THE INVIGILATOR APP AND SOME VUCA ELEMENTS IT TRIGGERS IN STUDENTS AND LECTURERS DURING ONLINE EXAMINATIONS: A CASE STUDY OF AN ENGLISH STUDIES MODULE AT UNISA

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ABSTRACT

This study reports on the experiences students registered for a first-year, undergraduate English Studies module and English Studies lecturers had with the Invigilator app during an online examination in the first semester of 2023. Current research indicates that e-proctoring induces anxiety and uncertainty in students when they write online examinations. However, there is a paucity of research on the VUCA elements that the Invigilator app triggers in students and in lecturers during online examinations. The study was informed by a critical data surveillance framing, and it used convenience sampling to collect data through semi-structured interviews with seven lecturers (n = 7) for various undergraduate English Studies modules. Additionally, it employed purposive sampling to collect data from five (n = 5) email queries sent by five first-year, undergraduate English Studies module students to their lecturers when they experienced problems with the Invigilator app during their online examination. The findings indicate that lecturers and students struggled with the Invigilator app as an e-proctoring tool. Future research should focus on other less-invasive and better AI-proof assessment methods of maintaining academic integrity in online assessments.

Keywords: The Invigilator app, e-proctoring, online examinations, VUCA, critical data surveillance.

INTRODUCTION

The current paper is motivated by and builds on Shange's (2023) study on the use of the Invigilator app by first-year, undergraduate English Studies students at the University of South (henceforth UNISA). Most importantly, it is triggered by student queries that we (as lecturers) and some of our colleagues in our department tend to receive about the Invigilator app during and after every online examination. Shange (2023) points out that few of the e-proctoring apps that are currently available for higher education (HE) online examination invigilation purposes have not yet been extensively studied in relation to the experiences students have in using them. Most of the studies that have investigated e-proctoring apps for HE online examinations have focused on using e-proctoring apps during the COVID-19 pandemic. Three such studies are those by Khalil et al. (2022), Lee and Fanguy (2022), and Woldeab and Brothen (2021). All these three studies frame e-proctoring technologies as surveillance technologies, with Lee and Fanguy (2022) further framing these technologies as resembling Foucauldian disciplinary governmentality. This framing suggests how e-proctoring technologies lend themselves well as invasive technologies (Brown, 2018; Giller, 2021; Khalil et al., 2022; Langerfeld, 2020; Shange, 2023; Terpstra et al., 2023) that tend to discipline targeted users' bodies.

There appear to be fewer studies that have investigated the impact of e-proctoring technologies on students within the HE online examination environment in the post-COVID-19 pandemic period. As mentioned above, a study by Shange (2023) has examined what it calls 'the bad and ugly' (p. 214) side of the Invigilator app among first-year, undergraduate English Studies students at UNISA during an online examination after the COVID-19 pandemic. One of the variables this study explored was an Invigilator app-induced anxiety in examinees (in these first-year students) (also see Giller, 2021; Langerfeld, 2020; Woldeab & Brothen, 2021). In a different but related context, a study by Saurwein and Xu (2020) investigated the VUCA elements associated with the COVID-19 pandemic among exchange students during a normal, disruption-free semester in 2019 and during a COVID-19-disrupted, VUCA-stricken semester in 2020.

In this regard, the current paper maintains that there is a paucity of research that has examined how online invigilation technologies tend to trigger volatile, uncertain, complex, and ambiguous (henceforth VUCA) elements in some of the HE students during online examinations. Thus, it set out to explore the VUCA elements the Invigilator app evoked in a cohort of first-year, undergraduate English Studies students at UNISA, who used it in one of the online examination sessions in the first semester of 2023. The paper also sought to examine lecturers' perceptions of the use of the Invigilator app in online examinations by undergraduate students in the Department of English Studies.

THE INVIGILATOR APP AND ONLINE EXAMINATIONS – E-PROCTORING ECOSYSTEM

When the COVID-19 pandemic broke out in 2020, many higher education institutions (HEIs) pivoted to emergency remote online teaching and learning (EROTL) (see Khalil et al., 2022) and to emergency online assessment (EOA) (see Chaka, 2020). In fact, schools and universities closed down globally (Sahu, 2020; Viner et al., 2020; cf. Zhou et al., 2020). Later on, Zhou et al. (2020) came to characterise this situation as 'School's Out, But Class's On' (p. 503). It was within this context that many HEIs transitioned to EOA. During this period, EROTL enjoyed the spotlight and a lion's share of scholarly publications, while EOA did not. Since then, though, some of the HEIs have formalised the EOA pivoting into their regular online assessment. UNISA is one such HEI, which is also an open distance and e-learning (ODeL) institution. The move to embrace online assessment, including the initial move to pivot to EOA, is part of safeguarding the academic integrity and credibility of online assessment (see Gamage et al., 2020; Giller, 2021; Guangul et al., 2020). EOA, like EROTL, is unplanned and less-coordinated, whereas online assessment is planned and well-coordinated.

