances to foster a learner and assessment-centered focus in ways that promote shared purpose and responsibility for effective teaching presence and sustained engagement.

Meaningful engagement also requires educators to guide and support learners in developing necessary skills to enable them engage more productively in shared role within teaching presence functions and formative assessment processes. This implies that teacher's role as a guide and mentor is important to enable learners focus their interactions on expected learning outcomes in ways that stimulate both collaborative and individual learning. In the same vein, allowing flexibility within the formative assessment processes is crucial in promoting leaner autonomy and multi-dimensional perspectives; which are precursor to contextualization, self-regulation and reflective practice.

The insights from this paper also have implications for future research. Acknowledging that the case study was conducted within a specific e-learning setting, there is need to conduct further research in other settings in order to confirm the positive findings from the current study and illuminate specific contextual issues that may be relevant in practice. This would contribute further understanding in relation to alternative pedagogical approaches towards achieving the goals of higher education in the 21st century. Considering ubiquitous ICT in today's world, it is also important to explore diverse ICT tools including mobile based tools that can enhance shared role in formative processes and teaching presence for enhanced educational experiences within e-learning contexts. It would also be useful for further studies to explore how varying strategies and ICT tools are appropriate across different subject areas.

CONCLUSION

To this end and to the theme of this paper, it is evident that the course utilized various strategies of online formative assessment that were framed within teaching presence perspectives. This approach evidently enhanced learning experiences and promoted deep learning approaches. One of the key findings is how shared role within formative assessment processes framed within teaching presence functions can be beneficial in e-learning contexts. This approach enhanced peer formative feedback and collaborative learning as evidenced in the findings. As the findings indicate, through the integrative pedagogical approach, there was evidence of sustained meaningful engagement and timely formative feedback. These aspects are critical for success in e-learning.

Moreover, through purposeful integration of formative assessment within teaching presence perspectives, students demonstrated meaningful reflectivity through connecting their learning experiences to real life professional contexts. Within these reflective processes, learning portfolio also emerged to facilitate progressive documentation of learning processes and products. Through these strategies, meaningful learning experiences were evident particularly in relation to active engagement, interactive collaborations and multi-dimensional perspectives. These in turn expanded opportunities for students to engage in contextualized and reflective discourse thus promoting self-regulation and deep learning approaches. These are important disposition in higher education.

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Designing for Distance Learning:
Analyzing the Process of Redesigning Online Courses Using the Three Pillars Method

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ABSTRACT

This study analyzed the process through which 37 online courses were transformed using the three pillars course transformation method. The method advanced active learning and engaged learning in order to impact student success. The transformation process began with training of instructors on using the method booklet before they would continue by transforming their courses. During this transformation, instructors worked with an instructional designer assuming the role of a Higher Learning Commission Quality Initiative Project (HLC-QIP) consultant. The study analyzed the transformation process, focusing on the pedagogical support provided to course developers and the actual redesign process, benefits, and challenges.

KEYWORDS

Course Redesign, Design Method, Distance Learning, E-Learning, Instructional Design, Three Pillars

INTRODUCTION

Instructional design theory assists educators in developing a vision of instruction during the design process (Reigeluth, 1999). Instructional theory assists in translating an instructional plan into instruction through the design and development process (Morrison et al, 2004). Krippendorf (2005) held the view that design brings forth the instructional technology that does not come naturally. Fink (2016) argued that when we teach, we engage in two closely related, but distinct, activities. First, we design the course by gathering information and making a number of decisions about the way the course will be taught. Second, we engage in teacher-student interactions as we implement the course we have designed. In order to teach well, one must be competent in both course design and teacher-student interactions. However, according to Fink (2016), of these two activities, our ability to design courses well is usually the most limiting factor. In using the Three Pillars Course Transformation Method of design, the designer/instructor places emphasis on active and engaged learning, which positively impacts student learning and success (Orey, 2010; Barkley, 2010; Kuh, 2008). Active learning also addresses learning needs for at-risk students, as well as advancing higher order thinking skills and creating a more rigorous experience (Twigg, 2005).

