

“It’s not that I want to see the student’s bedroom...”: Instructor Perceptions of e-Proctoring Software

KAZMA CHAUDHRY, Carleton University, Canada

ANNA-LENA THEUS, Carleton University, Canada

HALA ASSAL, Carleton University, Canada

SONIA CHIASSON, Carleton University, Canada

The COVID-19 pandemic motivated higher education institutions to adopt the use of e-proctoring software as a means to maintain academic integrity. This study explores the tension between student privacy and academic integrity from instructors’ perspective. Through semi-structured qualitative interviews with 19 university instructors, our findings delineate the competing factors influencing instructors’ adoption or avoidance of e-proctored assessments: academic integrity, the online remote format, logistical considerations such as class size, departmental policies, and privacy considerations. We analysed instructors’ specific privacy attitudes towards e-proctoring, and perspectives regarding student privacy and institutional data protection practices. Lastly, we evaluated instructors’ appraisals on the efficacy of e-proctoring software. E-proctoring was presented to instructors as the straightforward solution, but we found instructors’ experiences to be complex, leading them to exhibit conflicted views on whether e-proctoring accomplished its goals. Most instructors deprioritized privacy considerations when deciding whether to adopt e-proctoring but viewed academic integrity as the topmost inviolable priority. Overall, we provide insight into a detailed landscape showcasing the complexities of managing privacy and competing priorities within higher education from the instructors’ perspective.

CCS Concepts: • **Security and privacy** → **Human and societal aspects of security and privacy**.

ACM Reference Format:

Kazma Chaudhry, Anna-Lena Theus, Hala Assal, and Sonia Chiasson. 2023. “It’s not that I want to see the student’s bedroom...”: Instructor Perceptions of e-Proctoring Software. In *The 2023 European Symposium on Usable Security (EuroUSEC 2023), October 16–17, 2023, Copenhagen, Denmark*. ACM, New York, NY, USA, 24 pages. <https://doi.org/10.1145/3617072.3617103>

1 INTRODUCTION

The COVID-19 pandemic led academic institutions to rapidly adapt from in-person courses and assessments to online Emergency Remote Learning (ERL) methods. Maintaining academic integrity was a key concern among universities and instructors [4, 17], and e-proctoring software emerged as a popular solution to facilitate the shift [33, 41]. E-proctoring software enables instructors to administer online assessments remotely, by monitoring test-takers and their environment to detect instances of academic misconduct. It also enabled instructors to extend their previous in-person assessment methods to remote formats during the time-sensitive transitional period, without undertaking a major course design overhaul [16]. Although e-proctoring software had been used prior to the pandemic, the large-scale shift to remote learning during COVID-19 accelerated the prominent use of e-proctoring across educational institutions [22].

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

© 2023 Copyright held by the owner/author(s). Publication rights licensed to ACM.

Manuscript submitted to ACM

Online proctoring systems may offer a wide range of monitoring functionality, including AI-based automated proctoring[32]. E-proctoring software providers have promoted these features as solutions for administering cheat-proof examinations [36]. However, such systems have faced significant student backlash due to their invasive nature.

While students’ concerns with e-proctoring software have been widely discussed and studied in news media and research literature[8, 9, 25, 45], instructors’ experiences with the technology have garnered less attention [7]. Instructors are often involved in the decision to use e-proctoring for assessments and are required to create appropriate testing materials. Instructors and departmental administrators were tasked with leading the transition to ERL formats in a manner that preserves academic integrity [8, 30, 38]. But reports of widespread academic misconduct and cheating during proctored online learning assessments have heightened concerns regarding the preservation of academic integrity [4, 15]. Meanwhile, student concerns with the degree of monitoring involved in some e-proctoring methods require instructors to mediate between managing student concerns, departmental policies, and course requirements [14].

We present a qualitative interview study exploring instructors’ experiences mediating these various demands, and explore their decision-making process in implementing (or avoiding) e-proctored assessments. Data collection occurred directly following a two-year ERL period, allowing instructors in our study to retrospectively contemplate on any changing dynamics with e-proctored assessments during their ERL experience. We conducted semi-structured interviews with 19 instructors at a large North American university to address the following research questions:

RQ1: *What factors influence instructors’ decision-making regarding the use of e-proctored assessments?*

RQ2: *What is the interplay between e-proctoring use and instructors’ privacy attitudes, perceptions, and concerns?*

Most mainstream complaints with e-proctoring software revolved around the problematic nexus of third-party e-proctoring software companies, such as Proctorio, accessing, handling, and profiting off of sensitive student data [13, 19, 23, 25, 41]. A recent online survey [7] exploring educators’ use of third-party e-proctoring software during the ERL period found that educators engaged in tradeoffs between student privacy and the use of e-proctored exams, and held concerns regarding video/audio recordings taken by third-party software. However, the university within which our study is focused avoids these issue by using two e-proctoring tools developed in-house. Developing e-proctoring infrastructure in-house may allow for enhanced data protection measures that better meet students privacy needs in hybrid learning environments [3, 21]. The in-house e-proctoring software used by our participants is thus ostensibly more privacy-preserving than third-party options, yet we found that key privacy implications still remain.

Our qualitative interviews enabled in-depth analysis of influential factors, identified apparent contradictions in instructors’ privacy attitudes, and how these manifested into their adoption/rejection of e-proctoring. Our main contributions are: (1) instructors’ reflections on their journeys with the use (and non-use) of e-proctoring and the competing priorities involved, (2) an analysis of key factors influencing adoption, (3) instructors’ privacy attitudes, perceptions and concerns associated with e-proctoring and how these affect adoption, and (4) actionable recommendations for higher-education institutions and instructors regarding e-proctored assessments.

2 BACKGROUND AND RELATED WORK

Emergency Remote Learning and E-Proctoring: ERL and online learning are not synonymous. Online learning (also known as e-learning) is a well-established pedagogy that has been thoroughly researched [20, 31]. ERL is a temporary shift to an alternative mode of delivery prompted by large-scale emergencies (such as COVID-19), in which all aspects of teaching and learning are conducted online [26]. A key distinction is the *temporary* nature of ERL; the expectation is that delivery will return to the normal mode (i.e., in-person) once the emergency has subsided [31]. ERL is thus a circumstantial obligation, prioritizing the continuity of education that is safe, reliable, accessible, and quick and easy to

implement [26, 31]. Consequently, ERL classes will likely involve compromises to pedagogical priorities, as educators may not have the necessary time, experience, or resources to adapt their course syllabi and assessments [20, 43].

Privacy Implications of E-proctoring software: Previous studies highlight the differing priorities between higher education institutions, instructors, and students in relation to privacy and implications of e-proctoring activities. When implementing e-proctoring systems, higher education institutions often prioritized cost-efficiency, usability, teaching outcomes, and accessibility needs over data safety and student privacy [14, 30]. Addressing students' privacy concerns was often limited to specific data protection considerations, namely institutions' assurances that data would not be sold or shared, with limited attempts to address the wider effects of surveillance and intrusion [30]. Investigating factors that motivate institutions' to implement e-proctoring software, Gonzalez-Gonzalez et al. [22] examined the importance of eight potential factors, including trust, perceived compatibility, and perceived usefulness. They found that the most decisive factor for institutions was trust in the degree of security and privacy provided by the e-proctoring tool.

Common concerns raised by students regarding e-proctoring include discomfort with the targeted, individualized monitoring, the intrusions into students' personal spaces outside of the classroom [30], the amount and personal nature of the data shared with proctoring companies [8], privacy violations with room scans and recordings of ambient environmental data [24], and the lack of transparency in the tools' monitoring and data collection capabilities [11]. However, in their systematic analysis of 27 peer-reviewed papers, Khalil et al. [30] found no evidence of students' awareness of potential systemic privacy implications such as unauthorized access to student data, and any downstream uses of the data collected. Importantly, when considering the student-institution dynamic, findings by Balash et al. [8] suggest that institutional power dynamics, and students' trust in their institutions may dissuade students' resistance to e-proctoring systems. This is relevant because the encroachment of commercial EdTech "solutions" (i.e., e-proctoring tools) into educational institutions [10, 41] has led to resolute criticism of the increasingly "parasitic" relationships between technology and universities, known as "surveillance pedagogy" [40, 41]. The critique is focused on the ongoing popularity of e-proctoring tools introduced during COVID-19 that perpetuate a "pedagogy of punishment," and foster pedagogical environments based on fear, threat of punishment, and students' untrustworthiness.

