

Privacy and security in online teaching during the COVID-19 pandemic: experiences and concerns of teachers in UK higher education

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The coronavirus pandemic led to major changes in higher education around the world. Higher education institutions (HEIs) moved to completely online learning and a range of new technologies including online videoconferencing and chat tools. Research has shown that users have privacy and security concerns about such tools, but little is known about the attitudes of HEI teachers to these issues. An online survey of 37 UK HEI teachers explored their attitudes and concerns about privacy and security in online teaching during the pandemic. Participants' had reasonable awareness of institutional policies and were engaged in relevant training initiatives. Ratings of concern across a range of issues were generally low, however, four situations specifically were rated with moderate levels of concern. These situations involved the unauthorized use or sharing of teaching materials with others, students not turning on their webcams, students making unauthorized recordings, and accidentally sharing a wrong window containing private information. Going forward, it is important of ensuring that appropriate measures are in place to protect the privacy and security of both teachers and learners during online teaching.

Privacy and Security Concerns, Online Teaching, Higher Education, COVID Pandemic.

1. INTRODUCTION

Globally, the COVID-19 pandemic significantly impacted higher educational institutions (HEIs). HEIs were forced to shift almost entirely to online teaching, causing HEI teachers¹ around the world to teach and work online with little notice. This transition required major changes to teaching and learning methods. When possible, face-to-face lectures, seminars, and practicals were replaced with online equivalents. If this was not practicable, activities were suspended. Examinations were online or changed to alternative online assessments. This abrupt change caused teachers and students significant stress (Patterson et al., 2021; Pressley et al., 2021). Although many HEIs were already using online systems such as virtual learning environments (VLEs) to facilitate teaching and learning before the pandemic, the use of a range of different digital technologies greatly

increased during the pandemic. This sudden move to the use of many different digital technologies also initiated discussion of the privacy and security issues associated with these technologies in a teaching and learning context.

Studies of HEI teachers' experiences of the pandemic have highlighted existing privacy and security issues about online teaching, including the challenges of monitoring student participation and engagement in online sessions, the use of microphones and webcams (Gherhes et al., 2021, Yarmand et al., 2021), as well as how to monitor online assessments and examinations for collusion and cheating (Reedy et al., 2021).

The immediate impact of the pandemic on concerns about online privacy and security was seen in a wider domain in a worldwide online survey conducted in May 2020, this survey was with workers, not HEI teacher or students. However, the

¹ We use the term "HEI teacher" to cover all those who teach in an HEI context. Not all "academics" or "faculty

members" teach and some who teach do not fall into either of these categories.

survey found that privacy and security factors were the most frequently mentioned concerns about the use of increased online video conferences and communication tools (Emami-Naeini et al., 2021).

Another large general survey taken a few months before the pandemic began also found that users were concerned about the security and privacy of group chat technologies in particular (Oesch et al., 2020). These are the kinds of digital technologies that many HEIs began employing for online teaching during the pandemic, often with rapid and ad hoc deployment.

Several studies have investigated HEI teachers' experiences of digital technologies during the pandemic, in a range of countries and situations. However, no studies could be found which addressed specifically teachers' privacy and security issues regarding the digital technologies being used more frequently during the pandemic. A number of more general studies of HEI teachers' attitudes to online teaching do mention privacy or security issues. These include Alhubaishy & Aljuhani (2021) who investigated attitudes towards online learning of HEI teachers in Saudi Arabia. They found that teachers were concerned about online privacy, feared change and lacked experience in adopting digital technologies to facilitate the learning process. Another study by Vital-López et al. (2022) surveyed 993 HEI teachers in Mexico to explore their experience of online learning during the pandemic. The majority of these teachers stated that teaching from their home office invaded their family's privacy. A further study in Mexico by Zamora-Antuñano et al., (2021) examined the attitudes of 133 faculty members from 93 different HEIs. They found the main issue that the teachers faced was how they know if students were paying attention in online sessions or not.

