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# Exploring Student and Instructor Views on the use of Video Cameras in the Online Classroom

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## Abstract

A major barrier to online learning is student non-use of video cameras for online synchronous courses. Using online survey data from 76 undergraduate students (84% female) and 52 instructors (63% female) who have taken or taught online synchronous courses, we explored student and instructor video camera use tendencies and rationales. Quantitative data was analyzed using descriptive statistics and revealed that students typically left their cameras off due to others having their cameras off (70% for large groups, 59% for small groups), appearance concerns (58% for large groups, 45% for small groups), and/or not feeling as though it was important (43% for large groups, 32% for small groups). Conversely, instructors most frequently reported that they always had their cameras on and encouraged students to turn on their cameras. Analysis of the open-ended questions revealed that both students and instructors reported that camera use increased engagement, attention, and connection within the learning environment. Both student and instructor data showed that encouragement was the biggest motivator for camera use. In consideration of these findings, it may be beneficial for instructors to continue encouraging student camera use, as well as reminding them of its benefits for peer connection and engagement.

*Keywords:* online learning; video cameras; undergraduate students; instructors

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# Exploring Student and Instructor Views on the Use of Video Cameras in the Online Classroom

Although e-learning is not a new concept in the education sector, the COVID-19 pandemic has undoubtedly brought a significant transformation to the field of education. It is one that will very likely persist well into the post-pandemic era. The sudden shift to online education brought about a wide array of unforeseen barriers, dilemmas and complications regarding both the technology itself and the effective adaptation of traditional in-person learning into an online format (Alim et al., 2022). Despite the initial challenges, both students and instructors alike were eventually able to reach a commendable level of success in the transition to e-learning and communication (Sederevičiūtė-Pačiauskienė et al., 2022). However, a major barrier frequently discussed both then and now, is student use or non-use of video cameras for online synchronous courses (Meishar-Tal & Forkosh-Baruch, 2022). This was, and continues to be, a common point of frustration for many instructors, as they are often left speaking into the void of avatars or black screens (Castelli & Sarvary, 2021; Belt & Lowenthal, 2022). Considering this phenomenon alongside the increasing prevalence of online education, many researchers have begun to investigate student perceptions of, and reasons for, video camera use or non-use during their online courses (Castelli & Sarvary, 2021; Kushlev & Epstein-Shuman, 2022; Meishar-Tal & Forkosh-Baruch, 2022). However, relatively little research has considered both student and instructor views on video camera use. The purpose of the present study was to expand the current understanding of both student and instructor perceptions, experiences, tendencies, and contextual variables impacting camera use in the online classroom.

## Student Reasons and Perceptions of Camera Use or Non-Use

It is reasonable to assume that technological issues are the largest reason for camera non-use in students; however, a study conducted by Castelli and Sarvary (2021) found that one of the most frequently cited reasons for camera non-use was related to concerns over their appearance. This is a theme that was so recurrent in the literature that some researchers have even begun exploring mirror anxiety and appearance dissatisfaction as a consequence of video conferencing technologies (Ratan et al., 2022). Students had even argued that having their cameras on led them to become preoccupied with their appearance, and consequently, they could not concentrate during online lectures (Meishar-Tal & Forkosh-Baruch, 2022). Having one's camera on can also create the feeling of being watched or judged by others, which has

been seen to invoke feelings of anxiety for some students (Tien et al., 2023). Another frequently provided reason for non-camera use, and one that has been discussed and explored beyond the boundaries of the education field, is feeling fatigued (Karl et al., 2022). A recent study conducted by Rajab and Soheib (2021) discovered that approximately 50% of the students they surveyed reported experiencing Zoom fatigue as a significant challenge when using cameras during online sessions. Similarly, Oducado et al. (2021) found that 47% of students in their study reported high levels of fatigue related to video conferencing. Concerns about privacy violations were also a prevalent theme in the literature. This can refer to privacy concerns for the students themselves, or their housemates and/or family members whom they share spaces with. Additionally, there were concerns about the appropriateness of their environment and the potential for it to be distracting to fellow students or their instructors (Castelli & Sarvary, 2021; Meishar-Tal & Forkosh-Baruch, 2022; Rajab & Soheib, 2021). Other common reasons provided by students include camera non-use being the norm amongst peers in online classes, being distracted or unable to concentrate, general discomfort, or being away from the screen (Alencar et al., 2023; Alim et al., 2022; Castelli & Sarvary, 2021; Karl et al., 2022). The literature highlights a myriad of psychological, social, and environmental factors that can contribute to non- camera use for students in an online classroom.