Specific investigations into instructor perceptions of e-proctoring's privacy implications remain limited. In a case study exploring the large-scale adoption of online exams in Israel [29], lecturers expressed harsh feelings of discomfort regarding their monitoring of students in e-proctored assessments, which in some cases had led to revealing students' medical and private information. More recently, Balash et al. [7] conducted an online survey with 125 educators (26 e-proctoring users and 99 non-users) exploring third-party e-proctoring software use. They found a "transfer of trust" between institutions who license/implement the software, and educators who consequently trusted the provided e-proctoring tools. Most educators (79%) in their sample did not use e-proctoring tools due to potential harm to students, including negative impact on student privacy, and perceived ineffectiveness against cheating. Among the 26 users, common adoption factors included cheating deterrence, compliance with COVID-19 safety protocols, and student fairness. Further discussion of this work is included in Section 5. Additional research highlighted the unresolved tensions between instructor priorities and student privacy concerns. Elshafey et al. [18] found that while "faculty is mainly concerned with cheating, students are concerned about their privacy and face a lot of stress when using available software". Similarly, an investigation of general remote educational technology [14] identified tension between instructors' preferences for students' cameras to be on and students' concerns over misused video feeds.

E-proctoring Tools and Capabilities: Generally, there are three types of online exam proctoring tools [28]: (1) Live proctoring: Real-time synchronous proctoring using a human proctor that virtually monitors the exam. (2) Recorded

proctoring: The recording of video, screen-capture images and logging of test-taking events such as start and end times, which are later reviewed by a proctor/instructor to ensure the integrity of the exam. (3) AI-based proctoring: The proctoring process is automated by AI-based proctoring systems without the input or monitoring of a human proctor, where the system identifies cases of cheating based on certain programmed conditions such as access of unauthorized programs/materials during the exam. This type of e-proctoring is prone to false positives [28].

The technical capabilities of e-proctoring tools include eye tracking, keystroke recording, restricted "lockdown" browser modes, local network traffic analysis, biometric keystroke analysis, facial recognition, audio monitoring and recording, voice recognition, fingerprint analysis, 360-degree monitoring using multiple cameras, and biometric authentic measures [8, 10, 28, 37, 40, 42]. Consequently, e-proctoring systems are capable of surveilling, tracking, and collecting highly sensitive personal and ambient environmental data [10], such as recording students' household members, or accidentally displayed credit card information [13, 24]. As students may not be fully aware of the technical capabilities of an e-proctoring system, they may not notice what kind of information they are disclosing [11, 12]. And while previous studies have highlighted concerns with third-party data collection and protection [10, 14], Coghlan et al. point to potential privacy concerns related to the human proctor, who is using e-proctoring tools for monitoring purposes: "Online proctoring (OP) may allow the human invigilator [...] to re-watch the video and to use its pause function, potentially in private. In contrast, the student who is invigilated by OP technology cannot know, even when they are given assurances by universities and OP companies, how the online human proctor uses the video" [13].

Current Tool: The e-proctoring tools used by our participants were developed in-house at their university. The main tool is an AI-based proctoring system, based on the classification by Hussein et al. [28]. Its capabilities include recording and analysis of: video/audio, open processes, installed programs, screenshots, head-tilt orientation/eye-tracking. In some cases, instructors supplemented its use with additional live video software such as Zoom.

3 METHODS

We designed and conducted an IRB-approved semi-structured interview study with instructors at a North American university. Interested participants filled out an online pre-screening demographics questionnaire. All eligible participants were invited for an interview. Participants were recruited from 14 university faculty departments. The purpose of the study was stated as aiming "to acquire a greater understanding of instructor perspectives, concerns, and experiences with e-proctoring software tools." Data collection occurred in two phases: during the period directly prior to the lifting of COVID-19 ERL protocols in May/June 2022 and we included additional non-users in March 2023.

3.1 Pre-screen Questionnaire Methodology

Interested instructors completed an online pre-screening demographics questionnaire using Qualtrics. The questionnaire (see Appendix) was iteratively pilot-tested with colleagues. It included background and demographic questions such as current/previous involvement in a course using e-proctoring software, participants' role at the university, affiliated program/department, gender, and a brief (optional) open-ended question for describing their involvement with e-proctoring. All respondents who identified as instructors were invited to participate in the interview.

3.2 Interview and Data Analysis Methodology

Interviews were audio recorded and completed remotely using Zoom. Interviews lasted approximately one hour, and participants received \$20. Participants were asked to elaborate on their knowledge of e-proctoring software, e-proctoring experiences, perceptions, concerns, privacy implications, and decision-making factors (full interview guide in Appendix).

Minimizing bias: We avoided explicitly focusing on privacy from the outset to minimize bias, and probed each time privacy sentiments arose regardless of the initial interview question. This allowed for privacy topics to emerge more organically and limit social-desirability bias when broaching privacy topics, and enabled us to dig deeper to uncover contradictions and nuances in instructors' attitudes and perceptions. This approach allowed us to carefully probe expressed privacy sentiments to uncover the full spectrum of instructors' e-proctoring privacy attitudes.

Ethical Considerations: All participants in this IRB-approved study were assigned anonymized participant IDs. We do not report on any instructors' specific identifiable information such as discipline/department. Any identifiable information was removed from interview transcripts. Participants were informed of their right to skip any questions they did not wish to answer, and to keep their camera turned off for the duration of the recording. The study's consent form was emailed to each participant at least one day in advance for them to review prior to the interview session.

Analysis: The interview audio recordings were transcribed using Trint [2] transcription software. Each transcript was analyzed at least three times using inductive thematic analysis through open coding by the main researcher who was most familiar with the data, based on guidelines by McDonald et al.[35]. The research team met regularly to discuss themes and refine the analysis. A codebook was established by the main researcher, and a second coder used the codebook to code approximately 10% of relevant excerpts. Coding agreement was computed using the Holsti Index [6, 27], with 74% agreement. Disagreements were due to initially differing interpretations of the codes, but were resolved after discussion. We identified key themes from the data relevant to the research questions.

3.3 Participant Demographics

Phase 1: Fourteen university instructors completed the prescreening questionnaire (9 men, 4 women, 1 non-binary). We invited them all to the interview, however, two instructors did not respond to our invitation. We interviewed the 12 instructors (8 men, 4 women) who signed up for sessions. Eleven instructors reported having previous or current experience using e-proctoring software for course assessments, while one reported avoiding the use of e-proctoring. One instructor was involved in the implementation of e-proctoring as a departmental administrator. One instructor utilized e-proctoring for distance education students prior to COVID-19. *Phase 2:* 7 additional instructors who avoided e-proctoring (5 men, 2 women) were interviewed to supplement the existing sample of instructors. All 7 reported delivering their courses online during the COVID-19 ERL period, and retrospectively answered interview questions based on their experiences during the ERL period.

The total sample consisted of 19 participants (13 men, 6 women). 10 participants used e-proctoring during ERL, 8 avoided e-proctoring during ERL, and 1 used e-proctoring prior to ERL for distance education but avoided it during ERL. The two phases of recruitment allowed us to iteratively code and analyze interview transcripts and reach saturation. Instructors belonged to eight disciplines, with affiliations ranging from engineering, computer science, languages, and arts/social science (specific department/course descriptions remain confidential to preserve instructors' anonymity). Instructors taught undergraduate and graduate courses, with class sizes ranging from 40 to 200 students.

Table 1. Summary of themes and corresponding section number where each theme is discussed

Sec	Theme	Subsec	Sub-themes
4.1	Factors Influencing Adoption	4.1.1	Motivation to Maintain Academic Integrity <i>Response to rampant academic misconduct</i>
		4.1.2	Shifting to the Online Remote Format
		4.1.3	Logistical and Pedagogical Factors <i>Class size; Assessment type; Course nature; Student-instructor relationship</i>
		4.1.4	Departmental Policies
4.2	Non-Adoption		
4.3	Privacy and Ethical Concerns	4.3.1	Attempts to avoid e-proctoring
		4.3.2	Discomfort with student monitoring
4.4	Privacy Attitudes	4.4.1	Privacy conscious
		4.4.2	Privacy considerate
		4.4.3	Privacy indifferent
4.5	Data Protection and Institutional Trust		
4.6	Perceived Efficacy	4.6.1	Cheating detection limitations
		4.6.2	Increasingly privacy invasive options
		4.6.3	Grade inflation
		4.6.4	Overall appraisal

3.4 Limitations

Although we recruited widely across 14 faculty departments, we have a relatively small sample of 19 participants due to the small number of interviewees who signed up to for the study. The study may include a self-selection bias due to the topic’s controversial nature at the time of recruitment, and may include instructors most interested in the topic. Thus, generalizations about instructors and specific disciplines should be avoided. Despite these limitations, our findings point to interesting avenues for investigation on e-proctoring in higher education.

