



Video lecture format, student technological efficacy, and social presence in online courses

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ABSTRACT

Online platforms are frequently used as an alternative environment for individuals to meet and engage in a variety of activities, like attending courses online. We examined the effect of adding social presence cues in online video lectures and technological efficacy on college students' perceived learning, class social presence, and perception that the videos aided learning. Participants rated their technological efficacy and completed an online class with video lectures that either included the video (image) of the instructor or not. The interaction between technological efficacy and video manipulation predicted lower ratings of perceived learning, social presence, and video usefulness, particularly for students with lower technological efficacy. A mediated-moderation analysis showed that, the interaction between person (efficacy) and media (instructor image in video vs. no image) predicted greater perceived learning through the mediators of perceived usefulness of videos, class interactivity, and felt comfort in the class.

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1. Introduction

The internet has become a popular alternative platform for interacting with others and disseminating information. As a result, online courses are frequently being used as instructional mediums, especially within higher education. Over 5.6 million college students took at least one course online in the fall 2009 semester, and furthermore, research predicts that almost 90% of college students will take at least one class online during their college career (Allen & Seaman, 2010). Although the vast majority of university classes are still taught in traditional, 'face to face' settings, mediated learning environments are swiftly growing towards being accepted as a normal part of the American college experience.

The applications of online instruction presently extend across all academic disciplines, any level of curriculum, and a wide variety of student populations. For example, past research (Allen et al., 2004; Donavant, 2009) has demonstrated that students engaging in internet courses extend from youth in high school through college age, as well as into adulthood (e.g., police officers, military, and businesses). Similar to traditional 'face to face' courses, media-based courses utilize a multitude of teaching techniques in attempt to best meet the needs of students. Instructional methods vary by medium, resulting in a wide range of approaches such as email and bulletin board postings to utilizing supplemental interactive video lessons (Katz, 2002). Although there is a large amount of enthusiasm and

interest in promoting mediated learning, the creation of alternative environments directly paralleling 'face to face' learning experiences, has yet to be accomplished, resulting in a need to examine these new methods of teaching. Taken together, the widespread use and diversity of online instruction has led to a flood of research concerning the similarities and differences between online and face-to-face instruction.

The vast majority of research concerning online instruction revolves around the notion that there may be different experiences and outcomes between online and face-to-face learning environments. Whether or not these learning platforms indeed affect online learners differently is still under debate and past research findings diverge on a number of topics. For example, one proponent of online instruction published a seminal book that reviewed the research regarding traditional vs. mediated learning platforms and determined there was no significant difference between the two modes of instruction (Russell, 1999). On the other hand, researchers have noted some caveats of this conclusion. They suggest that self-selection, may account for the lack of significant results (Coates, Humphreys, Kane, & Vachris, 2004). In addition to inconsistencies between previous findings, past related research also contains a number of methodological concerns (e.g., lack of random assignment), further warranting caution regarding the interpretation of studies exploring online education (Institute for Higher Education Policy, 1999).

Although there are a number of concerns regarding past research on online learning, exploratory efforts have successfully identified a number of positive and negative aspects of using the internet as an educational platform. With respect to the typically

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busy and overwhelming lifestyle of a large number of students, the most commonly cited reason for students to prefer online instruction is the overall convenience (Bennett, 2002; Donavant, 2009; Perreault, Waldman, Alexander, & Zhao, 2008). For example, time and money is saved when students do not have to commute to a university to participate in a face-to-face class (Brinkman, Rae, & Dwivedi, 2007). Some negative aspects of using these methods of instruction are that online classes typically have a larger dropout rate than traditional courses (McLaren, 2004), and many students report having feelings of isolation, or limited 'social presence' (Gunawardena & Mclsaac, 2004), while taking online courses (Bennett, 2002; Donavant, 2009). Even with increasing internet speeds affording instructors the opportunity to offer video based instruction (Dykman & Davis, 2008), which compared to other forms of media (e.g., text-based communication) is posited to communicate greater felt social presence (Gunawardena & Mclsaac, 2004), reports of perceiving isolation persists. Irrespective of past research concerns and the benefits and costs of online instruction, the trend toward online education is continually expanding, resulting in the pressing need for further empirical investigation of this educational platform and its implications for learners.

