



OPEN ACCESS

EDITED BY

Maria Alzira Pimenta Dinis,
Fernando Pessoa University, Portugal

REVIEWED BY

Katerina Kedraka,
Democritus University of Thrace, Greece
Alessandra Cecilia Jacomuzzi,
Ca' Foscari University of Venice, Italy

*CORRESPONDENCE

Stephanie Kelly
✉ sekelly@ncat.edu

RECEIVED 27 February 2024

ACCEPTED 22 April 2024

PUBLISHED 03 May 2024

CITATION

Kelly S, Kim J, Berry I and Goke R (2024)
Student impressions of instructors based on
Zoom backgrounds: investigating perceived
technology skills of instructors and affective
learning of students.
Front. Comput. Sci. 6:1392669.
doi: 10.3389/fcomp.2024.1392669

COPYRIGHT

© 2024 Kelly, Kim, Berry and Goke. This is an
open-access article distributed under the
terms of the [Creative Commons Attribution
License \(CC BY\)](#). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic
practice. No use, distribution or reproduction
is permitted which does not comply with
these terms.

Student impressions of instructors based on Zoom backgrounds: investigating perceived technology skills of instructors and affective learning of students

Stephanie Kelly^{1*}, Jihyun Kim², Ian Berry³ and Ryan Goke⁴

¹Department of Business Information Systems and Analytics, North Carolina A&T State University, Greensboro, NC, United States, ²Nicholson School of Communication and Media, University of Central Florida, Orlando, FL, United States, ³Communication Department, University of North Dakota, Grand Forks, ND, United States, ⁴Department of Organizational Communication and Leadership, Murray State University, Murray, KY, United States

The purpose of this study is to identify how Zoom backgrounds affect students' affective learning and perceptions of an instructor's technology use skills in online learning experiences. Data collected from undergraduate students in the U.S. indicate that with certain Zoom backgrounds, male students perceive the instructor having lower technology skills and experience less affective learning towards the instructor and course content than do female students. Overall, the study's findings provide meaningful contributions to instructional communication research and suggest recommendations for strategic use of Zoom backgrounds to cultivate the best impression of an instructor and positive learning experiences.

KEYWORDS

affective learning, technical skills, distance learning, Zoom backgrounds, communication

1 Introduction

When the great pivot to distance learning took place after the COVID-19 outbreak, many educators were forced to engage with distance learning technologies they never expected to use (Chen, 2021). Despite the abrupt transition, many educators new to distance learning found that it was not just an acceptable way to convey their course content during an emergency, but that it could actually be a superior way to convey their content (c.f., Claus et al., 2021). This discovery has been long supported by the claims of scholars that distance learning can be just as effective as face-to-face learning if instructors communicate well through mediated channels and use technology to skillfully engage students (c.f., Kelly and Westerman, 2016).

The distance learning pivot brought with it a large increase in synchronous online learning, a type of distance learning in which students and professors hold class life through video conferencing technologies such as Zoom (Chen, 2021). The best practices of video conferencing technologies for business and learning are still being unpacked as faculty and

employees learn to balance the benefits of cue-rich video conferencing software with the heavy fatigue that comes from processing many nonverbal cues simultaneously (i.e., Zoom fatigue; [Bailenson, 2021](#)). Distance learning is likely a permanent mode of education delivery ([Claus et al., 2021](#)), so it is critical for instructors to know how to skillfully use video conferencing technologies to optimize students' experiences ([Kelly and Westerman, 2016](#)). Thus, the purpose of this study is to better understand how the use of varied Zoom backgrounds utilized by an instructor may affect students' perceptions of the instructor and their learning experiences.

1.1 Instructional beliefs model

The Instructional Beliefs Model (IBM) was proposed by [Weber et al. \(2011\)](#) to explain how three typologies of classroom variables affect student learning: student characteristics, classroom characteristics, and instructor behaviors. Student characteristics involve any feature that a student possesses when they walk into class on the first day such as their gender, prior knowledge of the course subject ([Weber et al., 2011](#)), or intrinsic motivation ([Foutz et al., 2021](#)). Classroom characteristics include design features of the class such as the course policies outlined on the syllabus ([Weber et al., 2011](#)) or the modality of the class (i.e., online, hybrid, in person; [Goke et al., 2021](#)). Instructor behaviors include all things an instructor may do in the class relative to their communication, such as their use of immediate behaviors ([Weber et al., 2011](#)), clarity, or affirming style ([LaBelle et al., 2013](#)). The IBM proposes that all variables that fall within these typologies have an indirect influence on student learning through the mediation of student beliefs.