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The purpose of the present study was to analyze the process through which 37 online courses were redesigned over three years using the Three Pillars Course Transformation Method. Developed by Varner (2015). The method comprises six steps, which were completed by course designers while transforming a specific online course. The steps include: reflection of teaching and learning, alignment of student goals across the three pillars (deep learning, intellectual skills, professional s kills), selection of new learning activities, development of the course, redevelopment of the syllabus, and evaluation of student learning. During that period, course developers worked with a designated instructional designer assuming the role of Higher Learning Commission Quality Initiative Projects (HLC-QIP) consultant. The present study analyzed this process, focusing on pedagogical support provided to course developers, the actual redesign process, and the benefits and challenges.

Purpose of Study

The study analyzed the process through which 37 online courses were redesigned using the Three Course Pillars Transformation Method. Developed by Varner (2015), this Method is comprised of six steps which were completed by course designers while transforming a particular online course. These course designers were online teaching faculty members from across curriculum. The steps were: a reflection of teaching and learning, alignment of student goals across the three pillars (deep learning, intellectual skills, and professional skills), selection of new learning activities, development of the course, and redevelopment of the syllabus and evaluation of student learning. The study focused on pedagogical support provided to course developers, as well as benefits and challenges of the entire process involved in the transformation of the 37 online courses.

LITERATURE REVIEW

According to Nomme and Birol (2014), the process of course redesign takes the form of either a series of stages or steps (forward or backward) or a cycle of revision. In backward design, a course developer first identifies the desired results, followed by determining acceptable evidence and planning for the appropriate learning experiences and forms of instruction (Wiggins & McTighte, 1998).

Reasons for course redesign appearing in the literature include building courses that reflect new directions in teaching and learning theory, creating stronger links between theory and practice, and teaching students to value course content and see its connection to real life (Hammerness & Darling-Hammond, 2002; Rose & Torosyan, 2009). Other reasons involve integrating active learning to create a student-centered classroom environment, introducing activities that improve problem-solving skills, integrating multiple perspectives, and encouraging students to engage higher order thinking skills (Bergtrom, 2011; Aitken, 2005; Sheridan & Kelly, 2012).

A different, yet notable, model for the course redesign process is a four-step cycle developed by Wiles & Bondi (1998), which entails analysis, design, implementation, and evaluation. This cycle emphasizes the importance of carefully studying the context in which the redesigned instruction will be taught, redesigning the new course, implementing it and evaluating the impact of the changes. Another model for course redesign is integrated course design. This model follows a backward cycle with integrated course design and considers the multifaceted realities of the designer's situational context (Allen & Tanner, 2007). Interestingly, it also emphasizes forward-looking assessment, specifically focusing on the types of evidence-gathering strategies that incorporate knowledge and skills that people use outside of school (Allen & Tanner, 2007). When it comes to online learning, courses which are taught completely online require some different instructional strategies and resources than hybrid or blended courses. Since hybrid courses involve some face-to-face contact with students, instructors can address issues that students seem to miss when taking a completely online course (Branoff &Wiebe, 2009).

The National Center for Academic Transformation (NCAT) identified five principles that can lead to successful course redesign, resulting in both student learning and reduced instructional costs

(NCAT, 2005). These principles include redesign of the whole course, encouraging active learning, providing students with individualized assistance by building an expanded support system, including ongoing assessment and prompt (automated) feedback, ensuring sufficient time on task, and monitoring student progress. So in essence, NCAT (2005) emphasized redesigning the whole course and not just part of it, incorporating activities that will actively engage students in learning, making assessment ongoing and incorporating graded events throughout the course, and providing timely feedback to students while monitoring their progress.

Where development of actual content in the redesign process is concerned, research in science education and other fields provides evidence that student engagement can be enhanced by using active learning strategies (Allen & Tanner, 2005; Otero & Gray, 2008); and as Nomme and Birol (2014) contended first, course concepts need to be made explicitly relevant to students, enhancing their engagement and motivating them to internalize the course material. In addition to information transfer, discussions, exercises or activities need to be incorporated to promote student engagement.

