



Proctoring Online Assessments: Enhancing Security and Academic Integrity in Open Distance eLearning

SPECIAL ISSUE

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ABSTRACT

This conceptual study explores and proposes strategies for enhancing security and academic integrity within the Open and Distance e-learning (ODeL) context, adhering to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocols. As higher education continues to evolve, the reliance on online assessments has become more prominent, necessitating robust measures to uphold the security and integrity of the assessment processes. The study analysed peer-reviewed empirical research published from 2014 to 2024 and explored unique challenges in the ODeL environment. It provides an in-depth analysis of various proctoring methods, their applicability, and the ethical considerations inherent in their implementation. The findings emphasise the importance of strategically integrating proctoring technologies tailored to meet the specific needs of ODeL students. This includes implementing asynchronous proctoring and offering flexible scheduling. They highlight the need to balance security measures and create a supportive learning environment. It also advocates for transparency, ethical use, and inclusivity. The experiences of stakeholders draw attention to concerns regarding highly anxious students and the limitations of technical support. Ethical considerations indicate the importance of addressing the digital divide and promoting fairness. The study suggests continuously adapting proctoring strategies to ensure both integrity and a positive user experience. The study contributes to the ongoing discourse on proctoring in online assessments within the ODeL context. This study contributes a framework-guided synthesis of proctoring practices in ODeL. Highlighting the balance between technological enforcement and inclusive, ethical learning environments.

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ODEL has transformed higher education by broadening access to learning opportunities. Moreover, enable students to manage their studies around work, family, and other responsibilities. Its emphasis on flexibility, inclusivity, and self-directed learning has made it a defining model for modern education. However, while ODEL dismantles barriers of place and time, it simultaneously introduces new challenges, particularly in safeguarding academic integrity in online assessments. Digital environments create opportunities for dishonest practices such as plagiarism, impersonation and unauthorised resource use. This compromises the credibility of qualifications (Hylton et al., 2016). The growth of digital education has also expanded forms of misconduct. E-dishonesty, including digital impersonation and misuse of internet resources, complicates the task of enforcing integrity (Wahid et al., 2015). Academic misconduct is rarely driven by technology alone; it reflects a combination of institutional culture, individual ethics, and assessment design (Namlu & Odabasi, 2007). In traditional, in-person examinations, invigilators could more easily detect and discourage dishonesty. In contrast, ODEL relies on virtual spaces without physical presence, making identity verification and monitoring far more difficult (Verhoef & Coetser, 2021). To mitigate these risks, universities have increasingly turned to online proctoring systems. These tools, which employ webcams, lockdown browsers, and activity tracking, aim to authenticate identity and deter misconduct (Hussein et al., 2020). While proctoring can be delivered in live, recorded, or automated forms, each has distinct strengths and limitations. Automated approaches offer scalability and cost-effectiveness, but they raise concerns about fairness, privacy, and technical reliability (Al-Zoubi et al., 2022). Students frequently report anxiety, connectivity problems, and the feeling that strict surveillance conflicts with ODEL's learner-centered philosophy (Gilbert, 2022). These challenges are compounded by structural barriers. Many learners in ODEL environments face low digital literacy, limited institutional support, and unreliable internet connectivity, which reduces engagement and performance (Majola & Mudau, 2022). Learning management systems (LMS) such as Moodle, Blackboard, and Sakai are widely adopted but often lack the capacity to support innovative and authentic forms of assessment (Badaru & Adu, 2022; Al-Zoubi et al., 2022; Gilbert, 2022). As well as technical failures, including software crashes and malfunctioning proctoring tools. This can prevent students from completing exams, leading to appeals and additional workloads for faculty (Selwyn et al., 2023). Beyond the technical dimension, students also face psychological challenges such as isolation. Such as test anxiety and reduced peer support, which further intensify the pressures of online assessment (Hussein et al., 2020). Despite these difficulties, upholding academic integrity remains critical. For students, integrity ensures that qualifications genuinely reflect their knowledge and skills, for institutions. It strengthens the credibility of credentials and promotes ethical practices. ODEL supports these aims by emphasising inclusivity, equity, and autonomy, which align with lifelong learning values (Phuthela & Dwivedi, 2020). Policies such as those adopted by UNISA (2008) explicitly seek to reduce structural barriers like distance, economic constraints, and access to resources. At its foundation, ODEL represents an effort to combine the strengths of distance education, removing spatial and temporal constraints (Brown & Brown, 1994). As well as open learning, which emphasises flexible entry and participation (UNESCO, 2001).

