The Effects of Instructor Control of Online Learning Environments on Satisfaction and Perceived Learning

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Abstract: Instructional design is important as it helps set the discourse, context, and content of learning in an online environment. Specific instructional design decisions do not only play a part in the discourse of the learners, but they can affect the learners' levels of satisfaction and perceived learning as well. Numerous studies have shown the value that both student satisfaction and learning have on learner achievement. For this reason, the question of whether instructors can impact satisfaction and perceived learning through various instructional design decisions is important. This study looked at broad-based instructor decisions to see if online environments with higher levels of instructor control lead to higher levels of student satisfaction and/or perceived learning. Three different online environments were used, with each one containing progressively more instructor control. The results show that there were no significant differences in regards to mean levels of satisfaction between the three environments. However, there were significant differences among mean levels of perceived learning based on the differing instructor-controlled environments. This study shows that increasing the levels of instructor control within online environments leads to an increase in perceived learning.

Keywords: computer mediated communication; instructor control; instructional design; online learning; perceived learning; satisfaction

1 Introduction

Within education, the importance of computer mediated communication (CMC) has become evident because of its use in facilitating the learning experience. This is done through interaction not only between students, but between students and instructors as well (Rourke, Anderson, Garrison and Archer 1999). CMC has helped to create a shift from a teacher-centered environment to a student-centered one. Although this shift has become apparent, students still need proper guidance to ensure effective interaction, regardless of the shift. This is because teachers need to be able to make appropriate learner-centered design decisions for use in instruction (Berge & Collins 1995).

Previous research has indicated that aspects of instructional design used to facilitate interaction within an online community have had a significant impact on both student satisfaction and perceived learning (Garrison 2007; Swan & Shih 2005; Wu & Hiltz 2004). The pedagogical significance of this is student satisfaction and perceived learning have been linked to successful implementation of E-learning and student achievement respectively (Sun, Tsai, Finger and Yeh 2008). An overarching theme within previous studies that look at the effect that instructional design has on satisfaction and perceived learning have focused on a form of instructor-control that dictates the amount of interaction that is to take place within a specific online environment. In addition to its influence on interaction levels, instructional design can be used to control other aspects such as the content of the class, the feedback given to learners, task structure, and theorganization of the online learning environment.(Puzziferro & Shelton 2008; Siragussa, Dixon and Dixon 2007; Ertmer, Richardson, Belland, Camin, Connolly, Coulthard & Mong 2007; Lim, Morris & Kupritz 2014). These aspects of design should be addressed so that effective methods for promoting satisfaction and learning can be fully implemented.

Research which has measured the effect that instructor-control has on student satisfaction and learning has done so through surveying students to see how much instructor control they perceived (Sher 2009; Swan 2001; Sun et al. 2008). The perceived levels of instructor-control were then compared to students' perceived levels of learning and satisfaction to determine the level of effects (Sher 2009; Swan 2001; Sun et al. 2008). The current study manipulates various online learning environments, in which the participants experience varying levels of instructor control. The differing levels of instructor control are based on a modification of Siragussa, Dixon and Dixon's (2007) IDOL model of instructional design. More specifically, this paper examines

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the effects of broad-based design decisions that manipulate the amount of instructor control and how that control affects levels of learning and satisfaction.. This research looks at two main questions:

- How do the differing levels of instructor control affect student satisfaction?
- How do the differing levels of instructor control affect student learning?

2 Theoretical Background

2.1 CMC in Education

The popularity of CMC within education has brought forward ideas of interaction within online learning communities. Swan, Garrison, and Richardson (2009) claim that the biggest question within these communities has been whether they can actually be sustained in the form of text-based, asynchronous environments. The answer to this question can be found within online learning environments that use asynchronous forums as a means of communication between instructors and learners. Asynchronous online forums have proven sustainable as a form of CMC because of their success in removing barriers to participation and allowing learners to communicate with each other "anytime" and "anywhere" (Wu & Hiltz 2004). Another benefit of asynchronous online forums is that students have been shown to favor this form of online learning over face-to-face communication because it allows users to communicate at their own pace and in their own way (Callan 2006; O'Neill, Duplock and Willis. 2006; Wang and Woo 2007). Furthermore, claims have been made that asynchronous forums are more effective in terms of producing a greater quality of work, as responses are well thought out, longer, and more detailed when compared to face-to-face learning environments (Hara, Bonk and Angeli 2002).

