



Webcam Use in Online Learning: A Cross-National Survey of Portuguese and Romanian University Students

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Abstract: The landscape of digital pedagogy has undergone a profound transformation in recent years, a shift catalysed by the global disruptions of the COVID-19 pandemic. Central to this transition is the near-ubiquitous integration of webcams into the virtual classroom, a practice that has redefined traditional instructional spaces while broadening academic accessibility for a global student body. However, the rapid adoption of video-mediated learning has sparked ongoing debate regarding its pedagogical efficacy and ethical implications.

This article investigates the multifaceted influence of webcam usage on the lived experiences of students, examining its impact on peer-to-peer social dynamics and the broader implications for learner well-being.

The paper draws on a mixed-methods approach applied to a self-administered survey of 1,085 Portuguese and Romanian university students. This study shows that webcam use in online classes is shaped primarily by social and emotional factors rather than technological or academic ones. Students tend to keep their cameras off for comfort, privacy, and reduced social pressure. In contrast, camera use is mainly motivated by the desire to enhance interaction, attention, and respect for teachers. These findings highlight the need for flexible and inclusive webcam policies that balance social presence with students' well-being in digital learning environments.

Keywords: online education; webcams use; students' engagement; participation; digital empathy

1. Introduction

Digital learning, once a niche activity, has become a staple in recent years, adopted by an increasingly large and diverse global demographic (Gherheș et al., 2021; Händel et al., 2022). Indeed, this exponential increase in online education represents a paradigm shift in modern pedagogy, driven by the ubiquity of personal computing, improved internet infrastructure, and a growing institutional interest in flexible learning models (Duarte & Riedl, 2021). While this shift offers undeniable benefits, such as eliminating geographical barriers, cost-effectiveness, and avoiding traditional commutes (reducing time and costs), it has also brought to light new socio-technical challenges.

Among some of the most controversial issues in the virtual classroom is the mandatory use of webcams. On the one hand, proponents of its use argue that active video feeds facilitate nonverbal communication, reinforce student engagement, and promote a sense of mutual respect between students and educators (Day & Verbiest, 2021). On the other hand, research by Gherheș et al. (2021) suggests that students often opt for anonymity due to multifaceted pressures, which include psychological barriers such as anxiety, self-consciousness, and social shyness; privacy concerns, particularly about apprehension about the exposure of their home environment or the accidental appearance of third parties; and the possibility of multitasking, i.e., the intention to engage in simultaneous activities during synchronous sessions.

Using a mixed-methods approach combining approach, this study assesses and discusses the intersection of webcam usage practices and student engagement, based on 1,085 self-administered questionnaires completed by university students in Portugal and Romania.

2. Literature review

Engagement plays a vital role in evaluating the success of online learning. Although it can be seen as a “catch-all term” (Händel et al., 2022, pp.10408-10409) because of its various types, such as cognitive, emotional, social, psychological, etc., for this study, the authors adopted the concept used by Fredricks et al. (2004): “Researchers describe behavioral, emotional, and cognitive engagement and recommend studying engagement as a multifaceted construct.” (Fredricks et al., 2004, p. 59).

In conventional physical classrooms, engagement generally depends on immediate interpersonal contact and the continuous exchange of nonverbal cues between students and teachers. Replicating this synergy in a digital environment remains a significant obstacle (Duarte & Riedl, 2022), as the lack of physical proximity and restricted opportunities for dialogue often prevent educators from accurately assessing student understanding or adjusting their teaching strategies in real time (Li et al., 2022). Proponents of the active use of cameras argue that visual presence

cultivates empathy and community bonds, effectively simulating the relationship found in traditional settings. By maintaining visibility, students can experience a greater sense of belonging and responsibility, which generally translates into more active participation in classroom activities. This behaviour is also driven by social norms; for example, Zabel et al. (2022) demonstrated that a 25% increase in the number of visible participants makes it almost six times more likely that others will follow suit and activate their own webcams.

Despite these perceived benefits, mandatory camera use can also generate considerable friction for many students. The main deterrent factors generally involve concerns about home privacy, potential external interruptions, and a strong self-consciousness regarding physical appearance under the constant gaze of the lens. Compulsive visibility has been associated with high levels of anxiety and discomfort, which can lead to a paradox where the very tool intended to increase engagement ends up decreasing it (Greene et al., 2021). Ultimately, these stressors negatively impact the student's emotional well-being (Hosszu et al., 2022) and can result in significantly compromised academic performance (Tien et al., 2023).

There is no doubt that webcams can be considered a useful tool for increasing student participation in online learning, by allowing visual interaction between participants and thus making virtual classes more personalized and interactive. However, as Hosszu et al. (2022) found, the expectation of looking good on screen can generate additional stress and anxiety in students, negatively affecting their overall learning experience. Furthermore, concerns related to privacy, technical difficulties, and cultural influences can also contribute to students' decisions to keep their cameras on or off (Borup et al., 2020; Dennen et al., 2022).

Another factor that may explain why students prefer to keep their cameras off is "Zoom fatigue," a condition comparable to social anxiety that occurs when individuals feel constantly observed for extended periods of time ("Excessive close eye contact, cognitive overload, increased self-evaluation due to constant self-observation on video, and limitations in physical mobility", Bailenson, 2021, p. 1).

A significant number of recent academic studies have investigated the relation between webcam use and student engagement in digital learning environments. While most studies indicate that video activation can influence and increase interpersonal interaction (Dixon, 2015), participation (Giesbers et al., 2013), and overall engagement (Kiranou & Karayianni, 2023), other researchers have reached more ambiguous conclusions. Borup et al. (2020), for example, did not identify significant variation in engagement levels when comparing students who used cameras with those who kept their screens off.

For Li et al. (2022), however, individual factors, such as strong self-awareness, a sense of belonging to a visible minority, and a specific academic context, play a crucial role in a student's hesitation to turn on their camera. These personal factors interrelate with broader environmental variables, including class size, the teacher's pedagogical approach, the level of interactivity in the course, and inherent privacy concerns.