There are different types of online exam proctoring options. The first is recorded proctoring. This is an artificial intelligence (AI) powered webcam in which students' screen and audio feeds are recorded, with no real-time monitoring. The second is auto proctoring, which is a web-based, AI-enabled, automated proctoring. The third one is live proctoring. It is similar to an in-person exam setting, except that it is device-driven, with real-time audio and video feeds from the start to the end (Jain, 2021; also see Arnò et al., 2021; Giller, 2021; Hussein et al., 2020; Nigam et al., 2021; Shange, 2023; Terpstra et al., 2023). The Invigilator app used at UNISA falls under the first proctoring option. It is a mobile-based app, which students can access from their mobile phones, especially their entry-level smartphones (see Mafolo & Shoba, 2021). Dubbed the "Owl" by students (Mafolo & Shoba, 2021) owing to its iconic owl logo (see Figure 1), this invigilation app's real name is the Digikamva Invigilator app (Mafolo & Shoba, 2021). This paper refers to it using its short form, the Invigilator app (cf. Business, 2022). The word kamva in Digikamva is an isiXhosa word for the future. So, loosely translated, Digikamva is Digifuture. IsiXhosa is one of the nine African languages spoken in South Africa.

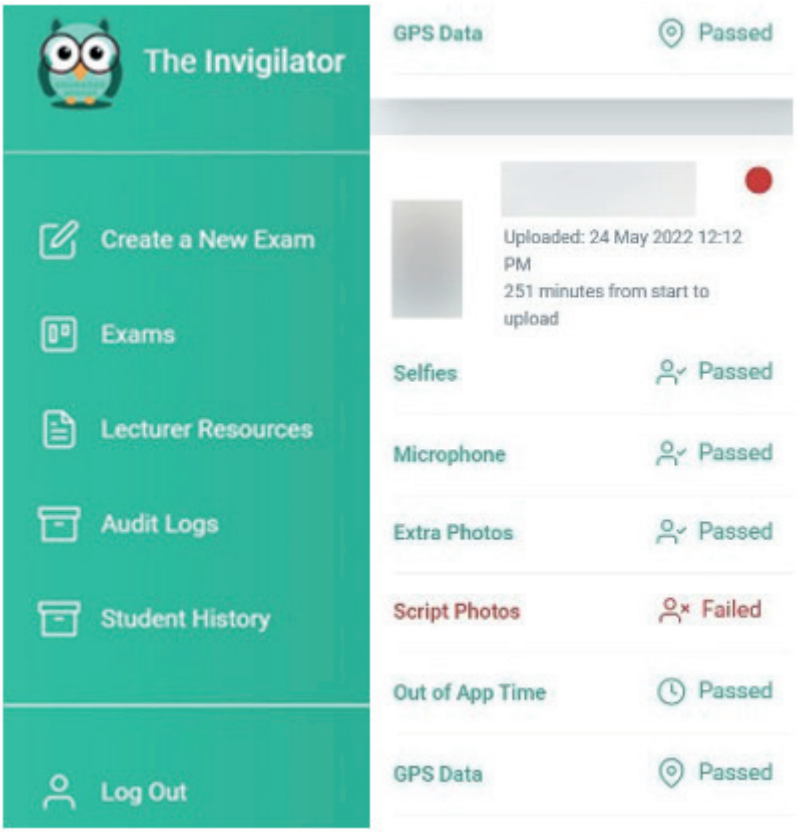

Figure 1. A screenshot of the Invigilator app (left-hand side) and the GPS data it requires from a student (right-hand side).

The Invigilator app is AI-powered. It utilises Global Positioning System (GPS) to track and pinpoint students' location, and to establish students' proximity to one another during an online examination session. It also employs facial recognition technology to verify students' identities while sitting down to take their online examination. In addition, it requires students to randomly take their selfies during the online examination, and to take random audio recordings during the online examination (Business Day, 2022; Mafolo & Shoba, 2021; also see Figure 1). Moreover, using AI-aided facial recognition technology, the Invigilator app matches students' selfies with students' master photos to regularly verify students' identities. In this case, it employs a liveness test, which is an anti-spoofing technology that prevents students from providing photos of video or photos of photos (Business Day, 2022) as proof of their faces. All of this has to do with two issues that are at stake here: test-taker authenticity and test-taking credibility, or identity and authorship verification, and credible and trustable test-taking environment (cf. Giller, 2021; Terpstra et al., 2023).

Broadly speaking, the Invigilator app as used at UNISA and the online examinations conducted by UNISA in the post-pandemic era are part of the broader e-proctoring ecosystem, which, has, since, been adopted by many HEIs globally (see Arnò et al., 2021; Giller, 2021; Khalil et al., 2022; Nigam et al., 2021; Shange, 2023; Terpstra et al., 2023). This e-proctoring move is meant to maintain and safeguard the integrity and credibility of UNISA's online examinations. So, the Invigilator app is the case of a private tech company coming to the rescue (Business Day, 2022) of UNISA's online examinations as is the case with other technologies that are an integral part of our everyday lives such as Google Assistant, Siri, Alexa, Google Maps, and Google Translate (see Chaka, 2023a, 2023b, 2023c).

However, there is a catch in deploying the Invigilator app for online examinations: breaches and violations of students' personal privacy data online. This catch relates particularly to:

- Harvesting these data for genuine and logical uses vis-a-vis the Protection of Personal Information Act (POPIA or POPI);
- Personal data surveillance (cf. Giller, 2021; Khalil et al., 2022; Shange, 2023; Woldeab & Brothen, 2021); and
- Privacy invasion (cf. Giller, 2021; Langerfled, 2020).

In addition to the personal data concerns raised above, there are issues triggering the VUCA elements for some students. One example of these VUCA elements is depicted in Figure 2 in which one ENG0000 (not its real name) student had a chat with the Invigilator app about the problems he encountered during an online examination.