3 Instructional Design Online

When designing instruction online, teachers need to take into account the various aspects that will support learners. Chen (2007) explains that the four components needed for effective support-based instructional design online are 1) technology, 2) course content, 3) participants, and 4) goals/activities. Goals and activities form the heart of the online learning process. Chen (2007) argues that these four components need to be used in the following ways in order to provide the best support for students in the learning process: Technology should be user-friendly and used to support the facilitation of learning tasks. Course content should be presented through the use of scaffolding to support engagement and achievement. Effective interaction and collaboration should be promoted by the instructor through the design of a social support system. Properly structured learning tasks should be implemented to achieve pre-determined learning goals. Like Chen (2007), Janicki and Liegle (2001) focus on effective instructional processes along with the use of technology in order to effectively design instruction online. In respect to technology, they propose that consistent layout, ease of navigation, and the availability of help screens are important components that support design in online learning. From an instructional process perspective, they promote the following: instructors acting as facilitators, use of a variety of presentation styles, use of multiple exercises, solving hands-on problems, allowing learner-control of pacing, testing learners frequently, and providing clear feedback.

Anderson, Rourke, Garrison and Archer (2001) look at instructional design as part of teaching presence, which they define as the design, facilitation and direction of social and cognitive processes used to create meaningful student outcomes. Based on their work, teaching presence is divided into three categories: facilitating discourse, direct instruction, and design and organization. Facilitating discourse involves the guidance of the learner by the instructor in a meaningful way to make certain that students stay focused on the task (Anderson, et al. 2001). Direct instruction involves the direct intervention of the instructor in order to "correct misconceptions, provide relevant information, summarize the discussion and/ or provide some metacognitive awareness" (Swan and Garrison 2009, p. 13). Design and organization not only involves the design and implementation of individual and group learning activities (Akyol & Garrison 2011), but it also includes setting the curriculum, designing methods, establishing group norms (netiquette), and utilizing the medium effectively by keeping students focused and providing encouragement (Anderson, et al. 2001). The teacher in the role of instructional designer is also responsible for setting clear expectations with respect to the type of discourse that is desired within the online environment. This includes teacher actions such as stating the desired message length, structuring the discourse through instructor comments, and establishing time parameters for learners to post within the online environment (Anderson, et al. 2001).

Within the design and organizational aspects of online learning, instructors may need to control aspects of engagement to reduce the difficulty learners have interacting within the online community. Such control can come in the form of checking understanding at frequent intervals and providing immediate feedback to the learners when necessary (Lim, Morris & Kupritz 2014). It is important to note that the need for various levels of instructor control within a specific online environment may lead to different outcomes for the learners. Anderson et al. (2001) focus on these aspects to ensure that specific, desired student outcomes are obtained. They believe that instructional design should be used to provide students with guidelines, model appropriate posts, and assist the learners when communication breakdowns occur (Anderson, et al. 2001). Furthermore, they believe that design and organizational aspects implemented by the instructor should follow a narrative path through mediation and interaction in which the students have a clear idea of what is expected of them (Anderson, et al.2001). Such interaction is obtained through making instructional design decisions in such a way that they create an overlap between content interaction and participant interaction to create a sense of community within an online learning environment (Swan 2002).