One study which was conducted before the pandemic investigated teachers' and students' attitudes to the use of webcams in online teaching sessions. Kozar (2016) interviewed twenty experienced online language teachers from a range of countries (Australia, Canada, Ukraine, UK, USA) and twenty adult language students from Eastern Europe about their perspectives on and use of webcams in online classes for English language learning. The majority of both teachers and students only used webcams at the beginning of their sessions to create a relationship with the student or teaching and gradually stopped using them after the first two to three weeks of classes. The idea that "webcamming" is more tiring and the fact that it makes people feel awkward were two of the main reasons why participants said they used webcams less as time went on.

Since the pandemic, several studies (Yarmand et al., 2021; Petchamé et al., 2022) have highlighted the difficulty for teachers of engaging with students

who cannot be seen because they do not turn their webcams on. Research has also found that when students in an online learning environment cannot see one another or the teacher, they feel isolated and disengaged.

We found there is a paucity of information about HEI teachers' concerns about the privacy and security issues of the numerous digital technologies which have been used increasingly in online teaching since the pandemic. These technologies are very likely to continue to be used to some extent even as face-to-face education has returned in most HEIs. Therefore, we set out to investigate these concerns with a sample of HEI teachers. We chose to concentrate in the first instance on a sample of HEI teachers from the UK as educational practices at the HEI level can vary between countries. But most importantly, HEI teachers from different cultures may have different attitudes to online privacy and security, and British HEI teachers may have distinctive concerns about privacy and security in relation to their visibility (e.g. on a webcam) in online teaching situations.

In a recent research investigation of HEI students' attitudes and concerns about the use of technologies in online learning and studying, differences were found between Saudi Arabian and British students regarding the use of chat technologies (Almekhled and Petrie, 2023a & b). On the other hand, both Arab and British students demonstrated parallel attitudes concerning online privacy and security in the context of video conferencing employed for online teaching and studying.

Our research questions were, in the context of the pandemic:

RQ1: What do UK HEI teachers understand by online privacy and security?

RQ2: Are UK HEI teachers aware of their institution's policies about online privacy and security issues and are they provided with training about these issues?

RQ3: What are UK HEI teachers' concerns about privacy and security issues about using video conferencing and online chat technologies for online teaching and other institutional work?

RQ4: What are UK HEI teachers' concerns about privacy and security issues in a range of specific online teaching and learning situations?

2. METHOD

2.1 Participants

The inclusion criteria were to teach at a UK higher educational institution (HEI) either full-time or part-time. Participants were recruited through personal contacts at HEIs in the UK. We also publicised the

study through announcements in staff newsletters, and email lists at HEIs in the UK. 39 HEI teachers completed the questionnaire, but data from two were discarded because they failed attention check questions (see section 2.1, below) leaving a sample of 37 participants.

The age range of participants was wide, 11 participants (29.8%) were aged 55 and over and 26 (70.3%) were 32 and over. However, the distribution of ages is not close to the overall UK HEI teaching population. Information from the Higher Education Statistics Agency (HESA,) shows that only 19% of academic staff are aged 56 and over, so there were more older participants than would be representative of the target population. The distribution of gender is balanced, with 14 men (37.8%) and 13 women (35.1%). Demographic information for the UK faculty member participants is shown in Table 1.

Table 1: Demographics of the sample of UK HEI teachers

Age	
Range	32 - 66
Mean	32.3 years
Gender	
Men	14 (37.8%)
Women	13 (35.1%)
Prefer not to say	7 (18.9%)
Prefer to self-identify	3 (8.1%)
Highest level of education	
Masters	3 (8.1%)
PhD	28 (75.7%)
Years of teaching experience	
1 year to 5 years	9 (18.9%)
6 years to 10 years	9 (24.3%)
11 years to 15 years	2 (5.4%)
More than 15 years	10 (51.4%)
Subject area of teaching	
Administrative/Business Studies	14 (37.8)
Arts/Humanities	2 (5.4%)
Architecture	7 (18.9%)
Computer Science/Engineering	3 (8.1%)
Medical/Health Sciences	10 (27.0%)
Social Sciences	1 (2.7%)

Participants were teaching at 16 different UK HEIs, representing every type of HEI from the elite universities (Oxford and Cambridge) to the newer HEIs. Most participants were teaching at HEIs in England (25, 67.6%), but with good representation from Scotland (11, 29.7%) and one person from Wales (2.7%). Considering their own educational level most had a PhD degree. More than half of the participants had more than 15 years of teaching

experience in HEIs. Areas of teaching covered six of the 10 areas defined by HESA (2023), there were no participants from the areas of agriculture, forestry and veterinary science, biological, mathematical and physical sciences, or education.

