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Making online learning more satisfying: The effects of online-learning self-efficacy, social presence and content structure

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Abstract

This study examines the effects of instructor presence and online learning self-efficacy on learning satisfaction, and how the effect of social presence may depend on content structure. In this study, undergraduate students from a Singaporean university rated their online learning self-efficacy. Then they rated their learning satisfaction after watching each of four video lectures in a 2 (low versus high instructor presence) × 2 (low versus high content structure) repeated measures experiment. Findings show that learning satisfaction is related to instructor presence and online learning self-efficacy and that the effect of instructor presence is stronger for unstructured than for structured content. This study contributes to research on pedagogy and online learning by clarifying when and how instructor presence enhances learning outcomes. Although most kinds of instruction can benefit from higher levels of instructor presence, there is the greatest benefit for unstructured content, where teaching and learning involve a more interpretive process.

Keywords: Online learning; learning satisfaction; instructor presence; self-efficacy; content structure

Making online learning more satisfying:

The effects of social presence, online learning self-efficacy, and content structure

Technological advancements have changed how people communicate and disseminate information. The education sector is no stranger to this phenomenon, where internet-enabled technologies can facilitate learning. Online courses have become increasingly common, particularly in higher education (Allen & Seaman, 2010, 2016). However, scholars have debated about the effectiveness of online learning, with many arguments centering on whether fully online courses are as effective as courses delivered face-to-face (Blinded citation; Richardson et al., 2017).

Although scholars have made compelling theoretical arguments about the successful deployment of online courses and content (Harasim, 2017; Shea & Bidjerano, 2009), there is mixed evidence of that success (Alpert et al., 2016; Hart et al., 2019) and getting students to engage with online learning can be a challenge (Panigrahi et al., 2018). Yet, that literature has identified a few concepts distinguishing the online learning experience from the experience of learning face-to-face. One of these concepts has to do with the social presence of others in a learning environment (Borup et al., 2012; Richardson et al., 2015; Thomas et al., 2017).

The current study focuses on the concept of instructor presence, which reflects the sense students have of their instructors as being helpful and engaging (Wang & Antonenko, 2017). Some recent work suggests instructor presence is lower for online instruction than for traditional

face-to-face instruction (Blinded citation), but other research shows no difference (Cutsinger et al., 2018). Instructor presence does not necessarily lead to more learning, but students have greater preference and liking of online formats with higher levels of it and find it easier to pay attention to those formats (Blinded citation; Wilson et al., 2018).

Despite mixed findings regarding instructor presence, we feel there are some questions worth asking. First, are there ways to improve instructor presence in online learning? Recent work suggests modes of online learning that enhance nonverbal communication also enhance social presence (Blinded citation; Hibbert et al., 2016; Pi et al., 2020). Second, do some students have more to benefit from enhanced instructor presence than other students? This question recognizes that individuals have their own learning styles and abilities (El-Bishouty et al., 2019), and the amount of social presence needed for learning to be satisfying and effective may differ among individuals (Kelly & Banaszewski, 2018). Third, does the utility of instructor presence depend on the structuring and presentation of knowledge? Research suggests social presence can enhance student engagement in discussion forums (Martin et al., 2018) and students appreciate instructor presence when learning involves explanation and interpretation (Raturi, 2018).

The answers to the three questions above all seem to be at least partly in the affirmative and would benefit from additional empirical clarification. The current study aims to provide some of that clarification. First, we will study the effect of social presence on learning satisfaction. As we noted, prior research has already shown this effect, but studying it anew sets the stage for addressing the latter two questions. Next, we will consider if the effect of social presence on learning satisfaction depends on students' online learning self-efficacy, or their confidence to engage in online learning. That factor by itself should be positively related to learning satisfaction and we expect it will moderate the effect of social presence. Among

students with low online learning self-efficacy, social presence may function as scaffolding to help them learn. Finally, we will see if the effect of social presence also depends on the "structuredness" of the content. Structuredness has to do with the organization of knowledge along a continuum with a rigid and formulaic presentation at one end and flexible interpretation at the other. We expect social presence to be more positively related to learning satisfaction toward the latter end of the continuum, where instructors may need to spend more time discussing and interpreting concepts. Findings of the latter two effects would mark novel contributions to the literature. In the following sections, we define each concept and develop arguments about their relationships.