Following the emergence of social presence theory (Short, Williams, & Christie, 1976), the majority of related research primarily focused on exploring the nature and implications of online media and communities, and in particular, online educational settings. Social presence theory suggests that different media (e.g., face-to-face, telephone, text) convey differing degrees of social cues that lead interacts to feel more or less psychologically present with one another (Tu & Mclsaac, 2002). A number of dimensions of social presence have been proposed including intimacy, immediacy (Short et al., 1976), social context (e.g., informal or formal conversation), online communication (e.g., ease of expression), interactivity (Tu, 2000), group interactivity, comfort, influence of others (Lin, 2004), privacy (Tu, 2002), affective interaction, cohesion with other interactant (Rourke, Anderson, Garrison, & Archer, 1999), emotional expression, and group cohesion (Garrison, Anderson, & Archer, 2000). Although the literature is filled with ambiguity among defining terms and conceptualization of the components of social presence (Biocca, Burgoon, Harms, & Stoner, 2001), a common theme is evident. Social presence is related to the subjective perception of feeling psychologically connected with others while engaging in social interactions through various mediums.

Many social presence theorists and researchers have expanded the original theoretical framework to account for the complex and dynamic nature of this phenomenon (Biocca et al., 2001; Gunawardena & Zittle, 1997; Kehrwald, 2008; Richardson & Swan, 2003; Tu & Mclsaac, 2002). Originally, social presence theory focused on the degree to which users perceive and feel as though interactions within mediated settings are indeed interactions among real people. However, it has been suggested that consideration of other factors, such as the user's technological competence (e.g., computer skills) and the user's individual perceptions of their experiences (e.g., perceived interactivity), also provide important insight into understanding the experience of social presence. As suggested by Lewin (1946), dynamic interactionism is encapsulated in the simple formulation—behavior (B) is a function (F) of the person (P) and his environment (E), $B = F(P, E)$. In effect, perceived social presence is an outcome of the dynamic interaction between the person (e.g., past experience, efficacy to use the media, mood, motivation, preference, culture) and the environment (i.e., the communication medium).

The ability to utilize mediated interfaces to successfully interact within different mediums and personal perceptions of mediated activities are two important factors which influence the potential for perceiving social presence. Tu and Mclsaac (2002) suggest that individual's technological skills and past experiences with media

platforms greatly affect the degree of social presence users may perceive. For example, an individual's lack of experience with a communication medium may affect their perception of the media's social presence affordances at any given point in time. With practice, the same individual may learn to properly use the components of the media or develop new strategies to adapt and better interact with others in the environment, which may reduce extraneous factors related to lack of experience. As a result, the degrees of social presence afforded by the media will likely evolve as technological skills are obtained. Similarly, the perception of interactivity has been identified as another key dimension related to social presence (Tu, 2000). According to past research on online learning environments and social presence, an individual's perception of student–teacher and student–student interactivity throughout online courses, consistently predicts the amount of satisfaction they will have with the class (see Fulford & Zhang, 1993; Lowenthal, 2009). Furthermore, perceiving oneself to be 'present' in an online course is related to students' perceived learning and satisfaction with the instructor (Richardson & Swan, 2003). Together, technological efficacy and subjective perceptions of mediated experiences, provide insight into the extent to which media users perceive social presence. Thus, it seems desirable to identify how to manipulate social presence among users in mediated settings and further explore the nature and implications of this dynamic interaction between students and online class environments.

According to social presence theory, the use of supplemental methods, like adding video instruction, should induce some degree of social presence through non-verbal cues (e.g., eye gaze, facial expressions, smiling) which are otherwise absent in telephone or text based instruction. However, promoting social presence is not limited to enhancing instructional methods alone. Individuals who engage in taking online classes, regardless of specific instructional techniques, have commonly demonstrated the ability to overcome the limitations of the communication medium, and they too provide different types of cues (e.g., using emoticons in email) which facilitate social presence (Gunawardena & Zittle, 1997). Combined, these findings suggest that social presence is grounded upon a number of personal and social factors, and not merely on something inherently built into the communication medium itself (Gunawardena & Zittle, 1997).

