Student Webcam Behaviors and Beliefs: Emergent Norms, Student Performance, and Cultural Differences

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Abstract
This study presents findings from a survey of 2298 university students from three countries (South Korea, Turkey, United States) focused on their use of and beliefs about webcams to support synchronous learning, including behaviors such as turning cameras on and multitasking. Additionally, it explores differences due to national culture, school achievement, and classroom seating preferences. As expected, findings show synchronous learning use increased during the pandemic. Student preferences for passive viewing behaviors are strong, along with preferences for keeping cameras off. Differences based on classroom seating preferences suggest that students who sit at the front are more likely than their peers to make decisions about webcam use based on involvement, attention, and preparedness. Cultural differences suggest different pedagogical expectations. Multitasking proved to be a complex behavior and is not always linked to poor achievement outcomes. This study has implications both for future research directions on synchronous learning, student webcam practices, and achievement and for how instructors design synchronous classes.

Keywords: higher education, norms, online learning, synchronous learning, webcam

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Students have learned via synchronous video for more than two decades, but in many ways the learning medium was not heavily adopted in university settings until the beginning of 2020. One might argue that as an educational technology, adoption of synchronous video had not progressed beyond the early majority state in Rogers' (2003) Diffusion of Innovation model. Early adopters established a few norms for synchronous learning (SL), such as keeping one's microphone muted when not speaking and raising one's virtual hand to be called on (Suggs et al., 2010). However, there are many areas where norms have yet to be fully established, which was evident when instructors and students rapidly shifted to remote learning during the COVID-19 pandemic. One of these areas is the use of webcams. In this study, college students in three countries (South Korea, Turkey, United States) were surveyed to learn how they approached participation and webcam use in their synchronous courses during the first year of the COVID-19 pandemic. These self-reported SL behaviors are examined in light of similar face-to-face behaviors and grade point average to see if norms or common expectations emerged. Additionally, student behaviors are compared across the three countries to explore whether SL and webcam behaviors are universal or reflect different cultural expectations.

Literature Review

The earliest versions of video-based SL involved clusters of students at videoconference centers with some students perhaps co-located with their instructor (e.g., Goodfellow et al., 1996; Lawrence, 1995). Videoconferencing was expensive at this time, and not an activity one could engage in from their office or their home. After an initial period of intrigue, videoconferencing languished for a period, during which time learning management systems with asynchronous discussion tools rapidly proliferated. Learners took advantage of the opportunity to learn at home or while traveling thanks to continuous improvements in broadband and Wi-Fi along with widespread adoption of laptops, tablets, and smartphones, and asynchronous courses became the most common form of online learning. These ongoing technological developments also increased the potential for students to learn via synchronous video: webcams became a standard feature of laptops and smartphones; internet speeds increased, and streaming video services became common; and tools like Skype, FaceTime and Zoom were popularized for other purposes. During this time, even as some people were using this technology, few were researching it. In a systematic review of studies published between 1995 and 2018, Al-Samarraie (2019) found 335 articles on the topic of videoconference-based learning, but only 31 were empirical studies.

The COVID-19 pandemic was the catalyst for an atypical moment in educational technology adoption. Usually adoption occurs slowly, with social capital serving as a major driving force (Rogers, 2003). However, from spring 2020 through spring 2021, many brick-and-mortar higher education institutions changed their approach to learning out of necessity. This quick transition from physical classrooms to video-based ones, termed emergency remote teaching (ERT; Hodges et al., 2020) to maintain a distinction between this temporary solution and more typical and thoughtfully designed online learning courses for learners and instructors who opt in under normal conditions, resulted in unprecedented adoption levels for synchronous video-based learning.

The rationale for using synchronous video as an approach to ERT reflects a variety of beliefs and conveniences. First is the belief that learners who had previously chosen to learn in face-to-face classrooms would prefer synchronous over asynchronous learning. This belief reflects two assumptions: that synchronous learning requires less autonomy than asynchronous (Beyth-Marom et al., 2005), and that students enrolled in campus-based programs are not

expecting autonomous learning experiences. Second, instructors were encouraged to use synchronous tools during ERT under the assumption that preparation would be simpler (Hodges & Barbour, 2021). In other words, instructors who had planned to lecture in a classroom could simply replicate the lecture over a video connection, and real-time instructor-facilitated discussions would also be possible. However, the reality was a bit more complicated, and both instructors and students found themselves struggling to connect with students and function without established learning norms.

Why Webcams Matter

Webcams play an important part in synchronous learning experiences because they help decrease perceptions of transactional distance. Transactional distance is the subjective perception of the between instructors and learners in distance education. The three variables contributing to transactional distance are dialogue, structure, and learner autonomy, each of which contributes to how a person experiences not just a geographical, but also a psychological and communications gulf when learner partners are not co-located (Moore, 1993). Moore points out that different media directly affect transactional distance through the dialogue variable, determining the frequency, nature, and quality of communication across learning transactions.

In a synchronous class, transactional distance can be lessened by having webcams turned on, allowing participants to see each other's facial expressions and, when the audio channel is enabled and used, hear each other's voices in real time. Both audio and video channels have been found to be among the factors that help students and instructors with relationship development and communication in online courses (Falloon, 2011; Lowenthal et al., 2021). In a comparison study, there were no significant differences in achievement, community, or satisfaction between students in an asynchronous-only group and those with a synchronous component (Olson & McCracken, 2015). However, the synchronous group was limited to text chat interactions. In other studies, both asynchronous video (Lowenthal & Moore, 2020) and synchronous video (Angelone et al., 2020) were found to help increase perceptions of presence, Additionally, when transactional distance decreases, student satisfaction has been found to increase (Gavrilis et al., 2020). As a result, minimizing transactional distance via webcam use may be a worthwhile practice in synchronous courses.

Synchronous Learning Norms and Behaviors

Although webcam use is an appropriate way to reduce transactional distance and increase presence, it is not yet established as a norm in synchronous learning settings. By the time students enter the university setting, they typically have a strong sense of acceptable classroom behaviors. However, when the learning context or modality changes, existing norms must be reconsidered (Zydney et al., 2020). Although some norms may carry over from the prior learning environment, others may change. New technologies or learning expectations may bring about the need for entirely new norms. Instructors are typically considered in charge of learning environments and tasked with articulating and upholding these behavioral expectations, but in the absence of strong instructor leadership, students will work collaboratively to shape learning norms (Hod & Ben-Zvi, 2015).