Where the effectiveness of redesigned courses is concerned, Schwartz (2016), contended that because the process of course redesign may change the assessments used in a course, it is normally a challenge to compare student achievement between older and newer versions of the course. However, according to Perkins et al. (2005), one potential measure that can be used to determine the effectiveness of a redesigned course is to investigate student beliefs and attitudes toward the subject. Nomme and Birol (2014) compliment this view by stating that questionnaires can also be used to gather quantitative data about the impact of new teaching strategies on student attitudes, beliefs, and values toward the subject matter.

Further, in order to determine the effectiveness of a redesigned course, several studies have compared learning gains and changes in student attitudes towards science (Armbruster, Patel et al, 2009; Knight & Smith, 2010; Libarkin, 2001). However, Nomme and Birol (2014) cautioned that when the course revision involves a major change in the course content, including new learning outcomes and new assessment tools, it may not be possible to compare student achievement in the original and the redesigned courses.

Therefore, while various schools of thought differ in their selection of different elements in course redesign, certain elements are common. The commonalities included are that the redesign is considered a process, that it involves gathering of information, and that implementation and evaluation of the effectiveness of the redesign is completed.

Research Questions

The following three research questions guided this study:

1. What were the issues in pedagogical design that course developers encountered while redesigning online courses and how were these issues solved?
2. What benefits did online course redesign developers gain from the process of transforming courses through the Three Pillars Method?
3. What aspects of the 37 online courses were successfully improved upon as a result of the transformation process?

Method

A state university in the Southwest embarked on a course transformation project to transform undergraduate education. The Method, entitled "Three Pillars Course Transformation" was approved by the Higher Learning Commission (HLC) as the University's quality initiative project, after it was evaluated on genuineness of effort. HLC observed that the Three Pillars of Learning in Undergraduate Education Course Transformation Method and six-step process demonstrated acceptable scope and significance, clarity of purpose, evidence of commitment, and appropriate timeline. The main purpose

of the Three Pillars Method is to advance students' deep learning, intellectual development, and professional skills in general education and academic program courses. The plan indicated that the process of transforming courses would be done in five cycles. Under the project, faculty members would voluntarily register their course(s) for transformation with the Center for Excellence in Teaching and Learning (CETL), which had structures in place to support individual course developers. During the redesign process, course developers worked with a designated instructional designer, assuming the role of Higher Learning Commission Quality Initiative Projects (HLC-QIP) consultant. The consultant guided course developers through the redesign process and provided continuous feedback that assisted them in revising their artifacts.

In the Three Pillars Method, deep learning is the first pillar and is discussed in Bender (2012) as making students learn in ways that allow them opportunities to reflect upon the content, make meaning from the content, and collaborate with their peers and/or instructor. The Method further defines the second pillar, intellectual skills, as ways in which learners are provided opportunities to engage in critical thinking, reflection activities to develop cognitive skills, collaborative learning activities to help them develop social presence and also advancing their problem solving ability (Stavredes, 2011). Vai and Sosulski (2011) further added that intellectual skills also involve presentation of new knowledge and skills, providing activities and resources that allow students to practice and apply their new knowledge and skills, and providing proper assessment and feedback. Finally, in the Three Pillars Method, the third pillar, professional skills, is defined as learning activities that help prepare learners with skills needed to succeed in the workforce. The simulations provide students' opportunities to participate in personalized virtual internships that can make learning an enjoyable experience and help them close gaps between learning and use (Beckem & Watkins 2012).

The Three Pillars Method Booklet took online course developers through a series of six steps that they had to complete for each transformed course. The steps in the Method Booklet served as a parameter to measure successful completion. These steps included: (1) Reflecting on the teaching and learning already embedded in the original course – an online course developer would answer questions that enabled them to assess the current status of their course and goals they wanted to achieve with the transformation. (2) Aligning student learning goals across the three pillars (deep learning, intellectual skills, and professional skills) – An online course developer would align each course learning objective with an appropriate pillar. (3) Selecting new learning activities – An online course developer would select learning activities from a list provided in the Method Booklet by aligning them with their learning objectives. (4) Developing the course – Online instructors developed the selected activities into detailed teaching content including grading criteria. (5) Redeveloping the syllabus – Upon redevelopment of the course, online course developers would go back to the syllabus and revise it to accommodate the new activities. (6) Implementing the course within the learning management system and evaluating student learning – The redeveloped course would be taught for a semester after which the course developer and teacher would work with the University Assessment Center to evaluate student performance and compare results with the pre-redesigned version of the course.