2.1 Online questionnaire

A questionnaire was designed to explore UK HEI teachers' attitudes and concerns about privacy and security issues in online teaching and learning. The questionnaire asked about attitudes and concerns held before the pandemic and since the pandemic.

The questionnaire included five sections. Questions included multiple choice, 7-point Likert items and open-ended questions.

Definition: Participants were asked what "online privacy and security" meant to them to gauge their understanding of the concepts. A working definition for the survey was then provided, so if their understanding was different they would understand what was meant by the terms in the questionnaire: "that a person's data, including their identity, is not accessible to anyone other than themselves and others who they have authorised and that their computing devices work properly and are free from unauthorised interference" (based on a range of sources, (e.g. NCSC, 2022; Schatz, 2017; Steinberg, 2019; Windley, 2005).

About the participant's institution: asked where the participant teaches, their major subject of teaching, the kind of department they work in, the time they have spent teaching in this department, and how long they have been teaching in higher education in total. It also asked about the methods of teaching at their institution before and since the pandemic.

Privacy and security concerns about videoconferencing and chat technologies in teaching: participants' experiences and concerns of online security and privacy specifically about video conferencing and chat technologies in their teaching.

Privacy and security concerns about a range of particular online teaching and other institutional work situations: asked about concerns about security and privacy issues relevant to online teaching. Questions also addressed attitudes and practices around the use of webcams during teaching and other institutional work. A set of situations was developed from the literature and by brainstorming with a number of HEI educators about their experiences since the pandemic. Questions were asked about a range of specific situations.

Demographics: asked basic questions about age, gender, and how knowledgeable participants rated themselves about online privacy and security issues and videoconference and chat technologies.

The questionnaire included two attention-check questions at different locations in the survey to check whether participants read the questions carefully and did not respond randomly (Curran & Hauser, 2019).

The online questionnaire was deployed using the Qualtrics survey software in December 2021. A pilot study with five HEI teachers at the Department of Computer Science assessed the clarity of the questions and the time required to complete the questionnaire. Some small adjustments were made as a result of the pilot. The survey received ethical approval from the University of York Ethics Committee.

2.2 Data preparation

The questionnaire used a number of 7-point Likert items. Responses were heavily skewed and were therefore analysed using non-parametric statistics. The Wilcoxon One Sample Signed Ranks Test was used to assess whether the ratings differed significantly from the midpoint of the scale. As the sample size was large (more than 30 observations), the Z statistic for the normal distribution approximation was used to compare different ratings as an extension of the Wilcoxon T.

Thematic analysis was performed separately on each open-ended questions using an inductive approach (Braun et al., 2019).

3. RESULTS

Before addressing the four research questions, we briefly present results on participants' experience of online teaching and how that changed due to the pandemic. Participants were asked whether their teaching before the pandemic was totally online, totally face-to-face, or blended (i.e. a mixture of face-to-face and online). 33 participants (89.2%) reported that it had been totally face-to-face, with only one participant (2.7%) reporting totally online teaching, and 3 (8.1%) blended teaching. In response to the pandemic, teaching for the majority of participants (29, 78.4%) moved totally online, with only 8 (21.6%) reporting that teaching moved partly online. Thus, for a majority of participants (29, 78.4%) the pandemic resulted in a radical of teaching methods, from totally face-to-face to totally online.

RQ1: What do HEI UK teachers understand by online privacy and security?

At the beginning of the questionnaire participants were asked to provide their understanding of "online privacy and security". 24 out of 37 (64.9%) participants provided an answer. The results of a thematic analysis of responses are summarized in Table 2. More than half of the participants (15, 62.5%) expressed definitions around data protection and security, a further third (9, 37.5%) expressed definitions in terms of confidentiality and privacy,

Most participants related the terms to their personal data. Only one participant mentioned the importance of online activities and accessing the institution's resources in the context of data protection and security.