In the context of SL, norms and practices surrounding webcam use, especially by students, have been a matter of debate. Within this debate, among the topics that are raised are how webcam use may affect student participation, student comfort, and student multitasking.

Webcams and Student Participation

The relationship between webcam use and student participation has not been heavily researched. In some settings camera use has been associated with attendance in SL (Marquart & Russell, 2020) and webcams are also commonly used as a proctoring tool (Daffin Jr. & Jones, 2018). Essentially, the role webcams are believed to play in participation relates to accountability. However, in another study their use was not related to student motivation (Giesbers et al., 2013). In a survey conducted in a large class, some students reported that keeping webcams off felt like a norm that had been established (Castelli & Sarvary, 2021), suggesting that other forces may influence webcam choices. However, instructors may not support this norm. A survey of instructors found that when student webcams were turned off, instructors had greater difficulty gauging student understanding (Gavrilis et al., 2020; Lowenthal et al., 2021), although another study suggested that some students are unaware that turning their webcams on serves a function like providing feedback to instructors (Yarmand et al., 2021).

Webcams and Student Comfort

Mandatory webcam use has been a topic of debate among instructors, noting that camera use may lead to a tradeoff between perceptions of presence and transactional distance, which are increased when cameras are turned on, and student comfort, which may decrease when cameras are turned on. Instructors may feel sensitive to this issue because they are prone to experiencing discomfort themselves when in front of the camera (Borup & Evmenova, 2019). Students have reported that concerns about their setting or appearance have led them to keep their cameras off (Castelli & Sarvary, 2021; Yarmand et al., 2021). Webcams not only raise issues of privacy (Castelli & Sarvary, 2021; Rajab & Soheib, 2021)—a concern shared with other modes of online learning (Tu, 2002)—but also of equity (Day & Verbiest, 2021). During the COVID-19 pandemic, instructors observed how mandatory webcam use exposes the socioeconomic inequities among students (Lowenthal et al., 2021). While webcams are beneficial to learning because they enhance social presence, the value of this presence is not universally recognized, and it may cause challenges for some learners.

Webcams and Multitasking

Having one's camera on during class has been likened to sitting in the high interaction zone of a classroom, with the assumption that it will reduce multitasking and lead to increased participation and learning (Peper et al., 2021). Although multitasking in online learning has not been heavily studied (Alghamdi et al., 2020), it can inhibit learner ability to perform cognitive tasks (Ekuni et al., 2022) and is greater in online settings where students are unmonitored (Lepp et al., 2019). In a study of workers, findings showed that when webcam audio and video are turned off, multitasking is more prevalent (Cao et al., 2021), suggesting that webcam use may discourage such behaviors by making them visible.

Face-to-face Classroom Behaviors and Outcomes

Although webcam norms are not well established, it is worth considering whether students carry over classroom behaviors to their new learning environments, establishing new behaviors online that allow them to engage in class in similar ways and have similar learning outcomes. These face-to-face classroom behaviors have been heavily studied in the past. For example, students who sit near the front of the classroom—the high interactional zone—typically have higher participation and fewer absences (Zomorodian et al., 2012). Other behaviors associated with sitting near the front include attention on task (Will et al., 2020) and notetaking

(Lindquist & McLean, 2011). Effects on performance and GPA are more complex, but a recent study found that class grade drops by row moving backwards (Will et al., 2020) and even in studies where students in front do not perform best, similarities are seen among students sitting in the same zone (Joshi et al., 2019). Seating preference is a complex issue, reflecting room size and design, student beliefs and locus of control (Xi et al., 2017), and regardless of where students sit, multitasking can detract from learning (Jamet et al., 2020). Whereas teachers can recommend that students sit up front where they can best pay attention and are least likely to multitask, similar SL behaviors are not yet established.

Cultural Norms

Cultural norms affect classroom norms. In other words, teaching and learning practices and expectations will vary not only by context, but also by national culture as has been found with other learning technologies and settings. For example, prior studies have found that Chinese learners were reticent to be active participants and had different pedagogical expectations in an online course heavily populated by North American and Western European participants (Dennen & Bong, 2018), and that American, Chinese, and Turkish learners have different perceptions of mobile learning (Hao et al., 2017). Students from collectivist and individualist cultures may differ from each other in terms of the perceived usefulness of online learning and their need for social spaces in their online classes (Zhao et al., 2020) as well as their preference for different types of cognitive activities (Zhu et al., 2009). Connecting back to the issue of webcam use in the synchronous learning classroom, not only are norms not fully established for when cameras should be on or off, cultural differences around these norms also remain uncertain. However, it would make sense if norms differ somewhat across cultures given established cross-cultural differences in related areas such as online learning participation (Yang et al., 2010), pedagogical expectations (Liu et al., 2010), and even facial behavior (McDuff et al., 2016).

Research Purpose and Questions

In this study, we investigate students' perceptions of SL and webcams, considering whether their preferences and behaviors have any relationship to achievement and face-to-face classroom behaviors. Additionally, we examine whether emergent SL behaviors differ by culture among American, Turkish, and Korean students. This study addresses the following research questions:

1. What factors influence students' use of webcams? Do students differ based on country, face-to-face classroom seating choice, and achievement?
2. What are students' webcam and related synchronous learning beliefs and behaviors? Do students differ based on country, face-to-face classroom seating choice, and achievement?
3. What are students' multitasking behaviors in online classes? Do students differ based on country, face-to-face classroom seating choice, and achievement?

Method

Participants

Participants in this study were 2,298 college students enrolled at institutions in the United States (n = 408), Turkey (n = 925), and South Korea (n = 965). Participants' ages ranged between 18 and 43 with a mean of 21.20 and standard deviation of 2.76. Their gender

identification was distributed as follows: 832 male (36.2%), 1,395 female (60.7%), and 37 non-binary (1.6%) with 34 participants (1.5%) declining to share gender.

Race and ethnicity data only were collected from participants in the United States as both Turkey and South Korea have a more homogenous population and race or ethnicity is not as a strong determinant of other social factors (such as socioeconomic status) as they are in the United States in these countries. There were 258 White (63.2%), 69 Asian (16.9%), 26 Black or African American (6.4%), 26 Hispanic or Latinx (6.4%), and one American Indian or Alaska Native (0.2%) participant from the United States. Additionally, 25 participants (6.1%) indicated more than one race while three participants (0.7%) identified themselves as "other."

