The Bad and the Ugly: Reflections on the Use of Invigilator App by First-Year Students in English Proficiency for University Studies at an Odel University in South Africa

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Abstract. This study explores the first-year students in English Proficiency for University Studies' experiences of e-proctoring challenges when they used the Invigilator app during online exams at a mega open and distance e-learning (ODeL) university in South Africa. Current research indicates that the few proctoring technologies that are available on the market remain largely untried and untested, thus the amount of research available on the students' experiences with the Invigilator app is limited. The study seeks to fill that gap by exploring the students' experiences with this app when they used it for the first time. A mixed methods approach was used involving ten (n = 10) students who completed questionnaires, twenty (n = 20) who took part in online interviews, and five (n = 5) email queries sent by the students during the exam session. The principal findings from the questionnaires, interviews and email queries indicate that while students had experienced challenges with the Invigilator app as they often felt inadequately prepared to use it, they still supported e-proctoring compared to physical invigilation. Future research should focus on how to adequately prepare the students to use the Invigilator app with confidence.

Keywords: E-proctoring · Invigilator app · ODeL · Connectivism · Digital Surveillance

1 Introduction

The emergency and uncertainty brought about by the Covid-19 pandemic and subsequent lockdowns in South Africa and elsewhere in the world, resulted in universities facing challenges with the transition from venue-based to online modes of assessment. In the international context research on online (formative or summative) assessment focused on various aspects like the analysis of different online tools, types of tests used, validity and reliability by institutions, and teachers and learners [9]. Whilst there has been strong institutional uptake of high-stakes e-assessment, there has been little corresponding research conducted on students' attitudes towards and experiences of computer-based testing [20]. In the same breath, research on e-proctoring tools increased as universities grappled with ways of maintaining online assessment integrity [12].

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To continue with the academic project amid the unprecedented situation of the Covid 19 pandemic and subsequent lockdown, many universities had to implement online assessment as part of remote emergency teaching. While online learning and teaching were not a novelty, the meaningful assessment of students and the integrity of the assessment process represented a new set of challenges, considering that exams had previously been in-person events [2]. At the university where this research was conducted, the immediate transition from venue-based to online assessment entailed introducing e-proctoring invigilation to curb the problem of cheating and maintain examination integrity. The participants were first-year students in a module called English Proficiency for University Studies who used the Invigilator app for the first time in 2022. Thus, it was deemed necessary to examine the students' experiences and perspectives on the use of this app when they wrote their semester examinations in May 2022.

1.1 Contextualising the Research

This study was conducted in a mega ODeL university in South Africa which has an enrolment of over 400 000 students from different parts of the world. This research site was deemed suitable for the study since the mode of delivery is e-learning and online assessment was conducted for the first time in this module. Many of these students are from diverse social and educational backgrounds. This is also the case with the students who are registered for the English Proficiency for university studies module which was offered at the first-year level in the first and second semesters of 2022. During the first semester, about 1300 students were registered for this module and about 1100 in the second semester. The module aimed to improve the students' linguistic competence in English and develop their ability to write critically and logically. The mode of delivery used to be a blended approach witan h assessment conducted through venue-based contact invigilation. However, since the Covid-19 pandemic hit in 2020, exams in this module have been conducted online. In 2022 the Invigilator app was used for the first time in this module as an e-proctoring system to curb cheating and other misdemeanours during the examination. The students sat for a four-hour paper, with an additional one hour given for downloading the exam paper and uploading the answer script. Students with disabilities were granted extra time, depending on the nature of their disability. In the case of students who had visual and hearing impairment, and other similar challenges, the university also exempted them from having to use the Invigilator app during the exam. The procedure followed was for a student to complete a form declaring their disability, with supporting medical documents so that they would be granted concessions like extra time, depending on the nature of their disability.

1.2 Objectives of the Research

- To examine the students' preparation for using the Invigilator app during the online assessment.
- To evaluate the students' experiences and perceptions of the Invigilator app.

1.3 Research Questions

The following questions emanated from the research objectives:

RQ1: How were the first-year students prepared to use the Invigilator app during the exam?

RQ2: What were the students' experiences and perceptions of using the Invigilator app during an online exam?