Nevertheless, significant barriers persist as students continue to experience missed assessments due to poor connectivity and software failures (Selwyn et al., 2023). Technological limitations, such as low bandwidth, also undermine feedback quality and timeliness, affecting learning outcomes (Mak et al., 2022). Furthermore, academic integrity is not just a technical matter; it is rooted in values of honesty, fairness, trust, and responsibility (Holden et al., 2021). These values guide academic experiences and professional development. However, the rapid expansion of online assessments has made authentic identity verification and fair monitoring increasingly complex (Hollister & Berenson, 2009). Institutions are therefore moving toward more advanced platforms beyond traditional LMS exams (Prisacari & Danielson, 2017). Yet verifying identity without physical contact remains a persistent issue, requiring technical innovations (Ryu et al., 2020). Such as keystroke tracking, biometric authentication, dynamic test generation, and AI-driven behavior analysis. While these technologies strengthen exam security, they also raise ethical concerns around privacy, bias, and accessibility. The COVID-19 pandemic intensified this debate by forcing higher education to adopt online proctoring at scale. While the tools reduced cheating, they also highlighted deep concerns about surveillance, student autonomy, and data

protection (Nigam et al., 2021). Scholars argue that systems must be evaluated not only for cost and reliability but also for their ethical and pedagogical implications (Lee, 2021). Interim low-tech solutions, such as video-based supervision, have been used to maintain fairness and accessibility in the absence of robust proctoring infrastructure (Crowdmark, 2020). Despite the growing interest in technical functionality, gaps remain in exploring the pedagogical, ethical, and social consequences of online proctoring. As ODeL continues to expand globally, there is a pressing need to understand how these systems shape student experience, equity, and educational outcomes (McKenna, 2022). Context-sensitive and inclusive approaches are essential, ensuring that proctoring does not undermine the very philosophy of openness and flexibility that defines ODeL (Nasr, 2020). A deeper conceptual examination of the ethical, social, and instructional implications of proctoring is required (Lee & Fanguy, 2022). This will guide institutions towards sustainable assessment policies that safeguard both standards and inclusivity. Hence, this study aims to contribute a framework-guided synthesis of proctoring practices in ODeL, highlighting the balance between technological enforcement and inclusive, ethical learning environments.

THEORETICAL FRAMEWORK

This conceptual study adopts a theoretical framework that integrates principles of two theories, Social Constructivism and Technological Determinism, to understand the complexities of proctoring in online assessments within the ODeL context.

SOCIAL CONSTRUCTIVISM

The theory proposed by Vygotsky (1978) posits that knowledge is co-constructed through social interactions and emphasises the collaborative nature of learning through social negotiation (McLeod, 2022). He rejected the assumption made by Piaget that it was possible to separate learning from its social context. Vygotsky believed everything is learned on two levels through interaction with others and the individual's mental structure (McLeod, 2022). The framework suggests that proctoring solutions should focus on surveillance and promote collaborative learning experiences. It advocates for proctoring methods that align with the principles of social constructivism, allowing for the co-construction of knowledge and maintaining a sense of community in the absence of physical classrooms. The Social Constructivism Theory (SCT) posits that students' acquisition of knowledge is influenced by sociocultural factors (Ambrose et al., 2010). Students construct meanings by actively collaborating with others by sharing and receiving information. Therefore, to achieve a social constructivist learning environment (SCLE), an interactive process should occur among stakeholders to share information (Lee & Smagorinsky, 2000). E-learning developers need to understand students' perceptions of their preferred online classroom environment (Taylor & Maor, 2000).