Online Learning

Online learning, a broad term to describe learning facilitated by the internet, has been adopted at educational institutions around the world. Instructors can develop content using many formats, including video and audio recordings, discussion boards, online quizzes, and online notes. Advantages of online learning include greater convenience, flexibility, and customizability of online platforms (Cui et al., 2013). Online learning research often examines outcomes related to perceived and actual learning (Arbaugh, 2013; Richardson et al., 2017) and learning satisfaction (Arbaugh, 2010; Muilenburg & Berge, 2005; Paechter & Maier, 2010). Other outcomes include the likelihood of taking future online courses (Muilenburg & Berge, 2005), online participation (Tu & McIsaac, 2002), and content engagement (Chen et al., 2010). This study focuses on learning satisfaction as an outcome of online learning because it seems especially related to instructor presence (Wilson et al., 2018), which is the main focus of the current research.

Learning Satisfaction

Learning satisfaction refers to how pleased students are with the online learning experience (Richardson et al., 2017) and affects the extent an online course retains current students and attracts new ones (Li et al., 2017). Educators can adjust online lessons to enhance the overall learning experience by understanding two key factors that can influence learning satisfaction. The first we will consider is the social interactions that may arise during in the course of learning, which are affected by instructor characteristics (Arbaugh, 2010; Paechter & Maier, 2010; Sun et al., 2008), the degree of interaction (Muilenburg & Berge, 2005), and social presence (Kim et. al, 2011; Richardson et al., 2017; Swan & Shih, 2005). According to that research, students who engage in class discussions, team projects, and conversations with their instructors have a higher level of learning satisfaction. Second, learning satisfaction is related to self-efficacy, or the belief individuals have of their ability to achieve a desired outcome. This can be important in the context of online learning because students need to be familiar with navigating the learning medium (Lee, 2010). Below we discuss how social presence and online learning self-efficacy are related to learning satisfaction and how they may interact with each other to uniquely affect satisfaction.

Social presence. There are many definitions of social presence (see Lowenthal, 2010). Early conceptualizations regarded social presence as an objective quality of the medium, related to its ability to make people feel physically or psychologically close with their communication partners (Short et al, 1976). Other researchers have focused more on social presence as an experience related to but distinct from immediacy (Biocca, Harms, & Burgoon, 2003; Gunawardena, 1995; Tu, 2002). Consistent with that focus, we adopted Gunawardena and Zittle's (1997) definition, which concerns "the degree to which a person perceives their communication partners to be 'real' in mediated communication" (p. 8). Factors influencing

social presence include social context, online communication, and interactivity (Tu, 2000); privacy (Tu, 2002); group cohesion and emotional expression (Rourke et al., 1999); technological competence in using the medium (Tu & McIsaac, 2002); and cognitive abilities to process message elements that convey presence (Harrison, Vishwanath, Ng, & Rao, 2015).

Instructor presence is a subcategory of social presence reflecting, in a sense, the degree to which students perceive their instructor as being "real." Wang and Antonenko (2017) operationalized instructor presence as a sense of instructors being able to provide feedback and engage directly with students, which is akin to the concept of immediacy. Researchers have experimentally manipulated instructor presence by limiting or enhancing the presence of nonverbal information, such as vocal tone, gaze, and gestures (Blinded citation; Pi et al., 2020; Wilson et al., 2018). Those manipulations are not about immediacy, per se, but more about creating a sense of social connection.