4 RESULTS

The interviews allowed for an in-depth exploration of instructors’ experiences using e-proctoring systems for university course assessments. Six key themes emerged in the thematic analysis of instructors’ interview responses (Table 1).

4.1 Factors Influencing Adoption

Four main factors influenced instructors’ adoption of e-proctoring for assessments during the ERL period. In order of general importance to instructors, these included: the need to maintain academic integrity, the online remote format, logistical and pedagogical constraints, and departmental policies. These factors held the potential to both *encourage* and/or *impede* the ultimate adoption of e-proctoring, with certain factors exerting greater influence on some instructors due to contextual nuances (e.g., respective disciplines, responsibilities, or workload). Additionally, we observed general fluidity where the relative importance of factors shifted over the ERL period for some instructors. The tension between these factors and both the privacy and ethical concerns discussed in Section 4.3 is apparent throughout the interviews.

4.1.1 Motivation to Maintain Academic Integrity. While instructors grappled with important considerations and compromises regarding e-proctoring during the ERL period, the desire to preserve academic integrity was held as an inviolable duty for various reasons, one of which was its ideal as an academic principle and tradition:

P11: “Exams should not be given without proctoring. This is how I have done my exams since I was in elementary school. [...] [E]xams that are closed book are supposed to be proctored just to preserve the integrity of the exam, to maintain fairness.”

For others, the preservation of academic integrity was paramount to the protection of public safety:

P2: *“When they graduate, these people are, in theory, supposed to build things like airplanes and bridges and pacemakers [...]. So you want to make sure that [...] they are not going out designing things that kill people. So the safety of the public is paramount. That’s priority one.”*

Frustration and displeasure was expressed when this important ideal was perceived to be violated by other instructors’ improper administration of online exams (i.e., un-proctored closed-book exams):

P12: *“[...] We had a year practice and a year to figure it out. And so, you know, if we’re still continuing to allow ourselves to think that we could have closed book un-proctored online exams, at that point, I have a little bit less forgiveness for an instructor who is continuing to hold that kind of attitude.”*

Response to rampant academic misconduct. Relatedly, some instructors noted the sense of disarray at the onset of the COVID-19 pandemic and a rise in suspected cases of academic misconduct needing to be addressed. For example, P9 attempted to ensure “fair and equitable” assessments without using e-proctoring, which was undermined by students who engaged in academic misconduct, giving them an unfair advantage (“a lot of students were looking for loopholes [...] so e-proctoring was introduced to try to make a fair playing field for everybody. So that’s the purpose behind it, for fairness, because [...] the good students were starting to complain that the bad students were getting unfair advantages”). In contrast, P7 rejected the use of e-proctoring software due to its privacy and security risks, and maintained that academic integrity can be preserved without the use such tools:

P7: *“Even if you’re teaching online, there are ways to help support academic integrity that do not require [...] e-proctoring software. [...] [T]here are hybrid models. [...] [T]hose are much better than trying to do e-proctoring, which is a problematic technological solution in many dimensions. And I can’t see that their effectiveness is worth the compromise to student privacy.”*

The importance of preserving academic integrity was echoed by all our instructors, and was one of the main driving factors for adopting e-proctoring, despite some instructors’ skepticism of its effectiveness and student privacy concerns.

4.1.2 Shifting to the Online Remote Format. The sudden transition to ERL triggered the adoption of e-proctoring. Many relied on e-proctoring as “an attempt to make the course seem as similar as possible to an on campus experience,” [P10]. P8 echoed this sentiment while also balancing departmental regulations that required the administration of a final exam:

P8: *“For our [course] level, we really wanted to be able to assess the [same] way that we had done previously [in-person]. And so we stuck with it.”*

Many instructors emphasized that online remote learning was the *only* reason to use e-proctoring, and planned to revert to in-person proctoring as soon as possible. However, some instructors considered continuing to use e-proctoring for midterms while having an in-person final exam, or a hybrid format with online exam and in-person proctoring:

P1: *“[Students could] do the exams on the university computers available. So there will be a human proctor available around the students. [...] I believe it’s more flexible and fast and convenient for all of them. But e-proctoring software, again... I don’t think we will use it if the in-person options are available.”*

4.1.3 Logistical and Pedagogical Factors. Various logistical and pedagogical factors held an encouraging or impeding influence on e-proctoring adoption. Instructors felt encouraged to adopt e-proctoring methods after its benefit was deemed favourable in three overarching contexts: (i) large class sizes, (ii) the assessment type (i.e., timed exam), and (iii) the nature of the course (e.g., language courses). However, one instructor was deterred from adopting e-proctoring due to its perceived impact on eroding student-instructor relationships.

Class size. E-proctoring was considered necessary in managing the logistics of remote assessments for large classes. As class sizes scaled up, the recorded e-proctoring option was deemed to be more effective as compared to the live monitoring option (e.g., P9: “Generally, we haven’t really been given much choice if it’s a large class. It’s kind of [recorded proctoring] because that’s the only thing that scales up [...].”). P2 further elaborated on the practicality of this decision (“A lot of it was driven by human resource issues. [...] [Y]ou can have an exam period with four or five thousand students writing exams. So that’s... 500 proctors. So no, everybody can’t have live proctoring.”)

Assessment type. Instructors deemed exams, and especially final exams, to require proctoring, and used e-proctoring to mimic traditional in-person exams (typically proctored by human invigilators) in the online remote format.

P10: “When I decided to use e-proctoring [...], I basically included similar types of questions that I would on an in-person exam. Whereas the year before, I had all [unproctored] essay type-questions and take home exams.”

Course nature. Instructors from Arts and Social Sciences disciplines in particular faced pressure to adopt e-proctoring to protect the integrity of their assessments. One instructor (P8) described the need to maintain traditional, proctored assessment methods due to the difficulty in designing assessments in their domain that are unsusceptible to cheating.

P8: “I teach [course name]. And when we transitioned online [...] everybody said make sure you have an exam that students can’t find the answer to [...] online. [...] The thing is, for [course name] teaching, we assess our students’ ability to produce [content] and unfortunately they can write in whatever language they want and then plug it into Google Translate. And then since AI and [...] other tools have improved [...] it’s harder and harder to see that it wasn’t them who wrote it.”

P8 ultimately concluded that e-proctoring was the best solution to address these concerns (“[W]e basically determined [...] that there was no way to really verify that what students were submitting was their own work unless we supervise them in some form through e-proctoring”).

Student-instructor relationship. Interestingly, as one of the few non-adopters of e-proctored assessments, P7 avoided e-proctoring due to its perceived negative pedagogical impacts on students. From their perspective, establishing student trust, maintaining their relationship with students, and encouraging student engagement were key priorities as an instructor. For P7, e-proctoring undermined these aspects that they valued, particularly due to the “fear” it instills in students which was perceived as “unsustainable” and “corrosive” to the student-instructor relationship. Instead, they adopted non-proctored assessment methods that they believed maintained evaluation integrity and validity. Although, P7 acknowledged the limitations of this approach, they reiterated their reason for avoiding e-proctored assessments:

P7: “[...] [M]y standard types of evaluations are expensive from a grading perspective. [...] I think [e-proctoring] erodes the trust relationship with the students. You have to have a relationship with your students. If you put it into adversarial context, that doesn’t foster learning.”

In sum, the four logistical and pedagogical factors described above were closely interrelated in their influence on instructors’ e-proctoring adoption.

4.1.4 Departmental Policies. Instructors worked with their departments to determine which e-proctoring methods suited their needs and to discuss policies to protect instructors from student push-back to e-proctoring, as well as the perceived negative impact on instructors’ course evaluations if they chose to use e-proctoring. However, the lack of an overarching e-proctoring university policy complicated instructors’ adoption of e-proctoring.