1.2 Instructor Zoom backgrounds

The IBM was proposed before Zoom was used to teach. As such, Zoom backgrounds are not considered in [Weber et al.'s \(2011\)](#) IBM proposal. It could be argued that an instructor's Zoom background is a classroom characteristic such that the backgrounds are features of the classroom environment that students will learn during synchronous online learning or asynchronous online learning through recordings. It is also possible to argue that an instructor's Zoom background choice is an instructor's behavior given that instructors choose the background to accompany their messages. Regardless of whether an instructor's Zoom background is considered part of the classroom characteristic or an instructional behavior, Zoom backgrounds fall into one of the two typologies of the IBM that are direct influences on students' beliefs and indirect influences on student learning.

1.3 Student gender

Student gender is a student characteristic according to the IBM because it is a feature self-contained within the student that they enter the classroom with on the first day ([Weber et al., 2011](#)). Prior research has found that student gender predicts students' perceptions of instructional technology use. For example, female students rate

instructors using a moderate amount of technology as more caring and competent than male students, while male students rate instructors using no technology as more competent and caring than those who use a moderate amount of technology ([Schrodt and Turman, 2005](#)). Another study found that male students are unlikely to believe that the structure of technology in online learning affects their potential for success, while female students tend to believe that their success is affected by design of technology ([Young and Lewis, 2008](#)). [Park et al. \(2019\)](#) found that when instructors introduce a new technology in class, female students are likely to adopt and learn the technology based on its introduction by the instructor, but male students will not willingly utilize the technology unless they clearly see its utility for their future.

Gender differences also persist specific to using video conferencing software. [Fauville et al. \(2021\)](#) found that females are more prone to Zoom fatigue than males, in part because women have more anxiety about mirroring the nonverbal behaviors of their communicative partners while using such software than their male counterparts. In another study on video-based learning found that male students reported higher self-efficacy for learning the material with technology than female students ([Hoogerheide et al., 2016](#)). A recent study on students' reactions to an instructor's professional or personal virtual background choices in the online classroom found that female and male students perceive credibility of the instructor differently ([Kelly et al., 2023](#)). While male students found instructors who used personal virtual backgrounds in teaching to be less credible than those who used professional backgrounds (e.g., official university backgrounds), female students did not respond differently. In short, student gender has been shown to be a predictor of how students react to classroom technologies. Therefore, it is possible that students of different genders will react differently to instructors' various Zoom backgrounds.

1.4 Attitudes towards instructor technology competence

Student beliefs are an important variable in the IBM that influences student learning ([Weber et al., 2011](#)). The original conceptualization of student beliefs was that these beliefs were constrained to students' beliefs about their ability to learn. This definition has received criticism for being too narrow (c.f., [Johnson and LaBelle, 2015](#); [Tatum and Frei, 2018](#); [Kelly et al., 2020](#)), and more recent research driven by the IBM defines student beliefs as students' psychological responses to the exogenous variables within the typologies of student characteristics, classroom characteristics, or instructor behaviors. For example, instructor behaviors may change the perceived immediacy students feel with their instructor ([Kelly et al., 2020](#); [Foutz et al., 2021](#)), the justice of the course policies may influence students' understanding of participation expectations ([Goke et al., 2021](#)), or students' own communication anxiety may affect their interest in the course subject ([Wombacher et al., 2017](#)).

A psychological response not tested under the guidance of the IBM thus far is students' attitudes about instructors' technology competence. Students make constant unconscious assessments about how their instructors use technology and make value judgments about the quality of their education experiences based on those judgments of how their instructors use technology ([Steff-Mabry et al., 2010](#); [Myers and Martin, 2017](#)). Prior research has also found that female

students are more forgiving in those judgments of their instructor's technology skills when the technology is new (Shuell and Farber, 2001). Given that students' psychological responses to their instructor's use of technology fit the updated definition of student beliefs in the IBM (Johnson and LaBelle, 2015; Kelly et al., 2020; Tatum and Frei, 2018), and that the student characteristic of gender (Shuell and Farber, 2001; Schrod and Turman, 2005) as well as instructor behaviors (Steff-Mabry et al., 2010; Myers and Martin, 2017) have been found to influence those attitudes, it is reasonable to ask in accordance with the IBM:

RQ1: How do student gender and the use of Zoom backgrounds of varying technical skills affect students' attitudes towards instructors' technology use skills?