An extensive body of research has linked social presence with learning satisfaction (Gunawardena, 1995; Gunawardena & Zittle, 1997; Swan & Shih, 2005; Tu & McIsaac, 2002) and various metrics of student engagement (Liu et al., 2009; Swan & Shih, 2005; Tu & McIsaac, 2002; Wilson et al., 2018). Swan and Shih (2005) found that students in an online course who perceived a higher level of social presence placed greater value on the interactions they have with their classmates and engaged in more "present" activities, such as self-disclosure and speaking to the group. This suggests that social presence is related to a willingness to participate in an online course, which may be related to satisfaction with online learning. Recently, Wilson et al. (2018) found recorded lectures with higher levels of social presence resulted in greater enjoyment and interest, and a lower likelihood of dropping the course. That finding suggests students were more satisfied when social presence was higher. Authors (blinded) found similarly

that students rated as more enjoyable the same lectures they felt had a high degree of social presence. Our first hypothesis conceptually replicates those findings.

Hypothesis 1 (H1): Online learning satisfaction is higher when instructor presence is high versus low.

Online learning self-efficacy. Despite the evident role of social presence in learning satisfaction, self-efficacy is arguably more fundamental to learning satisfaction. Self-efficacy is the perception individuals have of their ability to organize and perform certain actions for the purpose of achieving desired goals and results (Bandura, 1997). In the online learning context, self-efficacy reflects beliefs about the ability to learn in an online environment. Scholars who study online learning self-efficacy generally emphasize technology and academic self-efficacy as factors that support learners' ability (Alqurashi, 2016). Related concepts include computer self-efficacy (Compeau & Higgins, 1995) and internet self-efficacy (Alqurashi, 2016, Eastin & LaRose, 2000), or the perceived abilities to use computer devices and the internet. Both computer and internet self-efficacy are positively related to online learning satisfaction (Kuo et al., 2014; Womble, 2007; Wu et al., 2010).

Online learning self-efficacy combines technical competencies with a more general competency for learning. Individuals with one competency and not the other will have difficulty learning in an online environment because either they are unable to use the technological tools or unable to grasp concepts. Other research presents a broader view of online learning self-efficacy. Shen et al (2013) defined it as a combination of five aspects: a student's self-efficacy with (1) completing the course, (2) navigating the course medium and content, (3) interacting with socially with peers, (4) interacting academically with peers, and (5) interacting with instructors.

Furthermore, all five components were positively related to learning satisfaction. We propose to conceptually replicate that finding.

Hypothesis 2 (H2): Online learning self-efficacy is positively associated with online learning satisfaction

The interaction of social presence and self-efficacy. As we have argued, online learning self-efficacy plays an important role in learning satisfaction. We suggest it creates a boundary condition for the effect of instructor social presence. Consistent with our second hypothesis, Seo et al. (2015) showed student ability for self-learning in a blended learning environment was positively related to learning satisfaction. It is intuitive that students with the highest levels of that kind self-efficacy would be able to succeed with little or no instructor contact. For those self-directed students, instructor social presence would have little bearing on their learning satisfaction.

Other research has directly linked online learning self-efficacy and social presence. For example, students with higher online learning self-efficacy tend to perceive their online classmates as having more social presence (Kozan, 2016; McQuaid, 2010; Shea & Bidjerano, 2010). This suggests social presence may mediate the effect of online learning self-efficacy on learning satisfaction, but there is an alternative explanation. We propose this effect is partly due to individuals with low online learning self-efficacy having more difficulty using online media to learn and thus a greater need for external support in online learning environments. We predict individuals with low online learning self-efficacy will have more positive learning outcomes when their instructor has high social presence. In contrast, those with high online learning self-efficacy may not have the same need for support and are thus less sensitive to changes in social presence.

Hypothesis 3 (H3): The effect of instructor social presence on learning satisfaction is more positive for students with lower online learning self-efficacy.

Content Structure

Instructional variations, such as the duration and type of content appearing in a lecture, have allowed researchers to study effects of social presence in different learning contexts. Arbaugh et al. (2010) suggested the effect of social presence on learning satisfaction may depend on the academic discipline. Scholars have long been interested in comparing disciplines in terms of pedagogical factors, such as student approaches to learning (Baeten et al., 2010; Laird, et al., 2008), course design (Edelstein, 2010), and communication teaching tools (Harasim, 2000). Despite evidence that academic discipline affects learning satisfaction, the reason for it is not well understood (Richardson et al., 2017).