Similarly, Martin and Bolliger (2018) also suggest that the ultimate effectiveness of webcam use depends on a combination of instructor visibility, the intentionality of the course design, the quality of the technical infrastructure, and the personal inclinations of the students themselves.

Scientific evidence suggests that computer-mediated interaction fundamentally alters the nature of social exchanges, since virtual communication operates under different parameters than face-to-face contact (Terry & Cain, 2016). Furthermore, as Robal et al. (2018) demonstrated, the use of webcams, in addition to impacting student engagement, also plays a potentially significant role in determining their academic performance. Effectively, the presence of visual cues in the learning process can improve cognitive processing, information retrieval, and the application of new knowledge.

By allowing educators to observe immediate reactions and assess comprehension through the identification of nonverbal cues such as disinterest, perplexity, stress, or irritation, among others, webcams enable more personalized guidance and timely pedagogical adjustments, which, as Racheva (2018) has shown, contribute to better educational outcomes.

Academic literature emphasizes various variables that predict webcam use, including gender, age, grade level, demographics, and socio-economic status. Kubiato et al. (2012) found that boys exhibit more positive attitudes than girls toward ICT, whereas Farid et al. (2022) identified a statistically significant association between female gender and the inclination to turn off the camera during online meetings, due to distraction, self-consciousness, and concerns about appearance. Conversely, several other researchers concluded that there is no gender difference in webcam use

(Kiranou & Karayianni, 2023; Tien et al., 2023). Nevertheless, Park and Kim (2020) revealed that gender differences moderated the relationship between the interactive tool employed and social presence in online education.

In another research, Uzun et al. (2020) found that age has an impact on students older than 25, having a more positive attitude towards e-learning. At the same time, Lai and Hong (2015) surveyed 880 students in a New Zealand university to analyse generational differences (less than 20, 20-30, and more than 30 years old) but did not find any difference.

3. Research Questions

Following the literature review, which analysed the association or correlation between webcam use in education and the sociodemographic profile of students, or other cultural/technological variables, personal choices, engagement, academic status, etc., several research questions were formulated:

- RQ1. Does age, gender, level of study, number of hours used in technology, and number of online semesters impact the use of the camera on or off during online education?
- RQ2. Are students who consider online education as a positive context more likely to keep the camera on?
- RQ3. Are students who have difficulty interacting with classmates more likely to keep the camera on or off?
- RQ4. Are students who need the emotional support of classmates or feel emotionally disconnected more likely to keep the camera on or off?
- RQ5. What are the main reasons for keeping the camera on or off during online classes?

4. Methodology

The study is based on a mixed-methods approach combining a survey and thematic analysis.

The quantitative research carried out in Portugal and Romania between September 29 and November 9, 2022, involved administering a survey to university students enrolled in Communication Studies degree programs. The study followed the principles and requirements of the EU General Data Protection Regulation (April 27, 2016/679). No personal data, such as name or address, was collected. The data was safely stored by the researchers and was used only for research purposes. No third party used the data.

The selection of the countries (Romania and Portugal) considered the disparities in digital access and usage in Romania and Portugal. To explain the situation of 2022, when the research was performed, we made use of the findings of the Digital Economy and Society Index (European Commission, 2022), which evaluated the 28 European Union states. While Portugal is closer to the EU average than Romania, Romania has the advantage of higher connectivity. When it comes to the indicator of “Integration of Digital Technology within Society”, Portugal ranked 12th, above the EU average, and Romania was in 28th position. One common element is that in Portugal and Romania, there were two years of online education during the pandemic, and the analysed cohort included students who spent at least one semester in online education.

The survey contained 36 closed questions, including the socio-demographic ones – age, gender, country of origin, level of study, number of semesters attending online classes, self-assessed use of technology (number of hours/day) (Q1-Q7), and questions aimed to assess the level of empathy (Q8-Q27), which were not included in the present research, being previously analysed in a separate publication that examined the relationship among gender, exposure to digital technology, and empathy levels measured with the Basic Empathy Scale (Duarte et al., 2023).

Given the dataset’s large size and scope, the current study addresses different research questions and variables that were not examined in the earlier publication and analyses a subset from the dataset (Q28-Q32 and Q34) that was not included in our previous work (Duarte et al., 2023). The subset contains responses to six survey questions. The first one (Q28: “During online teaching sessions, I prefer to keep the camera on”) displayed three options (“yes, no, it depends on the context”). The second one (Q 29) was an open-ended question and asked the respondents to explain why they chose to keep the camera on or off during online classes.

After this single open-ended question, there was a section with close questions, built on the Likert scale: -2 (“I totally disagree”), +2 (“I totally agree”). These questions asked the respondents to express the level of agreement with the following statements: (1) Q30: “Online education positively impacts my life”; (2) Q31: “During online teaching sessions,

I find it difficult to interact with my classmates”; (3) Q32: “During online teaching sessions, I feel that I need the emotional support of classmates” and (4) Q34: “After two years of the pandemic, I feel more disconnected emotionally”.

1,085 students (515 from Romania and 570 from Portugal) completed the questionnaire. 19 out of 1,085 selected the undecided option “it depends on the context” and were no included in the statistical analysis. The subset (n=1,066) was analysed using the Cochran-Armitage trend test to investigate the association between camera on/off behaviour and independent variables such as age, gender, level of study, self-assessed use of technology (in hours/day), and number of semesters attending online classes.

Most respondents were aged between 18 and 23 years (84.98% of the total sample). Women represented nearly three-quarters of the sample (73.4%). Most participants were enrolled in undergraduate study programs, particularly in the first three years of study, while master’s students accounted for approximately one quarter of respondents. Exposure to online education varied across countries, with Romanian students generally reporting a higher number of semesters attended online than Portuguese students. Detailed demographic information is provided in the Appendix.

