Analysis of Students' Learning Satisfaction in a Social Community Supported Computer Principles and Practice Course

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ABSTRACT

The study compares the learning satisfaction of two student groups, one takes the fully online course–Introduction to Internet of Things, and the other takes the small private online course (SPOC). In the research framework, learning satisfaction is the dependent variable, and learning engagement, learning presence, video perception, platform perception, and design perception are independent variables. This work adopts online questionnaire survey to collect data from the two student groups. As to research method, Multiple Regression Analysis (MRA) is utilized to test proposed research framework. The results of MRA show that platform perception generates students' learning satisfaction for SPOC, while video perception and design perception generate students' learning satisfaction for fully online course. This empirical study elucidates the factors influence learner's satisfaction and contributes to theory and practice in the domains of online courses.

Keywords: learning satisfaction, Small Private Online Course (SPOC), fully online course, Multiple Regression Analysis (MRA)

INTRODUCTION

The paradigm shifts from Massive Open Online Courses (MOOCs) to Small Private Online Courses (SPOCs) in the past three years. Oremus (2013) writes a review titled as "forget MOOCs" and claims that free online classes should not replace teachers and classrooms, and they should make them better. Regardless of the different teaching model, learning satisfaction is still the most significant concern in the fields of education. Therefore, this study investigates the factors influence students' learning satisfactions.

Following the introduction, Section 2 presents a review of the relevant literature and proposes the hypothesis to be tested. Section 3 introduces the research method. Section 4 presents the data analysis. Section 5 gives the conclusion of the study.

LITERATURE REVIEW

Researches on learning satisfaction are very much. When one research explores learner, instructor, course, technology, design, and environmental dimensions affect learners' satisfaction (Sun, Tsai, Finger, Chen, & Yeh, 2008), the other investigates the relationship among collaborative learning, social presence, and satisfaction (So & Brush, 2008). This study expects to integrate any related factor in the research framework. Therefore, this study presents SPOCs first, then reviews the relevant literature on each dimension.

Contribution of this paper to the literature

- This empirical study elucidates the factors influence learner's satisfaction and contributes to theory and practice in the domains of online courses.
- The results show that platform perception generates students' learning satisfaction for the SPOC, while video perception and design perception generate students' learning satisfaction for fully online course.
- An important implication for educators is that in addition to promote students' platform perception, enhancing video and design perceptions are also significant tasks.

SPOCs

To solve the low completion rates of MOOCs, Fox who is a professor at Berkeley University of California proposed SPOCs in 2013. As opposed to MOOCs, this model advocate that if MOOCs are used as a supplement to classroom teaching rather than being viewed a replacement for it, they can increase instructor leverage, student throughput, student mastery, and student engagement (Fox, 2013). The approach is also known, less acronymically, as "hybrid" or "blended learning" (Oremus, 2013). SPOCs is characterized by improving teaching effectiveness (Wang, Wang, Wen, Wang, & Tao, 2016). The teaching model of SPOCs is based on the high-quality video content of MOOCs. Students can understand the basic knowledge of a subject before the class. Thus, teachers can practice high-level teaching content, answer questions, or offer other exercises and extra learning materials in the entity classroom to create a complete learning experience.

Learning Engagement

Sun and Rueda (2012) have a clear statement of definition: "In academic settings, engagement refers to the quality of effort students make to perform well and achieve desired outcomes". According to past research, learning engagement is related to students' learning outcomes, learning satisfactions, school identity, and future development (Carini, Kuh, & Klein, 2006; Hu, Kuh, & Li, 2008; Zhao & Kuh, 2004). Fredrick, Blumenfeld, and Paris (2004) identify three types of engagement: behavioral, emotional and cognitive engagement. Fredricks, Blumenfeld, and Paris (2004) outline three different ways that behavioral engagement has been defined, including positive conduct (e.g., following the rules, attendance, absence of disruptive behavior), involvement in learning and academic tasks (e.g., effort, persistence, concentration, and attention), and involvement in school-related activities. Emotional engagement refers to students' affective reactions in the classroom, including interest, boredom, happiness, sadness, and anxiety (Connell & Wellborn, 1991; Skinner & Belmont, 1993). Cognitive engagement, which refers to the level of thinking skills used by students (Blumenfeld, Puro, & Mergendoller, 1992; Corno & Rohrkemper, 1985), incorporates thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills (Fredricks, Blumenfeld, & Paris, 2004). In other words, cognitive engagement involves self-regulation or being strategic (Fredricks, Blumenfeld, & Paris, 2004). Sun and Rueda (2012) suggest that online activities and tools such as multimedia and discussion boards may increase emotional engagement in online learning, although they do not necessarily increase behavioral or cognitive engagement.