In an older model, Reeves and Reeves (1997) introduce ten dimensions that are used to explain instructional design within online environments. These dimensions are pedagogical philosophy, learning theory, goal orientation, task orientation, source of motivation, teacher role, metacognitive support, collaborative learning, cultural sensitivity, and structural flexibility. These dimensions vary along a continuum and learning environments can be described according to how differing aspects of those dimensions vary within those environments. Using a modified version of Reeves and Reeves' (1997) model, Siragussa, Dixon and Dixon (2007) developed a method of understanding instructional design elements that consist of a set of instructor-initiated decisions that are separated into categories that include content, structure and organization, study flexibility, interaction, and feedback. These decisions can vary in the online environment based on the needs of the students. According to Siragusa, et al. (2007), the amount of content provided in the online environment by the instructor can vary from being "totally provided and linear" to being "completely student-constructed and non-linear". For example, undergraduate students may benefit from content being totally provided to them so they can get a complete understanding of the underlying principles of a topic, while post-graduate students may benefit from student-constructed content to help them build on their own ideas of a specific topic (Glaser 1987). Varying levels of structure and organization may be useful as well, as providing more structure helps students gain a deeper understanding of the material presented to them (Chen 2007). Siragusa, et al. (2007) state that structure and organization ranges from teacher-proof to easily modifiable within the online learning environment. Teacher-proof means that the learning materials are represented in appropriate learning steps and additional learning materials are added when a deeper understanding is needed. Easily modifiable structure and organization gives more flexibility to what learning materials are given and how they are presented. In regards to study flexibility in online learning, teachers may control the amount of autonomy the students have when it comes to the pace at which they post. The pace at which students can post ranges from teacher-determined to student-controlled (Siragusa et al. 2007). In a fully online course, teachers may need to control the pace at which students post more than they would in a blended learning class. This is because the students in a blended learning course have a chance to participate in class, while students in a fully online course do not have this option. Interaction refers to the amount of control the teacher has on the interaction on the forum. Teacher decisions can range from "teacher-guided" interaction to "student-guided interaction" Siragusa, et al. 2007). Teacher-guided interaction may be used if teachers are looking to guide students in a certain direction to achieve specific outcomes. Student-guided interaction may be used for more abstract outcomes, where students may be required to come to their own conclusions through knowledge construction. Siragusa, et al. (2007) claim that the feedback that students require will vary depending upon student needs and level of engagement with the learning materials. Feedback can range from teacher-controlled to student-controlled. This model shows that the amount of instructor control in online learning environments such as asynchronous online forums can and will vary based on student needs. It cannot only give insight, but it is also useful to investigate if these variations in instructor control have any effect on student satisfaction and/or learning.

3.1 Effects of Instructional Design on Satisfaction

Delon and Mclean (1992) make the claim that student satisfaction is one of the most important factors when it comes to implementing e-learning. An increase in student satisfaction is positively correlated with retention as well as its influence on student motivation (Astin 1993; Edwards & Waters 1982; Bailey, Bauman, & Lata 1998; Chute, Thompson, & Hancock 1999; Donohue & Wong 1997). Additionally, students' satisfaction with their

teachers has been linked to increased levels of perceived learning (Richardson and Swan 2003). Among the various ways of influencing satisfaction, teaching design and organization of online environments appears to be a determining factor, as the role of instructors and their presence has been shown to be an indicator and determinant of student satisfaction (Garrison 2007; Sun, et al. 2008).

Research conducted by Sun, et al. (2008) address varying dimensions of instructional design online that can influence student satisfaction. Within the instructor dimension, instructor control such as the timeliness of instructor responses to student posts has been shown to have a significant influence on student satisfaction (Arbaugh 2002; Thurmond, Wambach and Connors 2002). Sun, et al. (2008) postulate that this is due to the students' perception that they are afforded more opportunities to learn when teachers respond to their posts in a timely manner. Within the course dimension, flexibility in time and location have been shown to increase student satisfaction (Sun et al. 2008). Sun et al. (2008) suggest that this is due not only to the convenience the students feel, but also to the elimination of awkwardness that can occur in face-to-face interactions. Within the dimension of the learning environment, Thurmond, et al. (2002), claim that feedback from others positively affects satisfaction. This is because feedback through interaction with others leads to the improved progress and ability of learner groups to solve problems (Arbaugh 2000).