Despite the multitude of reasons students give for not using their cameras during online classes, research suggests that having cameras on during online classes increases student engagement (Kushlev & Epstein-Shuman, 2022). This is a crucial factor to effective learning in the online environment (Weiser et al., 2018). Consequently, studies have begun to explore what students believe about how camera use or non-use may affect their online education, such as how it can impact the quality of their educational experience, their grades, or the connections they form within the classroom (Sederevičiūtė-Pačiauskienė et al., 2022). Sederevičiūtė-Pačiauskienė and colleagues (2022) conducted an in-depth exploration of student perceptions of video camera use and identified four overarching themes related to the use of cameras and how they view it impacting their learning and studies: (a) enhancing one's learning, (b) accountability, (c) fostering a sense of community, and (d) facilitating cooperation and communication. Some of these findings, namely that of communication and accountability, have also been noted by others (Alim et al., 2022; Karl et al., 2022).

**Instructors Perceptions and Reasons for Camera Use or Non-Use**

The vast majority of research on video camera use in online synchronous courses has focused on students' reasons and perceptions of camera utilization; however, there is a limited amount of research exploring the viewpoint of instructors. Mpungose (2021) conducted a study exploring faculty perspectives on using video conferencing technology for e-learning and found that instructors often experienced boredom or frustration, and that many reported that it had been difficult to foster a sense of connection with their students. This study had been conducted at the time of the pandemic. As such, instructors mentioned feeling concerned when students showed up to class looking exhausted or that some did not have adequate access to the necessary resources. Another study exploring instructor perceptions of synchronous e-learning was conducted by Belt and Lowenthal (2022). Similar to the study by Mpungose (2021), the focus was not exclusively on perceptions of video camera use. They found that some instructors felt their students were disengaged from course content when they chose to leave their cameras off, and that it was difficult when they had to teach to nothing but black screens and avatars; however, this is not to say that the use of video cameras did not have its drawbacks. Participants also made complaints about the small thumbnails, delays in the video feed, and distracting backgrounds (Belt & Lowenthal, 2022). Although the general consensus among instructors seems to be that the benefits of real-time communication outweigh the drawbacks, the formatting, features, and technical issues that come with video conferencing technologies can be disrupting and even overwhelming at times (Belt & Lowenthal, 2022).

**Media Naturalness Theory**

Developed by Kock (2005), media naturalness theory (MNT) is rooted in evolutionary psychology and suggests that humans have been biologically designed to communicate in certain ways and contexts. This typically involves being in a co-located and synchronous context, as it better enables us to take in all variables involved in our communication with another individual (i.e., seeing others facial expressions and body language, environmental stimuli, etc.). Being hardwired for communication in this specific manner, other modes of communication may be less “natural” to us depending on how similar it is to face-to-face communication. The more dissimilar and the fewer qualities of face-to-face communication that are retained, the less natural it feels to us and the more strain it puts on the brain (Houser et al., 2007). As the naturalness of a communication medium decreases, it impacts communication by

increasing cognitive effort and message ambiguity, while decreasing the physiological response. With video conferencing platforms, some elements of natural communication, such as body language or physical proximity, can be absent or partially obscured due to formatting (Riedl, 2022). MNT then suggests that additional cognitive demand is placed upon the brain as it tries to fill in the gaps, potentially impacting communication efficiency (Kock, 2005). Additionally, message ambiguity in e- communication may arise as the brain tries to compensate for the missing cues using past knowledge and schemas, which individually vary, and thus lead to varying interpretations between the message sender and receiver (Kock, 2005). Another key aspect of communication is the physiological response that occurs, and it is postulated that people adapted physiological responses to communication to serve as a motivator to encourage participation in interpersonal exchanges. Kock (2005) then suggests that when communication channels lack essential elements of natural communication, we see a decreased physiological response in the body and a diminished sense of engagement during interactions. By applying the principles of MNT to video camera use in the online classroom, we may gain valuable insights into the underlying reasons and actions that influence individuals' decisions for using or not using cameras during online synchronous courses.