P2 recalls the various departmental approaches to e-proctoring:

P2: “[T]here’s lots of departments where it’s up to the instructor. There are also departments who basically decided as a group at a department meeting that, ‘yes, all the courses shall have e-proctoring.’ [...] [A]cross the university, you’ll find vastly different attitudes toward e-proctoring depending on which faculty you’re in.”

Many instructors expressed comfort in having departmental backing and support regarding the use of this new technology during a time of uncertainty, particularly due to public concerns with e-proctoring software:

P9: “For me and some of my colleagues, when we discussed this, we didn’t want to bring in e-proctoring until we were kind of forced to do it. [...] We [...] waited until it was mandated by our faculty and then, kind of, went with what we were told to go with, assuming that somebody, especially since we’re a [STEM] faculty, has done their due diligence to make sure that this is something that’s safe for everybody.”

Others shared how their departments’ reluctance towards this technology discouraged their adoption of e-proctoring:

P10: “The first year that we were teaching online, there was a lot of reluctance to use e-proctoring. Whereas I think the second year maybe those guidelines were clarified and it was a more common solution. But you know, I remember being in a faculty board meeting and the dean talking about e-proctoring with a lot of suspicion. You know, that this was an invasion of privacy and things like that. So yeah, I mean, maybe that in part is what made me decide the first year not to use it.”

This reluctance also resulted in barriers for those who wanted to use e-proctored assessments:

P12: “Initially the department said ‘you’re not going to have this.’ [T]hen very early on into the first year of the quarantine, the department or the university said [...] ‘we’ll have some limited proctoring.’ Well, limited proctoring doesn’t really do me any good.”

Some departments made unofficial department-wide policies to adopt e-proctoring for midterm and final exams with the express purpose of avoiding student push-back against individual instructors who chose to adopt e-proctoring.

P1: “I didn’t receive an official statement [...] but I was told verbally to use [e-proctoring] because all of the department will do that to remove any embarrassment for any professor in general.”

4.2 Non-Adoption

Of the 8 participants who reported avoiding e-proctoring, the majority did so for non-privacy related reasons. These included dissatisfaction with the effectiveness of e-proctoring in preserving the integrity of the assessment (P18: “There are a number of modes of failure that can happen with any technology, especially a technology where this is all done automatically with relatively little human intervention”), and the perceived logistical/technological overhead associated with adoption which posed a “non-trivial amount of work required in setting it up from a technical perspective” (P18). A minority of instructors avoided e-proctoring specifically due to its invasive nature and privacy risks for students (P15: “I was certainly primarily concerned with student privacy”).

Most instructors who avoided e-proctoring perceived e-proctoring as a reactive approach to maintaining academic integrity. These instructors expressed dissatisfaction with this reactive approach due to its ineffectiveness:

P13: “These [proctoring software] companies...they would have to realize, ‘oh, people are doing this now. We’ll have to add this feature so that it prevents them from doing that.’ But [the students] will find another way. ‘Well, now we’re going to adjust and update or look for this.’ It’s just a matter of time. People find their way.”

Instead, these instructors opted for a more preventative approach, implemented using non-proctored methods. These included creating multiple versions of exam questions, decreasing the emphasis on high-stakes final exams by using multiple smaller evaluations to preemptively lower incentives for cheating, or increasing student awareness of academic integrity using “anti-plagiarism tutorials” (P17) or “self-declaration forms [where] students would explicitly declare that

what they submitted adhered to the rules and regulations” (P19). Instructors opting for the latter approach aimed to foster class environments of *“reciprocal trust”* (P19) by engaging students in conversation on *“cultural expectations”*(P17) about the importance of academic integrity. Some instructors used additional techniques, such as embedding programming test questions with invisible characters to prevent students from running the code on compilers (P13), or generating exam questions per student to identify students posting exam materials online for assistance (P16).

4.3 Privacy and Ethical Concerns

All instructors in our sample expressed awareness of the controversial nature of e-proctoring due to students’ concerns regarding its invasiveness. Some instructors described inhibitions regarding e-proctoring for ethical reasons due to the perceived negative impact on students, and also acknowledged the heightened scrutiny regarding e-proctoring in media and public discourse at the time:

P12: “I think it was a bit of a media buzz around e-proctoring and how much students didn’t like it. For some of the feedback I was getting, the students were to some extent, sort of, parroting some of that media buzz. But I mean, to be fair, I also wouldn’t like to be proctored. So I understand that sense of intrusiveness.”

4.3.1 *Attempts to avoid e-proctoring.* Due to ethical and privacy concerns, some instructors restructured their assessment by changing proctored assessments (i.e., timed exams) to essay-based take-home exams and projects. P10 explains how they held ethical reservations regarding e-proctoring that led them to modify their assessments:

P10: “It turns out I had more, sort of, moral objections to it than any of the students did. I had [only] one student in my first year class who did not want to be a proctored by a machine.”

Similarly, P3 describes shifting their assessment methods to respect students’ privacy:

P3: “I have shifted evaluation during COVID-19 with online teaching to mostly projects and assignments and essays[...] basically activities that do not require an exam. I’ve done that [...] to avoid being too intrusive on students. I wouldn’t want to be in a situation in which I’d be forced to have my camera open and have my activities being monitored. At that time, I hadn’t really examined the range of these tools [...] But I just took the easy way out and I shifted my evaluation altogether.”

However, most instructors who avoided e-proctoring observed unanticipated drawbacks to their decisions, and ultimately resorted to adopting e-proctored assessment methods despite privacy concerns. For example, P10 said about the aftermath of their initial non-proctored assessment:

P10: “So yeah, that totally backfired... I ended up with so much plagiarism that I decided that for all of my courses in the Winter term of the past year, I would use it [e-proctoring].”

Similarly, P3 received negative student feedback regarding the ineffectiveness of the non-proctored assessments in validly evaluating students’ competency and effort. P3 explained, “*the hard working students felt that most of the assignments [...] were easy to solve and find online. [They] felt that their hard work is not compensated properly.*” Additionally, one of the main students’ complaints was the increased workload that accompanied the non-proctored assessments, “[...] because there was no exam, so 100% of the grade was distributed on deliverables. They had something to do almost every week, and [...] they felt that they had no break” [P3].

Perceived privacy concerns ultimately impeded only three participants (P7, P15, P17) from the adoption of e-proctoring. While others attempted to reconcile their privacy qualms by re-structuring their course assessments, this eventually proved to be unfeasible as it violated other more pressing priorities. All instructors in the sample expressed awareness of privacy concerns and negative appraisals among students due to its privacy invasive nature. Instructors

grappling to reconcile these concerns while managing their conflicting priorities; e.g., P4: *“Ideally, it’s not that I want to see the student’s bedroom. But in those circumstances, we have to do something”*.

4.3.2 Discomfort with student monitoring. Some instructors felt uneasy with the voyeuristic nature of e-proctoring and the sense of inappropriately intruding into students’ lives outside of the traditional classroom setting:

P10: *“I did see the video camera feed of some of my students in a couple of the the e-proctoring records, and it made me feel a bit uncomfortable seeing students in their own homes, in their own rooms.”*

Similarly, P3 expressed feelings of discomfort and inappropriateness with potential inadvertent access to students’ personal computers through e-proctoring:

P3: *“[...] We could give students all sorts of assurances that we are going to delete the information after [...]but the feeling that we leave them with, of potentially being able to collect more information than we promised we would, I think this is what sort of like really gets at me, because they just have to take our word for it”*

Overall, instructors were sympathetic to the challenges students could face through e-proctored assessments’ encroaching into their private homes. They perceived potential ethical challenges that may unfairly disadvantage some students over others, such as access to appropriate work spaces (e.g., P12: *“some students may not have a space where they can go to write an exam [...] they may have to write the exam in a noisy kitchen with their family members in the background”*), or fair access to the required technology (e.g., P4: *“When you do an online exam with e-proctoring, you are assuming that every single student has a computer at home [...] some [may live] in downtown with a very high speed Internet, and [others may have] poor quality Internet. Well, then it’s not fair”*).

Instructors expressed deep uncertainty and concern with potentially placing students in these unfair circumstances.