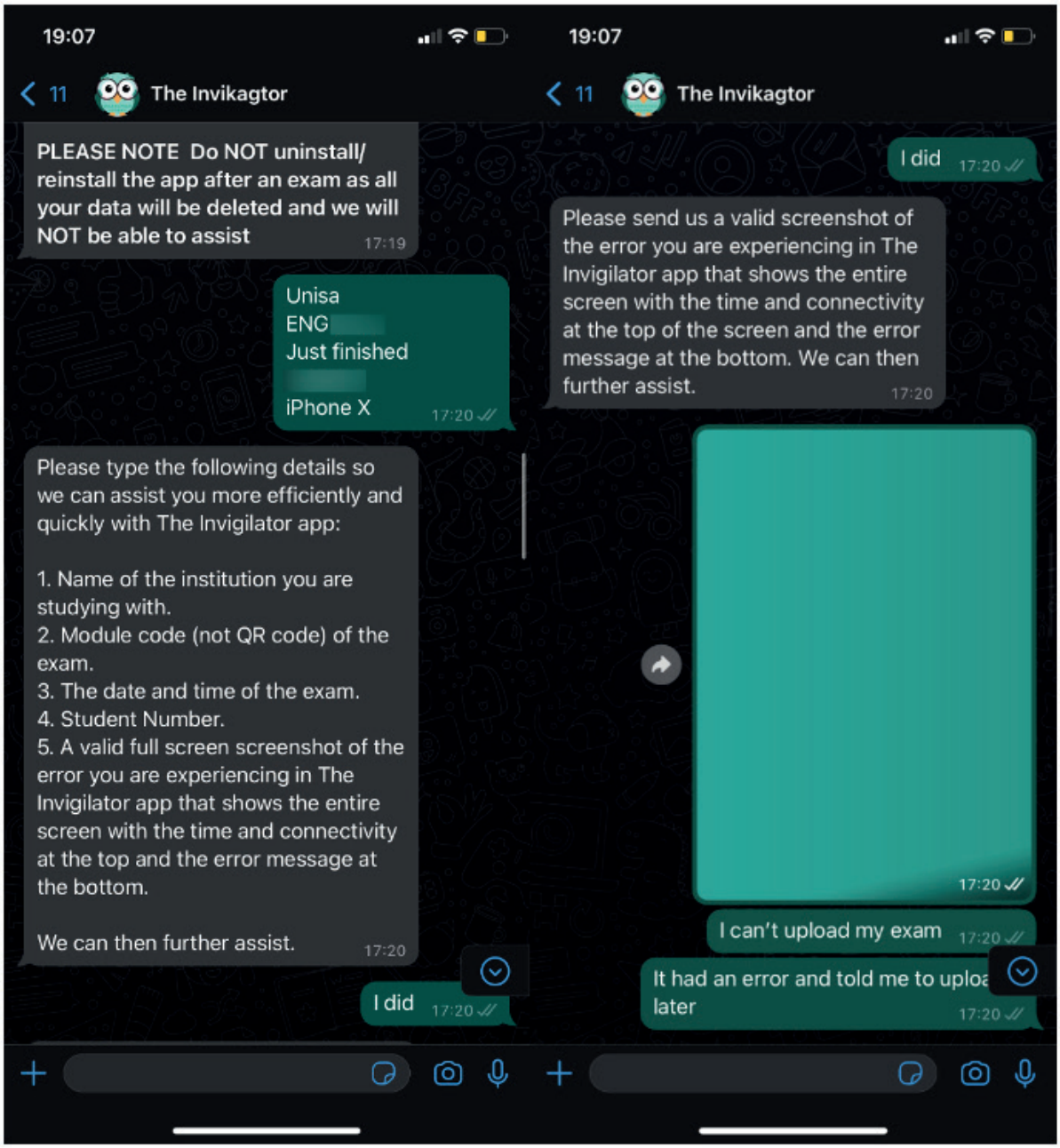

Figure 2. A student's chat with the Invigilator app about the problems the student encountered during an online examination.

Additionally, Figure 3 demonstrates the issues the Invigilator app had flagged for certain students who wrote an ENG0000 (not its real name) online examination. These two figures (Figures 2 and 3) provide a glimpse of some of the VUCA elements that students encounter, at a practical, real-world level, when writing their online examinations in this undergraduate module offered by the Department of English Studies at UNISA.