Learning Presence

To define the functioning of this community of inquiry, Garrison, Anderson, and Archer (2000) propose three overlapping elements—social presence, cognitive presence, and teaching presence. They suggest that all three elements are essential to a critical community of inquiry for educational purposes, and they can enhance or inhibit the quality of the educational experience and learning outcomes. Shea and Bidjerano (2010) suggest that learning presence represents elements such as self-efficacy as well as other cognitive, behavioral, and motivational constructs supportive of online learner self-regulation. Cognitive presence means the extent to which the participants in any particular configuration of a community of inquiry can construct meaning through sustained communication, and it is a vital element in critical thinking, a process, and outcome that is frequently presented as the ostensible goal of all higher education (Garrison, Anderson, & Archer, 2000). Short, Willams, and Christie (1976) define social presence as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships". It means the degree to which a person is perceived as a "real person" in mediated communication. Anderson, Liam, Garrison, and Archer (2001) define teaching presence as the design, facilitation, and direction of cognitive and social processes to realize personally meaningful and educationally worthwhile learning outcomes. The three categories of teaching presence are design and organization, facilitating discourse, and direct instruction.

Video Perception

According to the past research, the video is deemed as the strong learning media. Yousef, Chatti, and Schroeder (2014) claim that video-based learning (VBL) has unique features that make it an effective Technology-Enhanced Learning (TEL) approach. Zhang, Zhou, Briggs, and Nunamaker (2006) discover that students in the e-learning environment that provided interactive video achieved significantly better learning performance and a higher level of learner satisfaction than those with non-interactive video, without video, and traditional classroom environment. Guo, Kim, and Rubin (2014) find that shorter videos, informal talking-head videos, Khan-style tablet drawings are more engaging, and that students engage differently with lecture and tutorial videos.

Platform Perception

The use of discussion forums is found to correlate with better student grades and higher student retention (Coetzee, Fox, Hearst, & Hartmann, 2014). Besides discussion forum, there are lots of resources and functions on any MOOCs platform, such as lecture videos, presentation slides, exercises, online group discussion, instant interaction with teacher and teaching assistant, cloud-tutoring. After using the platform, learners would form their perceptions. For example, the function is helpful to their learning or not. This dimension is to explore students' perceptions towards the platform.

Design Perception

In Sun, Tsai, Finger, Chen, and Yehs' study (2008), perceived usefulness and perceived ease of use are proved to influence learner satisfaction. They are together affiliated to the design dimension. Cheung and Vogel (2013) find that perceived ease of use and perceived usefulness are found to influence the attitude of students toward the collaborative technology. Perceived ease of use predicts usefulness and is found to be a stronger predictor of attitude than perceived usefulness.

Learning Satisfaction

Many researchers emphasize that satisfaction is one of the most important factors determining the quality of online instruction (Allen & Seaman, 2010; Garrison & Cleveland-Innes, 2005; Moore & Kearsley, 2012). So and Brush (2008) indicate that student perceptions of collaborative learning have statistically positive relationships with perceptions of social presence and satisfaction through the analysis of quantitative data, and find that course structure, emotional support, and communication medium are critical factors associated with student perceptions of collaborative learning, social presence, and satisfaction through interview data.

This study generalizes that positive learning engagement, learning presence, video perception, platform perception, and design perception can most likely have high learning satisfaction. The five factors operate together for generating great learning satisfactions. Therefore, the study proposes the following hypothesis.

H1. Learning engagement, learning presence, video perception, platform perception, and design perception in combination to generate students' high learning satisfactions.