P12: *“It’s a big decision point to figure out how you’re going to reconcile these [privacy] challenges in a way that is hopefully fair to the students, but hopefully also accomplishes the academic objectives of the course. So, let the transcript show: he threw up his hands in resignation!”*

4.4 Privacy Attitudes

Our interviewees displayed a range of privacy attitudes towards e-proctoring, which was influenced by their perceptions of student privacy concerns as well as by their understanding of how student privacy was handled institutionally. Through inductive analysis of interview transcripts, we identified three broad categories of privacy attitudes by instructors: privacy conscious, privacy considerate, and privacy indifferent. Interestingly, we observed parallels to Westin’s privacy categorizations [44] though we did not administer any of Westin’s surveys.

4.4.1 Privacy conscious. These instructors regarded e-proctoring with unease and apprehension, particularly in terms of its invasive monitoring (e.g., describing it as *“basically a spying software”* [P3]), and its negative pedagogical impact that could corrode student-instructor relationships. Privacy conscious instructors communicated technical understanding of e-proctoring software functionality and its associated privacy risks, and concluded that they *“can’t see that their effectiveness is worth the compromise to student privacy”* [P7]. They also felt highly empathetic of the compromising position students being e-proctored are placed in, considering them as *“victims of privacy invasion”* [P3].

4.4.2 Privacy considerate. Other instructors acknowledged potential privacy risks with e-proctoring software and most remained receptive to students’ concerns and disquietude, recognizing that they *“also wouldn’t like to be proctored”* [P12]. However, these instructors felt compelled or bound to use e-proctored assessments for various reasons (e.g., to combat mass cheating and maintain academic integrity):

P1: *"I don't like being recorded, but I understand why this is happening. So, no, I don't have a problem with it."*

Most privacy considerate instructors were also more open to accommodating students' concerns:

P8: *"I had students reach out, some of them have anxiety issues [...] getting triggered by having somebody watching [them]. [W]e made some accommodations for [these] students, and that helped calm them down."*

4.4.3 *Privacy indifferent.* These instructors displayed awareness of the privacy concerns and controversy with e-proctoring. However, they expressed greater concern for other factors in their academic duties or held a more laissez-faire stance on the impact of privacy:

P5: *"when I'm delivering a lecture, I'm sharing my screen and I have turned on my camera ... Well, is it violating my privacy? No, not at all. I'm doing my job"*

They also held a more dismissive response to students' concerns (e.g., considering their requests "silly" [P2]). Most privacy indifferent instructors were less open to assuaging students' anxieties or providing alternative options:

P6: *"No, that was not an option. I told the students in the class outline that they would be proctored. And I told the students, 'if you have any questions or concerns about e-proctoring, contact examination services', I didn't have time to deal with that"*

Privacy indifferent instructors also shared a similar attitude towards students' privacy concerns with e-proctoring. These instructors considered students' privacy concerns to be "contradictory" [P4] or invalid if students engaged in other activities the instructors considered to be risky privacy behaviours, such as engaging in social media. For example, when referring to students' apprehensions about the security of the university's in-house e-proctoring platform, P4 stated that *"I suspect that the same students, especially nowadays, would be active on social media. And they would leak information about themselves there. To me, there is a contradiction."* P4 further undermined students' privacy concerns by suggesting that *"if they have concerns about compromise capability, then they should probably not be on social media. We actually know that the social media platform use metadata about us. It's not that there is a risk of information leaking. We know the information is leaking."* P6 similarly highlighted that they would only consider students' privacy concerns to be valid if they did not use social media: *"I cannot see how they are concerned about installing that [e-proctoring] software when Facebook or Google or Instagram takes every personal information that they have. I would understand that [concern] for students that do not have any social media. But not for someone that is everywhere or posting even in forums"* [P6].

4.5 Data Protection and Institutional Trust

Notably, one key factor influencing instructors' privacy risk perceptions was the in-house nature of the e-proctoring systems used, and instructors were reassured by the institutional endorsement and support. Almost all instructors were unaware of their institution's specific e-proctoring data protection and data management policies, but trusted that some sort of protocol was put in place.

P4: *"I think what [institution] did was fair. I mean, the information is safely saved on campus servers. It doesn't go elsewhere. It is deleted after, so that's fine."*

It was unclear on what information P4 had based this claim, but this sense of institutional trust was also echoed by other interviewees, who admitted to being unaware of the data management involved with the e-proctoring platforms, but held specific assumptions about data storage and data protection practices being carried out by the university. For example, P8 explicitly stated that they *"don't know how it works,"* but expressed confidence in the e-proctoring software's integration with the institution's learning management system (LMS), and that *"there's no storage of information really outside of that platform. It's all on [institution cloud storage], protected on [institution's] platforms"* [P8]. In terms of the

types of information stored on the e-proctoring platform for the examination, P8 explained that the system provides a report of the start and end times of the exam, confirmation that the student ID was checked, the student name, and possibly the student ID number. P8 concluded: “[...] from what I’m able to see and what I imagine is going on with that system, privacy is pretty protected, right?”

Other instructors expressed similar beliefs about how well student privacy is handled during e-proctoring sessions and assumed that the university’s department responsible for administering exams (henceforth, exam department) handled e-proctoring data management and security.

P9: "My feeling is that those little videos that they produce during the exam [...] I think they're being used in a reasonable way, they're not being put out there on the Web. I think they're kept secure. And I'm sure that after a certain amount of time, they get deleted. So I don't think it's a big concern."

P10: "I assume [the exam department] erases it after a certain amount of time and it disappears completely. I would be very surprised if a record of it is kept. I mean, we have to keep final exams for one full year. Maybe they keep it for a year. I don't know. But as far as I know, the handling of that data is secure."

Only a few instructors expressed a clear lack of personal knowledge about the specific data management and protection practices, and questioned data handling oversight of the human proctors involved.

P12: "I definitely do not understand the background of what happens behind the scenes on [e-proctoring]"

P10: "I am not sure about that because I don't know how the servers at [institution] are maintained. How easily can they be hacked? How confidential do the proctors themselves treat the information."

Interestingly, instructors with a ‘privacy conscious’ attitude were less confident about how well student privacy was handled by the institution, and some believed that *to some extent, it's not handled well at all* [P3]. For these instructors, the software’s invasive data collection and monitoring capabilities make it inherently vulnerable and unsafe.

P7: "I know these things can [be] compromise[d] [...] even if the company that installs it and everyone using it has good intentions. The fact the software is there is an opportunity for attackers to take remote control [...]."

They also raise concerns about unreliable software performance and potential unauthorized data collection that may occur due to technical glitches or poor software design.

In sum, institutional trust greatly influenced instructor’s security and privacy perceptions of e-proctoring software.

4.6 Perceived Efficacy

Instructors held mixed perceptions about the efficacy of e-proctoring, and whether it effectively maintained academic integrity. Overall, instructors did not plan to continue with e-proctored assessments beyond ERL.

4.6.1 Cheating detection limitations. Instructors did not view e-proctoring as an effective cheating detection tool due to its monitoring limitations and generally held the view that e-proctoring *“will not catch a cheater who intends to cheat”* [P1]. They detailed their frustration and dissatisfaction with the many perceived vulnerabilities they believed students could exploit to cheat by using “simple” methods such as having another monitor, having one of their classmates behind the screen, using a small Bluetooth headset and the Internet, or scanning their valid student ID before moving their keyboard over to somebody else to do the typing and answer all the questions.

Instructors were also aware that students could cheat by coming up with more elaborate acts such as using an image of themselves in front of a blue screen and then working on another computer, using two controls like two mice, or (if they have the skills) evading eye tracking. Some instructors noted that the dynamic created by e-proctoring could potentially backfire and, counter-intuitively, encourage cheating:

P3: "[Students] could take it upon themselves as a challenge and try to evade the system and play around with things and see what they achieve. So in that case, it's actually not deterring at all, it's potentially the other way around, it's potentially motivating students."

However, instructors generally contended that while e-proctoring solutions will not be 100% effective, they can be used to slow cheaters down by "making it a little more challenging" [P9]. In other words, interviewees seem to perceive the dynamic between students and e-proctoring software as a game of cat-and-mouse.