TECHNOLOGICAL DETERMINISM

Technological Determinism by Thorstein Veblen (2013) asserts that technological advancements shape and influence societal structures and behaviours. Technology has undergone significant transformations in the 4.0 Industrial Revolution era, reshaping and improving various human activities. Social media, among new media, is a powerful tool for rapid communication, facilitating the rapid dissemination of novel ideas (Schwab, 2015). This technological evolution is recognised as a driving force for societal change, requiring transformative shifts (Evans, 2011). The belief in technological changes as the primary catalyst for societal transformation corresponds to the concept of technological determinism. This viewpoint contends that technological advancements, including advances in communication technology and media, have the potential to fundamentally alter society (Veblen, 2013). These changes extend to education, altering society and individuals' engagement (p.86). As Hauer (2017) indicated, prior research emphasises the profound impact of technological development on society. Notably, some consequences of technological development result from improper technology use rather than inherent flaws in mature technology. This framework recognises that the choice and implementation of proctoring technologies can profoundly impact the dynamics of ODeL within the context of online assessments. The framework implies that the selection and integration of proctoring technologies should be strategic and considerate of their broader

implications on academic integrity and student engagement. It encourages a proactive approach to technological determinism, wherein institutions consciously choose technologies that align with the principles of ODeL and enhance the overall educational experience. Higher education institutions (HEIs) were urged to venture outside of their comfort zones by integrating technology into education, particularly in proctoring. Traditional in-person proctoring methods were supplanted by technologically enhanced solutions (Pandit & Agrawal, 2022). These tools analyse students' behaviour and eye movements to detect potential cheating during exams. Different approaches to pedagogy design, delivery, and evaluation remain crucial (Blignaut et al., 2022). However, this shift raises ethical concerns, including privacy issues, accessibility, and unintended biases in algorithmic decision-making. These theories were selected not only to frame the conceptual approach but also to guide the analysis. Social Constructivism informs the interpretation of collaborative, ethical, and community-focused findings, while Technological Determinism highlight the systemic impact of proctoring technologies. The results of the review are therefore explicitly connected to this framework in the findings and discussion sections.

RESEARCH METHODOLOGY

This study employs a systematic literature review (SLR) guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to examine strategies for enhancing security and academic integrity in ODeL assessments. As online education expands, institutions increasingly rely on digital assessments, necessitating the development of secure, transparent, and ethically sound proctoring solutions. This review synthesises existing research to identify best practices, challenges, and emerging trends in online assessment security within ODeL environments.

Following PRISMA guidelines, the review was conducted in three structured phases: searching, screening, and analysis, ensuring methodological rigour and replicability.

PHASE 1: SEARCHING

To comprehensively explore the landscape of security and academic integrity in ODeL, the study conducted searches across reputable databases, including Scopus, Web of Science, ERIC, and Google Scholar. Search terms such as “remote proctoring in ODeL,” “academic integrity in online assessments,” “security challenges in distance learning,” and “ethical considerations in online proctoring” were used. Boolean operators were applied, for example: (‘remote proctoring’ AND ‘ODeL’), (‘academic integrity’ AND ‘online assessment’), (‘security’ AND ‘distance learning’), (‘ethical considerations’ AND ‘proctoring’) refined the search process to focus on empirical studies published in English between 2014 and 2024, ensuring relevance to contemporary ODeL assessment practices.