One of the ways scholars have categorized academic disciplines is with respect to paradigms, or the body of theory to which most or all members of a field subscribe (Kuhn, 1962). Typically, "high paradigm" disciplines like physics consist mainly of structured content (Neumann, 2001; Neumann, Parry, & Becher, 2002)—content that is fixed, cumulative, and instructive, where the understanding of an underlying concept is crucial to proceed to the next level (Bruner, 1966). In contrast, "low paradigm" disciplines like philosophy mostly comprise unstructured content (Neumann et al., 2002)—content that requires constant revisiting to identify new insights with varied levels of subtlety for the purpose of solving dilemmas (Bruner, 1966).

Content structuredness, therefore, can be understood as a continuum with content that is sequential and orderly at one end and intersecting and flexible at the other end. However, content structure can vary within a discipline, regardless of the degree of paradigm development. At the introductory level, high paradigm disciplines such as physics, can have linear and hierarchical

content that describe basic laws and formulae, whereas more advanced levels are increasingly unstructured and may allow multiple interpretations of a single phenomenon. Similarly, low paradigm disciplines like history can have linear and hierarchical content describing recorded facts and event timelines, while at more advanced levels students engage in critical analyses to understand why the events took place.

We suggest content structure can explain some of the variance in learning satisfaction, which scholars have attributed to academic discipline. Part of this effect may have to do with learning style. Whereas some students prefer to learn by reflecting on abstract concepts, others prefer to learn by having concrete experiences (see Kolb, 1985). These differences in learning styles may incline students toward learning and having greater satisfaction from unstructured or structured content. Research has shown that there is greater learning satisfaction when the style of instruction matches with the learning style of students (Eom et al., 2006; Gurpinar et al., 2010). Although the current study does not examine learning style, those prior studies suggest that students' learning preferences may affect their satisfaction with respect to content structure. Therefore, we ask the following research question:

Research Question 1: Does learning satisfaction differ between unstructured and structured content?

The interaction of social presence and content structure

Research has shown that paradigms with structured content emphasize the instructor's role as a disseminator (Kellogg & Smith, 2009; Neumann, 2003; Shulman, 2006; Smith et al., 2008), as compared to paradigms with largely unstructured content, which required more involvement from the instructor (Arbaugh, 2010; Neumann et al., 2002; Shulman, 2006). This difference is intuitive because, whereas hard facts are easy to communicate in their entirety,

more critical or interpretive learning activities require facilitation. This suggests that instructors have a more advanced role to play when they are teaching less structured content. That role benefits from engaging with students, which in turn may benefit from social presence. This leads to our final hypothesis (see Figure 1 for a summary of our predictions).

Hypothesis 4: The relationship between instructor presence and learning satisfaction is more positive for unstructured content than for structured content.