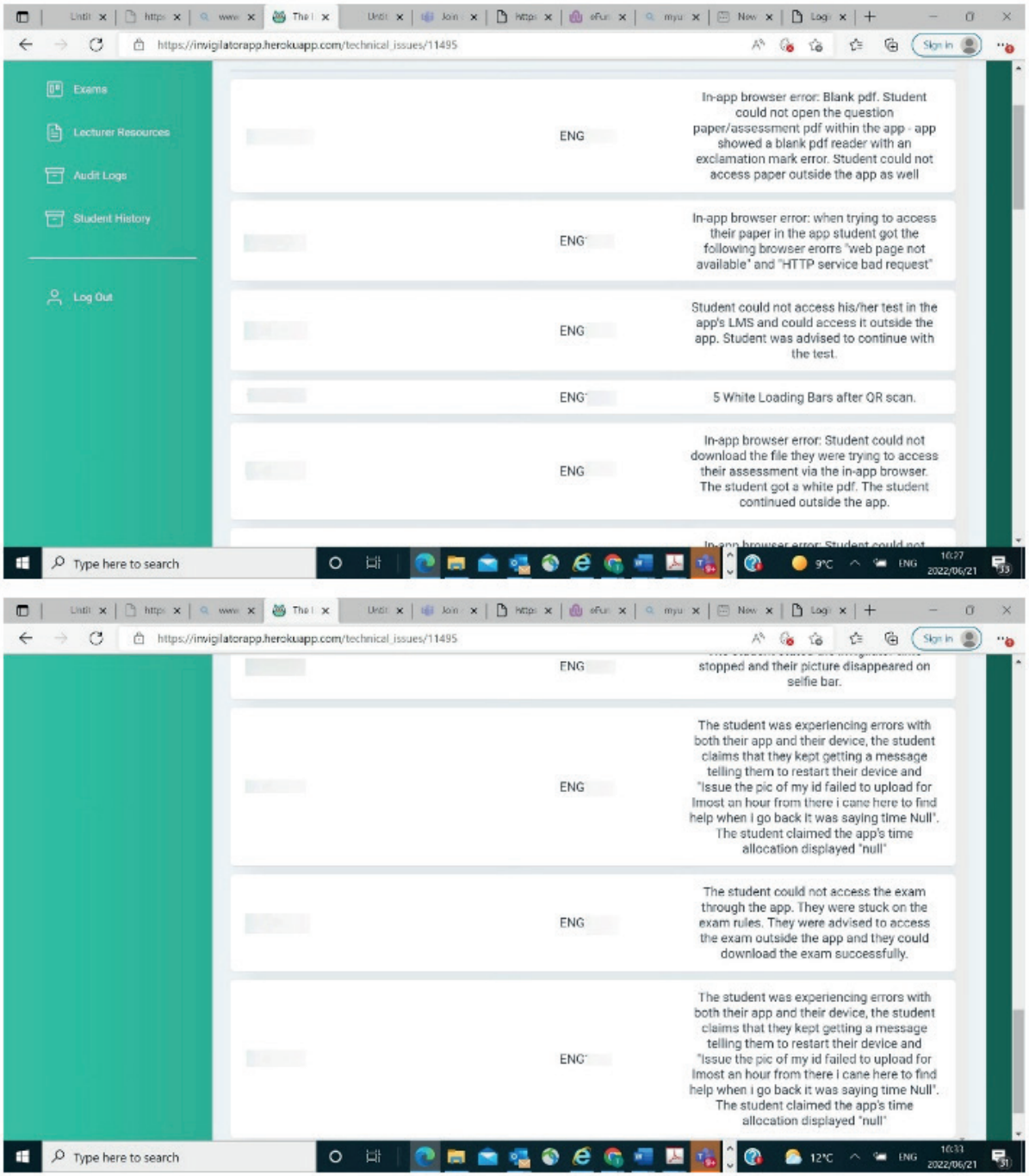

Figure 3. The Invigilator app's reporting on some aspects of students' activities during an online examination.

At a theoretical level, VUCA elements can be triggered by:

- Uncomfortability with the loss of control over personal privacy
- Onerous restrictions on body movements/postures
- Distractions/Interruptions by the Invigilator app through intermittent and untimed alert messages (see Brown, 2018; Giller, 2021).

All of these factors lead to student stress, anxiety, and fear: exam stress, anxiety, and fear tend to camouflage or falsify students' true abilities (cf. Giller, 2021; Woldeab & Brothen, 2021). These factors also have to do with techno-invasion, techno-uncertainty, techno-insecurity, techno-overload, and techno-complexity (Bahamondes-Rosado et al., 2023).

CRITICAL DATA SURVEILLANCE FRAMING

This paper employed a critical data surveillance (CDS) framework. CDS is part of critical data studies and views data technologies such as the Invigilator app as not just neutral technological inventions. Additionally, it sees data technologies as harvesters of data assemblages. As a concept, data assemblages are used to help imagine multiple ways in which big data shapes, manages, inflects, controls, monitors, surveils, and affects users' online lives and personas. In this sense, data assemblages include forms of knowledge; systems of thought; infrastructures; governmentalities; institutions; organisations; practices; communities; individuals; and subjectivities (Iliadis & Russo, 2016; also see Boyd & Crawford, 2012; Crawford et al., 2014; Dalton et al., 2016; Kitchin, 2015; Lee & Fanguy, 2022; Nguyen & Beijnon, 202). From a CDS perspective, data practices like data harvesting and datafication as aided by artificial intelligence (AI) powered tools such as the Invigilator app, are a throwback to Foucault's panopticon and the birth of the prison (see Foucault, 1977, 1980).

This is so since such surveillance data practices tend to invade students' online privacy and, crucially, foist 'self-disciplining governmentality' (Nguyen & Beijnon, 2023, p. 5) on students. Therefore, from a CDS vantage point, when users' data such as students' online data is harvested, managed, controlled, monitored, and surveilled, this practice leads to an algorithmic constitution and enactment of students' identities (cf. Chaka, 2022; Cheney-Lippold, 2011; Couldry & Mejias, 2020; Khalil et l., 2022; Langerfeld, 2020; Nguyen & Beijnon, 2023). Through this algorithmic constitution and enactment, students find themselves passively and helplessly interacting with the Invigilator app at the innocuous and seamless interface level, without knowing and understanding the subtle workings of "the black box of algorithms" (Nguyen & Beijnon, 2023, p. 9, my emphasis) underpinning and powering the Invigilator app. Against this background, this paper argues that the use of the Invigilator app triggers the VUCA elements for some students during online examinations administered by UNISA. That is, it wants to reflect on and interrogate Invigilator app-related student queries by using a VUCA lens.