RESEARCH METHOD

Research Framework

The study explores the relationship among learning engagement (LE), learning presence (LP), video perception (VP), platform perception (PP), design perception (DP), and learning satisfaction (LS). Learning satisfaction is the output variable, and learning engagement, learning presence, video perception, platform perception, and design perception are potential causes. The research framework is as **Figure 1**.
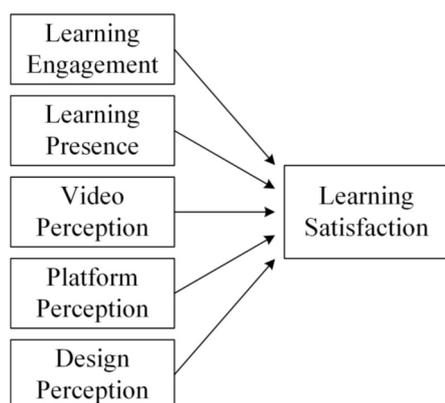
Figure 1. Research framework

Context and Participants

There are some popular MOOCs platforms: ShareCourse, ewant, TaiwanLIFE, OPENEDU, etc. Here, this study takes the course – Introduction to Internet of Things (IoT) on ShareCourse for example. The participants of this study consist of two groups. One group takes the fully online course, and the other group takes the online course collocating with Personal Computer Principles and Practice course for freshman students. The 18-hour online course includes six topics: IoT architecture and applications, sensor/network/application technologies, sensor node platforms, routing protocols for sensor networks, wireless communication technologies for IoT, and IoT framework and standards. Sudents watch the video first, and the teacher would lead following discussions and create some learning activities in the class. After finishing all the topics, students should fulfill the online self-assessment and take an online exam. After class activities include an online quiz, discussion, group learning, etc. The blended learning strategy is expected to enhance students' learning satisfactions. Students taking the fully online course would be the control group. The study would compare the two groups for advanced understanding of the impact of different learning strategies on learning satisfaction.

Measures

The study includes six dimensions, learning engagement (behavioral engagement, emotional engagement, and cognitive engagement), learning presence (teaching presence, social presence, and cognitive presence), video perception, platform perception, design perception, and learning satisfaction. The measurement, referring to previous studies and emending to fit this study, is as follows.

Learning Engagement (LE) (References: Sun & Rueda, 2012)

(1) Behavioral engagement

    1) I follow the rules of the online course.

    2) When I am in the online course, I just 'act' as if I am learning.

    3) I can consistently pay attention when I am taking the online course.

    4) I complete my homework on time.

(2) Emotional engagement

    1) I like taking the online course.

    2) The online classroom is a fun place to be.

    3) I am interested in the work at the online course.

    4) I feel happy when taking an online course.

(3) Cognitive engagement

    1) I check my schoolwork for mistakes.

    2) I study at home even when I do not have a test.

    3) I try to look for some course-related information on other resources such as television, journal papers, magazines, etc.

4) When I read the course materials, I ask myself questions to make sure I understand what it is about.

5) If I do not know about a concept when I am learning in the online course, I do something to figure it out.

6) If I do not understand what I learn online, I go back to watch the recorded session and learn again.

7) I talk with people outside of school about what I am learning in the online course.

Learning presence (LP) (References: Shea & Bidjerano, 2010)

(1) Teaching presence

I. Design & Organization

1) The instructor clearly communicates important course topics.

2) The instructor clearly communicates important course goals.

3) The instructor provides clear instructions on how to participate in class learning activities.

4) The instructor clearly communicates relevant due dates/time frames for learning activities.

II. Facilitation

1) The instructor is useful in guiding the class towards understanding course subjects in a way that helps me clarify my thinking.

2) The instructor contributes to keep course participants engaged and participating in the productive dialogue.

3) The instructor helps maintain the course participants on the task in a way that helps me to learn.

4) The instructor encourages course participants to explore new concepts in this course.

5) The instructor encourages course participants to explore new concepts in this course.

III. Direct instruction

1) My instructor provides useful illustrations that help make the course content more understandable to me.

2) My instructor presents helpful examples that allow me to better understand the content of the course.

3) My instructor provides clarifying explanations or other feedback that allow me to better understand the content of the course.

(2) Social presence

I. Affective expression

1) Getting to know other course participants gives me a sense of belonging in the course.

2) I can form distinct impressions of some course participants.

3) Online or web-based communication is an excellent medium for social interaction.

II. Open communication

1) I feel comfortable conversing through the online medium.

2) I feel comfortable participating in the course discussions.