3.2 Effects of Instructional Design on Learning

Within online learning environments, it is the job of the teacher to facilitate the process in order to fulfill specific learning outcomes (Anderson et al. 2001). Based on decisions made by the teacher, learners within a community may have various perceptions of learning. Research has shown that the way learners perceive their learning environment is related to student achievement (Fraser, 1994). Therefore, the role of instructional design and its effect on the perception of learning deserves some attention. Within online communities, Akyol and Garrison (2014) note that perceived learning of the students is affected by how teachers facilitate the online experience, highlighting the importance of looking at ways in which the decisions of the instructor can positively affect perceived learning.

Research comparing instructor-control of online environments and perceived learning of students has generally focused on the instructor-controlled levels of interaction. This is the case with research conducted by Shea, Fredericksen, Pickett and Pelz (2003), which compared interaction with instructors to students' levels of perceived learning. Survey analysis was conducted with both variables (students' perception of interaction with the instructor, and students' perception of learning) to show that students who perceived high levels of teacher interaction perceived higher levels of learning as well. The survey was based on how the teacher interacted with the students through the use of a variety of teaching behaviors, including instructional design and organization. In regards to design and organization, the students reported high levels of interaction when their teacher clearly communicated how to participate in the learning activities and what the course topics would be. The results showed that these design decisions were positively correlated with high levels of perceived learning. Additional research conducted by Arbaugh (2000) surveyed participants to find out how they perceived learning, ease of interaction, and instructor emphasis on interaction. The findings of this study were similar with that of Shea, et al. (2003) in that instructor interaction has a significant influence on the students' perception of learning. Research conducted by Swan (2001) not only looked at levels of student to teacher interaction, but also looked at levels of student interaction. The results showed that student-to-student interaction as well as student-to-teacher interaction led to higher levels of perceived learning, though student interaction with the teacher was a more powerful predictor of perceived learning than students' interaction with each other.

4 Methods

4.1 Subjects and Context

This study had 219 participants. The participants were students at a national university in Korea. The study was implemented in blended learning classes that focused on the improvement of writing skills and the development of understanding of key teaching issues such as classroom management and delivering instruction. The ultimate goal of the course was to provide the students adequate preparation for the Korean teachers' entrance exam. The classes took place over the course of three semesters from 2013 to 2014. The in-class aspects of the classes were lectures, student presentations, and group activities. The online portion of the course involved the students using an asynchronous online forum in order to interact and exchange ideas

as a community and enhance their understanding of the in-class material. Table 1 shows the gender and major breakdown for the three forums used in the study.

Table 1: The Gender and majors for the three forums

	Semester one	Semester two	Semester Three	Total
Gender				
Male	24	26	27	77
Female	46	46	50	142
Major				
English	37	35	40	112
Special	6	6	2	14
Business	1	2	1	4
Pedagogy	3	1	2	6
Art	2	2	4	8
Life Skills	5	5	5	15
Ethics	1	3	2	6
Early Childhood	2	2	2	6
Literature*	1	2	2	5
Social Studies	2	2	5	9
Calligraphy	0	2	0	2
Korean	2	2	3	7
Music	0	0	2	2
Tourism*	0	1	0	1
Chemistry	5	2	2	9
History	2	1	1	4
Earth Science	1	1	3	5
Economics*	0	1	0	2
Geography	0	1	1	2
Total	70	72	77	219

All majors were part of the college of education except those marked with an *

4.2 Experimental Procedures

This study took place over three consecutive semesters. It was implemented in order to see if manipulating the levels of teacher control of three different online forums would produce varying levels of student satisfaction and perceived learning. For each semester that the experiment was run, there was variation in the type of online learning environment from which the students interacted. These differing learning environments were progressively more instructor dominated, and more specific directions were given in forum 2 than 1, and forum 3 than 2. The three forums received progressively higher levels of instructor control. The instructional design model used to vary the levels of teacher control was created using a modification of the Instructional Design for Online Learning model (IDOL) designed by Siragusa, Dixon and Dixon (2007).

4.3 Defining the three learning environments

The following is a modified version of the Instructional Design for Online Learning model designed by Siragusa, Dixon and Dixon (2007). There are seven instructional design decisions used in this study. Each one is explained, and detail is given in regards to how the decisions varied in each of the three forums. A visual representation can be seen in figure 1, which shows more instructor-controlled choices to the right, and more student-controlled choices to the left.