PHASE 2: SCREENING

The inclusion criteria focused on empirical studies directly addressing security measures, proctoring technologies, academic integrity strategies, and ethical considerations in ODeL assessments. Exclusion criteria eliminated theoretical discussions, opinion pieces, and studies not explicitly linked to assessment security in distance education. The initial search yielded 1,200 articles after removing duplicates; 950 unique articles were evaluated based on their titles and abstracts. Abstract screening removed papers lacking methodological detail or clear links to ODeL assessment security. This process selected 250 articles for a comprehensive review, with 11 studies meeting all inclusion criteria.

PHASE 3: ANALYSIS

Based on relevance and methodological rigour, 11 studies were ultimately selected for inclusion. Key themes emerging from the review include:

- The role of adaptive proctoring technologies, such as AI-driven monitoring and biometric authentication, in enhancing security while maintaining a student-centered approach.
- The balance between security enforcement and student well-being, particularly addressing concerns related to test anxiety, accessibility, and inclusivity.

- Ethical challenges in online proctoring, including data privacy, digital equity, and transparency in assessment policies.
- Innovative approaches to ODeL assessment integrity, such as asynchronous proctoring, multi-factor authentication, and open-book assessment models.

A PRISMA flow diagram (Figure 1) was developed to visualise the systematic review process, detailing the progression from the initial search to the final study selection while highlighting critical themes. By systematically examining the intersection of security, academic integrity, and ethical considerations in ODeL assessments, this study contributes to the broader discourse on effective, transparent, and student-supportive proctoring strategies. The findings offer insights into implementing adaptive and ethically responsible assessment models that uphold the principles of openness and distance education.

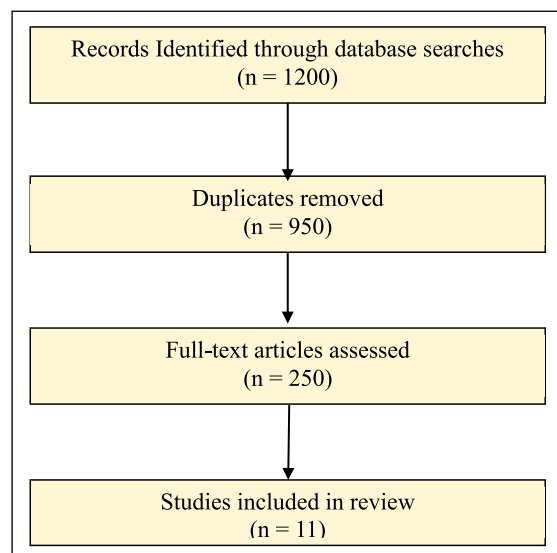


Figure 1 PRISMA Flow Diagram of Study Selection Process for Online Proctoring in ODeL (2014–2024).

Table 1 Summary of Empirical Studies on Proctoring and Academic Integrity in ODeL (2014–2024).

Thematic analysis identified the following recurring themes based on the 11 articles reviewed.

THEMES	AUTHOR(S) & YEAR	KEY FINDINGS
Strategic Integration of Proctoring Technologies	Badaru & Adu (2022)	LMS platforms (Moodle, Blackboard, Sakai) remain central to ODeL but often fail to support innovative assessment; integration should align with pedagogy, not only technology.
	Al-Zoubi et al. (2022)	Automation and blockchain integration in LMSs improve scalability but introduce privacy and reliability risks that affect assessment integrity.
	Selwyn et al. (2023)	Technical breakdowns in online proctoring systems cause missed exams, appeals, and faculty overload; these undermine institutional trust in ODeL settings.
Balancing Security and Academic Integrity	Majola & Mudau (2022)	Digital literacy gaps, weak institutional support, and low connectivity reduce the effectiveness of online proctoring and exacerbate inequality among students.
	Badaru & Adu (2022)	Integrity in ODeL requires pedagogical redesign rather than technological enforcement; sustainable assessment must integrate flexibility and inclusivity
	Hussein et al. (2020)	Comparative review of online proctoring tools demonstrates that while surveillance deters misconduct, usability and access barriers must be addressed for fairness.
Perceptions and Experiences of Stakeholders	Gilbert (2022)	Students report anxiety, isolation, and limited peer support under online assessment/proctoring
	Mak et al. (2022)	Need for greater technical preparedness, empathy, and emotional support to sustain performance.
	Al-Zoubi et al. (2022)	Technical friction during proctored exams frustrates students and harms perceived fairness.

