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CAMERAS ON OR OFF? A SYSTEMATIC LITERATURE REVIEW OF STUDENT CAMERA USE AND ITS IMPACT IN ONLINE SYNCHRONOUS LEARNING

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Abstract *Cameras are commonly used in online synchronous learning; however, research exploring the motivations behind students' camera use and its effects remains limited. This study systematically reviews the literature to investigate why students switch their cameras on or off during online synchronous lessons and how this behaviour impacts both instructors and students. The review followed five methodological steps: review protocol, research question formulation, systematic search (Scopus, Wiley, Taylor Francis, Sage, Springer Link, Emerald), quality appraisal, and thematic analysis. The analysis identified 19 themes according to four categories: (a) Motivation for turning cameras on: (1) social presence, (2) external motivation, (3) instructor's policy, (4) context dependence; (b) Barriers to camera use: (1) optional requirement, (2) passive learning, (3) online fatigue, (4) social norms, (5) lack of personal space, (6) privacy concerns, (7) appearance consciousness, (8) psychological factors, (9) technology issues, (10) avoiding distractions; (c) The impact of camera use: (1) active engagement, (2) anxiety; and (d) Consequences of turning camera off: (1) lack of engagement, (2) lack of connectedness, (3) lack of integrity. The findings provide insights for instructors on camera-use policies to enhance student engagement.*

Keywords: *camera usage, student anxiety, student engagement, online synchronous learning, privacy concerns*

INTRODUCTION

The advent of online synchronous education has transformed the way students and instructors interact in virtual learning environments. Platforms such as Zoom, Microsoft Teams and Webex have created opportunities for real-time communication that can enhance engagement and interaction in online learning (Martin et al., 2021). Seminal works have also provided the theoretical foundation for understanding how synchronous tools influence teaching and learning. For example, McBrien et al. (2009) demonstrated how structured interaction within virtual classrooms can support student engagement, while Swan (2002) highlighted the central role of interaction in fostering online learning communities.

A key concept in this regard is social presence, defined as the extent to which participants in an online environment are able to present themselves as "real" people in social and emotional terms (Garrison et al., 1999). Social presence has been associated with improved satisfaction, motivation and participation in online courses (Richardson et al., 2017. Camera use, in particular, is often regarded as a visible indicator of social presence, potentially strengthening perceptions of connection, immediacy and accountability. Nevertheless, the extent to which social presence is achieved is shaped by a range of factors, including technology, course design and learner preferences, making its relationship with camera use both multifaceted and context-dependent.

While online synchronous learning has enabled educators to bridge geographical barriers, student disengagement remains a critical challenge. Studies indicate that students who switch their cameras off are less likely to participate actively in discussions (Garris et al., 2022), report lower levels of social presence (Lee et al., 2023), and experience increased disengagement (Castelli & Sarvary, 2021). Furthermore, research suggests that camera use policies impact students' perceived autonomy, privacy concerns, and cognitive load during virtual classes (McMillan et al., 2022). Given these implications, it is crucial to understand the factors influencing students' camera usage decisions and their subsequent effects on learning outcomes.

Several studies (e.g. Castelli & Sarvary, 2021; McMillan et al., 2022) have explored students' reluctance to turn cameras on; however, these studies have not systematically synthesised empirical findings across different educational contexts. Most prior research lacks a comprehensive theoretical grounding to explain camera usage behaviours. Additionally, cross-cultural variations in student engagement and camera preferences remain underexplored. This study fills these gaps by conducting a systematic literature review (SLR) to consolidate findings, identify key themes, and offer evidence-based recommendations for instructors and policymakers.

An SLR is essential in consolidating diverse findings across multiple studies, identifying thematic trends, and providing evidence-based pedagogical strategies. Unlike traditional narrative reviews, an SLR follows a structured and transparent methodology, ensuring that the synthesis of research is comprehensive and reproducible. Following PRISMA guidelines (Page et al., 2021), this review systematically identifies, appraises, and synthesises peer-reviewed studies on student camera usage in online learning, offering a holistic perspective on the phenomenon. The implications of the empirical findings could suggest pedagogical strategies for instructors to encourage their students to switch their cameras on or to create an interactive learning environment when cameras are switched off. To address these gaps, this study systematically reviews the existing literature to answer two key questions:

1. What are the reasons for students turning their camera on/off during online synchronous lessons?
2. What are the effects of this decision on student engagement and learning?

This study is guided by Self-Determination Theory (Deci & Ryan, 2013) to understand the motivational factors behind students' camera usage and Social Presence Theory (Short et al.,

1976) to examine how visibility affects engagement and interaction in virtual classrooms. Self-Determination Theory explains that students' decisions to turn their cameras on or off may be driven by intrinsic motivation (e.g. feeling socially connected) or extrinsic factors (e.g. instructor mandates). Social Presence Theory suggests that increased visibility in online learning environments enhances communication, interaction, and engagement, which are critical for effective learning.

MATERIALS AND METHODS

This study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, covering research question formulation, systematic search strategies (identification, screening, eligibility), quality appraisal, and data extraction and analysis.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

PRISMA guides systematic reviews by structuring research questions, defining inclusion/exclusion criteria, and ensuring rigorous literature searches (Page et al., 2021). This study applied PRISMA to examine reasons for and effects of student camera use in online learning and instructor strategies to encourage video participation.