***Media Naturalness and Video Cameras***

There are numerous features of video conferencing software that, although may help to increase its similarity to that of face-to-face interactions, are still quite different and unnatural. The clearest distinction between these communication methods is the degree of physical and social presence. Sensing others' physical presence will, without a doubt, be absent through computer- mediated communications, as there is a lack of physical nearness. Conversely, social presence entails how individuals express themselves socially and emotionally, and how others then perceive these communication patterns and attribute them to another intelligent being (Kreijns et al., 2014). Unlike physical presence, social presence can be facilitated through e-platforms, although to varying degrees depending on the features employed (i.e. camera use, microphones, or only the chat function; Alencar et al., 2023). Riedl (2022) demonstrated that although certain qualities of face-to-face interaction can be preserved online, issues like buffering and camera limitations can significantly impact the effectiveness and naturalness of communication. In essence, the limited perceptions offered by video conferencing platforms contribute to communication gaps, resulting in greater message ambiguity and requiring

heightened cognitive efforts to compensate (Riedl, 2022).

The panel displaying conference participants is yet another unnatural feature of video communications. These panels typically show all participants in small boxes, with faces of varying proximities to the screen, which has been reported as unhelpful in large class sizes because limited non- verbal communication can be observed (Belt & Lowenthal, 2022). The abundance of faces and eyes seemingly staring at a user can also feel unnerving, increasing arousal and stress (Riedl, 2022). Additionally, unlike face-to-face interaction, online spaces often lack the ability to establish appropriate levels of personal space and intimacy, leaving users stuck staring at numerous up-close thumbnails of faces on their screen. This inability to maintain appropriate proximity to others, as well as the convoluted screen of faces may feel mildly distressing and consequently increase arousal (Riedl, 2022).

Furthermore, the default self-viewing feature is extremely unnatural as we seldom see ourselves in social environments interacting with those around us. This, coupled with that feeling of being watched or stared at, may increase self-awareness of one's own face and lead to heightened patterns of self-monitoring to manage one's self-presentation (Tien et al., 2023). This is in accordance with Erving Goffman's self-presentation theory. This theory posits that people wish to present themselves to others in a particular light and will modify their behaviours and actions to fit what they believe others want or expect from them (Taber et al., 2022). It may be expected that this type of behaviour increases as self- awareness is heightened when video cameras are turned on. This is a process that Shockley and colleagues (2021) described as cognitively taxing due to the mental efforts that go into creating and maintaining a certain image, while also monitoring the events of the video conference.

This increased self-awareness of one's face and social appearances on camera may also lead to what is known as mirror anxiety. This occurs when individuals become self-critical and fixated on their appearances when viewing their own live feed, which consequently impacts their ability to listen and pay attention (Kushlev & Epstein-Shuman, 2022; Meishar-Tal & Forkosh-Baruch, 2022; Sumner, 2022). The effects of self-viewing and mirror anxiety on video conferencing fatigue have been reflected in research findings, in which self-viewing has been seen to cause some level of fatigue due to the negative self-focused attention and it has also led to reduced test performance because of the appearance anxiety induced by self-viewing (Ratan et al., 2022; Tien et al., 2023).

Overall, this study aims to extend the currently available literature exploring student preferences and rationales for video camera use or non-use in the online synchronous classroom. It will also add to the limited literature available exploring instructors' experiences, preferences and rationales for video camera use in their online learning spaces. Findings will be analyzed and interpreted through the lens of the media naturalness theory and other related phenomena.