METHOD

This study sought to examine the lecturer and student VUCA elements that get triggered when students use the Invigilator app during online examinations administered by UNISA. The research question which guided the study was: What lecturer and student VUCA elements are triggered by the Invigilator app during online examinations? The study employed a qualitative research design as this design afforded the two researchers the ability to keep a focus on the views that the participants held (Creswell & Creswell, 2018) about the VUCA elements triggered by the Invigilator app. The researchers were lecturers of first- and third-year level English language modules at UNISA.

Participants and Context

The participants in the study were seven lecturers (n = 7), who taught different undergraduate English modules in the Department of English Studies at UNISA. These lecturers participated in the study through semi-structured interviews. They were purposively selected due to their experience with dealing with the Invigilator app-related student queries. Their profiles appear in Table 1.

Table 1. The demographic data of the lecturers (n = 7).

Participants' labels	Gender	Age	Years of experience with the Invigilator app
Lm1	M	>40-49	1
Lm2	M	>40-49	2
Lfl	F	>60	1
Lf2	F	>40-49	2
Lf3	F	>40-49	2
Lf4	F	>30-39	2
Lf5	F	>30-39	1

In addition, the study used purposive sampling to collect and select data from five (n = 5) email queries sent by five first-year, undergraduate English Studies module students to their lecturers when they experienced problems with the Invigilator app during their first-semester 2023 online examination.

The study was granted ethical clearance by the College Research Ethics Committee with the registration and reference numbers, respectively: NHREC Registration #: Rec-240816-052CREC and Reference #: 90258495_CREC_CHS_2021.

Data Analysis

Both sets of data were analysed using thematic analysis. The themes and sub-themes embedded in and that emerged from the two data sets were both inductively and iteratively searched and reviewed. They were, then, coded and categorised to establish patterns and links between them. A step-wise coding system was followed to capture and distill the richness embodied in the themes and sub-themes. Firstly, initial themes and sub-themes were identified from lecturer responses and student email queries (Chaka et al., 2020; Vaismoradi, 2013). Thereafter, they were compared and contrasted within each data set and across the two data sets. Secondly, final themes and sub-themes were identified following the procedures used in identifying initial themes and sub-themes. Thirdly and lastly, theoretical constructs related to the VUCA elements were established from the final themes and sub-themes of the two data sets (see Chaka et al., 2020).

To ensure that the data collected was valid and credible, firstly, student email data was drawn from a large pool of email messages that students sent to their lecturers during and after the afore-mentioned online examination, which was written in the first semester of 2023. That is, the selected student email data represents the common major categories of queries students sent to the module lectures during this online examination session. In this case, technical glitches emanating from the use of the Invigilator app and the students' inability to scan the Quick Response (QR) code during the examination session were among the top-ranking student queries. Secondly, the validity and credibility of lecturer data was ensured by selecting and interviewing lecturers who taught different undergraduate modules offered by the Department of English Studies at UNISA. Most importantly, the interview items (questions) were sent out to four other English Studies lecturers with a view to having them comment on them and *quality-assure* them. So, these two sets of data have a contextual representativeness of the online examination queries for the undergraduate module being investigated in this study. Finally, to ensure the validity and credibility data analysis, copies of the data analysis of the two sets of data conducted by the two researchers were sent to two more colleagues for their comments.

FINDINGS

In this section, the findings related to lecturers' responses to the semi-interviews are presented first. They are, then, followed by the findings based on student email data.

Data from Lecturer Semi-Structured Interviews

The lecturers' semi-structured interviews were meant to explore the VUCA challenges that lecturers experienced when dealing with the Invigilator app-related student queries during online examinations. The data here is based on lecturers' responses to the interview questions as indicated below.

> *How were you as lecturers first introduced to the Invigilator app?*

The responses to this question were almost similar as lecturers confirmed receiving information for the Invigilator app guidelines from the university or from watching videos about how the App works. However, comments like, "It was sudden and it became a stipulation so we received an email notification with support documents" (Lf1), suggest that this app was not introduced gradually over a long period of time to allow the lecturers time to familiarise themselves with this new way of invigilation.

> *Did you feel that as lecturers you were ready to facilitate this type of invigilation? Please share more information.*

When lecturers responded to this question, they all seemed to share a sentiment of uncertainty and fear about this new change. This comment from one lecturer sheds some light on how lecturers felt about their readiness to facilitate the Invigilator app:

> *"No. The Invigilator app only started sharing how-to videos after we'd been using it for more than a year" (Lf3).*

Another lecturer expressed strong feelings about his encounter with the Invigilator app, and he had this to say:

> *"No, just like students, we were equally confused. The guiding information that we received was kind of frightening to the first users. This made us wonder if we were going to receive enough exam scripts to mark given the rate at which students were being disqualified or not allowed to submit their exam scripts in the modules that started to use the Invigilator app before us" (Lm1).*

> *Were you ever exposed to any e-proctoring before you encountered the Invigilator app?*

The majority of the lecturers who were interviewed had never been exposed to any e-proctoring except for (Lf5) who had experienced it as a student at some point. She said: "*Yes. I wrote exams that used an Invigilator app in the previous year".* On the contrary (Lm1) and (Lf4) responded with an emphatic "*not at all*" or *never",* respectively. When the same lecturer who had experienced the Invigilator app as a student was asked about the queries she had received from students as a lecturer, this is how she responded:

> *"At times, I could not understand what the students needed assistance with as they could not articulate their issues clearly, and as lecturers, we could not see what was happening on their side of the screen and provide suitable answers" (Lf5).*

Seemingly, the experiences that one had as a student are not the same as those that one had as a lecturer.