2 Literature Review

2.1 E-proctoring for the Online Exam

The urgent move to online assessment caused by the Covid-19 pandemic forced universities to move from venue-based to online assessment with little or no proper planning on how to invigilate these exams [5, 12]. This led to concerns about things like cheating, hiring contract or ghost-writers, and other practices that could violate the integrity of the assessment. The new challenge faced by educators is the integrity of assessments, especially for students not physically proctored by invigilators [5]. It is against this backdrop that some universities resorted to e-proctoring. Online proctoring involves the use of virtual tools for monitoring student activities during the assessment [10]. These tools potentially make it possible for students to take an online exam at a remote location while ensuring the integrity and reliability of the online exam [10]. e-Proctoring includes the authentication of the student and their identity to secure and maintain the integrity of an exam and its administration [10]. Online proctoring comprises two components: a web camera on a student's computing device which needs to be activated to video record the physical learning space and everything the student does during the examination period. This prevents the student from using any other computer applications including an internet browser, and user-computing processes (such as copying, pasting, or printing) that can lead to potential cheating during the exam. Hussein et al. highlight four major features of online proctoring systems, namely:

(1) *Authentication*: This is the process of ensuring the registered student is a valid student taking the online proctored exam.
(2) *Browsing tolerance*: This is the process of setting the limit of a student's ability to use their computer for other tasks.
(3) *Remote authorising and control*: This is enabling the proctor to start, pause and end an online proctored exam, as well as flag suspicious student behaviours.
(4) *Report generation*: This is the creation of a report of a student's activities during a proctored exam.

There are three types of online exam proctoring:

(1) *Live proctoring* which is real-time proctoring taking place during the exam with a human proctor monitoring/supervising the exam virtually, online.
(2) *Recorded proctoring*, which involves the video recording of camera images and logs of the student taking an online proctored exam, where the proctor reviews the recording later and assesses the integrity of the exam.

(3) *Automated proctoring*: In this kind of proctoring human proctors do not monitor (or review) the entire exam, instead, the proctoring system identifies key events of possible fraud or cheating. The proctor is alerted to review these events to determine if the student has committed fraud or cheated [10].

The Invigilator app that was used by the students in this study did not use full proctoring. This was confirmed in the Invigilator lecturer user guide which states that full proctoring requires large amounts of data, high-end devices, and a constant internet connection with a minimum required internet speed, which makes large-scale implementation difficult [18, 19]. In the same user guide, it is stated that the only thing a student requires to be able to use it is an entry-level smartphone and very little data, that the application takes up little space, and is user-friendly, scalable, and affordable. The Invigilator app adopted the recorded type of proctoring which entailed reviewing the results by the Directorate Student Assessment Administration (DSAA) and lecturers as stated later in this paper.

2.2 Controversies About e-proctoring

Researchers have expressed mixed views about e-proctoring. Highlights the issue of data protection since e-proctoring involves the processing of personal data [3]. In this regard, the practice of e-proctoring, which involves the collection of data from the environment where the exam, is being taken and the background sounds that the system record could lead directly or indirectly to identifying other people besides the student taking the exam. Most, if not all, information collected by the proctoring systems are personal data, making the students – and sometimes other people in the place where the exam is being taken – data subjects [3]. In the case of the context where this study was conducted it would imply that not only the lecturers and other university staff members have access to this data, but the Invigilator app team would also be privy to it. In the case of the proctoring system providers where the boundaries of the data controller and data processor become more blurred [3]. It would appear as though the universities would have little or no control regarding the data controlling and processing on the side of the proctoring system providers.

Another area of concern would be the consent that the students have to give to the Invigilator app team to collect their data. Personal data must be processed based on the consent of the data subject affected. If this is the case, then one wonders if the students at this university were required to provide consent for their data to be shared with the external provider [3]. In the module which this research is about the researcher is not aware of any consent forms that the students had completed for this purpose. This possibly compromises some ethical principles. During the Covid-19 emergency, many universities were unable to obtain so-called “wet signatures” for explicit consent forms from students for this new approach of using e-proctoring systems [8].