Open-ended responses were analysed using thematic analysis following Braun and Clarke’s (2006) research design. An inductive, semantic coding approach was applied to identify recurring patterns in students’ motivations for keeping their cameras on or off. Codes were iteratively grouped into themes, and their frequencies were calculated to indicate their relative prominence. Three of the authors manually coded the responses through a collaborative coding process, ensuring coherence and consistency across categories. The majority of responses were in English. However, there were also responses in Portuguese and Romanian that were translated into English by the authors.

The data about keeping the camera on/off were also associated to other variables that referred to the perception of the respondents related to: (1) online education positively impacts life; (2) the difficulty to interact with classmates during online teaching sessions; (3) the need for emotional support of classmates during online teaching sessions; (4) the feeling of emotional disconnection after two years of the pandemic. The Cochran-Armitage trend test was used to assess the relationship between the possible predictors and the decision to keep the camera on or off.

Table 1

Respondents by Camera Usage and Country

Respondents by the usage of camera on/off	Portugal		Romania		Total	
	Frequency	%	Frequency	%	Frequency	%
Camera off	407	71.40%	407	79.02%	814	75.02%
Camera on	152	26.67%	100	19.42%	252	23.23%
It depends on the context	11	1,93%	8	1.56%	19	1.75%
Total respondents	570	100%	515	100%	1,085	100%

Table 2

Cochran-Armitage trend test results for testing association between camera_off_on and possible predictors (total number of participants)

Predictor variable	n	statistic	p	p signif	df	Method
<i>age_group</i>	1,066	32.668	< 0.001	****	1	Cochran-Armitage trend test
<i>gender</i>	1,066	0.668	0.414	ns	1	Cochran-Armitage trend test
<i>level_of_study</i>	1,066	3.965	0.046	*	1	Cochran-Armitage trend test
<i>hours_online</i>	1,065	0.875	0.35	ns	1	Cochran-Armitage trend test
<i>semesters_online</i>	1,066	1.059	0.303	ns	1	Cochran-Armitage trend test
<i>like_online_edu</i>	1,066	0.007	0.933	ns	1	Cochran-Armitage trend test
<i>low_interact_classmates</i>	1,066	18.205	< 0.001	****	1	Cochran-Armitage trend test
<i>need_emotional_support</i>	1,066	0.003	0.957	ns	1	Cochran-Armitage trend test
<i>perceived_emo_disconnect</i>	1,066	3.96	0.047	*	1	Cochran-Armitage trend test

Table 3

Cochran-Armitage trend test results for testing association between camera_off_on and possible predictors (Portugal and Romania)

Predictor variable	Country	n	statistic	p	p.signif	df	Method
age_group	Portugal	559	23.364	< 0.001	****	1	Cochran-Armitage trend test
age_group	Romania	507	10.090	0.001	**	1	Cochran-Armitage trend test
gender	Portugal	559	0.579	0.447	ns	1	Cochran-Armitage trend test
gender	Romania	507	0.001	0.977	ns	1	Cochran-Armitage trend test
level_of_study	Portugal	559	4.181	0.041	*	1	Cochran-Armitage trend test
level_of_study	Romania	507	0.983	0.321	ns	1	Cochran-Armitage trend test
hours_online	Portugal	559	2.243	0.134	ns	1	Cochran-Armitage trend test
hours_online	Romania	506	0.217	0.641	ns	1	Cochran-Armitage trend test
semesters_online	Portugal	559	0.520	0.471	ns	1	Cochran-Armitage trend test
semesters_online	Romania	507	2.760	0.097	ns	1	Cochran-Armitage trend test
like_online_edu	Portugal	559	0.028	0.868	ns	1	Cochran-Armitage trend test
like_online_edu	Romania	507	0.191	0.662	ns	1	Cochran-Armitage trend test
low_interact_classmates	Portugal	559	9.920	0.002	**	1	Cochran-Armitage trend test
low_interact_classmates	Romania	507	11.084	0.001	***	1	Cochran-Armitage trend test
need_emotional_support	Portugal	559	0.178	0.674	ns	1	Cochran-Armitage trend test
need_emotional_support	Romania	507	0.922	0.337	ns	1	Cochran-Armitage trend test
perceived_emo_disconnect	Portugal	559	0.439	0.508	ns	1	Cochran-Armitage trend test
perceived_emo_disconnect	Romania	507	3.490	0.062	ns	1	Cochran-Armitage trend test

5. Results

In both countries, most respondents reported usually keeping their cameras off. Specifically, 407 respondents in Portugal (71.4%) and 407 respondents in Romania (79.0%) indicated that they keep their cameras off (Table 1). By contrast, a smaller proportion reported keeping their cameras on, with 152 respondents (26.7%) in Portugal and 100 respondents (19.4%) in Romania. Only a very small number of respondents stated that their camera usage depends on the context (1.9% in Portugal and 1.6% in Romania). The results suggest that keeping the camera off is the dominant practice among students in both countries.

Age group (Table 2) showed a strong linear trend association with camera use (Cochran-Armitage $\chi^2 = 32.67$, $p < .001$). This result is consistent with other studies that suggested this association. In our case, students who are above 26 years old, who attended more online semesters, and were at the master's or postgraduate level were more likely to keep the camera on during online classes.

Cochran-Armitage trend tests indicated significant associations between camera use and age group ($\chi^2 = 32.67$, $p < .001$), perceived low interaction with classmates ($\chi^2 = 18.21$, $p < .001$), level of study ($\chi^2 = 3.97$, $p = .046$), and perceived emotional disconnection ($\chi^2 = 3.96$, $p = .047$).

No significant trends were found for gender, hours spent online, number of online semesters, liking online education, or need for emotional support. These findings suggest that camera use is primarily associated with social and demographic factors rather than exposure to or attitudes toward online learning.

The pattern of results was largely consistent across Portugal and Romania (Table 3). Age group and low interaction with classmates showed significant trends in both samples, whereas gender, online learning exposure, preference for online education, emotional support needs, and perceived emotional disconnection did not. The only discrepancy concerned level of study, which was significantly associated with the outcome in Portugal, but not in Romania.