## Method

We used a mixed methods survey design to conduct our research as it was focused on exploring and better understanding student and instructor perceptions of camera use in the online classroom. Data was gathered using an online survey created in Qualtrics. The surveys consisted of both open and close-ended question using multi-selection and Likert scales.

### Participants

After receiving ethical approval, we recruited 80 undergraduate students through our university's psychology research pool SONA. The only inclusion criteria were that students participating in the study must have taken at least one online course during their studies. Three students were excluded for excessive missing data (i.e. leaving the entire survey blank) and one for requesting their data not be included, leaving a final sample size of 76 participants. The mean age of the sample was 22.3 years ($SD$ = 4.23), with 64 (84%) participants identifying as female, 11 (15%) as male, and 1 (1%) as non- binary or third gender. The year of study distribution included 27 (36%) in their first year, 22 (29%) in their second year, 15 (20%) in their third year, and 11 (15%) in their fourth year of study. Most students were majoring in psychology (53%), general studies (22%) or business (20%) and the sample was predominantly South Asian (50%), Southeast Asian (16%) and White/European (15%).

Instructors were recruited via emails sent out through our university's list-serve and snowball sampling. A total of 63 instructors responded to the survey; however, 11 responses were removed for excessive missing data (i.e. leaving the whole survey blank), resulting in a final sample of 52. Similar to students, instructors must have taught at least one online course to participate in the study. The instructor sample had an average age of 48.54 years ($SD$ = 10.22) and consisted of 32 women (63%), 13 men (25%) and 2 as third-gender (4%). Five participants did not indicate their gender (10%). The sample was predominantly White ($n$ = 37; 71%), followed by bi/multiracial ($n$ = 3; 6%), then West Asian ($n$ = 2; 4%). Seven participants did not

indicate their ethnicity. Instructors taught in a variety of departments, with psychology ($n$ = 12; 23%), and business ($n$ = 8; 15%), being the most common. Thirteen instructors (25%) did not indicate their department. The sample was varied in how long they had been teaching: 11 for 1-4 years (21%), 14 for 5-9 years (27%), 2 for 10-14 years (6%), 19 for 15 or more (37%), and 5 who did not respond (10%).

**Survey**

Two separate surveys were created for the student and instructor samples aimed at exploring perceptions of video camera use in a virtual classroom. The student survey consisted of five closed questions and three open-ended questions targeting reasons for leaving one's camera off, situations for when cameras should be turned on, and the importance of using one's camera. The instructor survey consisted of four closed questions and four open-ended questions targeting reasons for leaving one's camera off, camera use among students, and the importance of using cameras by instructors and students. Some sample questions from each survey include: (1) If you have ever left your camera off during class/a live session, why did you leave it off? Select all that apply; (2) What is the significance of using your camera/students using their cameras during an online session; and (3) have there been differences in your camera use/students' camera use between COVID-19 and now. Both surveys also had a set of demographic questions such as on age, gender, and ethnicity. The surveys were created by blending the designs of both Sederevičiūtė-Pačiauskienė and colleagues (2022) and Castelli and Sarvary (2021), while also incorporating survey items adapted from Alencar and colleagues (2023) and Meishar- Tal and Forkosh-Baruch (2022).

**Procedure**

After receiving ethical approval, we collected data anonymously and online via Qualtrics in 2023. Participants were required to provide electronic consent before being given access to the survey, which was approximated to take 10 minutes. Students received 0.5% bonus credit for this participation; faculty did not receive any compensation.

## Results

**Student Data**

We used descriptive statistics to analyze the data and look for patterns in the responses to the close-ended questions. Table 1 presents a summary of reasons selected by students for why they have left their cameras off in both large (i.e. the whole class) and small group (i.e. breakout

rooms) settings. As seen in Table 1, for both settings, the three most common reasons provided were: (1) everyone else had their cameras off, (2) concerns over their appearance, and (3) that they did not feel using their camera was important. Table 2 presents reasons for when students are more likely to turn their camera on, with the most common response being if other students have their camera on. Table 3 presents the percentage of peers who typically turn on their cameras during class. When asked whether they were becoming more comfortable with turning on their camera, most students neither agreed nor disagreed with the sentiment (*n*=31; 41%); however, about a third of students did agree/strongly agree (*n*=19; 25%), while a quarter of them disagreed/strongly disagreed (*n*=19; 25%). Finally, when asked about their preferred method of communication in online classes, 46% chose the chat box, followed by 43% picking audio, and 11% preferring video.