Content source refers to whether the content is generated by either the instructor or the students. The amount of content direction given by the instructor varied among the three forums, ranging from student-controlled to largely instructor controlled. The first forum completely consisted of student generated content, as they were told to post "whatever they wanted" that related to the class. The second and third forums were more instructor-controlled in the sense that they contained specific instructor generated content in the form of questions. More specifically for the second and third forums, learners were given weekly questions to answer, and learner-to-learner interaction occurred on threads generated from those weekly questions.

Linear content refers to whether or not the content followed a specific linear pattern, for example a linear path of narrative or levels of difficulty. The first two forums contained no linear pattern. The topics used in the first forum were student-generated and the topics from the second forum were presented weekly, but not based on any specific linear pattern. On the other hand, the third forum contained progressively more difficult questions as time went on. The pattern for the third forum was based around the complexity of questions, ranging from simple in the earlier weeks of the semester, to more complex in the later weeks.

Instructor posting refers to how much the instructor interacts with the learners through posting. The first and second forums contained few instructor posts (less than 100 instructor posts out of approximately 3000 total posts in forums 1 and 2). The third forum contained significantly more instructor posts that focused on giving contents and moderating the learner-to-learner discussion (approximately 500 instructor posts out of approximately 3000 total posts).

Structure and organization refers to how the discourse and interactions are controlled by the instructor. This can include providing examples and restricting the way students reply to other students' posts. The first forum contained no such structure and students were told to write and interact anyway that they felt comfortable. For the second forum, students were given example posts that were focused and on-topic. Furthermore, students were instructed in netiquette and given instruction and encouragement in how to improve their interaction, for example, embedding media, the quote function, and how to find specific users. The third forum used the same set of instructions as in forum 2. Furthermore, it was made mandatory that contributions to a thread contribute directly to the topic and examples of effective knowledge building through threaded discussions were given.

Study flexibility refers to the freedom of students' posting in regards to time. In the first forum, students were free to post whenever they wanted throughout the semester. If they chose to, they could make many posts at the beginning of the semester, then stop, or contribute consistently throughout the semester. The second and third forums required the students to submit their posts on a monthly basis. Additionally, students on the second and third forum were given explicit encouragement to make their posts on time.

Interaction refers to how much the instructor controls the amount of interaction taking place between the students in the forum. The students in the first forum were allowed to interact with anyone they wanted to within the forum, but interaction was not mandatory. They could, if they wished, use the forum as a personal blog or diary about class, and not contribute to other users' threads. The students in the second forum were also free to interact with whomever they wanted, but interaction was mandatory, in that, on top of starting a thread answering their question of the week, they were also required to contribute three posts to other learners' threads. The third forum contained more instructor control as it had all of the interaction requirements of the second forum, and students were put into groups of 14 to 17 students and told that they can only interact with their fellow group members.

Feedback refers to the amount of responses the instructor made to the students' posts regarding quality of their posts and/or potential grading implications of their posts. The first forum contained little feedback, and was only given at the student's request. For the second and third forums, instructor feedback was given biweekly.

Figure 1 is a visual representation of the levels of instructor control for each of the instructional design decisions and how they varied between environments. The placements of the forums are subjective representations of how those forums appear within the design. The left side of the scale can be considered student controlled, while the right side of the scale can be considered instructor controlled.