Some disparities have also been reported about the pictures taken with a webcam. Many researchers have raised a concern that in some instances systems failed to properly identify students with dark skin and forced them to take extra measures to ensure that they complied with the requirements of the technology [3]. The same view is expressed by Langenfeld who asserts that at least one of these systems have trouble detecting

people of colour [8]. One may deduce that face detection may be a cause for concern for this group of people whose faces cannot be detected by the e-proctoring system thus leading to a false e-proctoring report. This may likely cause anxiety for these exam takers who may be disadvantaged by the unreliable face detection process. Even though some studies claim that e-proctored exams are better than invigilated exams, there are still uncertainties and criticisms about how artificial intelligence may detect and identify cheating [11].

2.3 Pedagogical Issues About Integrating e-proctoring into the Design of the Module

Some of the research has highlighted pedagogical issues relating to the use of the Invigilator app. The use of online proctoring technologies seems to favour the continuation of assessment methods – like the exam – that are not conducive to the assessment of learning nor support transactional and transformational education [2]. Additionally, such assessment methods preclude the development of alternative methods of assessment that are truly inclusive and that foster the advancement of a diverse student population. In the module where this study was conducted this seems to have been the case as a normal exam paper was simply moved to online assessment without carefully considering how the technology would affect this and how other assessment methods could have been used to assess learning. It is understandable that online assessment happened under emergency circumstances when the assessment plans had already been finalized for the year.

3 Theoretical Framework

This study is underpinned by the theory of connectivism as a lens to answer the research questions about the interconnectedness that took place when students used the Invigilator app during their exam. This interconnectedness involved students' online interaction with the Invigilator App team, the lecturers, and other relevant university staff members who assisted students with queries relating to this app. The situation with the Invigilator app exposed students to interaction and interconnectedness which is more relevant in computer-based teaching and learning environments. In the view of Siemens connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories [16]. Therefore, connectivism is relevant for this study since a lot of connectedness took place during the four-hour exam when the students used the Invigilator app. When students experienced problems with the Invigilator app, the guidelines provided by the College of Human Sciences stated that the students had to contact the Invigilator app team using the e-mail address provided or the WhatsApp number in the guidelines. It was emphasized that the lecturers could not resolve any issues relating to the Invigilator app. However, despite the information in the guidelines, some students still sent queries to the lecturers, the university exams department, or the call centre linked to the College Joint Operations Committee (JOC). Figure 1 illustrates that the student was centre stage while connected with the entities that appear in the diagram.

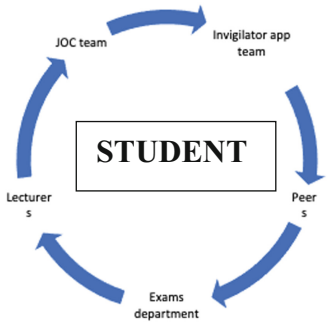

Fig. 1. Illustration of interconnectedness during the use of the Invigilator app

As the technology evolved and the use of digital tools like the internet and e-mail were infused into education, researchers have advocated for more appropriate teaching and learning approaches. Canonical approaches like behaviorism, cognitivism, and constructivism were no longer sufficient to describe new types of learning that were happening in the online milieu [1]. The more sophisticated computer networks emphasized interconnectedness which could result in mental phenomena [1]. This gave birth to connectionism, which later evolved into connectivism as referred to by Siemens. In his view, connectivism evolved from earlier connectionist ideas that situated knowledge as nodes in a network without any meaning of their own. Another view espoused by Downes is that connectivism as an epistemological approach is grounded in the interactions within networks, both inside an individual's mind and outside in the world [6]. It is these interactions that were taking place when students took the online exam in this module while engaging with the Invigilator app team and the university community when they experienced challenges with the app.

4 Research Methods

This study utilized a mixed methods approach to examine the participants' experiences of e-proctoring using the Invigilator app. A concurrent procedure was used to converge both the quantitative and the qualitative data to provide a comprehensive analysis of the research problem [4]. The research design of this study is thus descriptive and interpretive because data were collected at the same time through questionnaires, semi-structured interviews, and email queries from students. This method provided multiple perspectives about the problem that was being examined [13]. Purposive sampling was used to identify students who participated in the online semi-structured interviews.