FINDINGS

As presented in [Table 1](#), eleven studies published between 2014 and 2024 were included in this review. These studies were conducted in diverse contexts, including the United States, Canada, Switzerland, Kuwait, Australia, South Africa, and Iran. They employed a range of methodologies such as experimental designs, surveys, interviews, and systematic reviews. The thematic synthesis generated four interrelated themes: *strategic integration of proctoring technologies*; *balancing security and academic integrity*; *perceptions and experiences of stakeholders*; and *ethical considerations and inclusivity*. Each theme illustrates practical challenges of implementing proctoring in ODeL but also the broader implications for equity, trust, and academic integrity. This is illustrated in [Diagram 1](#) as the framework developed from these findings.

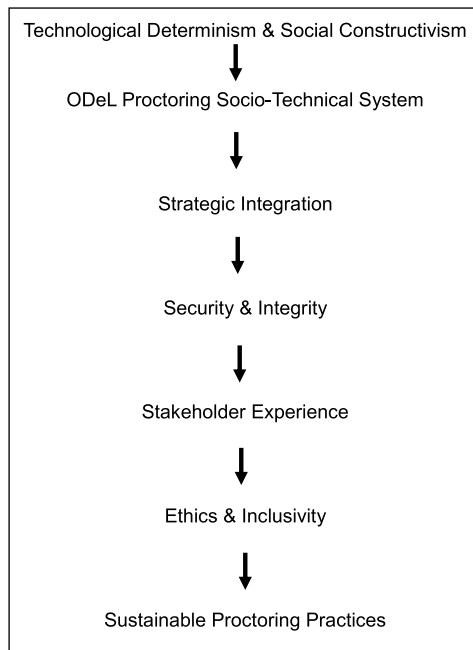


Diagram 1 The ODeL Proctoring Socio-Technical System: Integrating Technological Determinism and Social Constructivism.

[Diagram 1](#), titled *The ODeL Proctoring Socio-Technical System*, represents the framework developed from these findings. It combines the principles of Technological Determinism and Social Constructivism to show how technology and human factors interact to support academic integrity. The framework includes four connected components: strategic integration, security and integrity, stakeholder experience, and ethics and inclusivity to ensure sustainable proctoring practices.

STRATEGIC INTEGRATION OF PROCTORING TECHNOLOGIES

The evidence shows that the integration of proctoring and learning management systems (LMSs) is not a neutral technical matter but one that actively shapes teaching, assessment, and student experience. Badaru and Adu (2022) found that widely adopted platforms such as Moodle, Blackboard, and Sakai remain central to ODeL delivery, yet they often fail to support innovative forms of assessment. Similarly, Al-Zoubi et al. (2022) reinforced this view, showing that LMS constraints reduce the flexibility and creativity that ODeL is designed to promote. Selwyn et al. (2023) reinforced this by showing that technical failures, software crashes, and disconnections lead to missed examinations and student appeals, undermining institutional credibility. Their work also noted that automated proctoring, while cost-effective and scalable, often brings privacy concerns and technical risks. Selwyn et al. (2023) further observed that integration of proctoring tools leads to software crashes and exam interruptions, which in turn generate missed exams, appeals processes, and increased staff workload. Viewed through the lens of Technological Determinism, these findings suggest that technologies such as LMSs and proctoring tools are not passive supports but active shapers of outcomes, embedding certain behaviors and burdens into institutional practice. Social Constructivism, however, highlights that integration must be guided by pedagogical and social negotiation so that systems enable collaboration and inclusivity rather than rigid surveillance. This study contributes by reframing

integration as a pedagogical challenge rather than a technical add-on. It introduces a socio-technical alignment model that matches assessment purpose with appropriate proctoring modes (live, recorded, automated) and LMS affordances. By doing so, it shifts the conversation from adopting technology for its own sake to strategically aligning systems with ODeL's principles of flexibility, inclusivity, and learner autonomy.