Throughout this process, individual course developers worked with the designated (HLC-QIP) consultant and instructional design specialist. The process involved the consultant reviewing the activities in the original course and going through feedback with a course developer. Feedback was provided to course developers using a shared google doc. The online course developer would then use the feedback to revise the activity before the consultant reviewed it again for approval. They would then move to the next activity in the course. The entire process was a formative method of redesigning the course. Upon successful redevelopment of a course using the Three Pillars Method, each transformed course would be taught for a semester (implementation). After the semester of implementation, the course developer and teacher would work with the University Assessment Center to complete an assessment report that compared the changes in student performance before and after the transformation. Over a period of two and half years, a total of 37 online courses were

transformed and the present study analyzed the transformation process focusing on the redesign process that incorporated new, engaging online pedagogies into each of the 37 courses with close reference to the Three Pillars Method Booklet.

Against this background, the study analyzed the process through which 37 online courses were redesigned using the Three Course Transformation Method. Developed by Varner (2015), this Method comprises six steps which were completed by course designers while transforming a particular online course. The steps were: a reflection of teaching and learning, the alignment of student goals across the three pillars (deep learning, intellectual skills, and professional skills), selection of new learning activities, development of the course, and redevelopment of the syllabus and evaluation of student learning. The study focused on pedagogical support provided to course developers, as well as benefits and challenges of the entire process involved in the transformation of the 37 online courses.

Data Collection

Data collection, categorization and analysis was ongoing throughout the project. Research logs were used for categorization. According to Dilts (1996), a research log is a summary of significant findings with notations showing sources searched, comments about the search strategies, suggestions, questions, analysis, and discrepancies. In the Three Pillars Project, logs made it easy to collect data because it was necessary to keep records on a daily basis. During the project, research log sheets were created in Google docs and as course developers, while working with the designated Higher Learning Commission Quality Initiative Projects (HLC-QIP) consultant, went through the process of redesigning and redeveloping courses, notes reflecting the process were systematically recorded on the research log in Google documents. These notes emanated from areas, such as overall benefits to course developers, pedagogical challenges encountered while working on courses, and improvements to the transformed online courses.

Data Analysis

Research Question 1: What were the issues in pedagogical design that course developers encountered while redesigning online courses and how were these issues solved?

Table 1. Benefits to online course developers

Improved course redesign competence for faculty
• Process of online course redesign using Three Pillars Method helped developers improve instructional design skills.
Improved student performance
• Assessment reports from online courses transformed using Three Pillars Method indicated improved student performance.
• Reports compared course states from before and after transformation.
Student expressed satisfaction with new pedagogy
• Students reported they enjoyed learning new participatory, online, asynchronous ways.
• Faculty identified online students as becoming doers of knowledge rather than absorbers of knowledge.
• Faculty identified that students transitioned to independent learners.
• Faculty identified an increase in student cooperation with one another to discover new ideas and knowledge in asynchronous online learning settings.
Course redesign added points on faculty promotion and tenure plans
• Successful online course redesign using the Three Pillars Method added valuable points to developer's tenure and promotion plans.

Table 2. Challenges to the Process

Commitment and time
• Some online teaching faculty committed to transforming a course but never had the time to fulfill the commitment.
• Participation was voluntary, which meant all General Education courses were not transformed.
• Some course developers took longer time to complete the process; implementation semester had to be moved further in the future.
Method Book terminology
• Three Pillars pedagogical terminology was a challenge to course developers.
• QIP consultant diluted some terms for course developers.
Writing measurable objectives and aligning them with Three Pillars Method
• Faculty were challenged when employing action verbs.
• Faculty were challenged when making objectives learner-centered.
• Faculty found it difficult to align learning goals and teaching strategies.
Identifying appropriate teaching strategies
• Challenges were found when identifying and incorporating appropriate teaching strategies to aid transformation process.
• Complications were found in the process when transforming an originally traditional course to online using Three Pillars.
Lack of training
• Some course developers did not attend training but came forward to transform online courses.
• Rush training arrangements had to be made to accommodate those lacking original training as online course developers.
Aligning course development rubric
• Complications arose in transforming an online course using the Three Pillars Method while aligning with requirements mandated by University online course development rubric.