4.6.2 Increasingly privacy-invasive options. Some instructors responded to the perceived limitations highlighted above with a desire for increasingly privacy invasive e-proctoring requirements to improve the software's effectiveness, with little regard to the privacy implications for students. For example, P6 expressed dissatisfaction with the e-proctoring protocol used for their exam, as it did not require students to complete a room scan with a human proctor, nor to turn on their microphone to monitor sound. Furthermore, the instructor was frustrated with the narrow webcam monitoring that occluded the student from view. P6 explained, "For some of them I just see the face, not even the shoulders. And I don't know what they have on the keyboard, what they have on the sides." The instructor compared this with their own experience of completing an e-proctored professional exam, which required a full room scan, an enabled microphone, software monitoring their computer activity, and a human proctor "watching me on the camera and ensuring that I was visible all the time" [P6]. The instructor deemed this an appropriate e-proctoring protocol for online exams.

P9 recalled a colleague who detected cheating on an e-proctored exam because they had "set up different versions of the questions, and had some students who'd answered the wrong versions of the questions, even with the e-proctoring." Consequently, P9 wanted to monitor students' IP addresses during e-proctored exams but acknowledged that students who share accommodations and are enrolled in the same course could "manage to collaborate [in] some way."

P12 echoed similar sentiments, and made comparisons with the e-proctoring service they utilized prior to the pandemic while teaching distance education students. P12 had a high level of confidence in that service, which they termed "full-service" e-proctoring; they voiced no privacy concerns about it. It involved "a real person monitoring the webcam, [...] watching the screen, and the student, before starting their exam, had to pan across the room to show that they were alone [...] and that they didn't have a textbook." After learning about the e-proctoring software available during the ERL, P12 said they "just wrote it off" because of its automated monitoring capabilities that did not allow for a live proctor."

4.6.3 Grade inflation. Interestingly, instructors saw e-proctoring as an effective tool for targeting grade inflation during the ERL period. Instructors noted a sudden inflation in grades for assessments completed directly following the shift to ERL when e-proctoring had not been established yet.

P2: "The average grade in the university went up like 20 points[...]. They've gone way up compared to where they were pre-pandemic. Students aren't necessarily getting smarter".

Once e-proctoring assessments were administered, instructors noted grades being restored to pre-pandemic levels. P6 noted this comparison across two semesters with assessments administered with and without e-proctoring.

P6: "[I]n Fall 2020 we didn't use e-proctoring for this course, and in Fall 2021, and Winter 2022, we used it and the grades are lower. Basically their grades with e-proctoring were aligned with the grades pre-pandemic".

Other instructors also noted this normalization of grade averages after the incorporation of e-proctored assessments: *P2: "This type of grade distribution, I consider it healthy and I think it is a reflection of the quality of the level of academic integrity that was present in this course. And I think it was for the big part due to the online exam and the e-proctoring aspect [...]."*

4.6.4 Overall appraisal. Instructors acknowledged the limitations with e-proctoring, and also credited its perceived benefits in restoring the tensions caused by the pandemic and the transition to ERL. However, instructors overwhelmingly agreed that *“e-proctoring isn’t an effective proctoring solution”* [P10].

For P10, *“an electronic e-proctoring computer-based thing, honestly just doesn’t work.”* Moreover, P10 regarded e-proctoring as *“useless”* in their duty as a professor: *“One of the principles for professors is that we’re required to be fair to all of the students in our class. And there are students who failed a final exam, who did it honestly. And then there are students who pass the final exam with cheating.”*

As one of the few instructors in our sample who avoided e-proctoring due to privacy concerns, P7 regarded the concept of e-proctoring as *“security theatre at its heart... like taking off your shoes at the airport to check for things. It can’t live up to what it promises.”* P11 mirrored this sentiment by acknowledging the lack of evidence available to instructors to accurately assess the effectiveness of e-proctoring solutions, but demanding nonetheless that something be done.

P11: “I have no way to gauge actually whether cheating was reduced or not. I don’t think anybody would have that. I don’t have any numbers or any measurements to support that. But I think it’s better for academic integrity. [...] [I]t did not change the way I’m marking the exam. But it just gives me some sense of... I don’t know what the word is. Not doing anything is not right. [...] So whether actually this led to an actual decrease in the number of cheating incidents, I do not know. But on the other hand, not taking action is also not right.”

5 DISCUSSION

We explored factors influencing instructors’ adoption of e-proctoring (RQ1), and the interplay between these and instructors’ privacy attitudes, perceptions, and concerns (RQ2). Overall, instructors deprioritized privacy, resulting in key implications (Section 5.1). Contrary to prior suggestions [3, 21], our findings also suggest that privacy concerns persist regardless of provider. We then offer four recommendations (Section 5.2).

5.1 Privacy is deprioritized in e-proctoring decision-making

In addressing RQ1, we identified competing priorities that instructors grappled with when deciding whether to adopt e-proctoring, and found that preserving academic integrity surpasses all factors, including privacy. Our findings demonstrated that shifting long-established pedagogical approaches was not straightforward. Instructors attempting to adapt assessments to avoid e-proctoring faced unanticipated challenges, such as overburdened workloads for both students and instructors alike. Other complexities added to the issue, such as navigating departmental requirements, and managing the logistics of designing appropriate assessments. Previous research aligns with these findings [3, 7], highlighting that online exams require instructors to invest more effort and resources than traditional exams [29].

In addressing RQ2, we found that amongst these tensions and complexities, instructors often felt compelled, despite using in-house e-proctoring tools, to compromise student privacy to ultimately preserve academic integrity as an inviolable tenet of education. Sometimes instructors were not the ultimate decision-making authority on the (non)use of e-proctoring, and were bound by institutional factors such as departmental requirements. Balash et al. [7] found similar results with third-party e-proctoring software, suggesting that shifting the software provision from third-party providers to a seemingly more privacy-preserving in-house context may not fully address privacy implications.

Implications of deprioritizing privacy. Interestingly, all of our instructors were aware of the controversy and privacy risks associated with e-proctoring, including those with a ‘privacy indifferent’ attitude. However, deprioritizing privacy

from the outset led many instructors to become desensitized towards students' privacy concerns, even though they were, counter-intuitively, still empathetic towards other ethical considerations impacting students (such as fairness).

Some 'privacy indifferent' instructors ignored legitimate concerns based on their assumptions of how students truly value their privacy (e.g., complaints about e-proctoring are unjustified for students on social media). This sentiment was exacerbated by instructors' perception that the current solutions were insufficient in detecting cheating and were easily circumvented by students. Although this frustration was shared by most instructors, it prompted some 'privacy indifferent' instructors to desire even more privacy invasive capabilities, such as tracking students' IP addresses, expanding the webcam views to better monitor students' upper-bodies and workspaces, and conducting pre-exam room scans. The latter was recently deemed unconstitutional in the United States for violating students' right to privacy [5, 39]. This legal case highlights one of many ramifications for the 'post-pandemic university,' a concept coined to address the state of higher-education institutions following the unprecedented disruptions due to the COVID-19 pandemic [1].

5.2 Lessons for the 'post-pandemic university'

Our analysis of instructors' privacy attitudes (Section 4.4) uncovered contradictory beliefs held by some instructors, indicating poor mental models of e-proctoring privacy implications. Additionally, instructors faced great difficulty dealing with the predicament of maintaining high pedagogical standards whilst confidently evaluating e-proctoring privacy implications. Such complexities are amplified with the rapidly evolving educational landscape where many educators have reckoned with the chilling effects of the digitisation of learning [30, 34, 40]. These include the fairness and ethical implications of e-proctoring [13], and their impact on fostering distrust between students and teachers.

We contend that institutions are responsible for technically assessing e-proctoring software to ensure adherence to privacy-protection requirements. Beyond this step which most institutions are likely already performing (and which is potentially a legal obligation), we urge institutions to avoid burdening instructors with e-proctored assessment technicalities. Below are our actionable recommendations:

- (1) **Create privacy-preserving templates for different exam contexts:** Institutions should create standardized templates to support instructors administering e-proctored assessments. These templates should include recommended e-proctoring configurations for different types of assessments, taking into account factors such as class size and course type. Importantly, these templates should strive to be minimally-invasive and privacy-preserving.
- (2) **Training:** Besides focusing on instructors [7], we recommend training institutional and departmental decision-makers (i.e., those with the greatest power in enforcing community-wide privacy decisions). Training resources should additionally counter some dismissive and contradictory attitudes regarding the protection of student privacy.
- (3) **Resources:** We distinguish between training and making available informational resources on-demand. Institutions should provide well-designed, usable resources that address issues of transparency, data management, and privacy concerns for different members of the university community (e.g., FAQs for instructors and for students). This reduces the burden on instructors as front-line representatives responding to students' privacy concerns, and enhances transparency on privacy-related issues for all involved.
- (4) **Remove need for instructors to trade-off privacy and pedagogy:** Institutions should prioritize adopting and/or developing privacy-focused solutions that are transparent about privacy implications and data management.