BALANCING SECURITY AND ACADEMIC INTEGRITY

The second theme highlights the difficulty of ensuring security while preserving fairness and trust. Majola and Mudau (2022) reported that poor digital literacy, limited institutional support, and weak connectivity undermine the effectiveness of proctoring systems in South Africa, thereby deepening inequities rather than ensuring integrity. Selwyn et al. (2023) added that technical failures in proctoring software not only disrupt examinations but also erode trust in qualifications, raising questions about the legitimacy of ODeL. Badaru and Adu (2022) stressed that security measures alone are insufficient and must be complemented by pedagogical strategies such as authentic assessment design. Technological Determinism helps explain how surveillance-heavy systems may inadvertently reduce legitimacy by embedding inequities and producing unintended consequences such as false suspicions or lockouts. Hussein et al. (2020) compared several proctoring tools and concluded that while surveillance deters academic misconduct, usability, accessibility, and privacy. They must be prioritised to maintain fairness and legitimacy. Together, these findings reveal that sustainable assessment integrity requires both technological enforcement and pedagogical reform. It is for this reason that social constructivism emphasises that integrity is co-constructed through trust, fairness, and community building, rather than enforced solely through punitive monitoring. This study contributes by reconceptualizing academic integrity as a socio-technical achievement rather than a purely technical outcome. It proposes a dual-channel integrity strategy that combines assessment design (for example, open-book or portfolio tasks that reduce the incentive to cheat) with minimal and transparent proctoring safeguards. This approach highlights that integrity arises when technological controls are balanced with practices that build student trust and foster ethical engagement.

PERCEPTIONS AND EXPERIENCES OF STAKEHOLDERS

A third theme centers on the lived experiences of students, which strongly shape the acceptance and legitimacy of proctoring. Gilbert (2022) reported that proctored assessments frequently generate anxiety, feelings of isolation, and limited opportunities for peer support. Majola and Mudau (2022) found that poor connectivity and a lack of digital training reduce student performance and create inequitable conditions in online exams. Al-Zoubi et al. (2022) documented widespread frustration among students when technical failures interrupt assessments, leading to perceptions of unfairness and disengagement. Mak et al. (2022) documented both examiners' and students' experiences during virtual professional assessments. Revealing the need for greater technical preparedness, empathy, and emotional support to sustain performance. These studies collectively show that stakeholder experiences significantly influence the legitimacy of proctoring systems. From a social constructivism viewpoint these findings indicate that students' perceptions of fairness, transparency, and choice are central to the social construction of integrity. Where students feel respected and supported, proctoring is more likely to be accepted; where it creates stress or inequity, it undermines legitimacy. Technological Determinism underscores how rigid surveillance configurations and technical barriers can embed structural disadvantage for learners with weaker resources. This study contributes by elevating stakeholder experience from a peripheral concern to a central determinant of legitimacy. It introduces a participatory proctoring protocol that involves students and faculty in shaping proctoring policies, clarifying data use, and agreeing on fallback procedures in case of connectivity failures. By advancing the idea of students as co-constructors of integrity, this study reframes stakeholder perceptions not as obstacles but as essential drivers of sustainable proctoring practices.