1.5 Affective learning

The final output of the IBM is student learning (Weber et al., 2011). According to the IBM, student characteristics, classroom characteristics, and instructor behaviors are all indirect influences of student learning. The learning variables may be behavioral outcomes, such as dissent (LaBelle et al., 2013; Johnson and LaBelle, 2015; Goke et al., 2021), cognitive (Vallade et al., 2014; Wombacher et al., 2017), or affective (Vallade et al., 2014; Ojeda-Hecht et al., 2022). This study is focused on affective learning. Affective learning is a type of learning outcome inclusive of students' emotional responses to a course, most often measured as their feelings towards the instructor and/or the course content (Myers and Goodboy, 2015). Affective learning is impacted by several factors, such as instructor clarity (Titsworth et al., 2015), humor (Bolkan and Goodboy, 2015), and classroom justice (Vallade et al., 2014).

Instructors' technology use also affects students' affective learning. During emergency remote teaching due to COVID-19, students had affective learning for instructors who attempted to continue class through video conferencing rather than asynchronous platforms because it gave them a sense of connection (Garland and Violanti, 2021). When students perceive that instructors are using classroom technologies well, they feel that the instructor cares more (Myers et al., 2014). In an experiment of avatar learning companions in course software, female students had higher affective learning for the course content when they had an avatar companion than when they did not, while male students showed no difference in affective learning with or without an avatar companion (Arroyo et al., 2014). As such, how instructors choose to use technology (arguably an instructor behavior or classroom characteristic) and student gender (a student characteristic) have previously been found to predict students' affective learning for a course. Though these studies were not guided by the IBM, their findings are consistent with its predictions (c.f., Weber et al., 2011). As such, it is reasonable to ask the following research question:

RQ2: How do student gender and the use of Zoom backgrounds of varying technical skills affect students' affective learning for the instructor and course?

2 Materials and methods

2.1 Design and materials

This study conducted an online experiment with a 4 (Zoom background: university brand, winter, blurry, and office) x 2 (student gender: male and female) between-subjects design. To explore the proposed research questions, the study developed lecture videos. First, a baseline lecture video was created on the topic of one-way interview skills (e.g., interviews conducted by computer software). The lecture content focused on the basic description of one-way interviews and suggestions for conducting a successful one-way interview. Once the script was completed, two U.S.-based instructors with the same complexion and regional dialect were invited to video the lecture, one male and one female. To avoid any confounding effect of familiarity, these two instructors were not related to the university where data collection occurred. The female instructor's lecture was filmed first. Then, the male instructor filmed the scripted lecture by matching the body language (e.g., tone of voice, gesture, posture) and camera angle with those of a female instructor. Both baseline lectures were filmed on a green screen.

- 1 Lecture videos with different backgrounds were produced from the baseline lecture videos by transposing Zoom backgrounds into the green screen:
- 2 University branded: a university brand background utilized by faculty and staff at the participants' university
- 3 Winter: a photo of a winter landscape taken by one of the authors
- 4 Blurry: a screenshot of the author's office background (diplomas on the wall) while Zoom's default "blur background" filter was employed
- 5 Office: A screenshot of the author's actual office without a Zoom filter

Creating these Zoom backgrounds required varying degrees of technical skills of an instructor, such as no work for the office background, clicking a filter button for the blurry background, taking and uploading a photo for the winter background, and creating a composition using graphic skills and then uploading it for the branded background. In all, eight videos were developed: one with each background per instructor gender. The lecture was 2 min and 10 s in length.

2.2 Procedure

Participants were recruited from undergraduate communication courses at a large, urban, public university in the U.S. Upon Institutional Review Board approval, a recruitment message was distributed to several undergraduate courses. Interested students were invited to visit the research participation website that was included in the recruitment. Then, participants were asked to read and acknowledge the informed consent before beginning the research study.

The study consisted of two sections. The first section included a lecture video. In this section, participants were told that they would listen to a short lecture by a professor, then they were randomly

assigned to one of the eight lecture videos. To avoid a situation where participants clicked to the next page without watching the lecture, a timer was set, which did not allow participants to skip to the next page until the lecture ended. After watching the lecture, participants were asked to share their perceptions about the instructor via a series of questions. The second section included several demographic questions. Participation was voluntary, and all participants received extra credit. Confidentiality was guaranteed.