Formulation of Research Question

To guide the review, the following questions were formulated:

1. What are the reasons for students switching their cameras on/off during online synchronous lessons?
2. What are the effects of this decision on student engagement and learning?

Systematic Search Strategy

This study followed the identification, screening, and eligibility process for a structured literature review (Shaffril et al., 2018). Scopus was chosen for its high-quality, peer-reviewed content, broad coverage in education and social sciences, and superior citation tracking. While Web of Science (WoS) is also reputable, its significant overlap with Scopus made its inclusion redundant. Google Scholar was excluded due to quality inconsistencies and limited filtering options. PRISMA guidelines emphasise selecting databases with structured metadata and retrievability, which Scopus ensures.

Identification

Key search terms were refined using a thesaurus, database suggestions, previous studies, and expert input. Boolean operators, phrase searching, truncation, and wildcards were applied in Scopus, yielding 186 potential articles (Table 1).

Table 1
The Search String Used for the Systematic Review Process

Database	String
SCOPUS	TITLE-ABS-KEY (camera OR video camera OR webcam OR videoconferenc*) AND (synchronous) AND (online OR online learning OR virtual) AND (class*) AND (strateg*)

Screening

Articles were screened based on publication year (2004–2024), empirical research focus, and English language (Kraus et al., 2020) (Table 2). Manual screening excluded 120 articles for irrelevance, non-English language, or lack of retrievability, leaving 66 articles for eligibility assessment.

Table 2
Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Timeline	2004-2024	2003 and earlier
Document type	Articles with empirical data	Review article, proceeding, chapter in a book, book, etc.
Language	English	Non-English

Eligibility

A second screening removed 31 articles that did not address reasons for or effects of camera use, leaving 35 articles for quality appraisal (Figure 1).

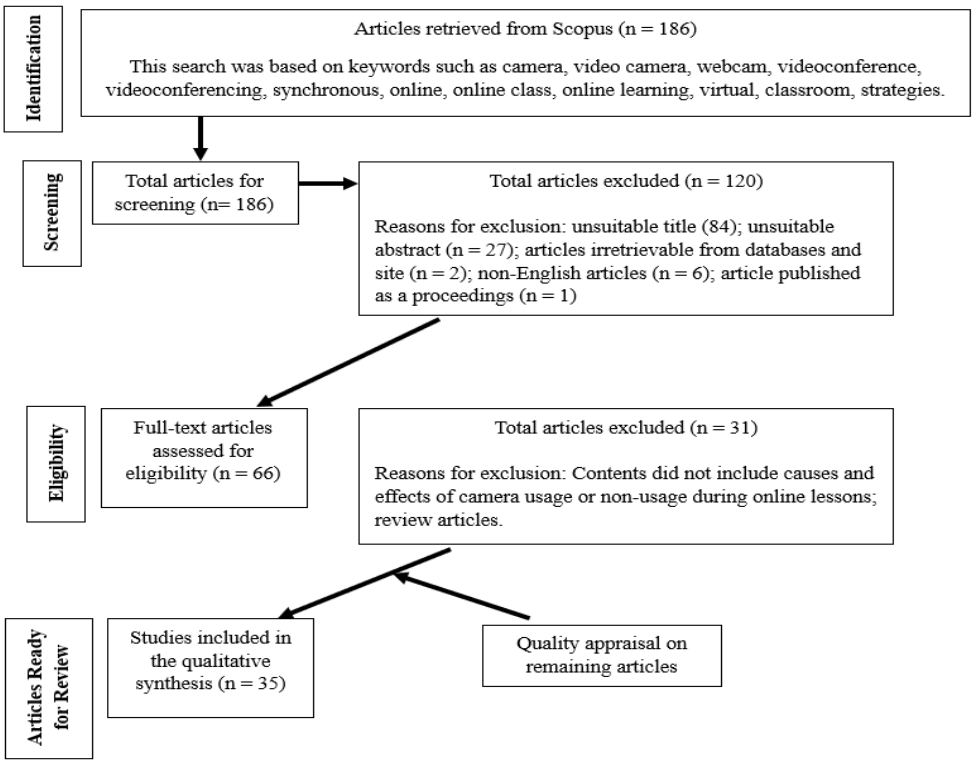

Figure 1
Flow Diagram of the Article Searching Process

Appraisal of Quality

The Mixed-Method Appraisal Tool (MMAT) (Hong et al., 2018) was used to evaluate clarity, methodology, sampling, data collection, analysis, and conclusions. Two reviewers assessed the articles, categorising 28 as high quality, five as above average, and two as average.

Data Extraction and Analysis

Data were extracted from abstracts, results, and discussion sections and synthesised using thematic analysis, which organizes large datasets into key themes (Nowell et al., 2017). This method is particularly suited for mixed research designs (Flemming et al., 2019). An external expert validated the themes:

1. **Motivations for turning cameras on** (four themes): Social presence, external motivation, instructor policy, and context dependence.
2. **Barriers to camera use** (ten themes): Optional requirement, non-interactive learning, online fatigue, social norms, personal space/living environment, privacy concerns, self-consciousness, psychological factors, technology issues, and distraction avoidance.
3. **The impact of camera use** (two themes): Active engagement, anxiety.
4. **Consequences of turning camera off** (three themes): Lack of engagement, connectedness, and academic integrity.