The results led us to conclude that there may be more pragmatic and rational explanations related to the decision to keep the camera on or off during online classes. We observed that older students, who may be more interested in participating in courses, are more likely to keep the camera on. Although students feel that keeping the camera off may lead to emotional disconnection, they do not change their behaviour. One unexpected result is the lack of

association between the camera on/off and gender. Recent studies restated the correlation between gender and digital empathy (Duarte et al., 2023). Keeping the camera on could be interpreted as a manifestation of empathy to teachers who often find themselves teaching in front of black rectangles, as most students keep their cameras off. As Händel et al. (2022) assert, students usually do not turn their webcams on or rarely do it during online classes, and the reasons go far beyond technical issues or privacy concerns. However, the lack of association between empathy and the habit of turning on the camera during online classes leads us to believe that the explanations should be searched elsewhere.

To understand the motivation of students, a thematic analysis was conducted on the answers to the open-ended question (Q29).

A total of 827 comments were analysed regarding students’ reasons for keeping their cameras off during online classes, and six major themes were identified (Table 4). The most frequently mentioned theme was personal comfort, accounting for 50.93% of all comments (n=421). Within this theme, students most often referred to *feeling relaxed* (n=236), followed by *privacy concerns* (n=122) and *aesthetic reasons* (n=63). These responses indicate that keeping the camera off was primarily perceived to maintain comfort and protect personal space during online learning.

The second most prevalent theme was social anxiety, representing 32.64% of the comments (n=270). Students reported *lack of security* (n=132) and *shyness* (n= 59) as the most common reasons, followed by *avoiding distractions during class* (n= 31), *Zoom fatigue* (n= 26), *avoiding interaction in class* (n= 13), and *an unpleasant educational context* (n=9). These findings suggest that camera avoidance could be linked to emotional and social discomfort.

The theme of *multitasking* accounted for 7.61% of comments (n=63), with students mentioning doing other activities without the teacher noticing.

Less frequently mentioned themes included *social conformity* (4.11%, n=34), referring to peer pressure and habitual behaviour, and *asserting students’ rights* (3.38%, n=28), where students emphasized autonomy and the belief that they should not be forced to turn their cameras on.

Finally, *technological shortcomings* represented only 1.33% of responses (n=11), indicating that technical problems were rarely perceived as a primary reason for keeping cameras off.

Although personal comfort was the most frequently reported reason for keeping cameras off in both countries, it was considerably more salient among Portuguese students (58.2% of coded comments) than Romanian students (44.0%). This difference was mainly attributable to privacy concerns, which were mentioned almost twice as often in Portugal. Social anxiety emerged as the second most common theme in both samples, accounting for approximately one-third of comments. However, Romanian students more frequently referred to feelings of insecurity and exposure, whereas Portuguese students more often described shyness. A notable cross-national difference concerned multitasking, which was substantially more prevalent among Romanian respondents (11.1%) than Portuguese respondents (4.0%). By contrast, social conformity, students’ rights arguments, and technological problems were relatively infrequent explanations in both countries.

Table 4

Themes related to keeping the camera off

No	Theme	Open-coded category in questionnaire	Frequency Portugal	Frequency Romania	Frequency Total
1	Personal comfort	Feeling relaxed: “It’s more convenient”, “It’s more comfy”, “When I’m having online classes, I tend to prefer to be in a comfortable place and position (maybe not so much class appropriate). Therefore, I would prefer to not show that to the teacher”, “I was usually in pyjamas and comfy in bed”.	113	123	236
		Privacy: “My home is a private space, and I’d like to keep it that way”, “I share my room with other person”, “Because I don’t want to show my private space”.	81	41	122
		Aesthetic reasons: “I don’t like my face and how I express my emotions”. “I was not dressed up”, “Sometimes I don’t feel good with the way I	41	22	63

		look”, “The way I looked is not appropriated to the classes (pyjama)”, “I feel insecure about my look”.	235 (58.2%)	186 (44%)	421 (50.93%)
2	Social anxiety	Lack of security: “I am anxious, I feel insecure”, “I feel safer, having the camera on makes me feel exposed and as if my every move is being watched”.	52	80	132
		Shyness: “I am very shy and I would prefer not to show my face”, “I didn’t want people to see me too much, as I was an introvert person”.	39	20	59
		Avoid being distracted during class: “I get distracted with my camera on, because I can’t stop look[ing] at me”, “Other colleagues reactions make me lose the attention to the class and the teacher”	16	15	31
		Zoom fatigue: “I get tired. I feel watched”.	12	14	26
		Avoid interaction in class: “I don’t have to engage in the class”.	7	6	13
		Unpleasant educational context: “Sometimes my colleagues laugh and I don’t know if it’s about me, so I feel uncomfortable in showing myself in an online environment”, “I’m afraid I’m going to be mocked by someone”.	3	6	9
		Total	129 (31.9%)	141 (33.3%)	270 (32.64%)
3	Multitasking	“Doing other things without the teacher knowing this”, “I clean, eat, play, watch something”, “Multitasking – doing other stuff while listening to the session”.	16	47	63
		Total	16 (4%)	47 (11.1%)	63 (7.61%)
4	Social conformity	Peer pressure: “If the majority of my colleagues have the camera off, I don’t want to stand out”, “No one kept it on”.	14	11	25
		Routine: “I’m used to”, “It’s a habit”.	4	5	9
		Total	21 (5.2%)	16 (3.8%)	34 (4.11%)
5	Asserting students’ rights	“No one can force me to turn the camera on so it’s my right to have it off”.	17	11	28
		Total	17 (4.2%)	11 (2.6%)	28 (3.38%)
6	Technological shortcomings	“The computer or Internet not working well”, “My internet gets slower when I’ve got the camera on”, “My laptop doesn’t have a camera”.	7	4	11
		Total	7 (1.7%)	4 (0.9%)	11 (1.33%)
Total no of comments			404 (100%)	423 (100%)	827 (100%)

A total of 243 comments were analysed regarding students’ reasons for keeping their cameras on (Table 5), with four main themes emerging.