The dynamic nature of social presence can lead to difficulties in examining this construct. Past research has demonstrated that mediums which have a few social presence cues may increase group cohesion and adherence to group norms when compared to face-to-face interactions (Lea & Spears, 1991; Reicher, Spears, & Postmes, 1995). Similarly, others have shown that adding cues may inhibit social presence, suggesting that there are limitations to using social presence cues in online classes. In two studies, Homer, Plass, and Blake (2008) examined the effect of adding additional social presence cues (i.e., non-verbal signals) to a video lecture on participants' cognitive load, perception of social presence, and learning. In Experiment 1, participants were randomly assigned to view a talk that contained the lecture slides and voice of the presenter (no image of the presenter) or the same video with the video image of the presenter included. Participants then rated their perceived social presence, cognitive load, and completed an exam on the material presented in the video. Contrary to social presence theory, no significant differences were observed between the video conditions (no image vs. image) on perceived social presence. Additionally, no differences in exam scores were found, however participants in the video with the presenter's image rated their degree of difficulty and effort with the video (i.e., cognitive load) significantly higher than participants in the no image condition.

In Experiment 2, a measure of visual learning preference interacted with the video manipulation to predict cognitive load.

Participants with a preference for verbal learning exerted greater mental effort in the image condition, while participants with a preference for visual learning exerted more cognitive effort in the non-image condition. This outcome is consistent with studies showing that greater redundancy of information presented hinders learning (Mayer, Heiser, & Lonn, 2001). Together, the results suggest that adding social presence cues in online education environments may sometimes hinder some students' experiences in online classes. In conclusion, while adding greater social presence cues did not affect ratings of social presence, the results did provide some support for past research suggesting that user's perceptions of mediated interactions can affect their experience (e.g., satisfaction) with specific mediated environments.

Mediated moderation models, which explain the relationship among an interaction between media attributes and psychological states on outcome variables through mediators, are advantageous for researchers within the areas of media, communication, and technology (Bucy & Tao, 2007; Tao & Bucy, 2007). Similar to prior distinctions between social presence as inherent in the media vs. a subjective perception influenced by the interaction between person and the environment, these authors argue for greater use of mediated moderation to examine the psychological states produced by the media and their influence on outcome variables. For example, Bucy and Tao (2007) propose examining the interactivity of websites by manipulating the number of interactive components of a stimulus site, and measuring participant's computer self-efficacy, perception of interactivity, and knowledge acquisition. The mediated moderation model should show that the aspects of the environment (independent variable of manipulation of site interactive components) and the person (moderator of computer self-efficacy) will interact to predict knowledge (outcome) through the user's perception of interactivity (mediator).

Social presence, as conceptualized by current researchers, is a psychological state developed through the dynamic interaction between the media and user. In the above-proposed study the perception (not actual manipulation) of interactivity should mediate the relationship between the interaction of person by media and the learning outcome. Recall, interactivity is also a proposed component of social presence (Tu, 2000). Homer et al. (2008) may have found that the interaction between video manipulation (independent variable) and preference for visual or verbal learning (moderator) interact to predict learning (outcome) through social presence (mediator). In the present study we apply a mediated moderation model to examine the influence of social presence in an online college course.

2. Present study

The purpose of the present study is to examine social presence (e.g., perceived interactivity and comfort in the class) as a mediator of the relationship between the interaction of personal attributes (e.g., technological self-efficacy) and media attributes (e.g., video with addition of social presence cues) on perceived learning outcomes. Prior to beginning an online course, students were asked to complete a measure of technological self-efficacy. Students then participated in an online course with video lectures that either contained an image (e.g., video) of the instructor or not (e.g., no image). At the end of the semester students completed measures regarding perceived learning, perception of the video lectures as useful to learning, perceived interactivity, and felt comfort.