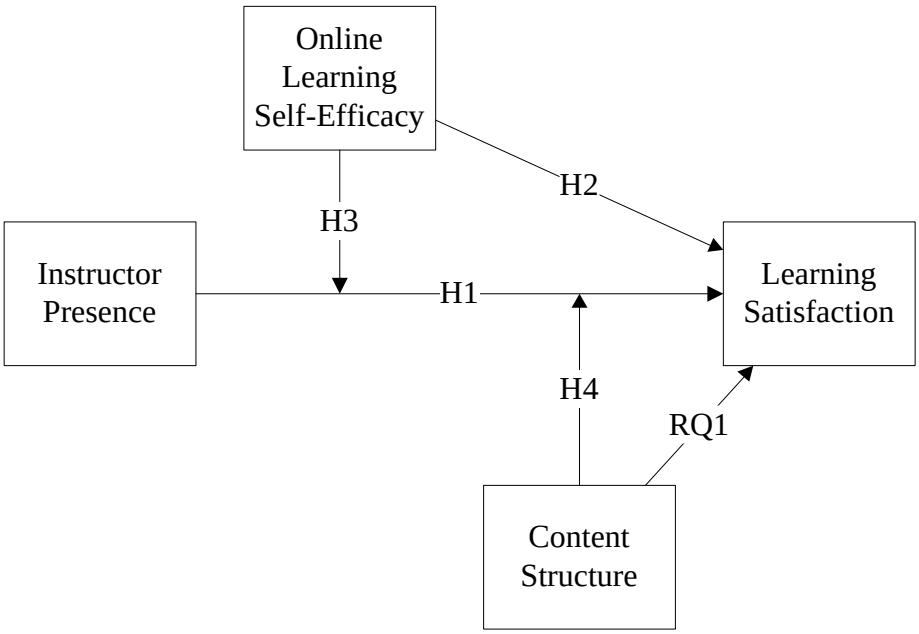

Figure 1. Model of predicted relationships

Method

Singaporean undergraduates took part in a repeated measures laboratory experiment in which they completed a survey at the start of the session and then after watching each of four pre-recorded video lectures. We conducted a pretest to ensure the readability of the survey questions and that the videos displayed properly. Otherwise, we did not conduct a pilot study to pre-validate the experimental manipulations.

Sample

Data collection took place in February 2018 in a university computer lab. Sample size estimation in GPower 3.1 indicated that a sample size of 92 is necessary to detect a medium effect size (Cohen's $f = 0.25$) with .05 alpha error and .95 power. Because we conducted the experiment in a computer lab, the students needed to be able to easily access the physical space. Therefore, we used convenience sampling to recruit 160 undergraduate students of the university where the computer lab was located. The sample size was more than adequate and not so large to have concerns about over-power. The participants had a median age of 21 years ($M = 21.2$, $SD = 1.80$), were mostly female (74%), and were mostly students majoring in the humanities, arts, and social sciences (90%). Participants chose either course credit or cash as compensation for their participation.

Procedure

After indicating their consent to an online questionnaire, participants answered questions about their online learning self-efficacy before moving on to watch four short video lectures. The four videos constituted a 2 (low vs high instructor presence) × 2 (structured vs unstructured content) factorial design. At the end of each video, participants rated their learning satisfaction, perceived social presence, and structuredness of the content. Lastly, participants answered demographic questions.

Stimuli

All videos comprised recordings of PowerPoint slides accompanied by voiceover. We used the voiceover format to limit confounding of the instructor presence manipulation, which might arise in other recorded lecture formats from visual cues, such as facial expression or body language. The videos were recorded with two male voices and two female voices to make

findings more generalizable to a variety of instructors. The recordings were roughly three minutes long and presented on different aspects of an historical event, the Maria Hertogh Riots in Singapore.

Factorial design

Videos were categorized into four groups: low instructor presence with unstructured content (LU), low instructor presence with structured content (LS), high instructor presence with unstructured content (HU), and high instructor presence with structured content (HS). We used a Latin square design to randomize the viewing order of videos such that each participant listened to four different lectures from four different instructors. Furthermore, the order of the four lectures was randomized to prevent carry-over effects.

Manipulation

Instructor presence. We used variations in vocal tone to manipulate instructor presence. The high instructor presence videos employed greater variation compared to the low instructor videos, which used a monotonous vocal delivery.

Content structure. We used history as the lecture topic. structured content described timelines and events, and unstructured content interpreted and analyzed the motivations behind those events. Specifically, structured content included the timeline of the riots and Maria Hertogh's life, and unstructured content explored the possible reasons the riots occurred.

Manipulation checks

Instructor presence. Participants rated the speaker on a 7-point semantic differential scale from Lombard et al. (2000) and Short et al. (1976). Items irrelevant to the experiment conducted, such as "unresponsive & responsive," were removed. A higher score indicated a higher level of instructor presence. The measurement had good reliability ($\alpha = .96$).

Content structure. Participants rated three 7-point Likert items from 1 (*completely disagree*) to 7 (*completely agree*), which we developed based on face validity. The three items were, "An argument can be made for a different interpretation of the content," "I think there is room for disagreement in the content that was taught to me," and "Other people might have differing views from myself after watching this video." The items were coded so that a higher score indicated a higher level of content structure. The measurement had good reliability (α = .93).