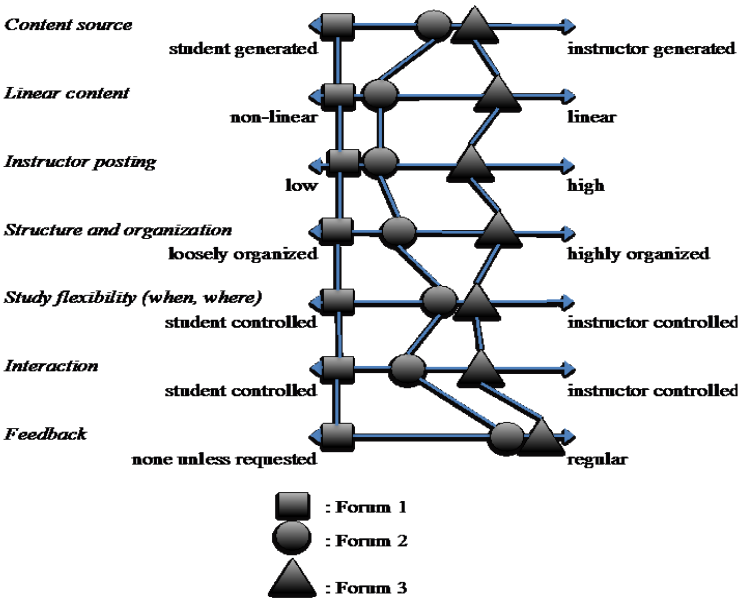

Figure 1: Modeling the three forums in terms of instruction design features

4.4 Measurement of Satisfaction and Perceived Learning

All of the participants from each of the three learning environments received a survey in which they rated their levels of satisfaction and perceived learning in regards to the learning environment. The survey consisted of Likert scale questions with 1 being the lowest and 5 being the highest. The data obtained from this survey were then put into SPSS version 20 and tested to find the mean values of satisfaction and learning within the three different learning environments. The means of each learning environment for both satisfaction and learning were compared using ANOVA and the results were used to determine whether the environments with more instructor control led to an increase in student satisfaction and perceived learning.

5 Results

5.1 How do the differing levels of instructor control affect student satisfaction?

The means for student satisfaction were calculated for each of the three conditions. As can be seen in Table 2, the low control environment (forum 1) had a mean satisfaction score of 4.84, the medium control environment (forum 2) had a mean satisfaction score of 4.82, and the high control environment (forum 3) had a mean satisfaction score of 4.82.

Table 2: Mean satisfaction for the three conditions

	N	Mean	SD
Low control	70	4.84	3.67
Medium control	72	4.82	3.87
High control	77	4.82	3.88

To compare the differences in mean satisfaction scores between the three environments, ANOVA testing was performed. As can be seen in Table 3, there is no statistically significant difference between the three conditions. This shows that regardless of experiment conditions, all forums had very similar student satisfaction.

Table 3: ANOVA for comparing variance in satisfaction means

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	.028	.014	.095	.909
Within groups	216	31.38	.145		
Total	218	31.41			

5.2 How do the differing levels of instructor control affect students learning?

The means for perceived learning were calculated for each of the three conditions. As can be seen in Table 4, the low control environment (forum 1) had a mean perceived learning score of 4.60, the medium control environment (forum 2) had a mean perceived learning score of 4.92, and the high control environment (forum 3) had a mean perceived score of 4.94.

Table 4: Mean learning scores for the three conditions

	N	Mean	SD
Low control	70	4.60	5.49
Medium control	72	4.92	2.78
High control	77	4.94	2.48

To compare the differences in mean perceived learning scores between the three environments, ANOVA testing and the Sheffe test were performed. As can be seen in Table 5, there was a statistically significant difference between the three conditions. As there were three different conditions, it was necessary to determine which forums varied from one another. Table 6 shows there is a statistically significant difference between the low controlled forum and the medium controlled forum. There is also a significant difference between the low controlled forum and the high controlled forum. However there is no significant difference between the medium controlled forum and the high controlled forum. These results show that instructor control does impact the perceived learning of students.

Table 5: ANOVA for comparing perceived learning means.

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	5.08	2.54	17.7	.000
Within groups	216	30.98	.143		
Total	218	36.06			

Table 6: ANOVA (Scheffe test) for comparing learning means

	Low control	Medium control	High control
Low control	0	-.317	-.335*
Medium control	.317*	0	-.018
High control	.335*	0.18	0

* The mean difference is significant at the 0.05 level.