> *When you experienced the Invigilator app for the first time did you experience any challenges? If so, what were those challenges?*

The lecturers' responses to this question mainly emphasised the challenges that the students experienced and that the students forwarded to them as lecturers for intervention. (Lf2) presented a list of some of the challenges when she mentioned the following:

> *"The amount of information may have been overwhelming, especially for first-year students who were already dealing with the stress of the examination. There was a lot of panic among students who did not scan the app code within the required timeframe. Students were given a WhatsApp number to call in case of technical or other difficulties – many reported not receiving responses. A huge number of microphone recordings were flagged – it took a long time to work through all of them. In addition, many conversations were not in English, so there were times when lecturers, who did not understand the language being spoken in the recordings, had to simply look out for English words that related to the exam. The information gathered from the recordings was not reliable."*

What seemed to bother the majority of the lecturers was the lack of assistance from the Invigilator app technical team as reported by the students. (Lf3) corroborated the observation made by (Lf2) when she

commented, "*We were unable to assist students with technical queries and they reported that the WhatsApp helpline referred them back to us".*

> *Did the students send you any queries relating to the Invigilator app when they wrote the exams? If so, how did you feel about that?*

The lecturers expressed emotions of frustration and helplessness when they were overwhelmed by queries from students about the Invigilator app-related technical challenges. Some of them uttered phrases like, "*… is frustrating because we always work under tight timeframes and the added queries cause more work and less time to process the exam* " (Lf1). In a similar vein, (Lf1) summarised her feelings by saying, "*…leaving us feeling helpless and frustrated*".

> *Were you able to solve these queries from the students relating to the Invigilator app when they wrote the exam? If yes, how so? If no, why not?*

When lecturers responded to this question, it felt like they were the first "line of defence" when students experienced elements of VUCA with the Invigilator app. One lecturer (Lm2) made this comment: "*Submission on the app was a major frustration for students, students panicked when this happened and sent emails. At times they were able to submit on my exams but not on the app".* Another lecturer, who thought that solving queries was not part of the lecturers' responsibility, commented as follows: "*Well solving is out of our hands. We merely administer and do not make decisions like this. So we need to depend on the exams department to support the students and make decisions. Not all decisions are in favour of the students though* "(Lf1). This view indicates that the three parties, that is, the lecturers, the Exams Department, and the Invigilator app helpdesk team have different understandings of what their respective responsibilities are and how far those responsibilities should go.

> *Please share any lessons that you have learnt from dealing with the Invigilator app.*

From the lecturers' comments, it is evident that they had learnt some lessons from their experiences with the Invigilator app. (Lm1) shared this comment: "*I have also learnt the extent to which the Invigilator app subjects students to frustrations".* Another interesting observation was shared by (Lf3) who said:

> *"There were hundreds of recordings randomly identified for cheating, yet a handful revealed actual plagiarism. In the rest of the recordings, we heard evidence of the difficult conditions under which students write their exams – lots of babies crying, children demanding attention, and spouses asking questions relating to domestic tasks."*

This comment reveals the challenges the students experience in their personal lives and some invasion of their personal privacy, all of which may negatively affect their examinations.

Data from Student Queries

In this study, five students sent their Invigilator app-related queries to lecturers during the online examination, while they were using the Invigilator app. The queries were selected in order to understand how the app might have triggered VUCA elements in the students. One student sent this long query:

> *"I am a bit worried and confused, it was my first time using the Invigilator app, hence my uncertainty. I've opted to make use of MS Word to do my assignment and accessed my exam portal via the link that we received via email, and uploaded my pdf document (clear-1 document) by using my laptop. The Invigilator app then required me to upload my document again, I did so, but I could only take pictures of the document. I had to capture my laptop screen but the pictures are not as clear as I would've liked it to be; the reflection of the laptop screen made it difficult to capture a clear picture... Will this affect negatively in any way? Please kindly advise, thank you in advance for your assistance in this matter"* (Student query 1).

This comment shows that even when the student had managed to submit the examination answer script, there was still uncertainty and concern about whether she/he had done the right thing. One gets a sense that this student may not have advanced digital literacy to contend with more than one device while dealing with a stressful event like an examination. This is corroborated by (Lf2) who mentioned that: "*many of the students did not have the required digital literacy to understand how to use the app correctly".*

Another comment that drew our attention was the following:

> *I am experiencing problems relating to the Invigilator app. I asked for some assistance from the helpline but it seems like they cannot assist me with the issue. If as a student you cannot access another Invigilator app elsewhere will the student be penalized? It keeps on saying there is an error mam and I can't go any further and yes I know if I don't use the app then it won't be marked. I've been refreshing the app but it keeps on doing the same thing. Good day mam it's 2 now and it's still not working I am gonna start with the exam. It's still giving me problems"* (Student query 2).

A common view among both the students and the lecturers was how the Invigilator app has brought added distress and helplessness to them during online examinations.

Student query 3:

> *"I'm (name), module Eng15… and I was written on 18 May 2023. I experienced a loadsheding problem when I was uploading my documents on the Invigilator app I tried to communicate with Invigilator assistant on WhatsApp but they didn't respond, I tried to go back to the Invigilator app my documents were not shown."*

Another source of VUCA elements regarding the Invigilator app is electricity load-shedding, which affected some students negatively either while they were in the middle of the online examination or before they even started writing the online examination.