Instruments and Data Collection

Data collection occurred via an online survey (see Appendix A). The online survey was based partly on items and findings from an earlier survey study of webcam use by learning professionals (Dennen et al., 2021) which focused on factors related to webcam use, webcam behaviors and beliefs, and multitasking behaviors. New items were added to collect data about face-to-face classroom seat choices and achievement (measured by GPA), and adjustments were made to some items to reflect the student context. The English version of the survey was constructed first and tested by six students for clarity and functionality. The survey was then translated into Turkish, and Korean using the back-translation method (Brislin, 1970) and validated by content and language experts before deployment. Potential participants were recruited via announcements in online classes, email and social media, and data were collected between April and June 2021. The study was approved by the researchers' Institutional Review Boards and all participants were volunteers.

Data Analysis

SPSS version 28 was used to calculate descriptive statistics for all items. Frequencies distributions were used to depict the responses of the whole sample as well as each subgroup used for comparison (country, seating choice, achievement). Chi-square tests of independence were used to look for significant differences in response patterns in each subgroup.

Results

This section begins with the presentation of participant background information, namely their face-to-face classroom seating preferences, GPA, and frequency of using SL tools. The remaining parts of the section are structured based on the research questions and present results about factors influencing students' webcam use, SL beliefs and behaviors, and multitasking behaviors in online classes.

Participant Backgrounds

Students were asked where they typically sit in a face-to-face classroom. Most reported sitting in the middle (1,302; 56.7%), followed by the front of the room (677; 29.5%) and the back of the room (319; 13.9%). They were also asked to share their GPA and were broken into three achievement groups: high (1,050; 45.7%), moderate (945; 41.1%), and low (106; 4.6%). These groups were used to answer the comparison parts of the research questions

To establish familiarity with synchronous learning, students were asked about the frequency with which they used synchronous video tools like Zoom for learning purposes prior to remote learning and during the period of remote learning (see Table 1). The results show that

the use of synchronous tools like Zoom increased in all three countries during the COVID-19 pandemic. According to the results, greater percentages of students used SL tools more frequently during the pandemic while only 14.6% of the participants used SL tools multiple times per week prior to the pandemic, that percentage increased to 80.8% during the pandemic.

Table 1

Frequency of Using SL Tools Prior to and During the COVID-19 Pandemic

	How often did you use synchronous tools like Zoom to meet with a class or other group of people prior to the COVID-19 pandemic?				**How often have you typically used synchronous tools like Zoom to meet with a class or other group of people during the pandemic?**			
	USA	TUR	KOR	Total	USA	TUR	KOR	Total
Daily	26	71	7	104	159	344	53	556
	6.4%	7.7%	0.7%	4.5%	39.0%	37.2%	5.5%	24.2%
4–6 times a week	26	66	16	108	143	364	273	780
	6.4%	7.1	1.7%	4.7%	35.0%	39.4%	28.3%	33.9%
2–3 times a week	23	40	62	125	76	84	360	520
	5.6%	4.3%	6.4%	5.4%	18.6%	9.1%	37.3%	22.6%
Once a week or less frequently	76	95	90	261	26	52	193	271
	18.6%	10.3%	9.3%	11.4%	6.4%	5.6%	20.0%	11.8%
Never	257	653	790	1700	4	81	86	171
	63.0%	70.6%	81.9%	74.0%	1.0%	8.8%	8.9%	7.4%

Factors Influencing Webcam Use

The first research question addressed the factors that influenced students' use of webcams. To answer the research question, a set of predefined items were presented to participants. They were asked to indicate factors that would influence their decision to turn on their webcam. Results are presented in Table 2. Most of the students reported the following factors affecting their webcam use in online classes: their surroundings (74.5%), whether turning webcams on is required (70.7%), whether others have webcams on or off (67.6%), and how they are dressed/groomed (56.3%). On the other hand, the following factors received low ratings by students: recording the class meeting (21.4%), the number of people in the class meeting (30.4%), their preparedness for class (32.8%), and the desire to talk during class (34.1%).

Table 2

Factors Affecting Students' Webcam Use by Country, Seating Choice, and Achievement

		Country				Seating Choice				Achievement			
		USA	**TUR**	**KOR**	**Total**	**Front**	**Middle**	**Back**	**Total**	**High**	**Moderate**	**Low**	**Total**
How I am dressed/groomed	*f*	319	504	470	1293	392	752	149	1293	644	501	51	1196
	%	78.2%	54.5%	48.7%	56.3%	57.9%	57.8%	46.7%	56.3%	61.3%	53.0%	48.1%	56.9%
My surroundings	*f*	325	733	655	1713	514	979	220	1713	793	703	69	1565
	%	79.7%	79.2%	67.9%	74.5%	75.9%	75.2%	69.0%	74.5%	75.5%	74.4%	65.1%	74.5%
My degree of involvement in the class meeting	*f*	277	365	255	897	292	504	101	897	434	335	41	810
	%	67.9%	39.5%	26.4%	39.0%	43.1%	38.7%	31.7%	39.0%	41.3%	35.4%	38.7%	38.6%
Number of people in the class meeting	*f*	206	285	207	698	206	406	86	698	340	270	29	639
	%	50.5%	30.8%	21.5%	30.4%	30.4%	31.2%	27.0%	30.4%	32.4%	28.6%	27.4%	30.4%
Whether others have webcams on or off	*f*	355	506	692	1553	420	925	208	1553	789	592	56	1437
	%	87.0%	54.7%	71.7%	67.6%	62.0%	71.0%	65.2%	67.6%	75.1%	62.6%	52.8%	68.4%
My ability to give my full attention to the class meeting	*f*	211	396	217	824	289	441	94	824	373	330	32	735
	%	51.7%	42.8%	22.5%	35.9%	42.7%	33.9%	29.5%	35.9%	35.5%	34.9%	30.2%	35.0%
Whether I want to talk during class	*f*	175	407	202	784	252	419	113	784	354	316	31	701
	%	42.9%	44.0%	20.9%	34.1%	37.2%	32.2%	35.4%	34.1%	33.7%	33.4%	29.2%	33.4%
Whether I am prepared for class	*f*	118	419	217	754	237	432	85	754	327	317	31	675
	%	28.9%	45.3%	22.5%	32.8%	35.0%	33.2%	26.6%	32.8%	31.1%	33.5%	29.2%	32.1%
Whether the class is being recorded	*f*	149	207	136	492	153	275	64	492	252	171	22	445
	%	36.5%	22.4%	14.1%	21.4%	22.6%	21.1%	20.1%	21.4%	24.0%	18.1%	20.8%	21.2%
Whether it is required	*f*	320	597	707	1624	446	953	225	1624	785	648	60	1493
	%	78.4%	64.5%	73.3%	70.7%	65.9%	73.2%	70.5%	70.7%	74.8%	68.6%	56.6%	71.1%
None of these items	*f*	4	33	25	62	21	31	10	62	19	31	4	54
	%	1.0%	3.6%	2.6%	2.7%	3.1%	2.4%	3.1%	2.7%	1.8%	3.3%	3.8%	2.6%
Total	*f*	408	925	965	2298	677	1302	319	2298	1050	945	106	2101