6 CONCLUSION AND FUTURE WORK

Our study investigated factors influencing instructor adoption (or non-adoption) of e-proctoring software; how these may have shifted over time; and how instructor’s privacy attitudes, perceptions, and concerns impacted their adoption decision. With the increasing appetite for hybrid learning options in the post-pandemic university, our study provides insights on the implications of e-proctoring platforms. It also highlights that those most impacted by privacy decisions are often not involved in the decision-making process. Additionally, an often overlooked aspect of privacy violations in news media and existing literature is the aspect of privacy between proctor and student [13]. E-proctoring tools allow live video access to students’ private workspaces, which can be done without the students’ knowledge, e.g., legitimately if a student is flagged for suspected cheating, but malicious data use is also feasible by bad actors. Future work could examine potential proctors-students privacy violation or abuse, and methods to protect students’ privacy.

REFERENCES

- [1] The post-pandemic university. URL: <https://postpandemicuniversity.net/>.
- [2] Trint. URL: <https://trint.com>.
- [3] Chiara Angiolini, Rossana Ducato, Alexandra Giannopoulou, and Giulia Schneider. Remote teaching during the emergency and beyond: Four open privacy and data protection issues of ‘platformised’ education. *Opinio Juris in Comparatione*, 1, 2020. URL: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3779238.
- [4] Ivo JM Arnold. Online proctored assessment during covid-19: Has cheating increased? *The Journal of Economic Education*, 53(4):277–295, 2022.
- [5] Ars Technica Ashley Belanger. Scans of students’ homes during tests are deemed unconstitutional, Aug 2022. URL: <https://www.wired.com/story/remote-testing-student-room-scans-privacy/>.
- [6] ATLAS.ti. How does analysis of inter-coder agreement work?, Jun 2023. URL: <https://atlastihelp.helpscoutdocs.com/article/195-analysis-of-inter-coder-agreement>.
- [7] David G Balash, Rahel A Fainchtein, Elena Korkes, Miles Grant, Micah Sherr, and Adam J Aviv. Educators’ perspectives of using (or not using) online exam proctoring. *arXiv preprint arXiv:2302.12936*, 2023.
- [8] David G Balash, Dongkun Kim, Darika Shaibekova, Rahel A Fainchtein, Micah Sherr, and Adam J Aviv. Examining the examiners: Students’ privacy and security perceptions of online proctoring services. In *Seventeenth Symposium on Usable Privacy and Security (SOUPS 2021)*, pages 633–652, 2021.
- [9] Nora Caplan-Bricker. Is online test-monitoring here to stay? *The New Yorker*, 2021.
- [10] Céline Castets-Renard and Simon Robichaud-Durand. Online test proctoring software and social control: Is the legal framework for personal information and ai protective enough in canada? *Blockchain and Artificial Intelligence Solution to Enhance the Privacy in Digital Identity and Internet of Things*, Taylor & Francis/CRC Press, Forthcoming, 2022.
- [11] Kazma Chaudhry, Ashi Mann, Hala Assal, and Sonia Chiasson. “i didn’t even want to turn my head because i was so scared of the prof.”: Student perceptions of e-proctoring software. In *Eighteenth Symposium on Usable Privacy and Security (SOUPS 2022)*, 2022. URL: <https://www.usenix.org/conference/soups2022/presentation/chaudhry-poster>.
- [12] Ted M Clark, Christopher S Callam, Noel M Paul, Matthew W Stoltzfus, and Daniel Turner. Testing in the time of covid-19: A sudden transition to unproctored online exams. *Journal of chemical education*, 97(9):3413–3417, 2020.
- [13] Simon Coghlan, Tim Miller, and Jeannie Paterson. Good proctor or “big brother”? ai ethics and online exam supervision technologies. *arXiv preprint arXiv:2011.07647*, 2020.
- [14] Shaanan Cohny, Ross Teixeira, Anne Kohlbrenner, Arvind Narayanan, Mihir Kshirsagar, Yan Shvartzshnaider, and Madelyn Sanfilippo. Virtual classrooms and real harms: Remote learning at US. universities. In *Seventeenth Symposium on Usable Privacy and Security (SOUPS 2021)*, pages 653–674, 2021.
- [15] David deMontigny. *Managing Academic Integrity in Canadian Engineering Schools*, pages 291–306. Springer International Publishing, Cham, 2022. doi : 10.1007/978-3-030-83255-1_15.
- [16] Sarah Elaine Eaton. Academic integrity during covid-19: Reflections from the university of calgary. *International Studies in Educational Administration*, 48(1), 2020.
- [17] Sarah Elaine Eaton and Julia Christensen Hughes. *Academic integrity in Canada: An enduring and essential challenge*. Springer Nature, 2022.
- [18] Ahmed E Elshafey, Mohammed R Anany, Amr S Mohamed, Nourhan Sakr, and Sherif G Aly. Dr. proctor: A multi-modal ai-based platform for remote proctoring in education. In *Artificial Intelligence in Education: 22nd International Conference, AIED 2021, Utrecht, The Netherlands, June 14–18, 2021, Proceedings, Part II*, pages 145–150. Springer, 2021.
- [19] Todd Feathers. Schools are abandoning invasive proctoring software after student backlash. *Vice*, Feb 2021. URL: <https://www.vice.com/en/article/7k9ag4/schools-are-abandoning-invasive-proctoring-software-after-student-backlash>.
- [20] Kevin Fuchs. The difference between emergency remote teaching and e-learning. In *Frontiers in Education*, page 353. Frontiers, 2022.