Measures

Online learning self-efficacy. We adapted five items from the self-efficacy component of Artino and McCoach's (2008) Online Learning Value and Self-Efficacy Scale (namely, items SE-3, SE-4, SE-5, SE-7, and SE-9). Participants rated three 7-point Likert items from 1 (*completely disagree*) to 7 (*completely agree*). Most of the original items referred to self-efficacy to succeed in an online course. Four of the items were specific to online courses (e.g., referring to using an online course management system; SE-2), which was not an interest of the current study; thus, we excluded those items. We reworded the remaining items to refer to video lectures instead of online courses. One example of the items used is, "I am certain I can understand the most difficult material presented in an online lecture." A higher score indicated a higher level of online learning self-efficacy. The measurement had good reliability (α = .84).

Learning satisfaction. Finally, we measured learning satisfaction with three Likert items adapted from Kim et al. (2011), with response options ranging from 1 (*completely disagree*) to 7 (*completely agree*). The original items measured perceived satisfaction with a course. We revised the wording to refer to the individual lecture recordings. The three items were, "I think I learned a lot from this video," "I think this video satisfied my learning needs," and "Overall I am

satisfied with the video as a learning tool." The higher the score, the higher level of satisfaction experienced. The measurement, which served as the dependent variable in our analysis, had good reliability ($\alpha = .93$).

Results

Manipulation Checks

Social presence was successfully manipulated, $F(1,159) = 669.88$, $p < .001$), $\eta_p^2 = .81$. The measure of social presence was higher in the high social presence conditions ($M = 4.95$, $SD = 1.05$) than in the low social presence conditions ($M = 2.57$, $SD = 1.16$). Likewise, content structure was successfully manipulated, $F(1,159) = 165.10$, $p < .001$, $\eta_p^2 = .51$. The measure of content structure was higher in the unstructured condition ($M = 1.63$, $SD = 1.23$) than in the structured condition ($M = 4.05$, $SD = 1.63$).

Findings

To test H1, we conducted a 2 × 2 repeated measures ANOVA and examined the parameter estimates showing the effect of the experimental treatments on learning satisfaction. In support of H1, learning satisfaction was higher in the high social presence conditions ($M = 5.03$, $SE = 0.08$) than in the low social presence conditions ($M = 4.23$, $SD = 0.10$), $F(1,159) = 77.87$, $p < .001$, $\eta_p^2 = .33$.

To test the next two hypotheses, we added online learning-self efficacy as a covariate and conducted 2 × 2 repeated measures ANCOVA. In support of H2, there was a positive relationship between participants' online learning self-efficacy and learning satisfaction in the LU ($B = 0.44$, $SE = 0.10$, $p < .001$), LS ($B = 0.38$, $SE = 0.09$, $p < .001$), HU ($B = 0.35$, $SE = 0.08$, $p < .001$), and HS ($B = 0.30$, $SE = 0.08$, $p < .001$) conditions. Failing to support H3, the

interaction between online learning self-efficacy and social presence was not significant, $F(1,159) = 1.104$, $p = .295$.

To answer RQ1, we again conducted repeated measures ANOVA. Results showed that learning satisfaction did not differ between structured content ($M = 4.68$, $SE = 0.08$) and unstructured content ($M = 4.57$, $SD = 0.09$), $F(1,159) = 2.38$, $p = .125$.

Finally, our test of H4 focused on the interaction between the repeated factors. Results showed a significant interaction $F(1,159) = 4.31$, $p = .040$, $\eta_p^2 = .026$. The pattern of cell means is consistent with H5 (see Figure 1). Hence, H5 was supported.