ETHICAL CONSIDERATIONS AND INCLUSIVITY

The final theme focuses on the ethical, equitable, and inclusive dimensions of online proctoring in ODeL contexts. As the use of remote surveillance tools expands, questions of fairness,

privacy, and transparency have become central to debates about academic integrity. Selwyn et al. (2023) argued that institutions frequently prioritise surveillance and compliance over student-centered values such as fairness, inclusivity, and care. Their findings reveal how heavy reliance on proctoring technologies can compromise trust and student well-being, creating tension between institutional control and ethical responsibility. Similarly, Verhoef and Coetser (2021) examined student perspectives during emergency remote assessments and found that privacy concerns, data security, and inconsistent access to reliable internet undermine the perceived legitimacy of proctored exams. They emphasised that ethical assessment practices must be grounded in transparency and inclusivity to ensure all students are treated equitably, regardless of their technological or socioeconomic context. Hylton et al. (2016) provided empirical evidence that webcam-based proctoring systems can effectively deter cheating but simultaneously raise concerns about discomfort, psychological stress, and invasion of privacy among distance learners. Their findings underscore the need for ethical safeguards that respect students' personal boundaries and emotional well-being while maintaining academic standards. Lee and Fanguy (2022) contributed to this discussion by framing online proctoring as both an educational innovation and an ethical dilemma. They argued that while technology can enhance assessment security, it risks eroding student trust if implemented without transparent governance, explicit consent, and sensitivity to diverse learner contexts. McKenna (2022) positioned online proctoring within a broader critique of neoliberal surveillance cultures in higher education. She warned that the normalisation of constant monitoring reflects institutional pressures to control rather than to educate, potentially undermining the humanistic values of openness and trust that define ODeL. Collectively, these five studies demonstrate that ethical legitimacy and inclusivity are not peripheral issues but essential pillars of academic integrity in online assessment. Through the lens of Technological Determinism, the expansion of surveillance technologies risks embedding inequities at scale, while Social Constructivism highlights that fairness, transparency, and trust must be co-constructed through dialogue between institutions and learners. Sustainable proctoring in ODeL therefore requires approaches that balance technological enforcement with ethical care, ensuring that security, not undermine the principles of openness, respect, and equity.

DISCUSSION

This study aimed to enhance security and academic integrity in ODeL. It also sought to develop a framework for sustainable and ethical proctoring as illustrated in [Diagram 1](#). The findings show that proctoring is not only a technological solution but a social process. Technology, people, and context interact to shape integrity in online assessments. Using Technological Determinism and Social Constructivism, the study explains how both forces influence the ODeL environment. From a Technological Determinism perspective, technology is a driver of change. Proctoring systems such as webcams, lockdown browsers, and artificial intelligence tools control how exams are conducted (Selwyn et al., 2023). They help prevent cheating but can also cause stress, anxiety, and technical problems. Veblen (2013) argued that technology transforms society. In ODeL, this is evident as technology reshapes learning spaces and relationships between students and institutions. Yet, the findings reveal that weak digital access and poor connectivity create inequality and frustration (Majola & Mudau, 2022; Badaru & Adu, 2022). Technology must therefore support learning rather than dominate it. Proctoring should align with ODeL's principles of flexibility, fairness, and inclusion. The Social Constructivist view focuses on people and interaction. Vygotsky (1978) believed that learning develops through shared experience. The findings show that academic integrity also grows through dialogue and trust. Students accept proctoring when they understand the process and feel respected (Gilbert, 2022). When surveillance is excessive, anxiety and alienation increase (Hylton et al., 2016; Verhoef & Coetser, 2021). Integrity, therefore, is not imposed by technology; it is co-created between learners and educators. Open communication and empathy help to build shared responsibility for honesty and fairness.

Balancing security and fairness are essential. Proctoring tools can discourage misconduct, but do not guarantee ethical behavior (Hussein et al., 2020). Sustainable integrity comes from ethical assessment, design, and community values. Social Constructivism supports collaborative assessment methods such as open-book or portfolio tasks that reduce the temptation to cheat and encourage authentic learning (Ambrose et al., 2010; Badaru & Adu, 2022). This balance

ensures that technology reinforces integrity without undermining the learner experience. Ethical and inclusivity concerns are central to the discussion. Over-reliance on surveillance can create bias, breach privacy, and increase inequality (Selwyn et al., 2023). Technological Determinism warns that systems can reproduce disadvantage if applied without care. Social Constructivism, however, reminds educators that inclusion and fairness are created through human connection and mutual respect (Lee & Fanguy, 2022). Proctoring must therefore protect privacy, ensure accessibility, and address the digital divide (McKenna, 2022). Ethical decision-making and transparency are vital for legitimacy in ODeL assessments.