Past research has shown that perceived social presence of a class predicts satisfaction with the course (Fulford & Zhang, 1993; Richardson & Swan, 2003). Similarly, perceived interactivity of the class (a dimension of social presence) predicts students' perception of the effectiveness of online classes (Peltier, Drago, &

Schibrowsky, 2003). Thus, we predict that students' perception of social presence of the class will be positively associated with perceived learning. Homer et al. (2008) provided evidence supporting past multimedia research (Mayer et al., 2001) that shows that adding more social presence cues may have a negative effect (i.e., increasing cognitive load) on participants' experience. We suspect that a similar effect (i.e., negative experience) will occur for students exposed to the video lectures that include the instructor's image. However, students' technological efficacy should also interact with the video manipulation to predict perceived learning.

Technological efficacy (e.g., individual's belief in capacity to use technology) has been found to affect satisfaction with an online class (Lim, 2001). We predict that students' technological efficacy will interact with the video manipulation (i.e., no image vs. image) to predict perceived learning, and social presence of the class. Students who report lower levels of technological efficacy may find the additional social presence cues (e.g., image of the instructor) in the video as distracting or redundant information. Overall, we predicted that a mediated moderation model with the interaction (e.g., video by efficacy) predicting perceived learning will be mediated through perception of the video as useful and perceived social presence.

2.1. Method

2.1.1. Participants and design

Participants ($N = 158$, 89.9% women) received extra credit toward their online class for participation. Their mean age was 23.34 years ($SD = 7.01$), and 77.8% indicated their racial/ethnic group was White. Prior to beginning the online course, participants rated their technological efficacy and were then randomly assigned to either view the video lectures with (or without) a video of the instructor at the top left of the screen for the remainder of the semester (13 lectures). All participants viewed and heard the same lecture; the only manipulation in this experiment was the presence or absence of the instructor's image (video of instructor speaking) while presenting the lecture. At the end of the semester students rated their perceived learning, perception that the video lectures aided learning, perceived interactivity, felt comfort, and demographic information. All participants were then fully debriefed and thanked. Unless noted otherwise, all measures used a 7-point Likert-type response scale, from 1 = *strongly disagree* to 7 = *strongly agree*.

2.2. Materials

2.2.1. Technological efficacy

To assess participants' degree of efficacy in using the internet and computer mediated communication in the online class, we adopted 14 items (e.g., "In this course, I believe I could use email to communicate effectively with my instructor") from prior research (Randall, 2001). Participants rated the extent they believed they could complete a number of tasks (e.g., use email, navigate websites, install new software) related to online classes ($\alpha = .90$).

2.2.2. Perceived learning

To assess perceived learning we combined seven items (e.g., "I learned to identify the central issues of the course") from Marks, Sibley, and Arbaugh (2005) and three items (e.g., "Overall this course met my learning expectations") from Richardson and Swan (2003) to form an index of overall perceived learning ($\alpha = .95$).

2.2.3. Perception of videos

One item ("The content of the videos contributed toward learning") was adapted from prior research (Peltier et al., 2003) to assess

participants' perception that the video lectures were useful for learning the class material.

2.2.4. Interactivity

Three items (e.g., "Class members normally responded to messages immediately") were adapted from prior research (Tu & Yen, 2006) to assess the degree of perceived interactivity of the course ($\alpha = .70$).

2.2.5. Comfort

Four items (e.g., "I felt comfortable expressing my feelings in this class") were adapted from prior research (Lin, 2004) to assess participants' experience of feeling comfortable in the course ($\alpha = .86$).

2.2.6. Demographic items

Participants were also asked to report their gender, age, and ethnicity.

3. Results

3.1. Preliminary analyses

To examine the effect of video presentation (image vs. no image) we conducted a one-way MANOVA with the measured variables as dependent variables. The omnibus test was significant, Wilks' $\lambda = .92$, $F(5, 152) = 2.73$, $p = .02$, $\eta_p^2 = .08$. As shown in Table 1, technological efficacy, perception of the videos, and felt comfort in the class did not differ significantly, however participants who viewed the video lectures with the image of the instructor rated the perceived interactivity in the class and learning to a lesser extent than participants who did not view the instructor's image.