Table 5*Themes related to keeping the camera on*

No	Theme	Open-coded category	Frequency Portugal	Frequency Romania	Frequency Total
1	Building the face-to face class interaction	Interactivity: "I prefer to keep my camera on - this way the whole process is more interactive", "I want to interact with the professor and my colleagues".	32	38	70
		Paying attention to class: "It made me focus more on what we were doing during the online sessions. It was a way, for me at least, to see other people's face and to be able to talk to them almost like we were actually face to face".	15	11	26
		Empathy: "Because it is still a class and, in this way, [we] maintain contact and empathy, not only with classmates, but also with teachers".	12	6	18
		The feeling of a real class: "I like to have the camera on to feel like the real classes".	11	6	17
		Engagement	5	4	9
		Total	75 (52.1%)	65 (65.7%)	140 (57,61%)
2	Respect for the teacher	Politeness: "It's a question of respect for the teacher's work", "Because I don't want the teachers to feel bad or to feel like they were lecturing no one", "Because I show interest to my teacher who is trying hard to keep the class attention".	44	23	67
		Feeling obliged to participate: "If I have the camera off, the teacher assumes that I'm not following the class".	2	1	3
		Total	46 (31.9%)	24 (24.2%)	70 (28,80%)
3	Assertiveness	Self-confidence: "Because I like to be seen and to see people too".	15	8	23
		Total	15 (10.4%)	8 (8.1%)	23 (9,48%)
4	Academic purposes	Mandatory attendance with the camera on: "It's a way to prove that I'm in the class, participating actively".	8	2	10
		Total	8 (5.6%)	2 (2%)	10 (4,11%)
Total no of comments			144 (100%)	99 (100%)	243 (100%)

The dominant theme was building face-to-face class interaction, which accounted for 57.61% of all comments (n=140). Students most frequently mentioned *interactivity* (n=70), followed by *paying attention to class* (n=26), *empathy* (n=18), *the feeling of a real class* (n=17), and *engagement* (n=9). These responses highlight the importance of social presence in online learning environments.

The second theme was respect for the teacher, representing 28.80% of the comments (n=70). Students referred to *politeness* (n=67) and *feeling obliged to participate* (n=3), suggesting that camera use was perceived as part of appropriate classroom etiquette.

The theme of assertiveness accounted for 9.48% of responses (n= 23), reflecting students' self-confidence when appearing on camera.

Finally, academic purposes represented 4.11% of comments (n=10), referring mainly to *mandatory attendance policies requiring cameras to be on*.

When compared Portugal and Romania, the most frequently reported motivation for keeping the camera on was the desire to recreate face-to-face classroom interaction, accounting for 52.1% of coded comments in Portugal and 65.7% in Romania. Romanian students were particularly likely to emphasize interactivity and communication with teachers and peers. The second most common theme was respect for the teacher, which was more prominent among Portuguese respondents (31.9%) than Romanian respondents (24.2%). References to self-confidence and comfort with being visible were comparatively infrequent in both countries, while academic or institutional requirements represented only a small proportion of responses. Overall, students in both countries viewed camera use primarily as a means of fostering engagement and social presence in the online classroom, although Portuguese students placed greater emphasis on courtesy towards teachers.

A chi-square test of independence indicated that the distribution of themes related to keeping the camera off differ between Portuguese and Romanian participants ($\chi^2 (5, N=243) = 23.80, p < .001$; the effect size: Cramér's $V = .17$). While students in Portugal and Romania reported broadly similar reasons, the relative importance of specific themes differed across countries. When it comes to keeping the camera on did not differ significantly between Portuguese and Romanian students ($\chi^2 (3, N=243) = 5.22, p = .16$; the effect size: Cramér's $V = .15$), suggesting broadly similar patterns of motivations across the two countries.

6. Discussion

The present study combined quantitative and qualitative approaches to shed light on students' webcam use in online learning environments. The integration of findings provides a coherent explanation of both the statistical associations and the underlying motivations shaping camera use.

The quantitative results indicated that webcam use was significantly associated with age, level of study, perceived interaction with classmates, and emotional disconnection. Importantly, no significant associations were found for gender, time spent online, number of semesters of online learning, or attitudes toward online education. These results suggest that webcam behaviour is not primarily driven by exposure to online learning or technological familiarity, but rather by social and emotional dynamics within the virtual classroom.

The thematic analysis complements these findings by revealing the psychological mechanisms behind students' choices. Students reported keeping their cameras off mainly for reasons related to personal comfort, privacy, and social anxiety. Together, these themes accounted for more than 80% of all comments, indicating that camera avoidance is largely a strategy of emotional self-regulation and personal boundary management. In contrast, technological problems were mentioned only rarely, suggesting that technical barriers are not a primary driver of camera use.

Conversely, the reasons for keeping cameras on were predominantly social. Students described turning their cameras on to foster interaction, increase attention, and recreate the atmosphere of face-to-face learning. Respect for the teacher also emerged as a major motivation, highlighting the role of social norms and classroom etiquette in shaping online behaviour. These results indicate that webcam use is closely tied to the concept of social presence in online education, with cameras functioning as a symbolic and practical tool for maintaining interpersonal connections.

Compared with the "camera-off" findings, the "camera-on" responses appear more convergent across countries. In both samples, students primarily associated camera use with maintaining the social and pedagogical qualities of face-to-face teaching. One difference is that Romanian students emphasized interaction and engagement, whereas Portuguese students more often highlighted respect for the teacher and the social obligation to visibly participate. The thematic analysis showed that reasons for turning cameras on are largely shared across Portugal and Romania, while reasons for turning cameras off show more national variation, particularly regarding privacy, insecurity, and

multitasking. Students in both countries generally agree on the positive functions of camera use (interaction, respect, engagement), whereas the factors that discourage camera use appear to be more culturally or contextually variable. Therefore, we argue that camera-on motivations may be relatively universal, while camera-off motivations could be more sensitive to local circumstances and student experiences.