2.3 Sample

A total of 576 undergraduate students participated in the study. The sample consisted of more females ($n = 368$: 63.9%) than males ($n = 198$: 34.4%), and 10 students (1.7%) did not identify their gender. The average age was 20.68 years ($SD = 3.86$). A majority of the participants identified as White/Caucasian ($n = 322$: 55.9%), followed by Hispanic or Latino/a/x ($n = 113$: 19.6%), Asian ($n = 56$: 9.7%), Black/African American ($n = 54$: 9.4%), and other racial and ethnic groups ($n = 31$: 5.4%). Regarding class standing, a majority was first year ($n = 184$: 31.9%), followed by junior ($n = 177$: 30.7%), senior ($n = 117$: 20.3%), and sophomore ($n = 93$: 16.1%), and unidentified ($n = 5$: 0.9%). Regardless of student gender, participants were randomly assigned to one of the eight videos: university brand [$n = 165$ (male = 80; female = 85)], winter [$n = 153$ (male = 72; female = 81)], blurry [$n = 118$ (male = 52; female = 66)], or office [$n = 140$ (male = 65; female = 75)]. The cell size is not balanced because unfinished responses (except the non-gender demographic questions) were deleted.

2.4 Measures

Affective learning was measured with McCroskey's (1994) assessment, which is multidimensional. Affective learning for an instructor ($\alpha = 0.94$) assessed likelihood of taking a course with this specific instructor on the lecture video using four items (e.g., "unlikely – likely"). Affective learning for course content ($\alpha = 0.88$) evaluated the lecture content, using four items (e.g., "good – bad": reverse coded). Responses were obtained on a 7-point semantic differential scale.

Attitudes toward an instructor's technology use skills ($\alpha = 0.94$) was assessed with McCroskey and Richmond's (1989) six items (e.g., "negative – positive"). Responses were obtained on a 7-point semantic differential scale.

Predicted future usage, a control variable, was assessed with a single item ("I predict that I will use the material from this lecture on a regular basis in the future"). Responses were obtained on a 7-point scale (1 = Unlikely, 7 = Likely).

3 Results

Prior to the primary analyses, a few important aspects that could impact the study were addressed. First, predicted future usage of the lecture content was considered as a control variable. There was a potential ceiling effect due to the usefulness of lecture content on one-way interviews, which students may actively utilize, particularly with the increasing popularity of virtual interviews. Second, given that

lectures were delivered by two instructors, an independent samples *t*-test was conducted to ensure group equivalence between students who watched a lecture by a female instructor ($n = 307$) and a male instructor ($n = 269$). There were no significant group differences on affective learning for course content or attitudes toward an instructor's technology use skills. However, a statistically significant difference was observed on affective learning for the instructor, $t(572) = 2.28$, $p = 0.023$, with male instructor ($M = 5.89$, $SD = 1.14$) rated higher than the female instructor ($M = 5.66$, $SD = 1.28$). Thus, instructor sex as well as predicted future usage of the lecture content were entered as covariates for all analyses.

A set of ANCOVA tests were performed to test the research questions. The first ANCOVA test examined student attitudes toward an instructor's technology use skills (RQ1). The results revealed that there was a statically significant main effect of student gender, $F(1, 556) = 6.90$, $p = 0.009$, $\eta_p^2 = 0.012$. Female students ($M = 6.03$, $SD = 0.98$) reported more favorable attitudes toward the instructor's technology skills than did male students ($M = 5.80$, $SD = 0.91$). A Bonferroni test revealed that the significant difference was particularly notable in the blurry background, $F(1, 556) = 6.00$, $p = 0.015$, $\eta_p^2 = 0.011$. Female students ($M = 6.19$, $SD = 0.93$) rated the instructor's technology use skills to be stronger than did male students ($M = 5.72$, $SD = 1.00$). Neither the main effect of Zoom backgrounds, $F(3, 556) = 0.74$, $p > 0.05$, $\eta_p^2 = 0.000$, nor the interaction effect, $F(3, 556) = 1.21$, $p > 0.05$, $\eta_p^2 = 0.006$, was found.

For affective learning for an instructor (RQ2), the results found a main effect of student gender, $F(1, 556) = 9.57$, $p = 0.002$, $\eta_p^2 = 0.017$. Female students ($M = 5.89$, $SD = 1.22$) reported more favorable attitudes toward the instructor than did male students ($M = 5.51$, $SD = 1.20$). A Bonferroni test revealed that the differences were particularly notable in two Zoom backgrounds. First, in the university brand background, $F(1, 556) = 4.03$, $p = 0.045$, $\eta_p^2 = 0.007$, female students ($M = 5.97$, $SD = 1.11$) rated the instructor more favorably than male students ($M = 5.50$, $SD = 1.29$). Second, in the office background condition, $F(1, 556) = 8.15$, $p = 0.004$, $\eta_p^2 = 0.014$, female students ($M = 5.89$, $SD = 1.24$) rated the instructor more favorably than did male students ($M = 5.21$, $SD = 1.43$). Neither the main effect of Zoom backgrounds, $F(3, 556) = 1.05$, $p > 0.05$, $\eta_p^2 = 0.006$, nor the interaction effect, $F(3, 556) = 1.04$, $p > 0.05$, $\eta_p^2 = 0.006$, was observed.