3.2. Regression tests for moderation

3.2.1. Perceived learning

We first centered participants' ratings of technological efficacy, then computed an interaction between efficacy and video manipulation (0 = no image, 1 = image). This interaction is used for the remainder of the analyses. Students' perception of the videos as contributing to their learning was regressed on the video manipulation, the centered technological efficacy variable, and the interaction between efficacy and video manipulation, $R^2 = .10$, $F(3, 154) = 5.84$, $p = .001$. The video manipulation ($\beta = -.20$, $t(154) = -2.63$, $p = .01$) was a significant predictor of perception of learning, while technological efficacy ($\beta = -.00$, $t(154) = -.02$, $p = .99$) was not. Importantly, the interaction between video manipulation and efficacy was significant, $\beta = .23$, $t(154) = 2.15$, $p = .03$. The simple slopes showed that less technological efficacy was associated with less perceived learning in the class when the instructor's image was included in the video, $B = -.66$, $t(154) = -3.38$, $p = .001$, but was unrelated to perceived learning when the instructor's image was omitted, $B = -.07$, $t(154) = -.34$, $p = .74$. In effect, including the instructor's image in the video lectures was related to lower per-

ceived learning, especially among students with lower felt efficacy to use technology (see Table 2 for estimated means).

3.2.2. Perception of videos

We regressed the students' perceived learning on technological efficacy, video manipulation, and the interaction, $R^2 = .05$, $F(3, 154) = 2.39$, $p = .07$. While the main effect of video manipulation ($\beta = -.10$, $t(154) = -1.26$, $p = .21$) and technological efficacy ($\beta = -.07$, $t(154) = -.64$, $p = .52$) were not significant, the interaction between video and efficacy was significant, $\beta = .22$, $t(154) = 2.01$, $p = .04$. Analysis of the simple slopes revealed that less technological efficacy was associated with perceiving the videos as unhelpful when the instructor's image was included in the video lectures ($B = -.57$, $t(154) = -2.32$, $p = .02$), but was unrelated to a negative perception of the videos when the image was omitted from the lectures, $B = .13$, $t(154) = .53$, $p = .60$.

3.2.3. Interactivity

We regressed participants' perception of class interactivity on technological efficacy, video manipulation, and the interaction, $R^2 = .12$, $F(3, 154) = 6.76$, $p < .001$. The video manipulation ($\beta = -.23$, $t(154) = -2.99$, $p = .003$) was a significant predictor of interactivity, while efficacy ($\beta = .02$, $t(154) = .16$, $p = .88$) was not. Importantly, the interaction between video and efficacy was significant, $\beta = .22$, $t(154) = 2.08$, $p = .04$. The simple slopes showed that less technological efficacy was related to perceiving less interactivity when the image was included in the videos ($B = -.94$, $t(154) = -3.58$, $p < .001$), but was unrelated to perceived interactivity when no image was present, $B = -.17$, $t(154) = -.64$, $p = .52$.

3.2.4. Comfort

We regressed students' perception of the class environment as comfortable on technological efficacy, video manipulation, and the interaction, $R^2 = .05$, $F(3, 154) = 2.56$, $p = .05$. The video manipulation ($\beta = -.10$, $t(154) = -1.20$, $p = .23$) and technological efficacy ($\beta = -.05$, $t(154) = -.47$, $p = .88$) were not significant predictors. However, the interaction was significant, $\beta = .22$, $t(154) = 2.01$, $p = .046$. The simple slopes showed that less efficacy was related to feeling less comfortable in the class when the instructor's image was included in the lectures ($B = -.66$, $t(154) = -2.27$, $p = .02$), but was unrelated to comfort when the instructor's image was omitted, $B = .17$, $t(154) = .57$, $p = .57$.