FINDINGS

Background of the Selected Studies

The 35 selected studies were conducted in 15 countries, with 15 from the USA, four from the UK, two each from Germany, Israel and Thailand, and one each from China, Indonesia, Japan, Lithuania, Slovenia, South Korea, Serbia, and Turkey. Two studies covered multiple countries: Dennen et al. (2022) (South Korea, Turkey, USA) and Chan et al. (2022) (Hong Kong, Australia) (Figure 2).

Regarding methodology, 16 studies used quantitative methods, 11 qualitative, and eight mixed methods (Fig. 3). By publication year, five articles were published in 2021, 11 in 2022, 17 in 2023, and two in 2024.

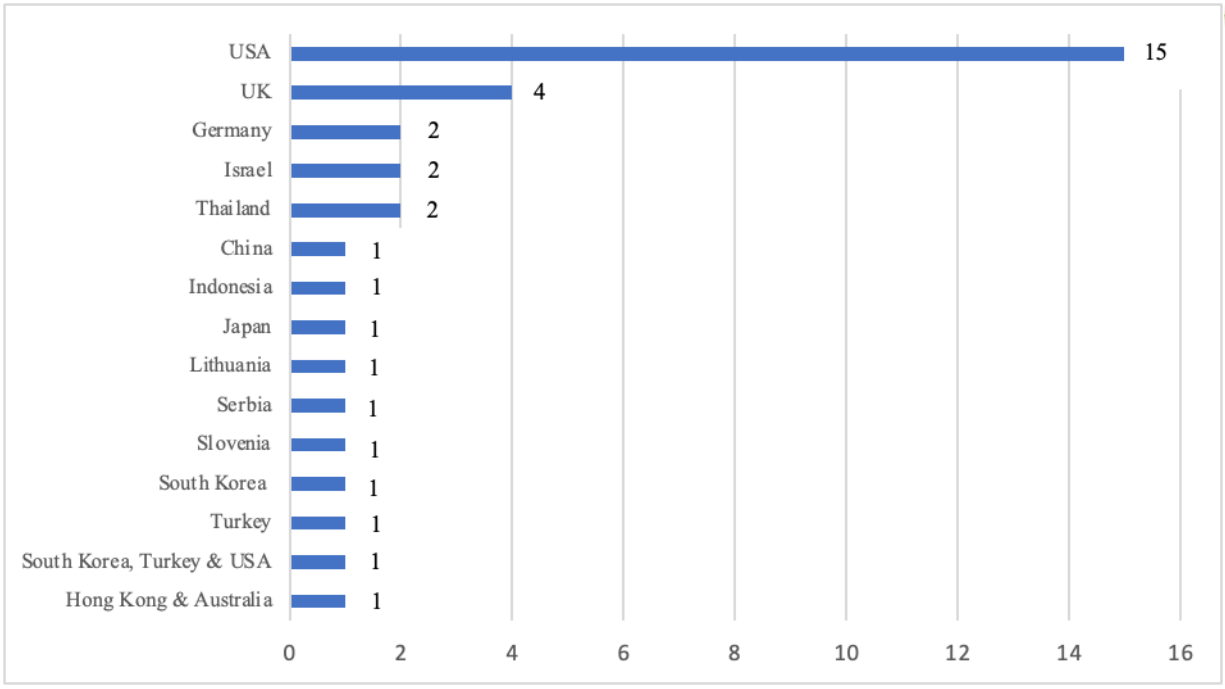

Figure 2
Countries Where the Selected Studies Were Conducted

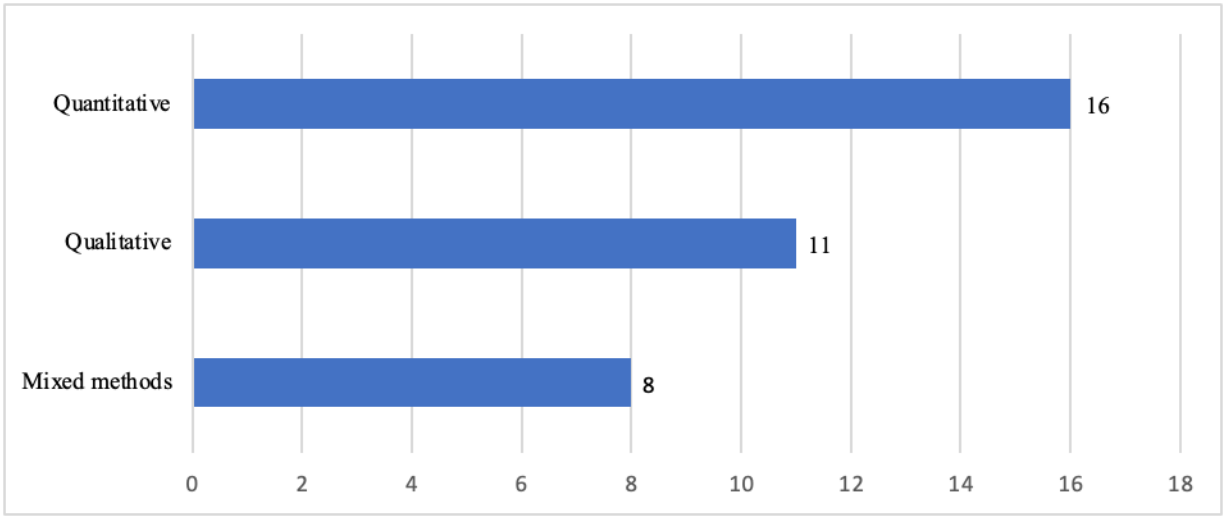

Figure 3
Research Design of the Selected Studies

The Developed Themes

The thematic analysis of 35 selected articles identified 19 themes (Table 3). For the first research question, "What are the reasons for students switching their cameras on/off during online synchronous lessons?", four themes explain students' motivation for turning cameras on: (1) social presence, (2) external motivation, (3) instructor's policy, and (4) context dependence. Ten themes explain the barriers to camera use: (1) optional requirement, (2) passive learning situations, (3) online fatigue, (4) social norms, (5) lack of personal space/inconducive

environment, (6) privacy concerns, (7) personal preference/appearance consciousness, (8) psychological factors, (9) technology/device issues, and (10) avoiding distractions.

For the second research question, "What are the effects of this decision on student engagement and learning?", two themes emerged for the impact of camera use: (1) active engagement and (2) anxiety. Three themes were identified for the consequences of turning camera off: (1) lack of engagement, (2) lack of connectedness, and (3) lack of integrity/cheating.

Motivations For Turning Cameras On: Social, Psychological, Pedagogical, and Institutional Factors

A review of the 35 articles has identified four main reasons students switch their cameras on during online synchronous lessons namely social presence, external motivation, instructor's classroom policy, and context dependent.

Social Presence

Students turned their cameras on to show support and respect for instructors, fostering connection and community (Carmi, 2024; Debbag & Fidan, 2022; Pi et al., 2024; Sederevičiūtė-Pačiauskienė et al., 2022). In Thailand and the USA, students enabled cameras out of empathy for instructors speaking to blank screens (Trust & Goodman, 2023) and to demonstrate engagement, participation, and attendance (Alim et al., 2023; LeRoy & Kaufmann, 2022).

During group activities, visibility improved interaction and nonverbal communication, such as nodding and facial expressions (Liu, 2023; Waluyo & Wangdi, 2023). Students found camera use essential in small-group discussions to create a friendlier, participatory environment, inspiring peers to do the same (Meishar-Tal & Forkosh-Baruch, 2022; Waluyo & Wangdi, 2023).