The three open-ended survey questions were analyzed by grouping responses into common themes and counting the number of times each of them was mentioned. Table 4 provides the summary of these themes for each question. Overall, video camera use contributes most to levels of engagement and attention. Students report that when their cameras are on, they are forced to pay more attention which leads to better engagement in the course. When students do not turn their cameras on, they acknowledge that it is more difficult to pay attention, and they are more likely to be distracted by other things in their environment. As summed up by two of the participants: Having your camera on during online learning promotes active participation, visual cues, and a more interactive learning environment, while having it off may create a more passive experience and hinder social engagement. When it is off, I tend to get distracted and do other things like other assignments or online shopping.

**Instructor Data**

Table 5 presents a summary of reasons given by instructors for why they have left their cameras off when teaching a synchronous class session. Nearly half of the sample reported always having their cameras on when inquired in a close-ended question. Amongst the remaining sample, the three most common reasons for not turning on one's camera were: (1) it was not necessary while screen sharing, (2) having a weak internet connection, and (3) concerns over their appearance

When asked if they require, or encourage their students to turn on their camera using a close- ended question, the majority (*n* = 30; 59%) indicated that they 'encourage it, but do not

require it', followed by 'I leave it optional for students' (*n* = 18; 35%), then 'Yes, I require it' (*n* = 3; 6%). Nobody selected the options for 'I encourage students not to turn on their cameras' nor 'I require students not to turn on their cameras'. When asked to explain why they selected this response in an open-ended question, 37 instructors provided a reason for their rating. For those who do encourage camera use, the most common reasons were for better classroom engagement (*n* = 10; 27%); fostering connection with, and between, students (*n* = 5; 14%); and for taking attendance (*n* = 4; 11%). For those who do not encourage camera use, the most common reasons were for student privacy (*n* = 6; 16%), and concerns about students being uncomfortable or self-conscious (*n* = 6; 16%). Others provided reasons that included it being students' choice to turn on their camera (*n* = 4; 11%), and bandwidth concerns (*n* = 3; 8%).

Similar to rates reported by students, the majority of instructors reported that 'none to very few students' tend to turn their cameras on (see Table 3). While students had a fairly neutral perception on their increased comfortability with having cameras on as they take more online courses, many faculty's Likert scale responses showed disagreement in that students seem more comfortable with turning on their cameras (n = 40; 77%). Only 5 instructors (10%) agreed that students seem more likely to have their cameras on as familiarity with online courses increases. The remaining 14% were neutral. Finally, when asked which format(s) they prefer to teach in, 32 (67%) selected in-person, 18 (38%) selected blended, 14 (29%) selected synchronous, and 11 (23%) selected asynchronous.

The three open-ended survey questions for instructors were also analyzed by grouping responses into common themes and counting the number of times each of them was mentioned. Table 6 provides a summary of these themes for each question. Overall, video camera use contributes most to levels of engagement, improved understanding in the communication of course content, and the building of connections between those in the learning environment. Example comments from instructors include:It allows me to see the uptake of ideas (oh how important that one head nodder is even in person!). It provides me with motivation and energy as opposed to feeling like I'm just talking into the void. I have no idea who most of my students actually are, aside from their names, when cameras are off. Those who have them on build a stronger relationship with me, demonstrate leadership and generally do the best in the class

## Discussion

Despite research showing social and academic benefits of video camera use (Kushlev & Epstein- Shuman, 2022; Sederevičiūtė-Pačiauskienė et al., 2022), students tend to abstain from turning on their cameras in their online synchronous courses. Research has begun to explore reasons for camera non- use among students (e.g., Castelli & Sarvary, 2021; Ratan et al., 2022), but few studies have incorporated instructors' views on video camera use in their classrooms. In this study, we explored both student and instructor preferences for, and experiences with, video camera use in online synchronous courses.