3.3. Mediated moderation

The prior analyses showed that the video manipulation (no image vs. image) by technological efficacy interaction predicted perceived learning, perception of the videos, perceived interactivity, and felt comfort in the class. Regression tests confirmed that perception of the videos ($R^2 = .19$, $\beta = .44$, $t(156) = 6.03$, $p = .01$), interactivity ($R^2 = .44$, $\beta = .66$, $t(156) = 10.96$, $p < .001$), and felt comfort ($R^2 = .44$, $\beta = .67$, $t(156) = 11.15$, $p < .001$) predicted perceived learning in the class. Importantly, when perception of the videos, interactivity, and felt comfort were added in the model ($R^2 = .57$,

Table 1
Means (standard deviations) for measured variables by video manipulation.

Variable	No image	Image	$F(1, 156)$	p -value	η_p^2
Technological efficacy	6.49 (0.59)	6.35 (0.59)	2.07	.153	.013
Perceived learning	6.21 (0.78)	5.81 (0.98)	8.02	.005	.049
Perception of the videos	6.39 (1.01)	6.15 (1.18)	1.91	.169	.012
Perceived interactivity	5.52 (1.13)	4.92 (1.23)	10.22	.002	.062
Felt comfort	5.57 (1.35)	5.29 (1.25)	1.82	.180	.012

Note: 7-point Likert-type scale, from 1 = strongly disagree to 7 = strongly agree.

Table 2
Estimated Means for Assessed Variables at 1SD Above and Below the Mean of Technological Efficacy.

Technological efficacy	No image		Image	
	-1SD	+1SD	-1SD	+1SD
Perceived learning	6.21 _a	6.21 _a	5.55 _b	6.14 _a
Perception of the videos	6.48 _a	6.32 _a	5.91 _b	6.45 _a
Perceived interactivity	5.50 _a	5.54 _a	4.57 _b	5.37 _a
Felt comfort	5.65 _a	5.51 _a	4.99 _b	5.68 _a

Note: Estimated means with different subscripts are significant slopes ($p < .05$).

$F(3,151) = 33.00, p < .001$), the video manipulation by technological efficacy interaction no longer predicted perceived learning ($\beta = .04, t(151) = .52, p = .61$). The perception of the videos ($\beta = .16, t(151) = 2.66, p = .01$), perceived interactivity ($\beta = .31, t(154) = 4.13, p < .001$), and felt comfort ($\beta = .40, t(151) = 5.62, p < .001$) remained significant predictors of perceived learning in the class.

Using Preacher and Hayes' (2008) bootstrapping macro (1000 iterations), we entered the interaction (video manipulation by efficacy) as the independent variable, perception of the videos, perceived interactivity, and felt comfort as mediators, perceived learning as the dependent variable, and video manipulation (0 = no image, 1 = image) and technological efficacy as covariates. As indicated by the absence of zero within the confidence interval (95% $CI = .052-.484$), the mediated moderation model was supported. Furthermore, the perception that the videos aided learning ($CI = .002-.129$), perceived interactivity ($CI = .010-.215$), and felt comfort ($CI = .005-.281$) were significant mediators between the interaction and perceived learning in the course.

4. Discussion

The purpose of the present study was to examine social presence as a mediator of the relationship between the interaction of personal attributes (e.g., technological efficacy) and video lecture attributes (e.g., presence or absence of non-verbal social cues) on perceived learning in an online college course. We predicted that (1) perceived social presence would be positively related to perceived learning, (2) the addition of social presence cues in video lectures (i.e., the instructor's image) would negatively affect students' experience in the class, (3) students with lower efficacy who were exposed to the video with the instructor's image would report lower perceived learning, and (4) perceived social presence would mediate the relationship between the video by efficacy interaction and perceived learning. The results obtained supported each of these hypotheses.

The mediated moderation model tested in the present study lends support to past theorizing (Bucy & Tao, 2007) and research (Tao & Bucy, 2007) of the usefulness of this model to examine media-based environments. Prior research (Homer et al., 2008) also showed an interaction between media and person attributes to affect user experience. The present study extends this finding to support the addition of examining users' subjective perceptions of the medium to mediate the relationship between media and user interaction and outcomes. While adding social presence cues to the video lectures in this online class negatively affected the users' perceived learning and interactivity, the lower scores were reported primarily by students with lower technological efficacy. Regardless of reported technological efficacy, no significant differences emerged in the assessed outcome variables (e.g., interactivity, learning, comfort) when lectures omitted additional social presence cues (i.e., the instructor's image). In other words, students' prior experiences and felt efficacy to use technology related to the class affected their experiences negatively, but only when the additional social presence cues were included in the videos. Similar to prior research (Homer et al., 2008; Mayer et al., 2001) we suspect this is due to the higher cognitive load that lower efficacious students may have experienced.