Taken together, the findings reveal a clear duality in the role of webcams in distance learning. On the one hand, as the literature review suggests, cameras may enhance engagement by humanizing the learning environment and facilitating interaction. On the other hand, as our findings suggest, they are associated with significant psychological and emotional barriers related to privacy, social evaluation, and fatigue. Students' decisions to activate or deactivate their cameras, therefore, reflect a continuous negotiation between the desire for connection and the need for personal comfort.

These findings are consistent with previous research (Castelli & Sarfary, 2021; Gherheș et al., 2021; Hosszu et al., 2022), which reported a widespread preference for keeping cameras off during online classes. The present study adds nuance to this literature by showing that this preference is primarily rooted in emotional and social factors rather than technological limitations. Students' choices appear to be shaped by their comfort levels, their sensitivity to social evaluation, and their need to manage competing demands during online learning.

Furthermore, in line with Duarte et al. (2023), the results highlight an important trade-off associated with camera use. While turning the camera off may reduce social pressure and increase comfort in the short term, it is also associated with lower perceived interaction and greater emotional disconnection. This finding suggests that camera avoidance could be associated with feelings of isolation and reduced social integration within the academic community.

Overall, the results indicate that webcam use should not be framed as a simple issue of compliance or discipline. Instead, it should be understood as a complex behaviour shaped by social presence, emotional well-being, and classroom climate. Requiring constant camera use may, therefore, place an unnecessary psychological burden on some students.

Encouraging voluntary participation, offering multiple forms of engagement, and fostering a supportive classroom climate may help balance the benefits of visual presence with students' need for comfort and autonomy. Such strategies can contribute to more inclusive and effective online learning environments.

7. Conclusions

This study examined how the use of webcams influences student engagement in online higher education, based on quantitative and qualitative data collected from 1,085 university students in Portugal and Romania. The results demonstrate that students' decisions to turn their webcams on or off are closely linked to how they experience participation, interaction, and emotional engagement in virtual classrooms.

The results show that webcam use is less related to technological limitations or familiarity with online learning and more strongly associated with the social and emotional dimensions of engagement. Students who kept their cameras on generally did so to strengthen interaction with peers and teachers, maintain focus during classes, recreate the atmosphere of in-person learning, and show respect for instructors. In this sense, webcam use served as a tool to increase social presence and reinforce active participation in online classes.

At the same time, the study also revealed that most students preferred to keep their cameras off, mainly due to concerns related to personal comfort, privacy, anxiety, shyness, and social pressure. For many students, turning off the webcam represented a strategy to reduce emotional stress and protect personal boundaries during online learning. Although students acknowledged that keeping their cameras off could contribute to emotional distance and weaker interaction with peers, these concerns were often outweighed by the need to feel comfortable and psychologically safe.

The findings thus highlight a central tension in online education: webcams can simultaneously promote and inhibit engagement. On the one hand, visible participation stimulates interaction, attention, empathy, and a stronger sense of community in the classroom. On the other hand, mandatory visibility can increase anxiety, fatigue, and discomfort, discouraging participation among some students. Engagement in online learning should therefore not be understood simply as visual presence, since students can remain cognitively engaged even with their cameras turned off.

The study further suggests that students who use webcams are primarily motivated by relational and participatory goals, while students who avoid using webcams are primarily motivated by emotional self-protection and the search for comfort. This distinction is important because it demonstrates that the behaviour of keeping the camera off should not be automatically interpreted as disengagement or lack of interest. Instead, webcam practices reflect different ways in which students navigate participation, well-being, and social exposure in digital learning environments.

Overall, the research supports the adoption of flexible and inclusive policies regarding webcam use. Rather than mandating the use of the camera, educators should create conditions that encourage voluntary visual participation, while also offering alternative forms of interaction for students who prefer to keep their cameras off. Strategies such as participation in chats, collaborative activities, polls, and interactive discussions can help maintain engagement without increasing psychological pressure.

By shifting the focus from surveillance and compliance to meaningful interaction and student well-being, higher education institutions can foster more welcoming and effective online learning environments. Future research should continue to explore how webcam practices affect different dimensions of engagement across various disciplines, cultural contexts, and hybrid learning models, particularly regarding their long-term impact on academic performance, emotional well-being, and students' sense of belonging.

Several limitations should be considered when interpreting the findings of this study. First, the research relies on self-reported data, which may be affected by social desirability bias. Students might underreport behaviours perceived as less acceptable (e.g., multitasking during classes) or overemphasize socially desirable motivations such as engagement or respect for teachers. Second, the study uses a cross-sectional design, which limits the ability to draw causal conclusions. While significant associations were identified between webcam use and several variables (e.g., age, interaction with classmates, emotional disconnection), the direction of these relationships cannot be definitively established. Third, the sample includes students from only two countries (Portugal and Romania). Cultural norms regarding privacy, classroom behaviour, and teacher-student relationships may influence webcam practices. Therefore, the generalizability of the findings to other cultural or educational contexts may be limited. Fourth, the study focuses exclusively on students' perspectives. Teachers' expectations, institutional policies, and course design were not directly examined, although these factors likely play an important role in shaping webcam use. Fifth, the qualitative component was based on short written responses, which, while useful for identifying themes, do not provide the same depth as full qualitative interviews or ethnographic observations.

Practical implications for educators and institutions

Based on the findings of this research, the following recommendations are offered to help educators and academic institutions navigate the complexities of webcam use, fostering a more inclusive and effective digital learning environment:

Adopting a pedagogical approach that prioritizes choice

Instead of imposing rigid “cameras on” rules, educators should prioritize student autonomy. This study indicates that making webcam use mandatory can generate privacy concerns and increase student anxiety, ultimately hindering learning. By making webcam use voluntary, instructors reduce the psychological burden on students, allowing them to participate in a way that feels safe and sustainable.