Table 2: Participants' understanding of online security and privacy (N= 24)

Theme/sub-theme	Examples
Data Protection and Security (Mentioned by 15 participants, 62.5%)	
Unauthorized access 8 (53.33%)	Securing information to limit access to authorized individuals (FU1). Protection against data collection and sharing by multinational corporations (FU2).
Against attacks and cyberattacks 7 (46.66%)	Protection against hackers.(FU5). Avoiding cyberattacks and maintaining personal data security (FU19).
Data Confidentiality and Privacy (Mentioned by 9 participants, 37.5%)	
Safety and confidentiality 5 (55.6%)	Safety and confidentiality of personal data (FU11) Confidentiality privacy and independence, safety (FU16)
Data being leaked, shared without permission 4 (44.4%)	... Ensuring personal data remains private and is not leaked (FU24) It means many things, but mostly it is making sure that data does not end up in the wrong hands intentionally, or unintentionally (FU14)

RQ2: Are UK HEI teachers aware of their institution's policies about online privacy and security issues and are they provided with training about these issues?

Participants were asked if they knew whether their institution has policies about privacy and security issues regarding the use of digital technologies for online teaching and learning. More than half of the participants (22, 59.5%) knew of such policies and less than one-third of participants (11, 29.7%) said they thought the institution did not have any policies.

When asked whether their institution provides training in online privacy and security issues, nearly half the participants (18, 48.6%) reported that training was provided, less than half were unsure or did not know (15, 40.5%); only 4 (10.8%) said their institution did not provide any training. Also, when asked whether they received any training in online

privacy and security issues, the majority of participants (18, 48.6%) reported that they received training, and more than a quarter of participants (7, 19.9%) reported they did not receive any training and less than one-third of participants (8, 21.6%) were not sure or could not remember.

Of the 18 participants who said training was available, 14 (77.8%) provided information about the kind of training available. 4 participants said training was mandatory and 5 participants said that training was optional, available to employees who are interested. Training topics mentioned covered a wide range of topics, including GDPR, ethics, and online teaching.

RQ3: What are UK HEI teachers concerns about privacy and security issues in relation to using video conferencing and online chat technologies for online teaching and other institutional work?

Participants were asked to rate their levels of concern about security and privacy issues regarding the use of videoconferencing and online chat technologies for teaching sessions and other institutional work on 7-point Likert items (from “not at all concerned” scored as 1 to “very concerned”, scored as 7) (Table 4 shows the medians and semiquartile ranges, SIQR). In all cases, participants rated their concern as very low (median of “not at all concerned” on all four cases, significantly below the midpoint of the rating item).

Table 3: Level of concern about online security and privacy about using video conferencing and chat technologies in online teaching and other institutional work

Issue	Median (SIQR)	Z	p
Using videoconferencing for teaching	2.00 (2.08)	-3.35	<.001
Using videoconferencing for your other institutional work	2.00 (1.86)	-3.71	<.001
Using online chat technologies for teaching	2.00 (1.67)	-2.89	<.001
Using online chat technologies for your other institutional work	2.00 (1.57)	-3.39	<.001

In a follow-up open-ended question about any concerns, 18 (48.6%) of participants did raise concerns (an interesting contrast to the very low ratings). A thematic analysis revealed a range of concerns (see Table 4). In relation to videoconferencing sessions, 6 (33.3%) of the

participants raising concerns referred to being recorded without permission, emphasizing the importance of personal privacy. 5 (27.8%) participants raised the concern of unauthorized reuse of materials. They highlighted instances where their recorded lectures were downloaded and re-uploaded without permission. Two participants also expressed concerns about confidentiality, intrusion and institutional surveillance during online meetings, emphasizing the need for secure platforms to prevent data breaches. Two participants raised concerns about personal privacy during online teaching, not wanting students or colleagues being able to see their family members or domestic spaces during video conferences. One participant expressed concern about the accidental release of sensitive data by students in online teaching sessions.

In terms of using chat technology, 3 (16.7%) participants raised concerns about over-sharing and unprofessional use of chat systems, particularly by students who may not be familiar with the boundaries of professional communication. Concerns raised by individual participants including archiving of chat discussions without permission and potential harassment in online chat, as well as concerns about personal images being used without consent.