To investigate group differences, we conducted chi-square tests of independence for country, seating choice, and achievement. Results are presented in Appendix B. Out of eleven chi-square tests of independence for country, ten tests were significant at $a = .001$ level and one test was significant at $a = .05$ level. Seven chi-square tests of independence for seating choice were significant (two at $a = .001$, three at $a = .01$, and two at $a = .05$), and five for achievement were significant (three at $a = .001$, one at $a = .01$ level, and one at $a = .05$).

Country differences show varying ways that webcam use reflects personal appearances, peer group behavior, and class preparation. A greater percentage of students from the United States reported that how they are dressed or groomed would affect their webcam use (78.2%) compared to students from Turkey (54.5%) and South Korea (48.7%). Surroundings mattered more to American (79.7%) and Turkish (79.2%) students than to South Korean students (67.9%). Furthermore, more Turkish students (45.3%) reported more than American (28.9%) or South Korean (22.5%) students that their webcam use would be influenced by whether they are prepared for class. They were also the group least likely to be swayed by whether their classmates had cameras on (54.7% compared to 71.7% for South Korean students and 87.0% for American students).

Classroom seating differences showed that students sitting in the front and middle of the face-to-face classroom reported higher levels of concern with personal dress and grooming (57.9% and 57.8%, respectively) and surroundings (75.9% and 75.2%, respectively) than their peers who typically sit in the back of the classroom (46.7% dress/grooming: 69.0% surroundings). Greater percentages of students who sit in the front of the room stated that their

webcam use behavior would be influenced by their involvement in the class meeting (43.1%), attention to the class meeting (42.7%), and preparedness for the class (35.0%) when compared to their peers sitting in the middle or back of the room. However no significant differences were found among groups responses based on meeting size, desires to talk during class, or class recording. Finally, greater numbers of students with high achievement reported the following factors as an influence on their decision to use a webcam: how they are dressed/groomed (61.3%), the degree of involvement (41.3%), whether others have webcams on or off (75.1%), availability of class recording (24.0%), and whether turning webcam on is required (74.8%). Items suggest that students were concerned with meeting requirements and how others in the class perceived them. No significant differences were found among group responses to questions about ability to give the class full attention, desire to talk during class, or class preparation.

Webcam and Related Synchronous Learning Beliefs and Behaviors

The second research question addressed students' webcam and related SL beliefs and behaviors. Response frequencies are presented in Table 3. According to the results, more than half of the students prefer to watch class recordings rather than attend the live session (50.9%), which would place them in a situation where webcam preferences are moot. Only a minority of students felt they should be required to turn webcams on during class lectures (12.1%), class discussions (19.8%), or in breakout groups (20.1%).

Table 3

Students' Synchronous Learning Beliefs and Behaviors by Country, Seating Choice, and Achievement

		Country				Seating Choice				Achievement			
		USA	TUR	KOR	Total	Front	Middle	Back	Total	High	Moderate	Low	Total
I learn better when my webcam is on.	*f*	123	152	231	506	196	240	70	506	247	197	30	474
	%	30.1%	16.4%	23.9%	22.0%	29.0%	18.4%	21.9%	22.0%	23.5%	20.8%	28.3%	22.6%
I am more likely to prepare for class if I am required to keep my webcam on.	*f*	127	284	284	695	227	382	86	695	324	289	32	645
	%	31.1%	30.7%	29.4%	30.2%	33.5%	29.3%	27.0%	30.2%	30.9%	30.6%	30.2%	30.7%
I am more likely to pay close attention in class if I am required to keep my webcam on.	*f*	225	303	352	880	310	462	108	880	434	344	42	820
	%	55.1%	32.8%	36.5%	38.3%	45.8%	35.5%	33.9%	38.3%	41.3%	36.4%	39.6%	39.0%
I am more likely to speak in class if I am required to keep my webcam on.	*f*	174	197	189	560	196	289	75	560	288	202	28	518
	%	42.6%	21.3%	19.6%	24.4%	29.0%	22.2%	23.5%	24.4%	27.4%	21.4%	26.4%	24.7%
I am likely to have private chat or text messages with classmates during class.	*f*	190	229	190	609	197	326	86	609	321	233	19	573
	%	46.6%	24.8%	19.7%	26.5%	29.1%	25.0%	27.0%	26.5%	30.6%	24.7%	17.9%	27.3%
I prefer to watch class recordings rather than attend the live session.	*f*	123	351	695	1169	262	725	182	1169	540	505	49	1094
	%	30.1%	37.9%	72.0%	50.9%	38.7%	55.7%	57.1%	50.9%	51.4%	53.4%	46.2%	52.1%
I think students should be required to turn their webcams on during class lectures.	*f*	50	98	130	278	107	138	33	278	135	110	15	260
	%	12.3%	10.6%	13.5%	12.1%	15.8%	10.6%	10.3%	12.1%	12.9%	11.6%	14.2%	12.4%
I think students should be required to turn their webcams on during class discussions.	*f*	132	121	201	454	166	240	48	454	241	170	17	428
	%	32.4%	13.1%	20.8%	19.8%	24.5%	18.4%	15.0%	19.8%	23.0%	18.0%	16.0%	20.4%
I think students should be required to turn their webcams on in breakout groups.	*f*	139	109	213	461	151	267	43	461	258	165	20	443
	%	34.1%	11.8%	22.1%	20.1%	22.3%	20.5%	13.5%	20.1%	24.6%	17.5%	18.9%	21.1%
None of these statements is true for me.	*f*	33	234	0	267	108	131	28	267	106	104	13	223
	%	8.1%	25.3%	0.0%	11.6%	16.0%	10.1%	8.8%	11.6%	10.1%	11.0%	12.3%	10.6%
Total	*f*	408	925	965	2298	677	1302	319	2298	1050	945	106	2101

Group differences were investigated via chi-square tests of independence for country, seating choice, and achievement. Results are presented in Appendix C. According to the results, out of ten chi-square tests of independence for country, eight tests were significant at $a = .001$ level while two tests did not reveal any significant differences. Seven of the ten tests for seating choice were signification (five at $a = .001$ and three at $a = .01$), and only three were significant for achievement (one test at $a = .001$ and two $a = .01$).