Giving this study a richer analysis and providing more support for the findings that broad based instructor decisions of creating higher controlled learning environments contributed to higher levels of perceived learning by the students, analysis was done comparing other variables to the perceived learning of the students. This strengthens the study, showing that the results are due to instructor control of learning environments rather than other factors such as gender, major, or grade. These three variables were analyzed to see if they had any influence on perceived learning. As can be seen in tables 7, there was no relationship found between gender, major, or grade with perceived learning of the students, adding support to the claim of this study that perceived learning was indeed caused by instructor control.

Table 7: ANOVA for comparing mean levels of learning based on gender, major, and grades

Gender		*df*	*SS*	*MS*	*F*	*p*
	Between Groups	1	.059	.059	.354	.552
	Within Groups	217	35.996	.166		
	Total	218	36.055			
Major						
	Between groups	18	2.80	.156	.936	.536
	Within groups	200	33.25	.166		
	Total	218	36.05			
Grade						
	Between groups	3	.647	.216	1.31	.272
	Within groups	215	35.41	.165		
	Total	218	36.06			

6 Discussion

In light of research that shows that engagement and interaction can be promoted through instructor controls within online instructional design (Lim, Morris & Kupritz 2014; Swan 2002), the results of this study validate that design can have an important impact, as positive learner outcomes were achieved through increases in instructor control. The current study looked at varying control of online environments in a broad way to give a general sense of how various instructional design decisions can affect student satisfaction and perceived learning. Increasing the amount of control used by the instructor in this study did not affect student satisfaction, but did prove to influence student learning.

The fact that the lowest controlled environment in this study had the highest mean score in terms of satisfaction (although there was no significant difference compared to the other two environments) does go against what previous research has generally shown. Previous research has claimed that higher levels of instructional design controls lead to higher levels of student satisfaction (Arbaugh 2002; Thurmond et al. 2002; Sun, et al. 2008; Thurmond, Wambach and Connors 2002). These studies show that instructional design that allows more interaction and feedback should lead to higher satisfaction. Although not statistically significant in this study, the reason student satisfaction was highest in the low-control group may be found in the area of study flexibility. Using more instructor control and putting restrictions on when students can post may be detrimental to student satisfaction. Sun et al. (2008) mention that students are more satisfied when they are not constrained by time. In the second and third forums, the students were more constrained by time as they were given specific deadlines of when to submit their posts, while the students in the first forum could submit their posts anytime they wanted throughout the semester.

In terms of learning, the students' mean rankings progressively went up as the level of control went up from forum one to forum three. There was a significant difference of perceived learning when comparing the first forum, which had the lowest levels of perceived learning with the other two forums, which had much higher levels of perceived learning. This shows that the higher controlled forums produced higher levels of learning when compared to the lowest controlled forum. Consistent with these findings, previous research has claimed that higher levels of instructor presence, specifically instructional design control, can significantly impact perceived learning levels of students (Arbaugh 2000; Shea, et al. 2003; Swan 2001).

Looking at the specific dimensions that were varied in terms of instructor control may explain the higher levels of learning in the more instructor-controlled learning environments. This study shows that learning increased with more instructor-controlled content. According to Glaser (1987), undergraduate students need the delivery of the content to be more complete so they can grasp the underlying concepts of the topic. This contrasts with postgraduate students who generally require less content because they are more involved in

the construction of knowledge (Siragusa, et al. 2007). Because the students used in this study were undergraduate students, they most likely benefited more in the two forums that contained instructor-generated content than they did in the forum that contained no instructor-generated content. It is apparent from the results that higher levels of learning occurred in the two forums that included instructor-generated content.

Looking deeper into how the content was delivered by the instructor in this study provides additional insight for how instructor decisions influenced the learning levels of the students. The content in the third forum was presented by the instructor in a much more linear fashion than in the other two forums. In the third forum, the instructor provided a clear linear pattern to the students as the questions posed to them became increasingly more difficult over time. The fact that the third forum appeared to have higher levels of learning makes sense when looking at other research. Cochran (1991) claims that teachers need to know how to best deliver the content and represent the content in a way that is understandable to the students. This can affect the students' perception of how difficult the content is. Through the delivery of content in a linear pattern (from less difficult to more difficult over time) forum three may have helped the students gain a better understanding of the content, further increasing their levels of learning. This helps to understand the results of the current study.