Cameras also helped simulate an in-person learning environment, keeping students attentive and accountable (Garris et al., 2022; Xu et al., 2023). Being watched by instructors and peers increased focus and engagement (Alim et al., 2023; Schwenck & Pryor, 2021; Waluyo & Wangdi, 2023), particularly during online exams (LeRoy & Kaufmann, 2022; McLeod & Gupta, 2023; Meishar-Tal & Forkosh-Baruch, 2022).

External Motivation

Instructors used cash incentives and grade-based rewards to encourage students to turn their cameras on. In the USA, students received $10 if 90% of a graduate class kept cameras on throughout a Zoom workshop (Xu et al., 2023). Some instructors also linked camera use to course grades (LeRoy & Kaufmann, 2022), though students were more motivated by peer interaction in small groups than grading incentives.

Instructors sought to create a virtual classroom mirroring in-person learning, which improved engagement and participation (Garris et al., 2022). Similarly, Taiwanese students prioritised camera use based on project significance for grades and careers over privacy concerns (Liu, 2023). In contrast, U.S. students were more likely to turn cameras on when given the option to switch them off without penalties (Trust & Goodman, 2023).

Instructor's Policy

Students are required to turn their cameras on when mandated by instructors for monitoring attendance, online exams, and group discussions (Händel et al., 2022; LeRoy & Kaufmann, 2022; Meishar-Tal & Forkosh-Baruch, 2022; Sederevičiūtė-Pačiauskienė et al., 2022; Topalov, 2023). This policy is a key reason for camera use in lessons (Carmi, 2024; Debbag & Fidan, 2022; Dennen et al., 2022; Pi et al., 2024; Trust & Goodman, 2023). However, some students oppose the policy, leaving negative feedback that may impact instructors' motivation (O'Dea & Zhou, 2023). To address this, instructors should allow students to turn cameras off when fatigued without penalty (Trust & Goodman, 2023).

Context Dependent

Students' decision to turn on their cameras depended on class or group size (Händel et al., 2022; Meishar-Tal & Forkosh-Baruch, 2022; Tien et al., 2023; West et al., 2023) and familiarity with peers (West et al., 2023). They felt more confident using cameras in smaller, familiar groups, which encouraged active participation and peer interaction (LeRoy & Kaufmann, 2022). This contrasts with earlier findings on social presence, where students sought a broader sense of community.

Social norms also influenced decisions, as students were more likely to turn on their cameras when their peers did, fostering a supportive learning environment (Alim et al., 2023; Dennen et al., 2022; Tien et al., 2023; Trust & Goodman, 2023).

Barriers to Camera Use: Anxiety, Privacy, Fatigue, Policy Uncertainty, and Technical Issues

A review of the 35 articles has identified 10 primary reasons students turn their cameras off during online synchronous lessons: it is an optional requirement by the instructor; the lesson (or part of it) did not require instructor- or peer-interaction; online fatigue; social norm; lack of personal space and inconducive learning situation; privacy concerns; student preference and appearance consciousness; psychological reasons; issues with technology and device; and to avoid distracting oneself and their peers and instructors.