IMPLICATIONS FOR POLICY AND PRACTICE

The findings of this study provide several implications for higher education institutions (HEIs) that rely on proctoring within ODeL systems. First, institutions should approach strategic integration of proctoring tools not as a technical add-on but as a pedagogical decision. Adoption should be guided by the distinctive features of ODeL flexibility, learner autonomy, and inclusivity. Pilot testing, stakeholder consultation, and alignment with learning outcomes are essential before large-scale implementation.

Second, policies must strike a balance between security and academic integrity. Excessive reliance on surveillance may reduce cheating, but at the cost of student trust and well-being. Universities should explore alternatives such as open-book exams, portfolios, and project-based assessments, where integrity is embedded into task design rather than enforced through monitoring alone. Third, the evidence underscores the importance of stakeholder experience. Students and faculty should be included in decision-making processes about proctoring. Clear communication of policies, transparent handling of data, and reliable technical support increase legitimacy and reduce resistance. Providing options for different modes of proctoring also empowers learners and addresses diverse needs. Finally, policies must foreground ethics and inclusivity. Institutions should adopt privacy-by-design approaches, ensure accessibility across varying technological contexts, and address the digital divide that disadvantages students with poor connectivity or limited devices. This requires investment in infrastructure as well as continuous review of fairness and inclusivity in assessment practices. Overall, these implications highlight that sustainable proctoring in ODeL depends on treating it as a socio-technical practice. Technology alone cannot secure integrity; it must be embedded within ethical, inclusive, and learner-centered systems that reflect the values of higher education in the digital age. The framework in [Diagram 1](#) provides a practical guide for institutions seeking to maintain academic integrity in ODeL. It encourages a holistic approach that combines secure technology with ethical and inclusive practices. By applying this framework, universities can create proctoring environments that are trustworthy, transparent, and aligned with the values of openness, fairness, and flexibility that define distance education.

CONCLUSION

This study has shown that proctoring in ODeL cannot be reduced to a debate about surveillance technologies or cheating prevention. Instead, it is a socio-technical system, where technological infrastructures and social values intertwine to shape integrity, trust, and equity. By applying the dual lenses of Technological Determinism and Social Constructivism, this work demonstrates that proctoring technologies are never neutral. They restructure assessment conditions, influence student performance, and alter the relationships between students and institutions. At the same time, their legitimacy depends on how students, educators, and institutions collectively negotiate fairness, inclusivity, and responsibility. The findings compel us to reconsider the future of integrity in ODeL. If institutions continue to prioritise surveillance alone, they risk undermining the very foundations of openness, flexibility, and autonomy. Conversely, if proctoring is reimagined as part of a broader ecosystem of trust, equity, and ethical assessment design, it can contribute to both academic credibility and meaningful learning. This study contributes a framework that highlights integration, balance, experience, and inclusivity as the pillars of sustainable proctoring. Its message is clear: proctoring in ODeL is not just about preventing cheating it is a socio-technical practice where technology and social values co-create integrity. Sustainable approaches must align surveillance with pedagogy,

DATA ACCESSIBILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

SUSTAINABLE DEVELOPMENT GOALS

This study is linked to the following SDG(s): Quality education (SDG 4) and reduced inequalities (SDG 10).

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS

Mncedisi Christian Maphalala: Conceptualization, writing—review and editing, writing—original draft preparation methodology. **Ntombikayise Nkosi:** Formal analysis, investigation, data curation, visualization, acquisition. The author has read and agreed to the published version of the manuscript.

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