For affective learning for the course content (RQ2), there was a significant main effect of student gender, $F(1, 556) = 6.49$, $p = 0.011$, $\eta_p^2 = 0.012$. Female students ($M = 6.26$, $SD = 0.86$) evaluated the course content more positively than male students ($M = 6.04$, $SD = 0.91$). Through a Bonferroni test, a noticeable difference was found in the blurry background, $F(1, 556) = 4.51$, $p = 0.034$, $\eta_p^2 = 0.008$. Female students ($M = 6.44$, $SD = 0.72$) evaluated the course content more positively than male students ($M = 6.06$, $SD = 0.76$). Neither a main effect of Zoom backgrounds, $F(3, 556) = 0.28$, $p > 0.05$, $\eta_p^2 = 0.002$, nor the interaction effect, $F(3, 556) = 0.62$, $p > 0.05$, $\eta_p^2 = 0.003$, was found. For complete statistical information across the conditions, see Table 1.

4 Discussion

This study explored whether the use of Zoom backgrounds that vary in the level of technical skills affect the way that students perceive their instructor's technology use skills and affective learning. Given prior research that found that student and instructor gender predicted

TABLE 1 Main effects of zoom background and student gender (RQs 1 and 2).

IV	DV	Condition	M	SD	F	η_p^2
Zoom background	Affect for instructor	Nature	5.93	0.95	0.07	0.000
		University	5.94	0.93		
		Blurry	6.01	0.98		
		Office	5.93	1.01		
	Affect for content	Nature	5.74	1.20	1.05	0.006
		University	5.81	1.19		
		Blurry	5.84	1.15		
		Office	5.64	1.35		
	Instructor's technology use	Nature	6.18	0.92	0.28	0.002
		University	6.14	0.93		
		Blurry	6.29	0.76		
		Office	6.15	0.88		
Student gender	Affect for instructor	Male	5.80	0.91	6.90**	0.012
		Female	6.03	0.98		
	Affect for content	Male	5.51	1.20	9.57**	0.017
		Female	5.89	1.22		
	Instructor's technology use	Male	6.04	0.91	6.49*	0.012
		Female	6.26	0.86		

** $p < 0.10$, * $p < 0.05$. Two control variables^{ab}: (a) predicted future usage of the content and (b) instructor sex. Effects of control variables^{ab} for instructor's technology use: ^aF (1, 556) = 90.30, $p < 0.001$, $\eta_p^2 = 0.140$; ^bF (1, 556) = 2.53, $p > 0.05$, $\eta_p^2 = 0.0050$. Effects of control variables^{ab} for affect: instructor: ^aF (1, 556) = 107.21, $p < 0.001$, $\eta_p^2 = 0.162$; ^bF (1, 556) = 5.58, $p = 0.019$, $\eta_p^2 = 0.010$. Effects of control variables^{ab} for affect: content: ^aF (1, 556) = 122.73, $p < 0.001$, $\eta_p^2 = 0.181$; ^bF (1, 556) = 1.00, $p > 0.05$, $\eta_p^2 = 0.002$.

how students would judge instructors' use of technology (e.g., Schrodtt and Turman, 2005; Young and Lewis, 2008; Hoogerheide et al., 2016), student gender was also considered as an independent variable in this study. The overall results of the study indicate that while female students tend to judge instructors more highly than male students, there is nuance to the judgments coupled with particular Zoom backgrounds.

The study's findings provide several implications and contributions to instructional communication research and practice. First, female students tend to show higher affect for the course content than males. Post-hoc analysis revealed that the content was rated particularly higher by females than males when the instructor used the blurry Zoom background. Because the Zoom blurry background filter obscures the view of a real background, male students may have been distracted trying to decipher what was being covered by the filter, missing critical information in the lecture.