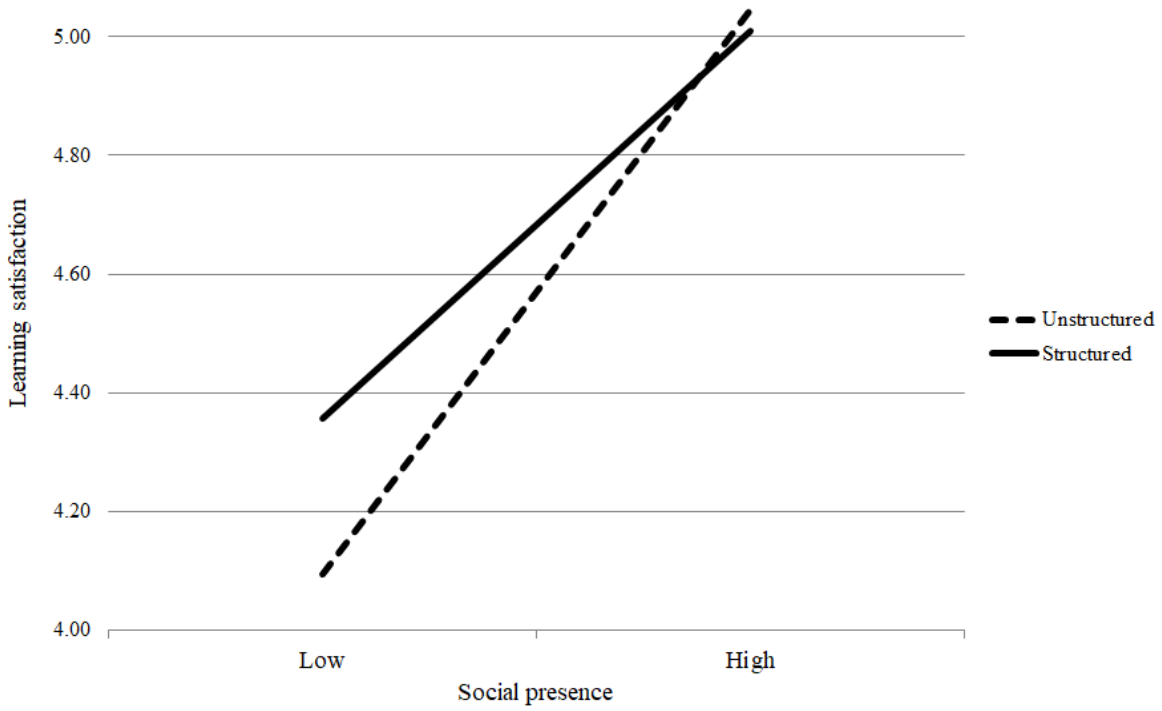

Fig. 2. Interaction between social presence and content structure on learning satisfaction.

Discussion

This study examined factors that affect online learning satisfaction. Whereas the relationship between social presence and online learning satisfaction has been widely studied by researchers cited in the literature section above (e.g., Blinded citation; Richardson et al., 2017;

Wilson et al., 2018); there has been less attention on how that effect may depend on learner ability and the type of instructional content. This study is the first to consider how social presence may matter more when learners have lower online learning self-efficacy and, separately, when the content is less structured. The current findings were mixed, but the significant findings have some theoretical and practical implications.

First, we found that instructor presence, a type of social presence, is positively associated with learning satisfaction. This is consistent with prior findings (Kim et al., 2011; Richardson et al., 2017; Swan & Shih, 2005) and reinforces the importance of social presence in online learning. In the current study, we manipulated social presence by varying vocal tone. This manipulation isolated the effect related to a single source of social information (i.e., the voice). Other research has found similar effects in the contexts of richer media, richer in the sense that they have more channels of communicating social information such as facial expression and body language (Hackman & Walker, 1990; Pale et al., 2014). The current findings suggest a voiceover lecture can use variation in vocal tone to enhance instructor presence, perhaps because it creates a richer experience for learners, but instructors should use the richest medium within their capability. Adding additional visual cues, such as in picture-in-picture recordings and lecture capture, can further enhance instructor presence and satisfaction (Author, blinded; Korving et al., 2016).