- [21] Paul Giller. E-proctoring in theory and practice: A review. Technical report, Dublin, Ireland, 2021.
- [22] Carina S González-González, Alfonso Infante-Moro, and Juan C Infante-Moro. Implementation of e-proctoring in online teaching: A study about motivational factors. *Sustainability*, 12(8):3488, 2020.
- [23] Brenna Clarke Gray. *Ethics, EdTech, and the Rise of Contract Cheating*, pages 189–201. Springer International Publishing, Cham, 2022. doi : 10.1007/978-3-030-83255-1_9.
- [24] Sandra Gudiño Paredes, Felipe de Jesús Jasso Peña, and Juana María de La Fuente Alcazar. Remote proctored exams: Integrity assurance in online education? *Distance Education*, 42(2):200–218, 2021. URL: <https://doi.org/10.1080/01587919.2021.1910495>.
- [25] Drew Harwell. Cheating-detection companies made millions during the pandemic. now students are fighting back. The Washington Post, Nov 2020. URL: <https://www.washingtonpost.com/technology/2020/11/12/test-monitoring-student-revolt/>.
- [26] CB Hodges, S Moore, BB Lockee, T Trust, and MA Bond. The difference between emergency remote teaching and online learning. virginia tech, 2020.
- [27] Ole R Holsti. Content analysis for the social sciences and humanities. *Reading, MA: Addison-Wesley (content analysis)*, 1969.
- [28] Mohammed Juned Hussein, Javed Yusuf, Arpana Sandhya Deb, Letila Fong, and Som Naidu. An evaluation of online proctoring tools. *Open Praxis*, 12(4):509–525, 2020.
- [29] Sagit Kedem-Yemini and Adi Katz. Implementing online-testing–cases in higher education in israel. *Journal of Information Technology Case and Application Research*, 23(2):83–114, 2021.
- [30] Mohammad Khalil, Paul Prinsloo, and Sharon Slade. In the nexus of integrity and surveillance: Proctoring (re) considered. *Journal of Computer Assisted Learning*, 38(6):1589–1602, 2022. URL: <https://doi.org/10.1111/jcal.12713>.
- [31] Rakesh Khanal. Crisis pedagogy: Student perceptions of pedagogical transition amidst the covid-19. *Pedagogical Research*, 6(2), 2021.
- [32] Faten F Kharbat and Ajayeb S Abu Daabes. E-proctored exams during the covid-19 pandemic: A close understanding. *Education and Information Technologies*, 26(6):6589–6605, 2021.
- [33] Royce Kimmons and George Veletsianos. Proctoring software in higher ed: Prevalence and patterns. *EDUCAUSE Review*, Feb 2021. URL: <https://er.educause.edu/articles/2021/2/proctoring-software-in-higher-ed-prevalence-and-pattern>.
- [34] Kyungmee Lee and Mik Fanguy. Online exam proctoring technologies: Educational innovation or deterioration? *British Journal of Educational Technology*, 53(3):475–490, 2022.
- [35] Nora McDonald, Sarita Schoenebeck, and Andrea Forte. Reliability and inter-rater reliability in qualitative research: Norms and guidelines for cscw and hci practice. *Proceedings of the ACM on human-computer interaction*, 3(CSCW):1–23, 2019.
- [36] Michelle. 7 things you should know about remote proctoring! Proctortrack, Jun 2022. URL: <https://www.proctortrack.com/blog/article/7-things-you-should-know-about-remote-proctoring/>.
- [37] Aditya Nigam, Rhitvik Pasricha, Tarishi Singh, and Prathamesh Churi. A systematic review on ai-based proctoring systems: Past, present and future. *Education and Information Technologies*, 26(5):6421–6445, 2021.
- [38] Smadar Patael, Julia Shamir, Tal Soffer, Eynat Livne, Haya Fogel-Grinvald, and Liat Kishon-Rabin. Remote proctoring: Lessons learned from the covid-19 pandemic effect on the large scale on-line assessment at tel aviv university. *Journal of Computer Assisted Learning*, 38(6):1554–1573, 2022.
- [39] Janus Rose. Judge rules schools can't scan your bedroom with creepy proctoring apps, Aug 2022. URL: <https://www.vice.com/en/article/qkj3w/judge-rules-schools-cant-scan-your-bedroom-with-creepy-proctoring-apps>.
- [40] Neil Selwyn, Chris O'Neill, Gavin Smith, Mark Andrejevic, and Xin Gu. A necessary evil? the rise of online exam proctoring in australian universities. *Media International Australia*, 186(1):149–164, 2023.
- [41] Shea Swauger. Our bodies encoded: Algorithmic test proctoring in higher education. *Hybrid Pedagogy*, Jun 2020. URL: <https://hybridpedagogy.org/our-bodies-encoded-algorithmic-test-proctoring-in-higher-education/>.
- [42] Arif Cem Topuz, Eda Saka, Ömer Faruk Fatsa, and Engin Kurşun. Emerging trends of online assessment systems in the emergency remote teaching period. *Smart Learning Environments*, 9(1):17, 2022.
- [43] César Torres Martín, Christian Acal, Mohammed El Homrani, and Ángel Custodio Mingorance Estrada. Impact on the virtual learning environment due to covid-19. *Sustainability*, 13(2):582, 2021.
- [44] Alan F Westin. Privacy and freedom. *Washington and Lee Law Review*, 25(1):166, 1968.
- [45] Jessica Wong. Post-secondary students decry cyber exam monitoring tools, urge changes to how they're assessed. CBC News, Oct 2020. URL: <https://www.cbc.ca/news/canada/post-secondary-assessment-integrity-proctoring-1.5767953>.

Perceptions of e-Proctoring Software – Screening Survey

Q1 Are you currently enrolled in a course using e-proctoring/have you used it in a previous semester?

- Yes
- No
- Unsure

[If yes selected on Q1]:

What software was used for e-proctoring?



- Other (please specify):

Q2 What is your role at [redacted] University? (check all that apply)

- Undergraduate Student
- Graduate Student
- Teaching Assistant
- Research Assisatnt
- Professor/Instructor
- Staff (please specify):
- Other (please specify):

[If undergraduate/graduate student selected on Q2]:

Q3 Which program are you currently enrolled in? [short-answer question]

Q4 What degree program are you in currently?

- Bachelor's degree
- Master's degree
- Doctoral degree
- Prefer not to answer


Q5 How many years have you been a student at [redacted] University? [short-answer question]

[If professor/instructor selected on Q2]:

Q6 Which faculty/department/program do you belong to? [short-answer question]

Q7 Which level of study do you teach?

- Undergraduate level
- Graduate level
- Both
- Prefer not to answer/not applicable

Q8 How many years have you been a professor/instructor at  University? [short-answer question]

[All]:

Q9 Which of the following gender categories best describes how you self-identify (optional)

- Gender-fluid
- Man
- Nonbinary
- Trans man
- Trans woman
- Two-Spirit
- Woman
- I don't identify with any options provided, I am:
- Prefer not to answer

Q10 We will be contacting a subset of respondents for interviews. Please enter your email address so that we can contact you if selected for an interview. (optional)

Interview Guide: Instructors

The interview is intended as semi-structured and we do not intend to ask all questions to each participant. We will skip questions or ask follow-up probes, depending on the participant's responses/interests. We will keep track of time to ensure that we remain within the agreed upon time.

Interview script/reminders

- Reminder about the right to withdraw from study, skipping questions
- Reassurance of anonymized data, no personal information linked to interview responses
- Reminder to turn off video prior to recording

Introduction

Thank you for taking the time to meet with me. My name is [REDACTED] and I'm a Graduate Research Assistant in [REDACTED], working with [REDACTED] for this project. For this interview, our objective is to listen to your experiences with e-proctoring as a professor/instructor. We have planned an open session to foster a conversation around the aspects most relevant to you.

Before we start, I wanted to assure you that we will remove any disclosed personally identifiable information during the interview (like names) from the transcript; and delete the audio recordings after transcribing the interview. In addition, you can turn off your video; can skip any question; and, have the right to withdraw from the study at any time during the session (while still receiving compensation for your time).

Do you have any questions before we get started? Let's start with some general questions.

General Questions

1. Can you tell us a bit about what you know about e-proctoring in general? [REDACTED]
2. Can you describe some of your experiences in this respect?
 - a. In how many of your courses did you use e-proctoring? Grad/undergrad? How big were the class sizes?
3. What do you wish that others understood about your experience?
4. Have you encountered situations where you thought issues relating to exam e-proctoring were handled particularly well (what should we keep doing or extend?)?
5. From your perspective, what recommendations do you have for improving e-proctoring at [REDACTED]?

Needs

1. Which kinds of proctoring methods/software best fits your needs (e.g., involving AI, involving a human proctor, etc.)

2. How does this affect your course and/or exam design? (more/less certain types of questions, ability to go back to previous questions).

Decision-making

1. What factors do you consider when deciding when/why to use e-proctoring software?
2. Was the use of e-proctoring required or encouraged by your department or university? What do you think of this decision?
3. What are the advantages of using e-proctoring for your course(s)?
 - a. Disadvantages?
 - b. What cost/benefit factors affect your decision-making process as an instructor.
4. How did you find information about e-proctoring to inform your decision to use/not use it?
5. Would you be most comfortable using e-proctoring software implemented by the university? Built by a 3rd party contracted by the university? Commercially available? Open-source? Why?
6. Would you use e-proctoring for in-person or hybrid courses? Why?

Concerns

1. Do you have any concerns about using [REDACTED] or other e-proctoring software for your course/s? (e.g. extra workload, unfair grading/inflated grades, cheating/academic integrity).
2. How do you ensure fairness in assessments for students? How well is this working?

Experience

1. What e-proctoring tools have you used?
2. What has your experience been like with using [REDACTED] X-tool that they've mentioned} as an e-proctoring tool?
3. Have you experienced any issues? What happened?
4. When/if issues arise, how are incidents handled? Who is involved? Did you find these methods effective? How could they be improved?
5. Have you used any alternative examination/evaluation methods? Describe.
6. What feedback/comments have you received from students regarding e-proctoring?

Perception

1. How similar/different is e-proctoring to traditional proctoring?
2. From your perspective, how has e-proctoring affected students? Instructors?
3. From your experience, how has e-proctoring affect cheating and academic integrity?
4. From your experience, how effective is e-proctoring in ensuring the quality of course assessment? Fairness?

Privacy

1. How well is student privacy handled in e-proctoring? What kinds of issues have come up in your experience?
2. Do you have any privacy concerns in relation to e-proctoring? (What are they?)

Final Questions

3. Is there anything else you'd like to share that we haven't covered yet?
4. What do you think are the most important points that you'd like me to remember from our conversation?

Closing Remarks

Thank you for participating and taking your time to meet with me. I will send the \$20 e-transfer to your [REDACTED] email account.

If you don't receive it by [TBD date], please let someone from our research team know.