In terms of country differences, students from the United States consistently reported higher rates of webcam-related accountability (i.e., more likely to learn better, pay close attention, and speak in class) than their Turkish and South Korean counterparts, as can be seen in Table 3. In addition, having private chat or text messages with classmates during class sessions was more commonly reported among American students. Most students from South Korea (72.0%) indicated that they prefer to watch class recordings rather than attend the live session, which is close to twice the response from Turkish (37.9%) and American (30.1%) students.

Greater percentages of students who sit in the front of the room reported preparing for class (33.5%) and paying close attention (45.8%) if they are required to keep their webcam on compared to students who sit elsewhere. However, there was an opposite relationship regarding preference for class recordings. Greater percentages of students who sit in the middle (55.7%) and back (57.1%) of the room reported that they prefer class recordings to the live session compared to students who sit in the front of the room (38.7%). Smaller percentages of students who sit in the back of the room reported that they think students should be required to turn webcams on during class lectures (10.3%), class discussions (15.0%), and in breakout groups (13.5%) compared to students who sit in the front and middle of the room; students who sit at the front chose this response in the highest proportions for all three items, although overall support for mandatory camera use was low.

Students' beliefs and behaviors had the fewest group differences when considering achievement level. Interestingly, high achieving students (30.6%) reported engaging in private chat with classmates more than students in the moderate (24.7%) and low (17.9%) groups. They were also more likely to indicate a preference for requiring webcams in breakout groups (24.6%), although this was not popular overall.

Multitasking Behaviors in Online Classes

The third research question addressed students' multitasking behaviors in online classes. Students were presented with five items addressing multitasking behaviors in online classes and were asked to indicate their agreement using a five-point Likert scale ranging from 1: *Strongly Disagree* to 5: *Strongly Agree*. We investigated students' multitasking behaviors with respect to country, face-to-face classroom seating choice, and achievement and the results are presented in Table 4.

Table 4

Multitasking Behaviors by Country, Seating Choice, and Achievement

			Country			Seating Choice			Achievement		
			USA (N = 408)	TUR (N=925)	KOR (N=965)	Front (N=677)	Middle (N=1302)	Back (N=319)	High (N=1050)	Moderate (N=945)	Low (N=106)
I multitask on my computer when in virtual classes (e.g., work within other windows)	SD	*f*	18	130	86	89	114	31	100	94	11
		%	4.4%	14.1%	8.9%	13.1%	8.8%	9.7%	9.5%	9.9%	10.4%
	SWD	*f*	20	264	211	137	300	58	242	194	14
		%	4. 9%	28.5%	21.9%	20.2%	23.0%	18.2%	23.0%	20.5%	13.2%
	NAND	*f*	12	251	282	146	315	84	203	258	23
		%	2.9%	27.1%	29.2%	21.6%	24.2%	26.3%	19.3%	27.3%	21.7%
	SWA	*f*	154	205	304	189	387	87	318	264	35
		%	37.7%	22.2%	31.5%	27.9%	29.7%	27.3%	30.3%	27.9%	33.0%
	SA	*f*	204	75	82	116	186	59	187	135	23
		%	50.0%	8.1%	8.5%	17.1%	14.3%	18.5%	17.8%	14.3%	21.7%
I multitask within my physical space when in virtual classes (e.g., knitting, cooking)	SD	*f*	53	129	213	124	229	42	200	145	20
		%	13.0%	13.9%	22.1%	18.3%	17.6%	13.2%	19.0%	15.3%	18.9%
	SWD	*f*	69	293	325	195	405	87	328	277	19
		%	16.9%	31.7%	33.7%	28.8%	31.1%	27.3%	31.2%	29.3%	17.9%
	NAND	*f*	33	215	257	123	310	72	193	237	32
		%	8.1%	23.2%	26.6%	18.2%	23.8%	22.6%	18.4%	25.1%	30.2%
	SWA	*f*	150	217	130	154	261	82	233	193	20
		%	36.8%	23.5%	13.5%	22.7%	20.0%	25.7%	22.2%	20.4%	18.9%
	SA	*f*	103	71	40	81	97	36	96	93	15
		%	25.2%	7.7%	4.1%	12.0%	7.5%	11.3%	9.1%	9.8%	14.2%
I am less likely to multitask if my webcam is on	SD	*f*	29	67	44	49	70	21	52	66	7
		%	7.1%	7.2%	4.6%	7.2%	5.4%	6.6%	5.0%	7.0%	6.6%
	SWD	*f*	28	114	123	69	156	40	126	109	11
		%	6.9%	12.3%	12.7%	10.2%	12.0%	12.5%	12.0%	11.5%	10.4%
	NAND	*f*	51	159	294	120	296	88	184	236	32
		%	12.5%	17.2%	30.5%	17.7%	22.7%	27.6%	17.5%	25.0%	30.2%
	SWA	*f*	137	349	360	241	504	101	402	335	33
		%	33.6%	37.7%	37.3%	35.6%	38.7%	31.7%	38.3%	35.4%	31.1%
	SA	*f*	163	236	144	198	276	69	286	199	23
		%	40.0%	25.5%	14.9%	29.2%	21.2%	21.6%	27.2%	21.1%	21.7%
I turn my webcam off if I need to multitask	SD	*f*	29	52	102	62	96	25	82	74	14
		%	7.1%	5.6%	10.6%	9.2%	7.4%	7.8%	7.8%	7.8%	13.2%
	SWD	*f*	43	96	204	91	200	52	178	135	15
		%	10.5%	10.4%	21.1%	13.4%	15.4%	16.3%	17.0%	14.3%	14.2%
	NAND	*f*	47	174	334	138	327	90	210	261	32
		%	11.5%	18.8%	34.6%	20.4%	25.1%	28.2%	20.0%	27.6%	30.2%
	SWA	*f*	151	401	238	238	458	94	378	302	23
		%	37.0%	43.4%	24.7%	35.2%	35.2%	29.5%	36.0%	32.0%	21.7%
	SA	*f*	138	202	87	148	221	58	202	173	22
		%	33.8%	21.8%	9.0%	21.9%	17.0%	18.2%	19.2%	18.3%	20.8%
When my webcam is off, I am more likely to walk away from the class	SD	*f*	34	137	193	109	207	48	176	145	13
		%	8.3%	14.8%	20.0%	16.1%	15.9%	15.0%	16.8%	15.3%	12.3%
	SWD	*f*	47	189	227	116	280	67	214	196	11
		%	11.5%	20.4%	23.5%	17.1%	21.5%	21.0%	20.4%	20.7%	10.4%
	NAND	*f*	32	197	361	142	356	92	234	271	37
		%	7.8%	21.3%	37.4%	21.0%	27.3%	28.8%	22.3%	28.7%	34.9%
	SWA	*f*	125	236	138	161	274	64	227	190	24
		%	30.6%	25.5%	14.3%	23.8%	21.0%	20.1%	21.6%	20.1%	22.6%
	SA	*f*	170	166	46	149	185	48	199	143	21
		%	41.7%	17.9%	4.8%	22.0%	14.2%	15.0%	19.0%	15.1%	19.8%