4.1 Preparation for Using the Invigilator App

The lecturers were provided with guidelines and a manual for using the Invigilator app. In addition, roadshows were also conducted to explain the lecturers' role in the invigilation scenario on the day of the exam. The Invigilator app Lecturer User Guide provided information on how to set up the assessment on the dashboard, how, when, and what to

communicate with the students as well as interpreting the review results from the Invigilator app reports after the assessment [18]. According to The Invigilator app Lecturer User Guide, the DSAA would clear all the level one reviews which included flagging students for unethical behaviour and integrating the dashboard with the university systems [19]. In the same manual it, was stated that lecturers would receive an e-mail notifying them about the completion of the level one reviews so that the lecturer could proceed with level two reviews. It was emphasized that queries relating to the Invigilator app would be handled by the Invigilator app team which was an external provider of the service and not the lecturers. On the side of the students, they were provided with the videos and student guidelines on the university website and instructions on how to download the Invigilator app and what steps to follow on the day of the examination. The lecturers posted additional information on the module site on Moodle on how to navigate the Invigilator app.

A week before the examination date, the students were given further guidance on the Invigilator app through a virtual class to help prepare students for the examination. They were also able to ask lecturers questions on anything about exams including the Invigilator app. The lecturers also emphasized the importance of the QR code which would be sent to the primary lecturer for sharing with the students on various platforms like announcements, and the module welcome page on the myExams Moodle site where the students would access the exam question paper on the day of the exam. The same QR code was also sent through bulk messaging.

During the exam, the students were expected to access the Invigilator app before downloading the exam question paper. They needed an internet connection while downloading the paper and when uploading it after they were done answering the exam questions. The university provided students with data to use for the exams. Once students had downloaded the exam paper, they were allowed to keep the app in airplane mode. The Invigilator app guidelines also provided students with a WhatsApp number where they could send queries to get assistance in real time if they experienced problems during the exam. The students had been warned that the QR code would expire within 30 min of the beginning of the examination, and this would prevent them from submitting their exam scripts. On the side of the university, if a student had not accessed the Invigilator app within the required time, the exam would be null-and-void and the student would be expected to apply for an aegrotat exam. It was explained in The Invigilator Student User Guide [18] that as they continued with the exam, they would be prompted to do certain actions like taking and uploading their selfies.

After the exam had been closed the DSAA handled the clearing of all the other reviews excluding the microphone and GPS reviews which the lecturer was expected to review by either failing or confirming the reviews as flagged by the DSAA. Out of 1300 students that were expected to sit for the exam in this module, only 873 had successfully submitted their scripts. This was concerning as it meant that over 400 students had not submitted their exam scripts due to various reasons. The report that was sent by the DSAA indicated that 291 students had failed the review and 572 had passed it. The lecturer had to review the results of the ones that failed the "microphone" as well as the GPS failure to see which students wrote near one another and whether there was

background noise which may have led to suspicion of the student receiving help from someone else [18].

4.2 Sampling Procedures

For qualitative data, purposive sampling was used to identify students who participated in the online semi-structured interviews. Interview questions were distributed via the students' official mylife email accounts, and the same applied to the questionnaires. A probability sample was chosen in this study because any of the 1300 students could have been selected, as they all had been expected to use the Invigilator app when they wrote the exam. For the quantitative data, fifty students were randomly selected to answer the questionnaire, but only twenty returned them. To ensure the validity of the research data the questionnaire used was adapted from an existing one that had been used in another study on computer-assisted language learning [15]. In the case of email queries, the researcher randomly selected five queries that were sent by the students via email.

4.3 Data Analysis

For the student questionnaire data analysis was performed using SPSS V27. Data were summarised through absolute frequencies, relative frequencies as well as cumulative frequencies. Content analysis was used to interpret the themes, patterns, and categories which emanated from the qualitative data. For the qualitative data trustworthiness was ensured through member-checking from the feedback given by the participants themselves. A senior member of the English Studies department who is the head of quality assurance was asked to advise on the flaws in the approach which were thus identified and eliminated. Even though this was a small study, the research provided a window into students' experiences with the Invigilator app as it sought to determine what worked and what did not. This study was conducted as part of the departmental research with the Ethical clearance details as follows: NHREC Registration #: Rec-240816-052, CREC Reference #:90258495_CREC_CHS_2021. One of the limitations of the study was that it focussed on the students only, whereas some of the lecturers in this module had also not used the Invigilator app before.