Unexpectedly, the study did not observe significant differences in how Zoom backgrounds affected students' liking of the instructor. Overall, females had higher affect for the instructor than males. Yet, these sex differences were statistically significant only in the university branded and office backgrounds. It is interesting that male students disliked the background choice that required the most and least amount of technical proficiency from the instructor. This finding partially contradicts previous research that male students tend to prefer high or low displays of technology skills compared to moderate display (Schrodtt and Turman, 2005).

Finally, there was also a statistically significant interaction effect in how Zoom backgrounds and gender affect student judgements of instructors' use of technology. Again, male students in the blurry background condition rated the instructors' technology use skills

more negatively than female students. As such, the blurry background negatively affected both the male students' rating of the content and their judgment of instructor's use of technology. As discussed earlier, the blurry background may have been a distraction to males.

Taken together, the results of this study show that certain Zoom backgrounds can affect the way male and female students perceive their instructor differently. Although female students consistently rated the instructor favorably across Zoom background types, male students reported different ratings based on background types. Among male students, the blurry background resulted in less favorable assessments of the course content and an instructor's technology skills, while the office and university branded conditions resulted in less affect for the instructor. The only background choice rated consistently well by male and female students across variables was the winter background. Prior research on instructor disclosure has found that positive disclosures (e.g., not self-disparaging information) positively related to student learning (Goodboy et al., 2014). It could be that a personal Zoom background acted as a type of instructor self-disclosure that positively impacted learning experiences. Additional research is needed to better understand this finding.

It should also be noted that while students rated both the male and female instructor conditions equally in terms of affect for the content and perceptions of the instructor's technology skills, students had more affect for the male instructor. The instructors were of similar demographics, used the same mannerisms, presented the same script, and spoke at the same rate. Yet, the male instructor was rated as more likeable. This finding echoes work of decades past in which students demonstrated more favorable attitudes towards male instructors (Basow and Silberg, 1987; Patton, 1999; Miller and Chamberlin, 2000).

This finding indicates that instructor gender should be considered as a control variable in student-teacher interaction studies.

As a whole, the present study makes meaningful contributions to the IBM. While the IBM has been continually used in instructional communication research, the scope of the IBM has been somewhat limited (Johnson and LaBelle, 2015; Tatum and Frei, 2018; Kelly et al., 2020). To the authors' knowledge, students' attitudes toward instructors' technology use skills has not been tested under the guidance of the IBM. Considering that students make judgements about how instructors use technology (e.g., Steff-Mabry et al., 2010; Myers and Martin, 2017), testing this variable in this present study helps broaden the scope of the IBM.

4.1 Limitations and future research directions

While the present study reveals interesting findings, it also has limitations. First, although student gender was an independent variable in this study, no participants identified as a third gender. Therefore, this was a study of gender influences that was not inclusive of the perceptions of these students.

Second, this data represents only student responses after initially seeing a lecture by this instructor. Longitudinal data may indicate that students' reactions to Zoom backgrounds change over time, moderated by their other interactions with the instructor. As such, this study can only account for the initial effects of Zoom backgrounds.

Third, all participants in this study were recruited from communication courses. It is possible that students being in the mindset of thinking critically about communication are prone to notice more nuanced aspects of the instructor's communication and the communication setting than students who have never had communication training. As such, this study should be replicated with a more diverse group of learners.

Fourth, all experiments are at risk of the reactive effects of the experimental arrangement limiting the generalizability of findings (Kelly and Westerman, 2024). Because students were aware that they were engaging in a research study at the time of data collection, they may not have responded to the experimental stimuli in the lectures as naturally as they would respond to the same stimuli in their online classroom. Replication of this study with a quasi-experimental design, utilizing students' actual classroom and instructor, would clarify whether the reactive effects of the experiment influenced the findings of this study.

Finally, the results of this study include very standard virtual backgrounds (i.e., a nature scene and a university-branded background). More personalized backgrounds that show more of the instructor's personality (e.g., a photo from a vacation, a photo related to pop culture) may have different effects on students' affective learning. Future research with a variety of uploaded virtual backgrounds is required.

4.2 Conclusion

The findings of this study indicate that instructors' use of Zoom backgrounds influences male students' affective learning

and their attitude toward the instructor's use of technology. Using an uploaded, personal virtual background, results in higher affect for the instructor, course content, and assessment of the instructor's ability to use technology among male students. As such, to cultivate the best impression across students, an uploaded, appropriate, personal virtual background is recommended for online teaching.

Data availability statement

The datasets presented in this article are not readily available because Data can be screen shared with interested parties upon reasonable request per IRB stipulations. Requests to access the datasets should be directed to jihyun.kim@ucf.edu.