Table 3.
Findings

Authors/Focus	**Motivation for Turning Camera On**				**Barriers to Camera Use**										**The Impact of Camera Use**		**Consequences of Turning Camera Off**		
Themes	SP	EM	IP	CD	OR	NIL	OF	SN	LPS	PC	SPA	PR	ITD	AD	AE	AX	LE	LC	LI
Bedenlier et al. (2021)						✓		✓		✓		✓	✓						
Castelli & Sarvary (2021)								✓	✓	✓			✓	✓	✓				
Schwenck & Pryor (2021)			✓		✓									✓			✓	✓	
Sugino (2021)								✓				✓					✓	✓	
Yarmand et al. (2021)								✓			✓		✓	✓	✓				
Chan et al. (2022)																		✓	
Debbag & Fiddan (2022)	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Dennen et al. (2022)			✓	✓							✓								
Garris et al. (2022)	✓	✓										✓							
Gregorc & Resnik (2022)											✓	✓				✓			
Händel et al. (2022)			✓	✓											✓				
LeRoy & Kaufmann (2022)	✓	✓	✓	✓		✓		✓		✓	✓	✓							
McMillan et al. (2022)								✓	✓		✓	✓	✓	✓					
Meishar-Tal & Forkosh-Baruch (2022)	✓		✓	✓		✓			✓		✓	✓							
Rojabi et al. (2022)										✓		✓				✓			
Sederevičiūtė-Pačiauskienė et al. (2022)	✓		✓						✓		✓		✓	✓					
Alim et al. (2023)	✓			✓				✓		✓	✓	✓	✓	✓	✓				
Belt & Lowenthal (2023)					✓		✓												
Broad et al. (2023)					✓												✓		
Chen & Sato (2023)					✓								✓						✓
Lee et al. (2023)					✓												✓	✓	
LeRoy et al. (2023)					✓		✓												
Liu (2023)	✓	✓			✓						✓	✓			✓				
Maware et al. (2023)					✓								✓					✓	
McLeod & Gupta (2023)	✓									✓									
O'Dea & Zhou (2023)				✓													✓		✓
Tien et al. (2023)				✓								✓	✓		✓	✓			
Topalov (2023)			✓		✓		✓									✓			
Trust & Goodman (2023)	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓		✓					
Tuckel & Pok-Carabalona (2023)									✓										
Waluyo & Wangdi (2023)	✓								✓	✓		✓	✓	✓		✓			
West et al. (2023)				✓					✓	✓		✓			✓	✓	✓	✓	
Xu et al. (2023)	✓	✓			✓														
Carmi (2024)	✓	✓	✓		✓	✓									✓		✓	✓	
Pi et al. (2024	✓	✓	✓	✓		✓									✓		✓		

Motivation for Turning Camera On
SP = Social presence
EM = External motivation
IP = Instructor's policy
CD = Context dependent

Barriers to Camera Use
OR = Optional requirement
NIL = Non-interactive learning
OF = Online fatigue
SN = Social norm
LPS = Lack of personal space or conducive living environment
PC = Privacy concerns
SPA = Student preference and appearance consciousness
PR = Psychological reasons
ITD = Issues with technology and device
AD = Avoid distracting instructor and peers

The Impact of Camera Use
AE = Active engagement
AX = Anxiety

Consequences of Turning Camera Off
LE = Lack of engagement
LC = Lack of connectedness
LI = Lack of integrity & cheating

Optional Requirement

Instructors allowed students to keep their cameras off but encouraged their use during discussions, particularly in breakout rooms (Belt & Lowenthal, 2023; Broad et al., 2023; Chen & Sato, 2023; Lee et al., 2023; LeRoy et al., 2023; Maware et al., 2023; Schwenck & Pryor, 2021; Topalov, 2023; Trust & Goodman, 2023). However, students were more likely to comply when discussions contributed to their course grade (Liu, 2023).

Passive Learning Situations

Students often turned cameras off during passive learning activities, such as lectures, screen sharing, individual work, or video viewing (Bedenlier et al., 2021; Meishar-Tal & Forkosh-Baruch, 2022). In lecture-based classes, where instructors made little effort to engage students, most students kept their cameras off unless required to speak (LeRoy & Kaufmann, 2022).

Online Fatigue

Students experienced Zoom fatigue after prolonged screen exposure, prompting them to turn off their cameras for breaks or privacy (Belt & Lowenthal, 2023; Debbag & Fidan, 2022; Trust & Goodman, 2023). This fatigue resulted from visual and audio overload, including screen gaze, mirror effect, and instructor expressions and gestures (Debbag & Fidan, 2022; Topalov, 2023; Trust & Goodman, 2023).

Students with cameras turned on reported higher anxiety than those using microphones or text to communicate in foreign language classes, likely due to the lack of visual cues such as eye contact (Topalov, 2023). However, no significant difference in total stress scores was found between students required and not required to turn on their cameras (LeRoy et al., 2023).