RQ4: What are UK teachers’ concerns about privacy and security issues in different online teaching situations?

Participants were asked to rate their level of concern about online privacy and security issues in a number specific online teaching and learning situations (see Table 5), (scored from “not at all concerned” as 1 to “very concerned” to “very concerned” as 7). Two situations, being recorded in online lectures and seminars without one’s knowledge, had median ratings of 2.0, which were significantly below the midpoint of the item, indicating a low level of concern. Two other situations, both relating to unauthorised people attending or interrupting sessions also had median ratings of 2.0, which again were significantly below the midpoint of the item, indicating a low level of concern. All the other situations had medians of between 3.00 and 5.00 which were not significantly different from the midpoint of the item, indicating a moderate level of concern.

Table 4: Concerns about videoconferencing and online chat technologies (N = 18)

Theme/sub-theme	Examples
Concerns about video conference systems (Mentioned by 14 participants, 77.8%)	
Being recorded (without permission) 6 (33.3%)	I was made aware last year that students were recording online Q&A classes and office hours without consent from teaching staff or other students (FU4) .. I could be recorded without my consent or knowledge. I am uncomfortable being recorded (FU5)
Unauthorized use of teaching materials 5 (27.8%)	...students many of whom think it is fine to download and re-upload these videos elsewhere. (FU10) ... clipping of material that ends up on social media (FU12)
Confidentiality, intrusion and institutional surveillance 2 (11.1%)	intrusion and also possible institutional surveillance (FU2) Sometimes confidential meetings need to take place online. If they are not secure, this could constitute a serious data breach (FU4)
Privacy concerns in relation to home environment 2 (11.1%)	I don't like relative strangers seeing into my home (FU5) There are concerns about sharing my image and images of my home specially of my family and domestic space ... depending on where I am working I do not necessarily wish to do with students (FU7)
Using Chat technology (Mentioned by 3 participants, 16.7%)	
Over-sharing and unprofessional use of chat systems 3 (16.7%)	... students, who might be too familiar with chat systems in their personal lives, might over-share information (with staff or other students) (FU3)

Table 5. Level of concern about online security and privacy about particular teaching situations

Issue	Median (SIQR)	Z	p
My online lectures are being recorded without my knowledge	2.00 (4.00)	-1.85	< .001
My online seminars are being recorded without my knowledge	2.00 (5.00)	-1.65	< .001
My online teaching materials (e.g. slide packs, notes, reading lists) are being re-used by others without my authorization	3.00 (4.00)	-.59	n.s.
My online teaching materials (e.g. slide packs, notes, reading lists) being shared with others without my authorization	4.00 (4.00)	-.26	n.s.
Students not turning on their webcams during sessions	5.00 (4.00)	0.86	n.s.
Unauthorised people attending sessions	2.00 (3.00)	-3.75	< .001
Unauthorised people interrupting sessions	2.00 (3.00)	-2.86	< .001
Students making recordings without your permission during online teaching sessions (e.g using their phone)	4.00 (5.00)	-0.88	n.s.
Accidentally sharing the wrong window that contains private information	3.00 (4.00)	-0.38	n.s.

4. DISCUSSION AND CONCLUSIONS

This study investigated the attitudes and concerns about privacy and security in online teaching of UK HEI teachers during the coronavirus pandemic. In relation to RQ1, participants had a reasonable comprehension of online privacy and security. The majority of participants emphasised the significance of data protection and security, particularly in preventing unauthorised access and attacks and preventing the collection and sharing of personal data by external entities. Participants also emphasised the importance of privacy and confidentiality, emphasising the need to maintain the privacy and confidentiality of personal data online. However, although the question did not specifically mention online teaching, the participants knew the study was about that topic, so the limited mention of online activities and access to institutional resources in the context of data protection and security

suggests a potential awareness or consideration gap among HEI teachers. Further research would be useful to follow up on HEI faculty members' comprehension of these concepts and their mental models of how online privacy and security function in online teaching with more in-depth methods, such as interviews and focus groups.