Note. SD: Strongly disagree; SWD: Somewhat disagree; NAND: Neither agree nor disagree; SWA: Somewhat agree; SA: Strongly agree

We further examined group differences in terms of students' multitasking behaviors via chi-square tests of independence for country, seating choice, and achievement. Full results are presented in Appendix D. According to the results, all of the chi-square tests of independence for country, seating choice, and achievement showed that there were statistically significant differences among groups. All five tests for country, three for seating choice, and one for achievement group differences were significant at the $a = .001$ level.

Notably, a greater percentage of students from the United States either somewhat agreed or strongly agreed that they multitask on their computer (87.7%) and within their physical space (62.0%) when in virtual classes. In both instances, this represents a rate of multitasking more than twice what was reported by Turkish and South Korean students. Multitasking while the webcam is on appeared to be more common among Turkish students thank among the other groups. On the other hand, students from South Korea were less likely to walk away from the class when their webcam is off.

While there were strong differences in multitasking behaviors among students from the three countries, differences based on classroom seating choice and achievement generally were less pronounced. Still, students responding the strongly or somewhat agreed that they would turn off their webcam to multitask decreased from a high of 57.1% among students who reported sitting at the front of the classroom to 52.2% and 47.7% for those who choose seats in the middle or back, respectively. High-achieving students were most likely to report that having webcams turned on was a deterrent to multitasking, with 65.5% strongly or somewhat agreeing with this statement compared to 56.5% and 52.8% of their moderate and low achievement peers, respectively. Low-achieving students were most likely to strongly or somewhat agree that they multitask on their computer (54.7%) compared to the high (48.1%) and moderate (42.2%) achievement groups.

Discussion

University students' SL experiences during the pandemic have brought familiarity with synchronous learning tools, but this familiarity has not necessarily led to unified expectations surrounding webcam use. The students in this study suggest that practices and beliefs surrounding webcam use differ by national culture, academic achievement, and preferred seating in the face-to-face classroom. Awareness of these differences can be used to help instructors design cross-cultural synchronous learning experiences, and identify behaviors associated with desired classroom behaviors and academic performance.

The extent to which these students will continue to experience SL may vary. Nikou (2020–21) found that university instructors were most likely to continue using synchronous learning tools after the period of ERT ended if they perceived them as useful and had been satisfied with their earlier experiences. The same may be true for learners. Campus student enrollment in online courses has steadily increased, as have online enrollments in graduate programs (Allen & Seaman, 2017), but students may self-select into asynchronous courses if their synchronous learning experiences during ERT were unsatisfactory.

A major debate among educators has been whether students should be required to have webcams turned on (Torchia, 2021). Most of these participants indicated that cameras should not be required, with a difference as well between lecture, a passive learning activity, and active learning activities. Combined with data showing that having cameras on may increase attention, speaking during class, and learning, especially for some students in the United States, instructors might consider requiring or at least encouraging students to turn their cameras on for interactive portions of a synchronous class session. In another study, students found the fatigue associated

with attending to computer-mediated communication cues (Wiederhold, 2020) lessened when they experienced greater social presence and saw their peers in the learning space (Peper et al., 2021).

Naturalistic webcam behaviors appear to be driven by image-related factors. These students were likely to indicate that surroundings and personal grooming were influential in their camera decisions. This was more pronounced among the United States students, with findings much like the learning professionals in Dennen's (2021) study which also drew a sample from the United States. Another parallel between the two studies was the power of peers in influencing behavior. People are likely to follow the lead of others, whether that be in turning a webcam on or keeping it off. This finding suggests that should an instructor want students to keep their cameras on, the key is to get a subset of students to set an example, perhaps through requiring it and perhaps also through praise. The high-achieving students may be the starting point; they were most likely to be swayed by these elements.

The connection between sitting at the front of the classroom and being more likely than peers to have webcam behavior influenced by class involvement, attention, and preparedness is not surprising. Collectively these are all behaviors one would associate with a student who strives to do well, who may also be a high-achieving student. This finding suggests that instructors should be sure to provide opportunities for students to be involved and to require preparedness, thereby setting up a learning environment that fosters and supports positive learning behaviors.

By default, students tend to adopt a passive position in the online classroom, with many preferring to keep their cameras off and to watch a recorded class rather than participate in a live class. These findings also suggest that some face-to-face classroom behaviors have analogous behaviors in the online synchronous classroom. For example, high-performing students are more likely than lower achieving students to report behaviors contingent on and associated with having social presence and being an active participant in class, and lower achieving students are more likely than others to report that having their webcam on encourages them to pay attention, suggesting that they feel less able to self-regulate.

These connections between student behaviors and achievement, which are like those found in studies of face-to-face classrooms (e.g., Will et al., 2020; Zomorodian et al., 2012), have implications for future research and practice on synchronous online learning. For example, instructors might recommend attending live sessions as a primary form of learning so students can benefit from the potential for interaction. Recordings can still be made, but their use might be relegated to supporting review activities or making up for an unavoidable absence. Not only are recorded classes easy for students to overlook, but students may multitask or play them back at faster speeds to save time (Cardall et al., 2008). Students who skip class and put off coursework in hopes of last-minute cramming may find that watching videos at double speed does not serve them well in terms of learning retention. Similarly, these findings challenge instructors to make their SL classes worth attending live. To that end, instructors can build interaction into their classes and use abundant visuals, which other research has shown to increase attendance (Gupta & Saks, 2013), and which also may reduce the desire to multitask during class.