In addition to electricity load-shedding issues, some students seemed to panic when their results were not released, and their immediate suspicion was that things may have gone wrong with the Invigilator app. This student's query suggests that she/he has no idea why her/his results have not been released. This is the message she/he sent:

> *"Help sir, I wrote exam using INVIGILATOR APP but even today my results are pending, and I even have screen shots as proof of submission to the Invigilator app help to get my results"* (Student query 4).

A query like this shows that the Invigilator app sometimes haunts the students beyond the day of the online examinations. In certain instances, students failed to follow the Invigilator app instructions and entered the wrong Quick Response (QR) code. The following screenshot from student query 5 shows that the student was unable to access an examination question paper because of the wrong QR code:

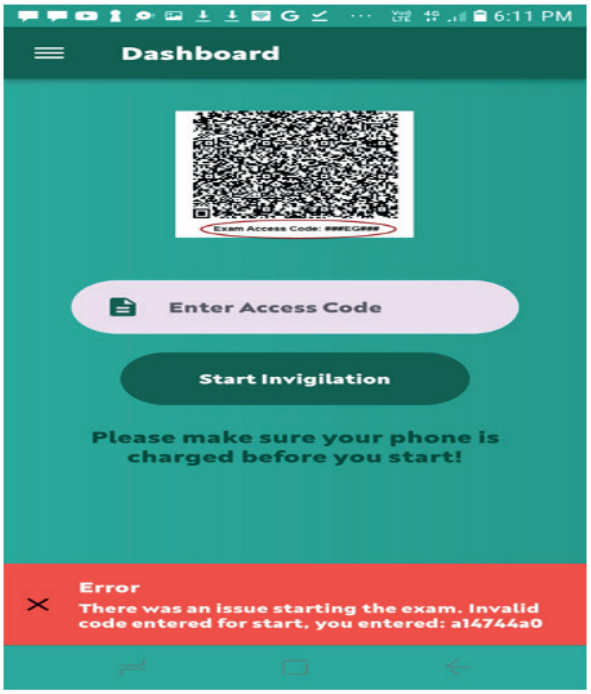

Figure 4. A screenshot of a QR code error the Invigilator app reported on a student's mobile phone during an online examination.

The same problem related to the QR code was flagged by some of lecturers during the interviews. For instance,(Lm2) mentioned that most of the queries that he had received had to do with the students' *"inability to scan the QR code"*.

DISCUSSION

In this section, we discuss the findings that emanated from the analysis of the responses of lecturers (n = 7) and of student queries (n = 5). The discussion focuses on some of the VUCA elements triggered by the Invigilator app in students and lecturers during and after online examinations.

Lecturers' and Students' VUCA Feelings towards the Invigilator App

The findings from both data sets confirm the presence of VUCA elements as lectures and students dealt with the Invigilator app. This is evidenced by the choice of words used by the two groups of participants. Lf4 alluded to this through this comment: "*The app has become an inconvenience for both lecturers and students"*. Seemingly, the intentions to employ the Invigilator app were good, but its use triggered some negative and unpleasant feelings in lecturers and students. On the side of the students, it becomes apparent from some of their queries that the Invigilator app had brought added stress to them. The following comment captures the possible consequences of failing to use the Invigilator app successfully: *"I couldn't write due to a problem that occurred to my Invigilator app, I think the main problem was that we were experiencing load shedding as the Invigilator app took time to proceed, this whole thing has made to have emotional break downs as I submitted a wrong script last year second semester ... this year it is this please assist me"* (Student email query).

This comment demonstrates that students can feel high levels of anxiety emanating from the volatile and uncertain conditions under which they write their online examinations. The Invigilator app could not work due to circumstances beyond this student's control, factors which had to do with the non-availability of electricity that was needed to power not only the Invigilator app but also the student's mobile device. Often when the electricity goes off, which in the South African context is referred to as load-shedding, the network coverage of most mobile network operators through which mobile phone users access the Internet connectivity becomes low or non-existent. All of this adds to the volatility and uncertainty most students experience during their online examinations. So, these factors render the Invigilator app unstable as exemplified by the view: "*The Invigilator app took time to proceed*". Most crucially, cumulatively, all of these factors lead to techno-uncertainty, techno-anxiety, and techno-stress (cf. Woldeab & Brothen, 2021) for the affected students.

Further instances of the VUCA elements related to the use of the Invigilator app are those raised by lecturers in varying degrees. These elements are instantiated by the responses provided by Lf2 and Lf3. For example, Lf2's reference to "*There was a lot of panic among students who did not scan the app code within the required timeframe*" and "*Students were given a WhatsApp number to call in case of technical or other difficulties – many reported not receiving responses*", underscore the techno-stress and techno-panic some of the students experience when accessing the Invigilator app and when trying to get assistance about technical glitches from the Invigilator app's WhatsApp mobile phone number. The failure by students to have a QR code provided to them scanned by their mobile phone handsets within 45 minutes from the commencement of the online examination disqualifies them from having their examination answer scripts marked. The stress induced by this QR code scan failure, together with the one caused by the non-response of the Invigilator app technical help desk, makes online examinations a traumatic experience characterised by VUCA elements for both lecturers and students. This collective VUCA experience is aptly captured by Lf3's sentiment that, "*we were unable to assist students with technical queries and they reported that the WhatsApp helpline referred them back to us"*. Herein lie the elements of uncertainty and ambiguity within the VUCA spectrum about how and who should help students encountering technical problems related to the Invigilator app.