Table 3. Aspects of online courses successfully improved

Informative syllabi
• Syllabi were well-developed to inform students of expected learning and level of achievement required for a course.
Comprehensive course module development
• Modules were comprehensively and systematically developed to guide students to learning required content.
• Graded events and readings were properly linked in module pages.
Measurable learning objectives
• Action verbs were well-utilized to produce measurable course objectives.
Higher levels of active learning
• Online courses were reconstructed to include active and engaged learning activities with robust assessment strategies.
• Applications that promote community building in online learning contexts were successfully incorporated.

While redesigning the 37 online courses using the Three Pillars Method, course developers encountered several issues that required the attention of the designated HLC-QIP consultant in order to be resolved. The first challenge was that some online teaching faculty members committed to transforming a course but never created the time to fulfill the commitment. In this scenario, the designated consultant would send reminders to the concerned course developer, but often with a negative outcome. Again, since participation was voluntary and not compulsory, it was not possible to have all general education courses transformed, as originally planned. That is because not all general education faculty members came forward to redesign their courses using the Method. Another challenge was with faculty members who volunteered to transform their course but took much longer than planned. In cases like these, the HLC-QIP consultant deliberately exercised patience and encouragement in order to help the concerned course developers complete their projects. However, the initially planned implementation semester (the semester the transformed course would be taught) had to be moved further into the future in order to make sure that the process was completed successfully.

Another challenge that course developers encountered while transforming online courses was the terminology used in the Three Pillars Method Booklet. Most course developers complained that the Three Pillars pedagogical terminology was too technical. In order to address this problem, the HLC-QIP consultant had to dilute the highly technical instructional design terms in order for course developers to follow the directions in the book.

A more thought-provoking task that online course developers had to fulfill was to rewrite course objectives making them measurable and in alignment with the Three Pillars; deep learning, intellectual skills and professional skills. In order to properly address this challenge, course developers worked with the HLC-QIP consultant to make sure action verbs were employed to make all learning objectives measurable. Individual course developers would then align each learning objective with a fitting pillar as defined in the Method Booklet. This was probably the toughest part of the process, and its completion opened the way for a smooth transformation.

The Three Pillars Method required course developers to identify teaching strategies that would form the basis of an online course transformation. While a variety of teaching strategies were provided and defined in the method booklet, it was a challenge to select strategies that not only fit with the online learning context in a particular course but also aligned well with the course objectives. The HLC-QIP consultant worked with course developers to make sure that this challenge was addressed and that fitting strategies were selected and were well-aligned with learning objectives. Teaching strategies aside, it must also be pointed out that a more time-consuming challenge faced by course developers was the process of transforming an originally traditional course into an online course, while at the same time utilizing the step-by-step procedure outlined in the Three Pillars Method Booklet. This was unlike transforming an existing online course using the Method because there are many activities used in a face-to-face course that cannot just be pasted into an online course environment via the learning management system. There were additional thoughts and insights that had to be incorporated, which made the process more complex, while completing the steps outlined in the Three Pillars Method Booklet. The HLC-QIP consultant worked closely with course developers to make sure that this complex process was completed successfully.

The initial Three Pillars training was mandatory and crucial to the redesign process, yet some course developers were unable to attend. This absence caused the need for additional trainings when course developers came forward to transform a course. In such cases, rush training arrangements had to me made to accommodate those lacking the initial training. Finally, the last challenge with which course developers struggled was the alignment of the transformed course to the university's rubric for evaluating online courses. Even though a course was well transformed using the Three Pillars Method, it could not be taught until approved by the Center for Excellence in Teaching and Learning (CETL). The teacher of the course had to use the rubric criteria to make a self-evaluation of the course before submitting it to CETL, who would then make a final review and provide feedback based on

adherence to the rubric. This process, in itself, was intricate, and only after the course satisfied the rubric, could it be taught.