In relation to RQ2, more than half of the participants knew whether their HEI had any policies about online privacy and security and nearly half had received training in this area. The results indicate that HEIs in the UK are taking positive steps to address the increasing importance of online privacy and security in online teaching and learning. By establishing policies and offering training, these institutions equip their teachers and other staff with the knowledge and skills necessary to navigate the online environment safely and safeguard sensitive data. However, the results also reveal a potential awareness and training divide among some participants, indicating the need for additional efforts to ensure that all teachers and other staff have access to training programmes and are aware of institutional policies.

Whether HEIs have defined policies in these areas is a separate issue. What precautions are required for students and teachers to have webcams on during online sessions, what is recorded in sessions (e.g. just the video or also the chat discussion), and how private and secure are informal channels like Slack and Discord? There are numerous circumstances in which privacy and security policies are required. The General Data Protection Regulation (GDPR) may serve as a starting point, but a much more specific policy is required in these areas. However, our survey was conducted in December 2021, when HEIs in the UK were still largely teaching in a hybrid format, often with online lectures but face-to-face seminars and practicals, but had ample time to define and publicise policies and provide teachers with the appropriate information and training.

The ratings of concern regarding online security and privacy, as indicated in RQ3 and RQ4, were generally very low among HEI teachers. However, four situations were identified as generating moderate levels of concern. These situations involved the reuse of teaching materials, students not turning on their webcams, students making unauthorized recordings, and accidentally sharing the wrong window containing private information.

The findings suggest that HEI teach in the UK were more concerned about privacy and security associated with video conferencing than with chat technology. In retrospect we realise that we should have asked participants how much they used each of these technologies, as this result may reflect less use of chat technologies in comparison with video conference systems. Concerns regarding the

reuse of instructional materials emphasise the importance of protecting intellectual property and securing the necessary authorization for their use. The concern that students do not switch on their webcams during online sessions may indicate an emphasis on visual presence as an important part of engagement. The concern over students creating unauthorised recordings reflects faculty members' awareness of the potential misuse of recorded materials and the need to maintain control over their course material. The concern over accidentally sharing an incorrect window containing private information demonstrates an awareness of the risks associated with sharing sensitive data and the significance of protecting personal and confidential information. related to using video conferences again.

These concerns on the part of UK HEI teachers is somewhat similar to studies which have shown concerns amongst the working population about online privacy and security issues (Emami-Naeini et al., 2021; Oesch et al., 2020). The results were also similar to those from Alhubaishy & Aljuhani (2021) who collected data during the pandemic and in a country without GDPR, which found that Saudi HEI teachers were concerned about their online privacy during online teaching.

Although we did not specifically ask the participants whether they had personally experienced any of the privacy and security issues asked about in the questionnaire, ongoing analysis of the open-ended questions suggest that very few participants had actual experience of the issues they were concerned about but had heard or thought about these issues. There were numerous uses of hypothetical phrases such as "I do not like my identity being broadcast online..." (FU5) and "I assume all of these happen..." (FU1).

There were only a very few instances in which a participant recounted an experience in some detail which they had clearly experienced personally. One participant reported this happening to him/her "I was made aware last year that students were recording online Q&A classes and office hours without consent from teaching staff or other students " (FU4).

A limitation of this study is that although a sample of 37 faculty members from a range of UK HEIs is adequate for the quantitative analysis, the amount of data for the qualitative analysis was relatively small. It was necessary to make the most of the open-ended questions optional – participants could not answer about concerns they did not have, but we also did not want to make the questionnaire too long and onerous to complete. Thus, some participants who did have concerns might not have mentioned them, but more importantly, the number of teachers responding to the open-ended questions about concerns was not large (e.g.18 participants for

RQ3). Thus, more data and different methods are needed to explore these issues further, but this study provides some initial pointers of interest. As mentioned in the Introduction, we specifically sampled the population of teachers at UK HEIs. The attitudes and concerns of teachers at HEIs in other countries may well be different. That is a topic we will address in further research. In addition, the questionnaire also asked about teachers' attitudes and concerns before the coronavirus pandemic and how the pandemic had changed their attitudes. This will be the focus of further analysis of our data.

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