Social Norm

In this context, social norms refer to students following the majority in keeping their cameras off. When most students did not use video, others followed suit to avoid feeling awkward (Bedenlier et al., 2021; Debbag & Fidan, 2022; McMillan et al., 2022; Sugino, 2021). Students felt uncomfortable turning their cameras on if their peers did not (Alim et al., 2023; Castelli & Sarvary, 2021; Yarmand et al., 2021).

Lack of Personal Space and Inconducive Living Environment

Students avoided using cameras due to lack of personal space, sharing rooms with siblings, or concerns about disruptions (McMillan et al., 2022; Tuckel & Pok-Carabalona, 2023). Some respected roommates' privacy, preventing them from appearing on camera (Waluyo & Wangdi, 2023). Others were self-conscious about their home environment, worrying about instructors or peers seeing their surroundings (Castelli & Sarvary, 2021; Debbag & Fidan, 2022; Trust & Goodman, 2023; West et al., 2023). Concerns over living conditions also led students to keep cameras off (McMillan et al., 2022; Meishar-Tal & Forkosh-Baruch, 2022; Sederevičiūtė-Pačiauskienė et al., 2022).

Privacy Concerns

Privacy concerns were a major reason students kept their cameras off (Bedenlier et al., 2021; Debbag & Fidan, 2022; Meishar-Tal & Forkosh-Baruch, 2022). They feared classmates taking and sharing screenshots or recordings, sometimes leading to bullying (Alim et al., 2023; Debbag & Fidan, 2022; Rojabi et al., 2022; Waluyo & Wangdi, 2023). Many were also self-conscious about their appearance and felt judged by peers (Bedenlier et al., 2021; McLeod & Gupta, 2023; Meishar-Tal & Forkosh-Baruch, 2022; Trust & Goodman, 2023; West et al., 2023). Others avoided cameras to protect their home privacy and felt uncomfortable being constantly watched (Castelli & Sarvary, 2021; LeRoy & Kaufmann, 2022; McLeod & Gupta, 2023; Meishar-Tal & Forkosh-Baruch, 2022).

Student's Preference and Appearance Consciousness

Students avoided turning on their cameras due to personal preference, introversion, multitasking, and self-consciousness. Introverted and shy students preferred using the chat function to avoid being observed (Alim et al., 2023; Debbag & Fidan, 2022). Many multitasked during online classes, engaging in activities including eating or leaving their learning space, which they preferred to keep off-camera (Alim et al., 2023; Gregorc & Resnik, 2022; McMillan et al., 2022; Meishar-Tal & Forkosh-Baruch, 2022; Sederevičiūtė-Pačiauskienė et al., 2022; Trust & Goodman, 2023; Yarmand et al., 2021).

In the U.S., 87.7% of students multitasked on their computers, while Turkish and Korean students did so significantly less (Dennen et al., 2022). Some students kept cameras off due to inappropriate attire, fatigue, lack of motivation, or insufficient time to prepare for class (Alim et al., 2023; Debbag & Fidan, 2022; LeRoy & Kaufmann, 2022; Liu, 2023; McMillan et al., 2022).

Psychological Reasons

Psychological factors, including low self-esteem, appearance anxiety, and speaking anxiety, influenced students' decision to keep cameras off. Many lacked confidence in their appearance and were self-conscious on camera, experiencing mirror anxiety and Zoom gaze (Alim et al., 2023; Bedenlier et al., 2021; Castelli & Sarvary, 2021; Gregorc & Resnik, 2022; Liu, 2023; McMillan et al., 2022; Meishar-Tal & Forkosh-Baruch, 2022; Sugino, 2021).

Viewing themselves on screen heightened appearance anxiety and reduced learning (Tien et al., 2023). Students feared peer judgment (Gregorc & Resnik, 2022; McLeod & Gupta, 2023; West et al., 2023) and avoided cameras due to speaking anxiety or discomfort in self-expression (Debbag & Fidan, 2022; Garris et al., 2022; Rojabi et al., 2022; Trust & Goodman, 2023).

Issues With Technology and Device

Students turned their cameras off due to unstable internet or limited data, as video streaming consumes more bandwidth (Alim et al., 2023; Castelli & Sarvary, 2021; Debbag & Fidan, 2022; Sederevičiūtė-Pačiauskienė et al., 2022). Some lacked built-in cameras or had poor camera quality (Chen & Sato, 2023; Debbag & Fidan, 2022; Yarmand et al., 2021). Additional issues included hardware/software malfunctions and mobile devices overheating or draining battery quickly (Alim et al., 2023; Bedenlier et al., 2021; Debbag & Fidan, 2022; McMillan et al., 2022; Sederevičiūtė-Pačiauskienė et al., 2022; Waluyo & Wangdi, 2023).

Avoiding Distracting Self, Peers, and Instructors

Students turned their cameras off to minimise distractions for themselves, peers, and instructors. Many felt distracted by their own appearance on screen (Alim et al., 2023; Trust & Goodman, 2023; Waluyo & Wangdi, 2023) or worried about disrupting class by fidgeting, moving, or multitasking (Castelli & Sarvary, 2021; Debbag & Fidan, 2022; Yarmand et al., 2021).

Pre-service teachers in the USA engaged in eating, browsing, using phones, watching TV, or playing with pets during lessons (Schwenck & Pryor, 2021). Similarly, students in Lithuania and the USA were concerned that children at home could be distracting (McMillan et al., 2022; Sederevičiūtė-Pačiauskienė et al., 2022).