Instructor-control of interaction in this study may have also played a role in how the student levels of learning were higher in forums two and three. Previous research has shown that students who perceive high levels of interaction also perceive high levels of learning (Ozturk and Ozcinar 2013). The results of this study reflect this research, the levels of student learning increased as the control of interaction also increased. Forum one, which required no interaction, had the lowest level of student learning. Forum two, which included mandatory interaction by having the students reply to a specific number of other users' posts had higher levels of interaction than forum one. Forum three, which had the most control over the interaction by requiring students to only reply to posts with fellow group members contained the highest levels of student learning. Therefore, it would be reasonable to conclude that more instructor control of interaction contributes to higher levels of student learning. In terms of how structure and organization was used to control interaction and discourse in this study, the instructor varied the levels of control within the online environments, which may have contributed to the differing levels of student learning. Forum one had no such structure, as students were told to interact in any way in which they felt comfortable. Forums two and three had more structure and organization, as specific examples were given about how posts should be done within the forums and examples of how the tasks should be done were given. Wilcox, Schram, Lappan and Lanier (1991) make the claim that when a teacher provides examples, it allows students to own their ideas. This helps the students shape their understanding of the content of whatever class they are taking (Wilcox, et al. 1991).

In this study, variation in instructor posting may have also contributed to varied levels of student learning. The level of instructor posting is by definition, the amount the instructor interacts with learners online. Previous research has shown that students who perceive high levels of interaction with their teachers, also perceive high levels of learning (Arbaugh, 2000; Shea, et al., 2003; Shea, et al., 2003). The current study varied the levels of teacher interaction through instructor posting. Forum one contained very few instructor postings, and the third forum contained significantly more instructor postings. Therefore, the increase of instructor-interaction with the students through more instructor postings in the third forum may have accounted for forum three having the highest level of student learning. Furthermore, the students in forum two and three were encouraged to post more, while the students in forum one were not. This could have led to more interaction, which can increase perceived learning (Swan 2001). Additionally, feedback in the second and third forum was given more regularly. Specifically, the students in the second and third forum received feedback every two weeks. Siragusa et al. (2007) explain that feedback enriches the students' online learning experiences. Furthermore, they make the claim that instructor feedback given to students in an online setting is helpful in that it assists the students in their learning process (Siragusa, et al. 2007).

Through this study, it is apparent that instructor control of learning environments, specifically though means of controlling content and interaction, can have positive effects of perceived learning of the students. Instructors need to be aware that introducing more complete content, not only can give them a clearer understanding of underlying concepts, but can also have a positive effect on how they perceive the learning process as a whole. Additionally, promoting interaction through efficient structure and organization can be beneficial to how students perceive learning as well. Although it appears that an online environment that is more instructor-

controlled can increase levels of learning, it is important to be aware that online communities should still be student-centered. Instructor-control should be designed to facilitate a student-centered environment, not make a teacher-centered one. Teachers who deliver instruction online need to be aware that certain levels of control within the environment can affect student outcomes positively. Perceived learning has been shown to be a beneficial outcome and if instructors want to increase this, they might want to look into instructional design decisions that emphasize a more instructor–controlled environment.

This paper uses a quasi-experimental design to look at the effects of instructor-control on student learning and satisfaction. It is a limitation of this paper that in the formulation of the concept of "instructor-control" multiple variables were manipulated. This makes it difficult to precisely ascertain which variables generated the positive effect on learning. Also, there may be other instructional design variables not covered in this experiment that can influence learning. Future research should seek to break down the constituent parts of this experiment into more precise and varied experimental conditions to see which parts of instructional control have a positive impact on learning. Furthermore, though there was no statistically significant difference between the differing learning environments and satisfaction, there must surely be ways that instructional design can positively or negatively impact satisfaction. More varied design features need to be investigated to find out how we can positively influence student satisfaction through instructor control.

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