Ethics statement

The studies involving humans were approved by University of Central Florida Internal Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

SK: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. JK: Conceptualization, Data curation, Formal analysis, Methodology, Software, Writing – original draft, Writing – review & editing. IB: Writing – original draft, Writing – review & editing. RG: Data curation, Investigation, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

- Arroyo, I., Woolf, B. P., Burelson, W., Muldner, K., Rai, D., and Tai, M. (2014). A multimedia adaptive tutoring system for mathematics that addresses cognition, metacognition and affect. *Int. J. Artif. Intell. Educ.* 24, 387–426. doi: 10.1007/s40593-014-0023-y
- Bailenson, J. N. (2021). Nonverbal overload: a theoretical argument for the causes of zoom fatigue. *Technol. Mind Behav.* 2:30. doi: 10.1037/tmb0000030
- Basow, S. A., and Silberg, N. T. (1987). Student evaluations of college professors: are female and male professors rated differently? *J. Educ. Psychol.* 79, 308–314. doi: 10.1037/0022-0663.79.3.308
- Bolkan, S., and Goodboy, A. K. (2015). Exploratory theoretical tests of the instructor humor–student learning link. *Commun. Educ.* 64, 45–64. doi: 10.1080/03634523.2014.978793
- Chen, S. (2021). Interpersonal communication instruction during COVID-19: challenges and opportunities. *Front. Commun.* 6:652241. doi: 10.3389/fcomm.2021.652241
- Claus, C. J., Girardelli, D., Kelly, S., and Permyakova, T. M. (2021). Cultural changes in instructional practices due to Covid-19. *Front. Commun.* 6:715180. doi: 10.3389/fcomm.2021.715180
- Fauville, G., Luo, M., Muller Queiroz, A. C., Bailenson, J. N., and Hancock, J. (2021). Nonverbal mechanisms predict zoom fatigue and explain why women experience higher levels than men. SSRN Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3820035
- Foutz, B., Violanti, M., Kelly, S., and Prentiss, S. M. (2021). Teacher immediacy behaviors and students' public speaking anxiety: more and less helpful than anticipated. *Basic Commun. Course Annu.* 33, 257–287.
- Garland, M. E., and Violanti, M. T. (2021). Rock my world: Rewind to a better transition to remote learning. *Frontiers in Communication*, 6, 641873. doi: 10.3389/fcomm.2021.641873
- Goodboy, A. K., Carton, S. T., Goldman, Z. W., Gozanski, T. A., Tyler, W. J., and Johnson, N. R. (2014). Discouraging instructional dissent and facilitating students' u0027 learning experiences through instructor self-disclosure. *Southern Communication Journal*, 79, 114–129. doi: 10.1080/1041794X.2013.865256
- Goke, R., Berndt, M., and Rocker, K. (2021). Classroom culture when students are reluctant to learn online: student dissent behaviors explained by their self-efficacy, control of learning, and intrinsic motivation. *Front. Commun.* 6:641956. doi: 10.3389/fcomm.2021.641956
- Hoogerheide, V., Loyens, S. M., and van Gog, T. (2016). Learning from video modeling examples: Does gender matter? *Instr. Sci.* 44, 69–86. doi: 10.1007/s11251-015-9360-y
- Johnson, Z. D., and LaBelle, S. (2015). Examining the role of self-disclosure and connectedness in the process of instructional dissent: a test of the instructional beliefs model. *Commun. Educ.* 64, 154–170. doi: 10.1080/03634523.2014.978800
- Kelly, S., Romero, A., Morrow, J. A., Denton, Z., and Ducking, J. (2020). Instructor misbehaviors and math anxiety. *Communication Reports*, 33, 27–40. doi: 10.1080/08934215.2019.16757
- Kelly, S., Kim, J., Goke, R., and Bryant, K. (2023). Do instructors' choice of virtual background in online classes matter? Effects of personal vs. professional virtual background use on instructor credibility and student learning. *Int. J. Hum. Comput. Interact.*, 1–8. doi: 10.1080/10447318.2023.2263695
- Kelly, S., and Westerman, D. K. (2016). "New technologies and distributed learning systems" in *Handbooks of communication science: Communication and learning*. ed. P. L. Witt, vol. 16 (Berlin, Germany: DeGruyter Mouton), 455–480.
- Kelly, S., and Westerman, D. K. (2024). *A primer in the philosophy of science: a guide to thinking like a scientist for social scientists*. Dubuque, IA: Kendall Hunt.