3) I feel comfortable interacting with other course participants.

III. Group cohesion

1) I feel comfortable disagreeing with other course participants while still maintaining a sense of trust.

2) I believe that my point of view is acknowledged by other course participants.

3) Online discussions help me to develop a sense of collaboration.

(3) Cognitive presence

I. Triggering event

1) Problems posed increase my interest in course issues.

2) Class activities pique my curiosity.

3) I feel motivated to explore content related questions.

II. Exploration

1) I utilize a variety of information sources to explore problems posed in this course.

2) Brainstorming and finding relevant information help me resolve content related questions.

3) Online discussions are valuable in helping me appreciate different perspectives.

III. Integration

    1) Combining new information help me answer questions raised in course activities.

    2) Learning activities help me construct explanations/solutions.

    3) Reflection on course content and discussions help me understand fundamental concepts in this class.

IV. Resolution

    1) I can describe ways to test and apply the knowledge created in this course.

    2) I have developed solutions to course problems that can be applied in practice.

    3) I can implement the knowledge created in this course to my work or other non-class related activities.

Video perception (VP) (References: Guo, Kim, & Rubin, 2014)

1) I engage more with shorter videos.

2) I engage more with talking-head videos.

3) I engage more with pre-production videos.

4) I engage more with videos where instructors speak faster.

5) I engage more with lecture videos where the first-time watching experience is optimized.

Platform perception (PP) (Resources: Self-developed)

1) The presentation slides are helpful for my learning.

2) The exercises before or after videos are useful to my learning.

3) The discussions on the forum are helpful to my learning.

4) The online group discussions are helpful to my learning.

5) The instant interactions with the teacher and teaching assistant are useful to my learning.

6) The cloud-tutoring is helpful to my learning.

Design perception (DP) (Resources: Sun, Tsai, Finger, Chen, & Yeh, 2008)

(1) Perceived usefulness

    1) Using the platform would enhance my effectiveness in the course.

    2) Using the platform would improve my performance in the course.

    3) I would find the platform useful in the course.

(2) Perceived ease of use

    1) It would be easy for me to become skillful at using the platform.

    2) Learning to operate the platform would be easy for me.

    3) I would find it easy to get a platform to do what I want it to do.

    4) I would find it easy to get a platform to do what I want it to do.

Learning satisfaction (LS) (References: So & Brush, 2008)

1) As a result of my experience with this course, I would like to take another online course in the future.

2) This course is a useful learning experience.

3) My level of learning that takes place in this course is of the highest quality.

4) My level of learning that takes place in this course is of the highest quality.

5) Overall, the instructor for this course meets my learning expectations.

6) Overall, this course meets my learning expectations.

The respondents are requested to indicate the extent to which they agree or disagree on those questions above, based on their experience. For each item, five-point Likert scales are utilized (1 = strongly disagree and 5 = strongly agree). The last part of the questionnaire is demographic questions, including gender, grade, and experience of online course.

Table 1. Multiple regression models predicting learning satisfaction—SPOC

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.914[a]	.836	.812	.33168

a. Predictors: (Constant), DP, LP, LE, PP, VP

Anova[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	19.595	5	3.919	35.624	.000[a]
1	Residual	3.850	35	.110		
	Total	23.446	40			

a. Predictors: (Constant), DP, LP, LE, PP, VP

b. Dependent Variable: LS

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	-.403	.391		-1.030	.310
	LE	.115	.169	.089	.680	.501
1	LP	.067	.170	.053	.395	.695
	VP	.256	.240	.209	1.063	.295
	PP	.754	.181	.674	4.156	.000
	DP	-.088	.222	-.073	-.397	.694

a. Dependent Variable: LS

DATA COLLECTION

Web-based questionnaire survey is executed to collect data. The questionnaire is carried out on Google docs. The respondents consist of two groups: one is students taking the fully online course—Introduction to IoT, the other is students of SPOC. The blended course is online course collocating with Personal Computer Principles and Practice course. The sample is 43 for the former, and 41 for the later.