These two elements are also evident from Lf5's observation: "*At times, I could not understand what the students needed assistance with as they could not articulate their issues clearly and as lecturers, we could not see what was*

happening on their side of the screen and provide suitable answers". Again, the foregoing students' and lecturers' comments foreground the collective VUCA elements induced by the Invigilator app that students and lecturers experienced during the online examinations. Again, borrowing from Woldeab and Brothen (2021), the two standout VUCA elements in this case are techno-uncertainty and techno-ambiguity.

In a different but related context, Majola and Mudau (2022) highlight the uncertainty and ambivalence lecturers have about dealing with the Invigilator app issues. They maintain that lecturers need technical support irrespective of the level of training received for the implementation and usage of e-learning platforms. Even though online proctoring may seem like a solution to the problem of cheating in online examinations, Lee and Fanguy (2022) argue that a decision to use online proctoring technologies is deeply rooted in rather problematic and authoritarian educational approaches. They also point out that although there are optimistic views about the effectiveness of online proctoring technologies in reducing the amount of student malpractice during online examinations, decisions informing their use are rather ruthless. In our view, the ruthlessness associated with the use of the Invigilator app is manifest in lecturers' responses and in student email queries, which paint a bleak picture of the Invigilator app-related challenges. Moreover, this ruthlessness is nothing short of invasive surveillance that has the elements of Foucauldian panopticon (Foucault, 1977, 1980) and of "self-disciplining governmentality" (Nguyen & Beijnon, 2023, p. 5). It has everything to do with the AI-based algorithms of controlling, monitoring, and policing students, which are part of online examination surveillance data practices.

Technical Challenges and Socio-Economic Issues Related to Using the Invigilator App by Students

In addition to learning about the frustrations and the predicaments that the students experienced with the Invigilator app, some lecturers also bemoaned the conditions under which some students wrote their online examinations after listening to the Invigilator app recordings. Lf3 crisply encapsulates this comment: "*There were hundreds of recordings randomly identified for cheating, yet a handful revealed actual plagiarism. In the rest of the recordings, we heard evidence of the difficult conditions under which students write their exams – lots of babies crying, children demanding attention, and spouses asking questions relating to domestic tasks.*" For one thing, this comment reveals the difficulties that students face when they write online examinations in their homes. For another thing, it exposes the invasive nature of the Invigilator app on the personal privacy of students in their private personal spaces. Importantly, it highlights how certain home conditions are not conducive to writing any form of examination as students' attention gets diverted from writing an examination by unavoidable distractions going on in their respective home environments. One irony of these forms of distraction is that these are the very students that their lecturers and their university expect to excel in and pass their examinations. Another irony is that when lecturers mark these students' examination answer scripts, they do not have any inkling of the challenging conditions under which these students would have written their examinations. To this end, Shange (2023) maintains that students may sometimes not have any control over the environment in which they take their examinations like noise in the background. In this case, there is a danger that the differentiation between public spaces and private spaces may be blurred if students are required to keep their webcams on during online examinations (Gordon et al., 2021; also see Terpstra et al., 2023). More often than not, it is not easy to determine if the benefits that online invigilation technologies such as the Invigilator app may have outweigh the concerns raised about them (see Nigam et al., 2021). In this study, though, the latter tended to prevail over the former.

Elsewhere, Eaton and Turner (2020) raise concerns about the relationship between proctoring systems and student mental health. In addition to the issue of digital inequalities which may impact the students' problems with the Invigilator app, some researchers have highlighted the unfairness that has been exposed by online assessments. Lee and Fanguy (2022) concede that the narrowly focused discourse about fairness on online examinations unintentionally, but unavoidably, neglects the importance of the surrounding environments of each student. A typical example is when students from different geographic and social backgrounds do not experience the same challenges. To this effect, Hussein et al. (2020) suggest a fit-for-purpose online examination proctoring technology to possibly address the inequalities that may exist among diverse students.

CONCLUSION

The lecturer's semi-structured interviews and the student email queries employed in this study have provided a glimpse into the VUCA elements that get triggered when students use the Invigilator app during online examinations at UNISA. What is evident is that not only did students suffer the negative consequences of this online invigilation tool, but lecturers also had difficulty trying to resolve student Invigilator app-related queries during online examinations. While lecturers empathised with their students, they also lamented the extra burden that the Invigilator app placed on them in addition to their everyday module-related responsibilities. It is therefore evident that the Invigilator app may serve as a deterrent against student cheating during online examinations, but its proclivity to trigger VUCA elements in both students and lecturers, including its invasion of student personal privacy, is a grave cause for concern that remains unresolved. In view of this, we recommend that future research should focus on ways of mitigating the negative impact of the Invigilator app on both students and lecturers during online examinations. We also recommend that the Invigilator app's technical team should eliminate the confusion and ambiguity they create by conflating some of the technical issues students experience when using the Invigilator app with the fact that lecturers will resolve those issues. Lecturers are not technicians; rather, they are module teachers. Some of the less evasive methods to be considered – with the word less being understood as relative and as varying with contexts – could be monitoring the applications running on students' devices, the contents students have on their clipboards, and the websites students visit during online examinations (cf. Terpstra et al., 2023).

Most importantly, we feel that the future use of the Invigilator app should comply with the provisions of the Protection of Personal Information Act (POPIA or POPI) together with the provisions governing the other related electronic regulations prevailing within the South African jurisdiction. Finally, lecturers should be encouraged to design online examinations that test less of the regurgitation of module content knowledge and more of the personalised critical thinking and creative skills needed to handle module content online. These types of online examinations may obviate the need for the use of invasive AI-powered online examination invigilation tools.

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