Establish clear and objective communication

Instructors should explicitly communicate the “why” of using the camera in certain specific activities. If a session involves small group discussion rooms or collaborative debates where nonverbal cues are vital, explaining these benefits can encourage students to participate. When students understand that visibility is a tool for connection, not a surveillance mechanism, they are more likely to participate.

Implementing diverse engagement strategies

To accommodate students who choose to keep their cameras off, educators can integrate alternative engagement tools. Using real-time polls, chat discussions, collaborative digital whiteboards, and shared documents can help ensure

that “cameras off” doesn’t necessarily mean “disengagement.” These suggestions, among others, allow students to demonstrate their presence, participation, and understanding without the stress of being exposed on screen.

Promoting a welcoming social environment

Given that webcam use is heavily influenced by social conformity, instructors can lead by example. Creating a “humanized” atmosphere where, for example, the teacher acknowledges their own technical or environmental obstacles can lessen the pressure on students. Furthermore, institutions can provide training or guidance on the use of digital backdrops or filters to mitigate privacy concerns regarding students’ personal space.

Monitoring and supporting isolated students

As data reveals that students who keep their cameras off may feel more disconnected and in need of more emotional support, educators should proactively check in on how these students are feeling. Brief, private messages or virtual “office hours” can bridge this gap, ensuring that those who opt for anonymity still feel valued members of the academic community.

By shifting the focus from visual surveillance to meaningful interaction, educational institutions can create digital spaces that respect individual boundaries while maintaining high standards of academic engagement and student well-being.

References

- Bailenson, J. (2021). Nonverbal overload: A theoretical argument for the causes of Zoom fatigue. *Technology, Mind and Behaviour*, 2 (1). 1-6. <https://doi.org/10.1037/tmb0000030>
- Borup, J., Graham, C., West, R., Archambault, L., & Spring, K. (2020). Academic Communities of Engagement: An expansive lens for examining support structures in blended and online learning. *Educational Technology Research and Development*, 68 (2), 807–832. <https://doi.org/10.1007/s11423-020-09744-x>
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3 (2), 77-101. <http://dx.doi.org/10.1191/1478088706qp063oa>
- Day, J., & Verbiest, C. (2021). Lights, Camera, Action? A Reflection of Utilizing Web Cameras during Synchronous Learning in Teacher Education. *Teacher Educators' Journal*, 14, 3-21.
- Dennen, V., Yalcin, Y., Hur, J., & Screws, B. (2022). Student Webcam Behaviors and Beliefs: Emergent Norms, Student Performance, and Cultural Differences. *Online Learning*, 26(4), 168-192. <https://doi.org/10.24059/olj.v26i4.3472>
- Dixon, M. D. (2015). Measuring student engagement in the online course: The online student engagement scale (OSE). *Online Learning*, 19(4), 1-21. <https://doi.org/10.24059/olj.v19i4.561>
- Duarte, A. & Riedl, K. (2021). ‘Virtualmente’ los mismos resultados de aprendizaje. Un caso de estudio de un proyecto de comunicación internacional. *Revista ICONO 14. Revista Científica De Comunicación Y Tecnologías Emergentes*, 19(2), 189-211. <https://doi.org/10.7195/ri14.v19i2.1724>
- Duarte, A. & Riedl, K. (2022), Perceived Learning Effectiveness and Student Satisfaction: Lessons Learned from an Online Multinational Intensive Program. In Smith & Zhou (Eds.), *Handbook of Research on Teaching Strategies for Culturally and Linguistically Diverse International Students*, (pp.326-344). IGI Global. <https://doi.org/10.4018/978-1-7998-8921-2>
- Duarte, A., Surugiu, R., Moraru, M., & Marinescu, V. (2023). Digital empathy in online education: A comparison study between Portugal and Romania. *Comunicar*, 76, 107-118. <https://doi.org/10.3916/C76-2023-09>
- European Commission. (2022). *Digital Economy and Society Index (DESI) 2022*. <https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-desi-2022>