Multitasking, however, appears to be a complex behavior and not necessarily a negative one. This study found that multitasking via text chat was more likely to be used among high-achieving students, suggesting that it may be relevant to attention and learning, contradicting studies that suggest multitasking detracts from self-regulation (Alvarez-Risco et al., 2020).

Although the survey did not inquire about specific details, students who use the text chat may be engaged in on-topic backchanneling with their peers. Backchanneling has been found relevant to learning in other studies (Wolf, 2008), and could be a good sign that students are engaged and self-regulating to practice and fill in necessary learning information among their peers. Instructors should consider the role chat plays in supporting learning activities and both interact with students in the chat space as well as encourage students to use the chat tools to interact with their peers in meaningful ways. High-achieving students appear to have learned how backchannel chat can support learning, whereas findings from other studies suggest that overall students do not recognize the potential of chat as a learning support (Sprenger & Schwaninger, 2021). By promoting chat as a learning tool and integrating it into class activities, instructors can encourage both learning interactions and live session attendance.

The cultural differences noted among the three countries suggest different pedagogical expectations surrounding coursework. For example, the South Korean students were most likely to watch class recordings, implying that an instructor might be lecturing and nothing would be lost by watching a video versus participating during the live session. Conversely, the American students' responses that showed they were more likely than the other groups to participate during class may reflect an expectation that their instructors would require and plan for participation.

Although this sample is insufficient for generalizing to entire national populations of learners, it nonetheless suggests that learners are entering the synchronous learning space with different notions of what online learners should do. Prior research presents similar findings regarding cultural differences in terms of learner preferences and behaviors in online learning. For example, a recent study found that Turkish students were less likely to prefer and feel satisfied with online learning than students from the United States (Aguilera-Hermida et al., 2021), which may also relate to this study's finding that Turkish students are less likely than others to turn on webcams. Other studies have also affirmed that cultural differences between collectivist and individualist countries influence online learning behaviors and technology use (Dennen & Bong, 2018; Zhao et al., 2020), although these differences appear to increasingly have less sway on learner behaviors and also have limited influence on outcomes (Boyle et al., 2020).

Conclusion

This study sheds light on student comfort and enjoyment of SL, encouraging instructors to carefully consider the complexity and situational nature of using synchronous technologies and requiring webcams for learning. Instructors should not embrace the myth of digital natives and assume that young adults, who spend a lot of time online watching videos and communicating with friends via video chat tools, are prepared and motivated to use similar tools in a class setting. In practice the way that university students use technology to fulfill personal needs can be narrow (Margaryan et al., 2011). In other words, the tools they use and the way they use those tools to interact socially differ from learning-related tools and interactions. Additionally, university students' desire to maintain separation between personal and educational settings as well as to experience learning as a private phenomenon as noted by Dennen and Burner (2017) may drive them to keep webcams off when learning. After all, the experience of leaving one's home to interact with instructors and peers is very different from inviting those people into one's home, even if just through the limited view of a webcam lens.

In terms of norms for the future of synchronous learning, instructors may wish to set expectations for student behaviors that are context specific. In other words, keeping cameras off

may be acceptable during passive activities, but cameras may be requested to be turned on for interactive and small group work. Noting that student behaviors trend toward passive approaches with lower levels of social presence, instructors may choose to take on the challenge of promoting active learning in synchronous spaces and openly discuss with students the rationale behind these activities and any camera-on policies they instate. Maintaining options for learners who lack the ability to keep their cameras on should also be possible, and this should be done in a manner that is respectful of any challenges these learners may face. Additionally, instructors might share with students which learning behaviors are common to high-achieving students and which are common to low-achieving students to promote productive learning behaviors.

The major limitation of this study is the sample, which represents students from three institutions in three countries. Although the sample is large, students at a single institution may not be representative of students more generally or students within a specific country. A replication of this study with a broader sample (i.e., students from multiple institutions and additional countries) would help confirm the findings, although it is worth noting that overall trends regarding webcam beliefs and attitudes align with Dennen et al.'s (2021) similar survey study of learning professionals in the United States.

More research is needed to directly assess the connection between webcam use, live attendance, multitasking, and achievement outcomes. Follow-up studies that extend beyond self-report measures would be helpful to affirm whether these perceived connections are evident in actual student behaviors in grades. It is also possible that student best practices in the SL setting will vary based on contextual factors (e.g., class size, class activities) much as they do in the face-to-face setting (Xi et al., 2017). Future studies should be situated in specific course contexts with findings enhanced by rich description of the learning setting. Collectively, this line of research will help instructors better design and teach in an online synchronous mode and will lead to empirically supported recommendations for learner success in synchronous courses.

Declarations

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The authors assert that approval was obtained from an ethics review board (IRB) at Florida State University, USA.

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Appendix A

Survey Instrument: English/United States Version

Background information

Have you taken classes that use synchronous video (e.g., Zoom, MS Teams, Google Meet)?

- Yes
- No (NOTE: Tracked out if response is no)

Are you currently enrolled in school?

- I am currently enrolled
- I am not currently enrolled, but was during the 2020-21 school year
- I am not currently enrolled and was not enrolled during the 2020-21 school year (NOTE: Tracked out if response is selected)

Current GPA

- 3.5-4.0
- 3.0-3.49
- 2.5-2.99
- 2.0-2.49
- 1.0-1.99
- Under 1.0
- Don't know
- Prefer to not share

In a face-to-face classroom, where are you most likely to sit?

- At the front of the room
- In the middle of the room
- In the back of the room

How often did you use synchronous tools like Zoom to meet with a class or other group of people prior to the COVID-19 pandemic?

- Daily
- 4-6 times a week
- 2-3 times a week
- Once a week or less frequently
- Never

How often did you use synchronous tools like Zoom to meet with a class or other group of people during the 2020-21 school year?