We found that peer influence, appearance and perceived unimportance have the largest impact on students' decision to use or not use cameras in the online classroom. This was identified for both large and small group settings. Peer influence was of particular importance, as it was also frequently cited as a motivating factor to turn cameras on. Findings from Castelli and Sarvary (2021), as well as those of Alim (2022) and Meishar-Tal and colleagues (2022), reflect similar findings in which social norms, insecurities, and perceived unimportance are all cited as reasons for non-camera use among students. Additionally, despite increased familiarity with taking online classes, the majority of students in our study did not feel more comfortable using cameras, and many preferred using the chat box to communicate during instructional time. This is similar to Alencar and colleagues (2023), in which students had a slightly below average rating regarding comfortability with camera use.

Although students were most likely to keep their cameras off, many did acknowledge its importance in promoting focus and engagement while simultaneously preventing distraction. Media naturalness (Kock, 2005) may be used to explain or understand these findings. Students frequently reported appearance concerns as well as visual distraction as reasons for non-camera use. The feeling of having so many eyes seemingly staring, coupled with the self-view feature that is often the default upon opening most platforms may be overwhelming for students. This experience of feeling watched in conjunction with the self-viewing may lead to increased cognitive demand due to energy being focused on self-monitoring, as well as an increased physiological response due to potential appearance anxiety.

Having cameras on also often allows us to see the background of the many other participants, and this visual distraction may also lead students to feel cognitively overwhelmed. On the flip side of this, however, having cameras on may also help students feel more engaged

in their course content, as its similarity to in-person courses is increased when we have additional visual and auditory cues during communications.

Unlike our student sample, instructors most often report using their cameras, although a fair proportion cited irrelevance during screensharing or poor internet connection as reasons for non-use. The in-person or blended formats are most preferred by instructors, and many feel that cameras are particularly valuable for increasing student engagement, as well as for fostering relationships among students and between students and the instructor. Relatedly, instructors in the study conducted by Mpongose (2021) reported that they felt less connected to their students and that it was difficult to engage students when running online courses when they did not use their video cameras. The difficulties in creating social connection and student engagement through such virtual spaces may be understood through MNT (Kock, 2005). The inability to see (and potentially hear) increases cognitive efforts and message ambiguity, and instructors are left guessing whether students are focusing on course content, understand the course content, or are even actually present in the online classroom. Furthermore, the physiological response is likely decreased when viewing each other only as black boxes, making it challenging to connect the text or voice to an individual student or peer, thus making it more difficult to foster relationships.

Although students and instructors reported different tendencies in camera utilization and student comfortability with camera use, there are some items they did perceive similarly. Both samples regarded cameras as being significant for engagement and social connectedness. Feeling engaged in the classroom is vital for promoting learning and personal development (Kuh, 2003). When students are engaged, it is considered a sign of successful classroom instruction (Fletcher, 2007) and institutional excellence (Axelson & Flick, 2010). However, engagement within the online environment is much challenging to achieve compared to the in-person environment (Belt & Lowenthal, 2022). Our results indicate that using one's video camera is one way to help increase engagement among students in this environment. Social connection can also help with increased engagement (Yamrali et al., 2023). Research has demonstrated that peers play an important role in the learning environment and can provide one another with both learning support (e.g., asking questions of one another, working together) and social support (e.g., developing friendship and sharing concerns; Mann et al., in press). Furthermore, the development of peer rapport is also associated with increased connection

(Dwyer et al., 2004; Sollitto et al., 2013), participation (Frisby & Martin, 2010; Sidelinger & Frisby, 2019), self-regulation (Räisänen et al., 2021), and academic achievement (Goguen et al., 2010). Being unable to connect with one's peers can increase one's likelihood to drop out (Angelino et al., 2007) and to feel lonely (Kaufmann & Vallade, 2022). These results may be used to help find or develop strategies to either encourage students to utilize their cameras or find alternative ways of keeping them engaged in their coursework during online learning.