- Farid, H., Siddiqui, T., Sukhia, R., Hasan, S., Naveed, A., & Pasha, L. (2022). Imperceptible learners: Students' reasons for keeping webcams off and strategies to address students' challenges. *Journal of Education and Health Promotion, 11*(1), 325. https://doi.org/10.4103/jehp.jehp_1836_21
- Fredricks, J., Blumenfeld, P., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109. <https://doi.org/10.3102/00346543074001059>
- Giesbers, B., Rienties, B., Tempelaar, D., & Gijssels, W. (2013). Investigating the relations between motivation, tool use, participation, and performance in an e-learning course using web-videoconferencing. *Computers in Human Behavior, 29*(1), 285–292. <https://doi.org/10.1016/j.chb.2012.09.005>
- Gherheș, V., Șimon, S., & Para, I. (2021). Analysing students' reasons for keeping their webcams on or off during online classes. *Sustainability, 13*(6), 3203 1-13. <https://doi.org/10.3390/su13063203>
- Händel, M., Bedenlier, S., Kopp, B., Gläser-Zikuda, M., Kammerl, R., & Ziegler, A. (2022). The webcam and student engagement in synchronous online learning: visually or verbally? *Education and Information Technologies, 27*(7), 10405-10428. <https://doi.org/10.1007/s10639-022-11050-3>
- Hosszu, A., Rughiniș, C., Rughiniș, R., & Rosner, D. (2022). Webcams and social interaction during online classes: Identity work, presentation of self, and well-being. *Frontiers in Psychology, 12*, 761427. <https://doi.org/10.3389/fpsyg.2021.761427>
- Kiranou, H., & Karayianni, I. (2023). Now You See Me, Now You Don't: Student Engagement, Student Instructor Relationship and Webcam Use in Synchronous Courses. <https://doi.org/10.31219/osf.io/ky2r7>
- Kubiatko, M., Yilmaz, H., & Halakova, Z. (2012). The attitudes of Slovakian and Turkish high school students to the ICT used in biology according to gender and age differences. *Energy Education Science and Technology Part B: Social and Educational Studies, 4*(1), 433-446.
- Lai, K. W., & Hong, K. S. (2015). Technology use and learning characteristics of students in higher education: Do generational differences exist? *British Journal of Educational Technology, 46*(4), 725-738. <https://doi.org/10.1111/bjet.12161>
- Li, N., Romera Rodriguez, G., Xu, Y., Bhatt, P., Nguyen, H. A., Serpi, A., ... & Carroll, J. M. (2022, June). Picturing one's self: Camera use in Zoom classes during the COVID-19 pandemic. In *Proceedings of the ninth ACM conference on learning@ scale* (pp. 151-162). <https://doi.org/10.1145/3491140.3528284>
- Martin, F., & Bolliger, D. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online learning, 22*(1), 205-222. <https://doi.org/10.24059/olj.v22i1.1092>
- Park, C., & Kim, D. G. (2020). Exploring the roles of social presence and gender difference in online learning. *Decision Sciences Journal of Innovative Education, 18*(2), 291-312. <https://doi.org/10.1111/dsji.12207>
- Racheva, V. (2018). Social aspects of synchronous virtual learning environments. *AIP Conference Proceedings, 2048*, 020032. <https://doi.org/10.1063/1.5082050>
- Robal, T., Zhao, Y., Lofi, C., & Hauff, C. (2018). Webcam-based attention tracking in online learning: A feasibility study. In *the 23rd International Conference on Intelligent User Interfaces* (pp. 189-197). <https://doi.org/10.1145/3172944.3172987>
- Terry, C., & Cain, J. (2016). The emerging issue of digital empathy. *American journal of pharmaceutical education, 80*(4), 1-4. <https://doi.org/10.5688/ajpe80458>
- Tien, I. S., Imundo, M. N., & Bjork, E. L. (2023). Viewing oneself during synchronous online learning increases appearance anxiety and decreases memory for lecture content. *Applied Cognitive Psychology, 37*(2), 395–404. <https://doi.org/10.1002/acp.4048>
- Uzun, G. Ö., Eş, A. Ç., & Evram, G. (2020). Examination of attitudes of university students in distance education according to some variables. *Near East University Online Journal of Education, 3*(2), 104-115. <https://doi.org/10.32955/neuje.v3i2.248>
- Zabel, S., Vinan Navas, G., & Otto, S. (2022). Social norms and webcam use in online meetings. *Frontiers in psychology, 13*, 907405, 1-7. <https://doi.org/10.3389/fpsyg.2022.907405>

Appendix. Sample characteristics

- Table A1. Respondents by Age and Country
- Table A2. Respondents by Gender and Country
- Table A3. Respondents by Level of Study and Country
- Table A4. Respondents by Exposure to Online Education and Country

Table A1

Respondents by Age and Country

Age	Portugal		Romania		Total	
	Frequency	%	Frequency	%	Frequency	%
18-20 y.	315	55.26%	212	41.17%	527	48.57%
21-23 y.	158	27.72%	237	46.01%	395	36.41%
24-26 y.	48	8.42%	41	7.97%	89	8.20%
+26 y.	49	8.60%	25	4.85%	74	6.82%
Total	570	100%	515	100%	1,085	100%

Table A2

Respondents by Gender and Country

Gender	Portugal		Romania		Total	
	Frequency	%	Frequency	%	Frequency	%
Female	401	70.35%	395	76.70%	796	73.36%
Male	166	29.12%	113	21.94%	279	25.72%
Other	2	0.35%	4	0.78%	6	0.55%
I prefer not to answer	1	0.18%	3	0.58%	4	0.37%
Total	570	100%	515	100%	1,085	100%

Table A3

Respondents by the Level of Study and Country

Level of study	Portugal		Romania		Total	
	Frequency	%	Frequency	%	Frequency	%
1st Bachelor	166	29.12%	88	17.10%	254	23.41%
2nd Bachelor	104	18.24%	109	21.17%	213	19.63%
3rd Bachelor	128	22.47%	147	28.54%	275	25.34%
4th Bachelor	6	1.05%	1	0.19%	7	0.65%
1st Master	84	14.73%	97	18.84%	181	16.68%
2nd Master	41	7.20%	51	9.90%	92	8.48%
PhD studies	12	2.10%	7	1.36%	19	1.75%
Postgraduate studies	19	3.34%	11	2.13%	30	2.76%
Other	10	1.75%	4	0.77%	14	1.30%
Total	570	100%	515	100%	1,085	100%

Table A4

Respondents by Exposure to Online Education and Country

Number of semesters attending online education	Portugal		Romania		Total	
	Frequency	%	Frequency	%	Frequency	%
1	81	14.21%	33	6.41%	114	10.51%
2	182	31.93%	83	16.12%	265	24.42%
3	170	29.82%	150	29.13%	320	29.49%
4	56	9.82%	166	32.23%	222	20.46%
5	7	1.23%	64	12.43%	71	6.54%
+ 5	8	1.40%	9	1.75%	17	1.57%
I did not follow any online classes	66	11.58%	10	1.94%	76	7.00%
Total	570	100%	515	100%	1,085	100%

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The authors declare that no generative artificial intelligence tools were used for data analysis, statistical processing, interpretation of findings, theoretical development, or any stage of the empirical research process. AI-assisted tools were employed exclusively for clarity improvement and minor linguistic editing after the scientific content had been fully developed by the authors. The following tools were used: Grammarly, ChatGPT (OpenAI), Version GPT-5.3-mini (2026), employed solely for language polishing, without altering the academic substance, argumentation, methodology, or results of the manuscript. All analytical, conceptual, and interpretative components of the study represent the author's own original work.

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