Social presence and the perceived usefulness of the video for learning mediated the relationship found between interactivity and perceived satisfaction with learning. The results support prior research regarding the positive relation between perceived social presence and student satisfaction with online learning (Fulford & Zhang, 1993; Peltier et al., 2003; Richardson & Swan, 2003). Perceiving that the course videos aided learning, and that the class

was interactive and comfortable, positively predicted perceived learning. As many social presence theorists and researchers have noted (Biocca et al., 2001; Gunawardena & Zittle, 1997; Kehrwald, 2008; Richardson & Swan, 2003; Tu & McIsaac, 2002), social presence is a dynamic construct that is subjective and affected by personal attributes interacting with media attributes. The present study supports this view by providing evidence that the media and person attributes interact to predict reported perception of social presence.

The present findings have many implications for a number of disciplines and also for users of mediated platforms. Communication, technology, media, and education researchers would benefit from greater attention to the dynamic interaction between person and environment on subjective experiences of reality. As the popularity of online education continues to grow (Allen & Seaman, 2010), and the accessibility and speed of the internet affords the adoption of new instructional techniques, like video based instruction (Dykman & Davis, 2008), instructors would benefit from knowing the positive instructional methods identified in research, so they may utilize these techniques in the construction of their online course environments. Following the original conceptualization of social presence, one would expect that video lectures with greater social presence cues would provide the most immersive class environment. However, the present study shows that students who may be unprepared for the technological demands in online education courses experience less perceived learning when more cues are provided. Students may not have the technological knowledge or confidence to successfully navigate the online class environments and the absence of basic knowledge of computers and applications hinders students' experiences in online classes. Based upon the findings, it appears that universities may benefit by offering educational programs to enhance computer and internet skills. Programs would engender technological efficacy, prior to students enrolling in online classes. Alternatively, instructors may wish to omit their images in video lectures to avoid overloading students with low technological efficacy.

As with many educationally based studies, the present study is limited in the generalizability of the findings to other instructors or other classes. Students in the present study were in an online psychology and diversity course taught by the same instructor. Other instructors may have different teaching styles that aid students with lower technological efficacy. Additionally, the course material (i.e., psychological research and theories concerning stereotyping, prejudice, and discrimination) may differ from other courses (e.g., math, physics) in terms of cognitive demand. Media richness theory (Daft & Lengel, 1986) suggests that information with multiple meanings should be conveyed through media with greater social cues. Future research may examine if the degree of complexity of class material in different courses would affect perceptions of the class for low technological efficacious students. Future research may also examine whether the negative effects of redundant information presented in lectures will also hinder student learning in face-to-face classes. The use of technology by both students and instructors in face-to-face instruction has grown in recent years. Following prior research (Fried, 2008), we suggest that, unless the technology is relevant and thoughtfully incorporated into the learning experience (e.g., clickers to get immediate student responses), the use of technology will only serve as a distraction for students.

The present study examined the effect of adding social presence cues to online video instruction. A mediated moderation model showed that the manipulation of the video (no image vs. image of instructor) interacted with students' degree of technological efficacy to predict perceived learning through the perception that the lecture videos aided learning, perceived interactivity of the class, and feeling comfortable in the course. Findings supported the positive

relationship between perception of social presence in an online environment and positive evaluation of the course. Furthermore, the results provide evidence of the dynamic interaction between person and media attributes influencing the subjective perception of social presence of a communication medium. Increased social presence cues in video lectures were found to lead to lower ratings of perceived learning and social presence, especially for students with lower technological efficacy. Omitting images of the instructor or, greater assessment and training for students who may lack the technology skills to effectively learn in online courses is advisable based on the present findings. Further research concerning the on-line education environment is needed, given its projected growth in academia.

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