Research Question 2: What benefits did online course redesign developers gain from the process of transforming courses through the Three Pillars Method?

The most outstanding benefit to course developers was that of learning and applying instructional design skills while transforming their online courses. Using a high level instructional design method to transform courses while working with an instructional designer, helped course developers quickly acquire vital instructional design skills for distance education. Once an online course was transformed, it could be implemented (taught for a semester) and student performance would be measured and compared with the previous version of the course. Assessment reports emanating from implementation of these online courses generally indicated improved student performance, which was a big advantage for faculty members involved. Upon successful implementation of the transformed online courses, students reported that they enjoyed learning in new, online participatory ways. Faculty also identified that online students had become doers of knowledge, rather than absorbers of knowledge, as a result of the transformation. Faculty further recognized that online students had transitioned to becoming independent learners, as well as showing an increase in student collaboration in order to discover new ideas and knowledge in the asynchronous online learning settings. Finally, successful completion of online course redesign using the Three Pillars Method added value to faculty members' tenure and promotion plans.

Research Question 3: What aspects of the 37 online courses were successfully improved upon as a result of the transformation process?

The 37 online courses transformed using the Three Pillars Course Transformation Method produced well-developed syllabi clearly informing students of expected learning and level of achievement required for a course. The transformation also made sure that course modules were comprehensively developed to easily guide online students to learning the required content in a course. Modules also included links to all graded events in a course, thereby having students go through content first, before fulfilling required assignments and examinations. In addition, transformed online courses utilized sound action verbs to produce measurable course and module objectives that would easily indicate that student learning had taken place (Cruze, 2003). Transformed courses included objectives at the highest course level and also at the lower module level with the latter mapped back to the former. The 37 online courses were reconstructed to include a variety of current, active, and engaged learning activities with robust assessment strategies.

Finally, transformed courses successfully incorporated strategies that promoted community building in online learning contexts. Selected applications were utilized in various online courses to promote the aspect of online learning where learners and instructors form a community that resulted in connected, participatory learning.

LIMITATIONS AND IMPLICATIONS

As the Three Pillars Course Transformation Project was concluded, the researchers felt that there were three limitations that needed to be addressed in the future. 1) Time was a limiting factor because the designer/instructors were also teaching full time, and the redesign process was very time-consuming. 2) There were approximately thirty instructors that volunteered for the project but some were unable to complete it within the three years. 3) Limitations of the available technologies sometimes kept the instructor's vision for the course from being met.

Implications due to the limitations are that the instructor/designer be separate personnel, as in many other higher education institutions, which would help with the time commitment and being able to follow through with the redesign process. As more technologies are made available and become more sophisticated, the courses would also become more sophisticated, interactive, and engaging as the technologies are applied to the curriculum.

CONCLUSION AND FUTURE DIRECTION

The Three Pillars Course Transformation Project was a huge success. The 37 online courses were successfully transformed to include modern teaching strategies, well-constructed and informative syllabi, sound assessment strategies and 21st century, active learning strategies. It has always been a challenge to create robust, active learning activities for online learning that would promote both participation and community building, but the Three Pillars Method deliberately emphasized creating such vibrant online teaching contexts to promote student participation and community building in an online learning environment. Also, it was clear that course developers could not have been successful without the prior training they received from the Method author. Even in cases where a course developer missed the training, rush training arrangements were made because one would find it hard to transform a course without familiarizing themselves with the highly specialized training. The role of the HLC-QIP consultant could not have been more important. Course developers received high level instructional design support from their designated on-campus consultant making the whole process seamless. Together, along with transformed traditional courses, the 37 online courses became a large portion of the University's innovations and bid for re-accreditation in the current year.

Future applications should include a comprehensive analysis of data generated from the assessment reports of the 37 implemented courses in order to determine the best method for further improvement in course delivery and student learning for the future.

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