DATA ANALYSIS

The study first runs the descriptive analysis towards the demographic data using SPSS. For the SPOC, about gender, male is 75.6%, and female is 24.4%. About grade, freshman is the most, 95.1%; junior and senior are 2.4% respectively. About the experience of taking online course, one course is the most, 70.7%; two courses is the runner-up, 22.0%; more than three courses is the least, 7.3%. For the fully online course, about gender, male is 83.7%, and female is 16.3%. About grade, freshman is the most, 95.3%, and junior is 4.7%. About the experience of taking online course, one course is the most, 60.5%; two courses is the runner-up, 23.3%; more than three courses is the least, 16.3%.

Then, the study adopts Multiple Regression Analysis (MRA) to test the research framework. MRA is a symmetric test that elucidates the "net effects" of variables on a dependent variable with a set of independent variables (Woodside, 2014). MRA would come out some causes that are significant and responsible for high learning satisfactions. **Table 1** and **2** include MRA findings for predicting learning satisfaction in the SPOC and the fully online course separately. The study enters all five variables to verify the framework. For the SPOC, R^2 is 0.836, and adjusted R^2 is 0.812, standing for 81.2% variation in Y explained by X. The model is significant in Anova analysis. The β values are 0.089, 0.053, 0.209, 0.674, -0.073 for LE, LP, VP, PP, and DP, but only PP is significant (p=0.000). No collinarity exist because the VIF is between 3.670 and 8.251.

For the fully online course, R^2 is 0.857, and adjusted R^2 is 0.838, standing for 83.8% variation in Y explained by X. The model is significant in Anova analysis. The β values are -0.098, 0.245, 0.256, 0.213, 0.392 for LE, LP, VP, PP, and DP, but only VP and DP are significant (p=0.021 and 0.002). No collinarity exist because the VIF is between 2.945 and 8.087.

Table 2. Multiple regression models predicting learning satisfaction—fully online course

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.926[a]	.857	.838	.29412

a. Predictors: (Constant), DP, PP, VP, LE, LP

Anova[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.257	5	3.851	4.519	.000[a]
	Residual	3.201	37	.087		
	Total	22.457	42			

a. Predictors: (Constant), DP, PP, VP, LE, LP

b. Dependent Variable: LS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.290	.318		-.913	.367
	LE	.105	.136	-.098	-.772	.445
	LP	.254	.183	.245	1.385	.174
	VP	.281	.117	.256	2.404	.021
	PP	.204	.131	.213	1.558	.128
	DP	.439	.133	.392	3.294	.002

a. Dependent Variable: LS

CONCLUSION

The study executes an online questionnaire survey, adopts MRA to test the proposed framework for learning satisfaction. The results of MRA show that platform perception generates students' learning satisfaction for the SPOC, while video perception and design perception generate students' learning satisfaction for fully online course. Learning engagement and learning presence are not significant for generating high learning satisfaction. The possible reasons may be that students' backgrounds are computer science and information engineering and they are not used to social communication. Therefore, the social interaction in the course is not favorable, and their focuses are still on the video, platform, and platform design only.

The findings illustrate that platform perception for the SPOC, video perception and design perception for fully online course, are more direct than learning engagement and learning presence to generate students' learning satisfaction. This is an important implication for educators that in addition to promote students' platform perception, enhancing video perception and design perception are also significant tasks. For SPOCs, educators can make effort on presentation slides, the exercises before or after videos, the discussions on the forum, the online group discussions, the instant interactions with students, and the cloud-tutoring. For fully online courses, educators can devote to make shorter, talking-head, instructors speaking faster, optimizing first-time watching experience, and re-watching and skimming videos. In addition, to strengthen the perceived usefulness and perceived ease of use of the platform is very crucial for learning satisfaction.

Inevitably, the study has a limitation. The limitation is that participants are almost freshmen, and the proportions of two groups are both up to 95%. Comparing to other older students, their experiences of taking courses are not enough. Maybe this is the reason that learning engagement and learning presence are not significant for generating learning satisfaction. In conclusion, there are two suggestions for future research. First, researchers can choose other grades, departments, or courses to test the proposed research framework to see if the result is different. Then, is there any dimension not included in the framework affecting students' learning satisfaction? Researchers can try to discover these dimensions. The achievement of this study is expected to contribute to the academic research. The study explores the factors impact on students' learning satisfaction, and the result can offer reference for academic research on technology education. Furthermore, the research results can be applied to the practice and supply a great help to the educators.

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