- Daily
- 4-6 times a week
- 2-3 times a week
- Once a week or less frequently
- Never

Factors influencing webcam use

My decision to turn on my webcam is influenced by (select all that apply):

- How I am dressed/groomed
- My surroundings
- My degree of involvement in the class meeting
- Number of people in the class meeting
- Whether others have webcams on or off
- My ability to give my full attention to the class meeting
- Whether I want to talk during class
- Whether I am prepared for class
- Whether the class is being recorded
- Whether it is required
- My bandwidth speed
- None of these items

Webcam and related synchronous learning behaviors and beliefs

Which of the following statements are TRUE for you in the online classroom? Select all that apply.

- I learn better when my webcam is on.
- I am more likely to prepare for class if I am required to keep my webcam on.
- I am more likely to pay close attention in class if I am required to keep my webcam on.
- I am more likely to speak in class if I am required to keep my webcam on.
- I am likely to have private chat or text messages with classmates during class.
- I prefer to watch class recordings rather than attend the live session.
- I think students should be required to turn their webcams on during class lectures.
- I think students should be required to turn their webcams on during class discussions.
- I think students should be required to turn their webcams on in breakout groups.
- None of these statements is true for me.

Multitasking

Please indicate your agreement with the following items about online classes taught via zoom or similar synchronous video tools:

[Answered using 5-point Likert scale; 1 = Strongly Disagree / 5 = Strongly Agree

- I multitask on my computer when in online classes (e.g., work within other windows)
- I multitask within my physical space when in online classes (e.g., knitting, cooking)
- I am less likely to multitask if my webcam is on
- I turn my webcam off if I need to multitask
- When my webcam is off, I am more likely to walk away from the class

Appendix B

Chi-square Test of Independence Results for Factors Affecting Students' Webcam Use

	Country			Seating Choice			Achievement		
	Pearson Chi-Square (df)	*p*	Cramer's V	Pearson Chi-Square (df)	*p*	Cramer's V	Pearson Chi-Square (df)	*p*	Cramer's V
How I am dressed/groomed	103.280 (2)	<.001	.212	13.755 (2)	<.01	.077	17.568 (2)	<.001	.091
My surroundings	38.997 (2)	<.001	.130	6.198 (2)	<.05	.052	5.520 (2)	.063	.051
My degree of involvement in the class meeting	207.322 (2)	<.001	.300	12.120 (2)	<.01	.073	7.269 (2)	<.05	.059
Number of people in the class meeting	114.485 (2)	<.001	.223	2.163 (2)	.339	.031	3.903 (2)	.142	.043
Whether others have webcams on or off	147.825 (2)	<.001	.254	17.444 (2)	<.001	.087	48.450 (2)	<.001	.152
My ability to give my full attention to the class meeting	139.062 (2)	<.001	.246	21.632 (2)	<.001	.097	1.208 (2)	.547	.024
Whether I want to talk during class	128.801 (2)	<.001	.237	5.318 (2)	.070	.048	.869 (2)	.648	.020
Whether I am prepared for class	114.872 (2)	<.001	.224	7.062 (2)	<.05	.055	1.741 (2)	.419	.029
Whether the class is being recorded	86.577 (2)	<.001	.194	.978 (2)	.613	.021	10.400 (2)	<.01	.070
Whether it is required	31.757 (2)	<.001	.118	11.506 (2)	<.01	.071	20.615 (2)	<.001	.099
None of these items	7.292 (2)	<.05	.056	1.151 (2)	.562	.022	4.943 (2)	.084	.049

Appendix C

Chi-square Test of Independence Results for SL Beliefs and Behaviors

	Country			Seating Choice			Achievement		
	Pearson Chi-Square (df)	*p*	Cramer's V	Pearson Chi-Square (df)	*p*	Cramer's V	Pearson Chi-Square (df)	*p*	Cramer's V
I learn better when my webcam is on.	34.580 (2)	<.001	.123	28.698 (2)	<.001	.112	4.147 (2)	.126	.044
I am more likely to prepare for class if I am required to keep my webcam on.	.546 (2)	.761	.015	5.602 (2)	.061	.049	.031 (2)	.984	.004
I am more likely to pay close attention in class if I am required to keep my webcam on.	62.392 (2)	<.001	.165	23.110 (2)	<.001	.100	5.099 (2)	.078	.049
I am more likely to speak in class if I am required to keep my webcam on.	90.674 (2)	<.001	.199	11.174 (2)	<.01	.070	9.996 (2)	<.01	.069
I am likely to have private chat or text messages with classmates during class.	108.787 (2)	<.001	.218	3.810 (2)	.149	.041	13.693 (2)	<.01	.081
I prefer to watch class recordings rather than attend the live session.	304.657 (2)	<.001	.364	57.070 (2)	<.001	.158	2.333 (2)	.311	.033
I think students should be required to turn their webcams on during class lectures.	3.687 (2)	.158	.040	12.422 (2)	<.01	.074	1.004 (2)	.605	.022
I think students should be required to turn their webcams on during class discussions.	67.536 (2)	<.001	.171	15.591 (2)	<.001	.082	8.845 (2)	.012	.065
I think students should be required to turn their webcams on in breakout groups.	91.874 (2)	<.001	.200	10.902 (2)	<.01	.069	15.445 (2)	<.001	.086
None of these statements is true for me.	300.352 (2)	<.001	.362	17.966 (2)	<.001	.088	.755 (2)	.686	.019

Appendix D

Chi-square Test of Independence Results for Multitasking Behaviors

	Country			Seating Choice			Achievement		
	Pearson Chi-Square (df)	*p*	Cramer's V	Pearson Chi-Square (df)	*p*	Cramer's V	Pearson Chi-Square (df)	*p*	Cramer's V
I multitask on my computer when in virtual classes (e.g., work within other windows).	592.406 (8)	<.001	.359	19.398 (8)	<.05	.065	26.013 (8)	<.01	.079
I multitask within my physical space when in virtual classes (e.g., knitting, cooking).	313.735 (8)	<.001	.261	27.423 (8)	<.01	.077	27.008 (8)	<.01	.080
I am less likely to multitask if my webcam is on.	153.741 (8)	<.001	.183	31.418 (8)	<.001	.083	30.687 (8)	<.001	.085
I turn my webcam off if I need to multitask.	292.408 (8)	<.001	.252	18.372 (8)	<.001	.063	27.386 (8)	<.01	.081
When my webcam is off, I am more likely to walk away from the class.	437.482 (8)	<.001	.309	31.853 (8)	<.001	.083	23.557 (8)	<.01	.075