5 Presentation of the Findings

5.1 Data from the Semi-structured Interviews

The intention of the interviews was to explore the students' e-proctoring challenges with the Invigilator app. These will be identified through an analysis of the themes, patterns, and categories that emerged from the data obtained from the students' responses, based on the interview questions:

How did the lecturers or the university prepare you for using the invigilator app for your May/June exams?

To this question the students either said that they had minimal or no help from both entities, and else that only one of these groups provided help with the app. This is

demonstrated by comments like: "*No. Lecturers did not give a brief description on how to use the app… only links was made available as guidelines to us as students"* (SQm2). The following comment also suggests that lecturers were aware of their responsibility: "*…by trying to find many ways in how they can teach us about Invigilator app"* (SQm2). On the other hand, students seemed to have had no understanding that the Invigilator app was an outsourced service over which lecturers had no control beyond sending the QR code and sharing the guidelines provided by the university.

How do you think your preparation for using the invigilator app by the lecturers and the university can be improved?

In response to this question, some of the students felt that they had received helpful preparation from the lecturers as well as the university. While some students (like SQf1) clearly had expected the lecturers to teach them about the Invigilator app, another student (SQm4) had a different view as he felt that students needed to take the responsibility of finding information themselves, for example, "*…go and look for videos, trying to do it on my own beforehand…learn from previous mistakes and expectations"*. Another student expressed a similar view when she emphatically said: "*I made sure to watch the videos concerning the app as I didn't want to be surprised when I enter the app"* (SQf2). It was likely that some students were eager to master the Invigilator app and work independently.

Do you feel that your lecturers prepared you well on how to use the invigilator app? If not, what do you think was lacking?

The students expressed frustration and anxiety about some of their experiences with the Invigilator app. One student (SQf3) had this to say: *"…the app would freeze during the exam, I was nervous, I thought I was doing something wrong. I started my exam late due to the app not wanting to take commands"*. Another concern that bothered most of the students was the time factor in preparing for using the Invigilator app. For example, one student (SQm1) made this comment: *"There was not enough time to learn about it. If the app was introduced early not when the exams are close by.*" The same sentiment was echoed by another student (SQf3) who felt that the preparation for using the Invigilator app could be improved by "*preparing early and planning for unforeseen circumstances*". This comment highlights the importance of planning for emergency situations like electricity load shedding and internet challenges. According to one student (SQf1), *"due to load shedding some of us students we did not get a chance to watch the video till the end of it so that's why we struggled in the exams*". This was in reference to the videos about the Invigilator app that were posted to guide the students on how to use the app.

5.2 Data from the Questionnaire

In this study, a questionnaire was distributed to ten (n = 10) English Proficiency students, who were randomly selected. All ten respondents completed the questionnaire and returned it to the researcher, who subsequently used this data. Table 1 indicates that 80% (8) of the ten participants were female and 20% (2) were male.

When looking at the years in which these students first registered at this university, 60% of them had registered for the first time in 2022, while 20% of them had first

Table 1. Profiles of the questionnaire's respondents (n = 10)

a. Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	8	80.0	80.0	80.0
	Male	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

b. First registration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2019	2	20.0	20.0	20.0
	2021	2	20.0	20.0	40.0
	2022	6	60.0	**60.0**	100.0
	Total	10	100.0	100.0	

Table 2. Participants' internet use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1	10.0	10.0	10.0
	Yes	9	90.0	**90.0**	100.0
	Total	10	100.0	100.0	

registered in 2019 and 20% in 2021. This means that all these students used the Invigilator app for the first time during the May 2022 exams.

To ascertain the students' internet use, they were asked if they had used the internet before they enrolled for university study. Table 2 indicates the English Proficiency students' internet use according to how they rated themselves.

Most students (90%) had indicated that they had used the internet before. This is in line with how the students rated themselves in terms of digital skills. Table 3 illustrates that 60% of students rated themselves as good and very good respectively, while 30% rated themselves as fair. Only 10% of them rated their digital skills as excellent.

In the next question the students were asked which invigilation method they preferred to use during exams. Table 4 shows the students' invigilation preferences.

From the students' responses in Table 4, it is evident that 60% of the students' preferred invigilation via the Invigilator app. It is worth noting that even though the Invigilator app was a new experience for these students, they still preferred it compared to face-to-face invigilation.