### Limitations

Some limitations of this study that should be considered when assessing the generalizability of the results are that the sample is based upon a singular Canadian institution and thus may not be reflective of student and instructor perceptions across different institutions or countries. Furthermore, both student and instructor samples were predominantly female, with most students studying psychology and most instructors identifying as ethnically Caucasian/White. The sample size for both groups were also fairly small, particularly for instructors, and a larger sample size may yield more generalizable results. Finally, the limit of self-report data should warrant careful consideration, as self- reported behaviour may not necessarily equate to their true online behaviour.

## Conclusion

From these results, we can better understand the factors at play in both students' and instructors' decision to use or not use their video cameras for online courses. It has also added to the limited data available on instructor perspectives, providing insight into both their own reasoning and tendencies. Additionally, it considers their observations of students' behaviours and how it affects the learning environment.

Overall, both students and instructors alike have reasons for not utilizing video cameras in the online classroom, however, being that both groups have acknowledged its value in fostering engagement with course content as well as social connection, we recommend that camera use continue to be optional but strongly encouraged by instructors, particularly for small group discussions. Instructors may consider having flexible camera policies, such as having designated camera moments during class discussions or group work. Discussing ways to mitigate student concerns of camera use may also be of value, such as disabling or minimizing the self-view function, so they are less focused on their appearances. Incorporating additional methods for keeping up student engagement, such as the use of the chat-box, polls, or reaction

tools, is another valuable strategy that can be used by instructors to keep students involved and focused without the use of cameras. Our findings can be used by instructors to help navigate how to best encourage students to utilize their video cameras, while also acknowledging concerns over camera usage. By explaining the value of camera use in the online classroom to students, it may provide them with a stronger incentive to use their cameras. Additionally, being flexible with camera use or using alternative methods for engagement may also help foster a well-connected and positive online learning experience for students.

# Tables

**Table 1**

*Descriptive Statistics for Reasons Why Students Turn Off their Video Cameras During a Synchronous Class*

| | Large Groups | | Small Groups | |
|---|---|---|---|---|
| Reason | *n* | % | *n* | % |
| Everyone else had their camera off | 53 | 70 | 50 | 59 |
| I was concerned about my appearance | 44 | 58 | 34 | 45 |
| I didn't feel like it was important | 33 | 43 | 24 | 32 |
| I didn't want to be seen walking away from my computer | 31 | 41 | 13 | 17 |
| I didn't want to be seen not paying attention | 30 | 40 | 15 | 20 |
| I was concerned about people being seen behind me | 25 | 33 | 20 | 22 |
| I felt more able to engage with the material | 23 | 30 | 16 | 21 |
| I felt like everyone was looking at me the whole time | 18 | 24 | 22 | 29 |
| My internet connection was weak | 16 | 21 | 10 | 13 |
| I was concerned about my physical location being seen behind me | 16 | 21 | 13 | 17 |
| I didn't want to be seen doing other things on my computer | 14 | 18 | 13 | 17 |
| I was concerned about distracting my classmates | 7 | 11 | 7 | 9 |
| I was concerned about distracting my instructor | 5 | 7 | 2 | 23 |
| My webcam was not working | 3 | 3.9 | 6 | 6.7 |
| I always had my camera on | 0 | 0 | 5 | .6 |

**Table 2**

*Descriptive Statistics for When Students Felt their Camera Should be Turned on*

| Reason | *n* | *%* |
|---|---|---|
| If other students in the class have their camera on | 40 | 53 |
| During small group activities/breakout rooms | 27 | 36 |
| When I am speaking | 25 | 32 |
| When the class size is small | 19 | 25 |
| During class discussions | 16 | 21 |
| I don’t think it's ever necessary | 15 | 20 |
| While my instructor talks without screensharing | 7 | 9 |
| If it is requested by the professor* | 2 | 3 |
| If it is mandatory* | 1 | 1 |
| It should be the standard to turn it on* | 1 | 1 |

* Reasons were provided as an ‘other’ response.