- LaBelle, S., Martin, M. M., and Weber, K. (2013). Instructional dissent in the college classroom: using the instructional beliefs model as a framework. *Commun. Educ.* 62, 169–190. doi: 10.1080/03634523.2012.759243
- McCroskey, J. C. (1994). "Assessment of affect toward communication and affect toward instruction in communication" in *1994 SCA summer conference proceedings and prepared remarks: Assessing college student competence in speech communication*. eds. S. Morreale and M. Brooks (Annandale, VA: Speech Communication Association).
- McCroskey, J. C., and Richmond, V. P. (1989). "Bipolar scales" in *Measurement of communication behavior*. eds. P. Emmert and L. L. Barker (New York, NY: Longman), 154–167.
- Miller, J., and Chamberlin, M. (2000). Women are teachers, men are professors: a study of student perceptions. *Teach. Sociol.* 28, 283–298. doi: 10.2307/1318580
- Myers, S. A., and Goodboy, A. K. (2015). Reconsidering the conceptualization and operationalization of affective learning. *Commun. Educ.* 64, 493–497. doi: 10.1080/03634523.2015.1058489
- Myers, S. A., and Goodboy, A. K. (2014). Members of COMM 600 (2014). College student learning, motivation, and satisfaction as a function of effective instructor communication behaviors. *South Commun. J.* 79, 14–26. doi: 10.1080/1041794X.2013.815266
- Myers, S. A., and Martin, M. M. (2017). "Instructor credibility" in *Handbook of instructional communication*. eds. M. L. Houser, A. Hosek, V. P. Richmond, J. C. McCroskey and T. P. Mottet (London, UK: Routledge), 38–50.
- Ojeda-Hecht, E., Kelly, S., Goke, R., and Christen, N. (2022). Perceived immediacy and burnout as mediators of instructor misbehaviors and students' task value. *South Commun. J.* 87, 373–385. doi: 10.1080/1041794X.2022.2099567
- Park, C., Kim, D. G., Cho, S., and Han, H. J. (2019). Adoption of multimedia technology for learning and gender difference. *Comput. Hum. Behav.* 92, 288–296. doi: 10.1016/j.chb.2018.11.029
- Patton, T. O. (1999). Ethnicity and gender: an examination of its impact on instructor credibility in the university classroom. *Howard J. Commun.* 10, 123–144. doi: 10.1080/106461799246852
- Schrodt, P., and Turman, P. D. (2005). The impact of instructional technology use, course design, and sex differences on students' initial perceptions of instructor credibility. *Commun. Q.* 53, 177–196. doi: 10.1080/01463370500090399
- Shuell, T. J., and Farber, S. L. (2001). Students' perceptions of technology use in college courses. *J. Educ. Comput. Res.* 24, 119–138. doi: 10.2190/YWPN-H3DP-15LQ-QNK8
- Steff-Mabry, J., Radlick, M., and Doane, W. (2010). Can you hear me now? Student voice: high school & middle school students' perceptions of teachers, ICT and learning. *Int. J. Educ. Dev. Using ICT* 6, 64–82.
- Tatum, N. T., and Frei, S. S. (2018). Applying the instructional beliefs model to training and development research and practice. *Discourse* 4:4.
- Titsworth, S., Mazer, J. P., Goodboy, A. K., Bolkan, S., and Myers, S. A. (2015). Two meta-analyses exploring the relationship between teacher clarity and student learning. *Commun. Educ.* 64, 385–418. doi: 10.1080/03634523.2015.1041998
- Vallade, J. I., Martin, M. M., and Weber, K. (2014). Academic entitlement, grade orientation, and classroom justice as predictors of instructional beliefs and learning outcomes. *Commun. Q.* 62, 497–517. doi: 10.1080/01463373.2014.949386
- Weber, K., Martin, M. M., and Myers, S. A. (2011). The development and testing of the instructional beliefs model. *Commun. Educ.* 60, 51–74. doi: 10.1080/03634523.2010.491122
- Wombacher, K. A., Harris, C. J., Buckner, M. M., Frisby, B., and Limperos, A. M. (2017). The effects of computer-mediated communication anxiety on student perceptions of instructor behaviors, perceived learning, and quiz performance. *Commun. Educ.* 66, 299–312. doi: 10.1080/03634523.2016.1221511
- Young, A., and Lewis, C. W. (2008). Teacher education programmes delivered at a distance: an examination of distance student perceptions. *Teach. Teach. Educ.* 24, 601–609. doi: 10.1016/j.tate.2007.03.003