The Impact of Camera Use on Engagement, Anxiety, and Learning Outcomes

The thematic analysis identified one positive and one negative effect students experience when their cameras are turned on namely active engagement and anxiety.

Active Engagement

Students engaged more in discussions with cameras on, creating an atmosphere similar to in-person interactions (Händel et al., 2022; Liu, 2023). Hand gestures, facial expressions, and eye contact enhanced communication and clarity (Debbag & Fidan, 2022; Liu, 2023). Bayes linear regression analysis predicted that camera use and student involvement were 7.14 times more likely to impact grades Alim et al. (2023). However, camera use was context-dependent, with students feeling more confident in smaller, familiar groups (West et al., 2023) and more likely to participate when peers also had cameras on to avoid awkwardness (Alim et al., 2023; Carmi, 2024; Castelli & Sarvary, 2021; Pi et al., 2024; Yarmand et al., 2021).

Anxiety

Tien et al. (2023) found that U.S. university students experienced higher appearance anxiety when viewing themselves on camera, leading to reduced learning and memory retention. This anxiety stemmed from concerns about their looks, peer judgment, and fear of their photos being shared or posted online (Debbag & Fidan, 2022; Gregorc & Resnik, 2022; Rojabi et al., 2022; Topalov, 2023; Waluyo & Wangdi, 2023; West et al., 2023). Indonesian EFL students also faced speaking anxiety on camera, struggling with confidence in self-expression (Rojabi et al., 2022). These findings highlight how technology can contribute to anxiety and communication barriers, impacting language learning.

Consequences of Turning Camera Off: Disengagement, Social Presence, and Academic Integrity

The thematic analysis identified three negative effects students experience when their cameras are turned off namely lack of engagement, lack of connectedness, and lack of integrity and cheating.

Lack of Engagement

Stephenson (2019) describes students who join online classes but remain silent with cameras and microphones off as 'ghost' or 'no-show' students. They avoid participation, even in chat, hindering engagement, learning, and community building (West et al., 2023). Proactive students in breakout rooms felt awkward receiving no response from ghost peers (Schwenck & Pryor, 2021). Instructors struggled to interact with and monitor these students, affecting their motivation (Lee et al., 2023; O'Dea and Zhou, 2023). However, ghost students still engaged through quizzes and chat functions (Broad et al., 2023; Sugino, 2021).

Lack of Connectedness

Camera-off behaviour reduced connectedness for both students and instructors. Instructors felt like "talking to a wall", unable to read facial expressions or adjust teaching due to the lack of nonverbal cues (Chan et al., 2022; Lee et al., 2023). Students found the experience impersonal, as they could not associate faces with names or build connections (Lee et al., 2023; Maware et al., 2023). This led to isolation and independent learning, with some unsure who to contact for support (Schwenck & Pryor, 2021; West et al., 2023). Connectivity issues and technical problems further hindered student participation and camera use (Sugino, 2021).

Lack of Integrity and Cheating

The absence of camera requirements increases the risk of unethical practices in online learning. Instructors suspected cheating, lying, and plagiarism among students (Chen & Sato, 2023; O'Dea & Zhou, 2023). To counter this, they mandated camera use during exams but still observed suspicious eye movements, suggesting students were peeking at notes (O'Dea & Zhou, 2023).

To address this, instructors shifted to open-book exams (Chen & Sato, 2023) and individual oral assessments (O'Dea & Zhou, 2023). However, detecting cheating remained challenging due to physical separation. Contract cheating also increased, with students hiring others to write assignments or take exams (Chen & Sato, 2023). Ensuring cameras are on during exams can help identify sit-in imposters.

DISCUSSION

This study systematically analysed students' reasons for turning cameras on/off and the effects of this decision. More reasons were identified for camera-off behaviour (10 themes) than for camera-on behaviour (4 themes), with two effects of camera use and three effects of non-use. This section explores resistance to technology, self-awareness theory, lack of presence, and anxiety as explanations for these findings.

Resistance to Technology

Students' reluctance to use cameras can be explained by two perspectives. The *psychological approach* suggests resistance stems from change-related anxiety and uncertainty (Laumer et al., 2016; Nov & Ye, 2008; Oreg, 2003). The *rational approach* considers factors such as ease of use, perceived usefulness, and personal characteristics (Davis, 1989). Rama Murthy and Mani (2013) identify four causes of technology resistance: economic (device issues), social (peer norms, self-consciousness), environmental (fatigue, privacy concerns), and pedagogical (passive learning environments), which align with the reasons students avoid cameras.

Objective Self-Awareness Theory

According to Duval and Wicklund (1972) self-awareness increases when individuals feel socially evaluated, altering their behaviour. Students experience mirror anxiety (heightened self-consciousness from prolonged self-viewing) (Pikoos et al., 2021) and Zoom gaze (awareness of being watched by peers) (Tien et al., 2023). Mirror anxiety is particularly common among students with low self-esteem (Alim et al., 2023; Gregorc & Resnik, 2022; Liu, 2023; McMillan et al., 2022). Seeing oneself can trigger self-evaluation, stress, and even depression (Fejfar & Hoyle, 2000; Gonzales & Hancock, 2011). Additionally, 17% of U.S. students felt they were being constantly watched (Castelli & Sarvary, 2021), increasing self-consciousness, peer judgment concerns, and fear of being photographed or shared online (Debbag & Fidan, 2022; Gregorc & Resnik, 2022; Rojabi et al., 2022; Topalov, 2023; Waluyo & Wangdi, 2023; West et al., 2023).