Next, we found that students with higher online learning self-efficacy had greater learning satisfaction. This is also consistent with prior findings (Artino, 2008; Lim, 2001; Womble, 2007) and reinforces the notion that online learning self-efficacy plays a key role in positive online learning outcomes. One practical implication is that learning institutions should explore initiatives to foster greater levels of online learning self-efficacy. These initiatives should

promote the mastery of online learning, where students have frequent and convenient access to online learning. These opportunities can help students develop efficacy beliefs by providing them with evidence of their capabilities in using information technology (Bandura, 1997). Of course, this is easier said than done, since students with the lowest levels of online learning self-efficacy might be reluctant to engage with online learning regardless of how accessible it is. These students may require additional scaffolding that would allow them to transition gradually into feeling confident to learn in online settings. Then again, getting to that point may largely be a function of improving learning self-efficacy (Kreth et al., 2019), which is an essential aspect of learning, but rather a platitude to draw as a practical implication.

Finally, we found that the relationship between instructor presence and learning satisfaction is moderated by content structure. This finding suggests instructor presence is more impactful, at least with respect to learning satisfaction, when teaching unstructured content versus structured content. This finding accords with the notion that, in the case of both offline and online learning, interpretive or critical approaches to learning benefit from a teacher who is engaged with students to facilitate their understanding of abstract ideas (Arbaugh, 2010; Neumann et al., 2002; Shulman, 2006). This engagement helps reduce psychological distance between teacher and student, which can be supported further by a high degree of immediacy, or social presence. Then again, relationship between instructor presence and learning satisfaction was positive for both unstructured and structured content. The pedagogical takeaway here is that, even with highly structured content, instructor presence can enhance the learning experience, but it has more benefit for less structured content.

Application

The results of our study can be applied in tandem with pedagogical research to better inform the use of media-based teaching tools and course design to improve student learning outcomes. One useful framework for thinking about our results is Bloom's taxonomy, a classification framework used to develop learning objectives by ranking the degree of complexity in cognitive and knowledge processes (Krathwohl, 2002). While Bloom's taxonomy is a good heuristic for teachers to match assessment items to the levels of learning objectives (Stanny, 2016), our findings provide additional rationales for teachers to consider the level of social presence being conveyed to students when creating online class objectives as well.

As an instructor moves up the taxonomy for class planning, content structure decreases and objectives become more complex. Students are expected to make judgements or to synthesize information to form coherent and logical arguments based on multiple perspectives (Krathwohl, 2002). Many online courses have implemented aspects of this framework, but there are concerns over a lack of student cognitive engagement (Crompton et al., 2019). Situated within this conceptual framework, the current findings can help instructors manage their online classes by understanding the importance of social presence when planning objectives at the higher end of the taxonomy. Such an approach can help ensure students have learning experiences that are both emotionally and cognitively satisfying.

Limitations

There are some limitations to our study. First, our manipulation of social presence and content structure may be confounded. For example, structured content should generally have lower hypothetical distance because the ideas are more concrete. To the extent that social presence is a function of psychological distance, it may be affected by content structure. This creates a potential challenge for future researchers who wish to manipulate either content

structure or social presence, but not the other. Second, our experimental stimuli were limited to a single discipline. Future research may want to validate our findings by testing them in other disciplines. Third, our participants were Singapore university students, with the majority majoring in the humanities, arts and social science disciplines. As the cultural background of students could affect perceptions of social presence (Al-Harthi, 2005; Yen & Tu, 2011), the cross-national generalizability is limited. Lastly, this study examined voice-over recorded video lectures, which was useful for testing our hypotheses, but lacks ecological validity when many recorded lectures use other formats.

Conclusion

With the advancement of technology and its application in education, online learning will become a more complex phenomenon. This study focused on the role of instructor presence and two potential moderators of its effect, which we addressed in the introduction with three broad questions. In answering our first broad question, we showed instructors can enhance their presence simply by having more natural vocal variation. We also found students; online learning self-efficacy was related to their satisfaction but did not influence the effect of instructor presence. In other words, we were unable to answer our second broad question. In answering our third broad question, we showed instructor presence more positively affects learning satisfaction when the instructional content is less structured. We hope that educators can use these findings to enhance the learning outcomes of their online courses. Specifically, instructors developing online content should learn how to use tools that facilitate greater instructor presence, for example, by not only using video, but also by orienting themselves toward the on-screen content (see Pi et al., 2020). This recommendation applies to all academic disciplines and has special import for instruction requiring abstraction, discussion, and interpretation of learning concepts.

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