**Table 3**

*Percentage of Students who Turn on their Cameras During a Synchronous Online Class as Reported by Faculty and Students*

| | Student | | Faculty | |
|---|---|---|---|---|
| | *n* | *%* | *n* | *%* |
| None to very few students | 50 | 66 | 40 | 78 |
| About a quarter of students | 15 | 20 | 6 | 12 |
| About half of the students | 5 | 1 | 1 | 2 |
| About three-quarters | 1 | 1 | 0 | 0 |
| All or nearly all of the students | 5 | 6.6 | 4 | 8 |

**Table 4**

*Summary of Student Responses to the Three Open-Ended Survey Questions*

| Significance of using a video camera during online learning ($n$ = 70) | | Differences between having a camera on or off ($n$= 66) | | When students are most likely to turn on their camera ($n$ = 70) | |
|---|---|---|---|---|---|
| *Response* | *n (%)* | *Response* | *n (%)* | *Response* | *n (%)* |
| Increases engagement and paying attention | 41 (59%) | Levels of engagement and attention | 37 (56%) | If the instructor asks | 17 (24%) |
| Increases peer connections | 13 (19%) | Levels of comfort in participating | 13 (20%) | If peers turn on their cameras | 16 (23%) |
| Puts a face to a name | 9 (13%) | Visual distractions in self and others | 9 (14%) | When talking in small groups | 15 (21%) |
| Feels more like a real classroom | 8 (11%) | There is no difference | 9 (14%) | If the instructor requires it | 14 (20%) |
| Encourages students to be more confident | 4 (6%) | Being able to see peers | 4 (6%) | If speaking during the class | 10 (14%) |
| Provides non-verbal cues | 4 (6%) | | | For presentations and oral exams | 9 (13%) |
| There is no significance | 4 (6%) | | | | |

*Note.* Instructors provided answers in more than one category. Only categories with four or more responses are shown.

**Table 5**

*Descriptive Statistics for Reasons Why Faculty Turn Off their Video Cameras During a Synchronous Class*

| Reason | *n* | *%* |
|---|---|---|
| I always had my camera on | 25 | 48 |
| I did not feel like it was important as I was screen sharing | 10 | 19 |
| My internet connection was weak | 9 | 17 |
| I was concerned about appearance | 6 | 12 |
| The students all had their cameras off | 4 | 8 |
| We were on a break* | 4 | 8 |
| I was concerned about distracting my students | 3 | 6 |
| My camera was not working | 3 | 6 |
| I was concerned about people being seen behind me | 2 | 4 |
| I was concerned about my physical location being seen behind me | 2 | 4 |
| When students were in breakout rooms or doing a group activity* | 2 | 4 |
| I felt like everyone was looking at me the whole time | 1 | 2 |
| I was not feeling well* | 1 | 2 |
| I did not want to be recorded* | 1 | 2 |

* Reason was provided as an ‘other’ response.

**Table 6**

*Summary of Instructor Responses to the Three Open-Ended Survey Questions*

| Significance of instructor using their video camera ($n$ = 51) | | Significance of students using their video camera ($n$ = 51) | | Difference between students who do and do not have a video camera on ($n$ = 45) | |
|---|---|---|---|---|---|
| *Response* | *n (%)* | *Response* | *n (%)* | *Response* | *n (%)* |
| Improve communication/using non-verbal communications | 21 (41%) | Builds connection with instructor and peers | 27 (53%) | Levels of engagement | 27 (60%) |
| Build community/ connections with students | 19 (37%) | Greater engagement and levels of attention | 25 (49%) | Knowing who students are/level of connection | 9 (20%) |
| To be seen as a "real person" | 17 (33%) | Can gauge student understanding | 10 (20%) | Not feeling like one is "talking into the void" | 7 (16%) |
| Improve engagement | 13 (25%) | It is not significant | 4 (8%) | Level of student understanding | 6 (13%) |
| Better mimic the in-person class experience | 3 (6%) | | | Impact on instructor motivation | 5 (11%) |

*Note.* Instructors provided answers in more than one category. Only categories with three or more responses are shown.

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