Online Fatigue (Zoom Fatigue)

Online fatigue occurs due to prolonged exposure to screen time, constant self-viewing, and excessive visual/audio input (Bailenson, 2021; Palmer et al., 2022; Peper et al., 2021; Tien et al., 2023). Factors such as lack of nonverbal cues, multitasking, distractions, and technical issues further strain cognitive load (Fauville et al., 2021; Fuller et al., 2021; Tien et al., 2023). These elements heighten self-awareness and anxiety, making students reluctant to use cameras.

Lack of Presence and Connectedness

Camera-off behaviour reduces student engagement and leaves instructors feeling like they are "talking to a wall" (Lee et al., 2023). Visual cues help assess understanding and adjust instruction, but their absence weakens real-time interaction. However, camera use alone does not ensure connectedness. Students in Lee et al.'s (2023) study reported that even with cameras and microphones on, they did not feel the same sense of community as in physical classrooms. Lanier (2001) attributes this to structural limitations of camera and screen positioning, preventing actual eye contact between participants.

Camera Use and Anxiety

Extended eye contact in virtual settings can feel unnatural and stressful, triggering discomfort (Binetti et al., 2016; Patterson, 2012). Foreign language learners experience higher speaking anxiety on camera, struggling with self-expression and peer scrutiny (Rojabi et al., 2022). In Serbia, 75% of English for Specific Purposes students reported high anxiety in video-based communication (Topalov, 2023).

The mirror effect—seeing oneself on screen—also induces self-judgment, self-consciousness, and embarrassment (Bailenson, 2021; Castelli & Sarvary, 2021; Fejfar & Hoyle, 2000; Gonzales & Hancock, 2011; Roth & Gafni, 2021). However, some students found self-viewing beneficial for maintaining attention (LeRoy & Kaufmann, 2022; McLeod & Gupta, 2023).

Privacy and Distraction

Students worried about exposing their personal living space, particularly those from low socio-economic backgrounds (Roth & Gafni, 2021; Yeung et al., 2023) . Others feared causing distractions, such as siblings or children interrupting their class (McMillan et al., 2022; Tuckel & Pok-Carabalona, 2023). These concerns further discouraged camera use.

PEDAGOGICAL IMPLICATIONS FOR PRACTITIONERS

There are several pedagogical implications for practitioners to consider when conducting online synchronous lessons. Instructors may consider surveying students on camera use and collaboratively establishing class guidelines (Castelli & Sarvary, 2021; Trust & Goodman, 2023). These could include turning cameras on for attendance, answering questions, group discussions, and oral assessments. Discussing the benefits of camera use—collaboration, communication, and class community—can encourage participation (Castelli & Sarvary, 2021).

Incentives such as cash rewards (Xu et al., 2023) or additional marks (Liu, 2023) can promote accountability and engagement. Creating social norms by selecting high-achieving students to model camera use may influence reluctant peers, as these students tend to be more engaged and prepared (Dennen et al., 2022).

For active engagement, instructors should use the chat box for questions and discussions, as 87% of students reported high satisfaction using this function (LeSuer & Reed, 2022). Since chat lacks nonverbal feedback, emojis and anonymous surveys can help gauge comprehension (Lamon et al., 2020; Trust & Goodman, 2023). Tools such as Jamboard encourage participation and reduce distractions (de Sobral et al., 2022). Adopting student-centred methods—quizzes, case studies, projects, and multimedia—enhances engagement. Instructors should also directly involve passive students by asking questions and encouraging discussion (Beuchot & Bullen, 2005).

CONCLUSION

Online synchronous learning creates a virtual classroom, allowing students to attend lessons from any location and enabling instructors to use diverse teaching tools such as videos, PDFs, and podcasts. However, while some students prefer camera use, others opt to keep them off, raising questions about their motivations and impacts.

This study systematically reviewed 35 articles to examine the reasons and effects of camera use in online learning. Thematic analysis identified:

1. *Motivations for turning cameras on*: Social presence, external motivation, instructor policy, and context dependence.
2. *Barriers to camera use*: Optional requirement, non-interactive learning, online fatigue, social norms, personal space/living environment, privacy concerns, self-consciousness, psychological factors, technology issues, and distraction avoidance.
3. *The impact of camera use*: Active engagement, anxiety.

4. *Consequences of turning camera off*: Lack of engagement, connectedness, and academic integrity.

Findings help instructors decide whether to implement a 'camera-on' policy or allow student autonomy, balancing benefits and drawbacks.

In regard to the limitations, this study relied solely on Scopus, retrieving 186 articles, supplemented by databases including Emerald, Taylor & Francis, Sage, Springer Link, and Wiley. Future reviews should consider Web of Science and ScienceDirect for broader coverage. Additionally, the MMAT tool was used for quality appraisal, but employing multiple assessment tools could improve evaluation consistency (Shaffril et al., 2021). Future research should expand article selection and assessment methods for a more comprehensive review.

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