Table 3. Participants' digital skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fair	3	30.0	30.0	30.0
	Good	3	30.0	30.0	60.0
	Very Good	3	30.0	30.0	90.0
	Excellent	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Table 4. Participants' invigilation method preferences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Face-to-face invigilation by a person	4	40.0	40.0	40.0
	E-proctoring via the Invigilator app	6	60.0	60.0	100.0
	Total	10	100.0	100.0	

Table 5. Participants' problems with the Invigilator app

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Logging in to the system	1	10.0	10.0	10.0
	Downloading the app	1	10.0	10.0	20.0
	Understanding the instructions	2	20.0	20.0	40.0
	Uploading the answer script	6	60.0	60.0	100.0
	Total	10	100.0	100.0	

When the students were asked about the problems they experienced when they used the Invigilator app during exams, the results in Table 5 showed that more students (60%) had experienced problems with uploading the answer script, whereas about 10% had struggled to login to the system. This is worrying as it has negative implications for the number of students that could successfully submit their exam answer sheets for assessment if they struggled at the stage of uploading the answer sheet.

When the participants were asked where they sought help when they struggled with the Invigilator app, the results in Table 6 show that most students (77.8%) asked for help from the Invigilator app team, whereas the rest of the students asked for help either from

Table 6. Where the participants sought help when they struggled with the Invigilator app

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ask for help from a family member	1	10.0	11.1	11.1
	Ask for help from the Invigilator app team	7	70.0	77.8	88.9
	Ask for help from other students	1	10.0	11.1	100.0
	Total	9	90.0	100.0	
Missing	System	1	10.0		
Total		10	100.0		

Table 7. Participants' thoughts on using the Invigilator app to mitigate cheating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A waste of time	1	10.0	10.0	10.0
	Helps to a certain extent	2	20.0	20.0	30.0
	Helps a great deal	2	20.0	20.0	50.0
	Should be an essential part in any online exam	5	50.0	50.0	100.0
	Total	10	100.0	100.0	

family members (11.1%) or from other students. This indicates that most students had followed the instruction of contacting the Invigilator app team for assistance in case of problems with the app.

When the students were asked for their thoughts about using the Invigilator app to mitigate cheating, more than half of the students were positive about it (see Table 7). Most of the students (70%) thought that the Invigilator app should be essential in any online exam, while 10% regarded it as a waste of time.

Most of the respondents (80%) indicated that they enjoyed using the Invigilator app during the exams. Considering that these were mostly first-year students who have never been assessed on an online platform, it is possible that the Invigilator app was a novelty to them – something which also entailed them having to take selfies every now and then. The students did in fact mention in the interviews that they had enjoyed taking selfies when they used the Invigilator app.

When the respondents were asked the reasons why they enjoyed using the Invigilator app, the responses in Table 8 indicate that less than half of them (44.4%) said that they liked it because the instructions were easy to follow. Only a small minority (11.1%) indicated that they liked it because one could make mistakes that nobody would know

Table 8. Reasons why the participants enjoyed the Invigilator app

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Because the instructions are easy to follow	4	40.0	44.4	44.4
	Because it helps mitigate cheating	1	10.0	11.1	55.6
	Because it causes anxiety during exams	1	10.0	11.1	66.7
	Because you can make mistakes that nobody would know about	1	10.0	11.1	77.8

Table 9. The participants' use of the Invigilator app after the lecturer had prepared them

Frequency	Percent	Valid Percent	Cumulative Percent
2	20.0	20.0	20.0
8	80.0	80.0	100.0
10	100.0	100.0	

Table 10. Participants' preparedness for using the Invigilator app

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	My lecturers prepared me well	1	10.0	10.0	10.0
	The university prepared me well	1	10.0	10.0	20.0
	I prepared myself well	3	30.0	30.0	50.0
	All of the above	4	40.0	40.0	90.0
	None of the above	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

about. This may point to the possibility that some students were bothered by losing face in front of their peers (Table 9).

When the students were asked if they found it easier to use the Invigilator app after the lecturer had prepared them, an overwhelming majority (80%) of them answered in the affirmative.

When the students were asked how they were prepared for using the Invigilator app, Table 10 in the text shows that less than half of the respondents (30%) said that they had

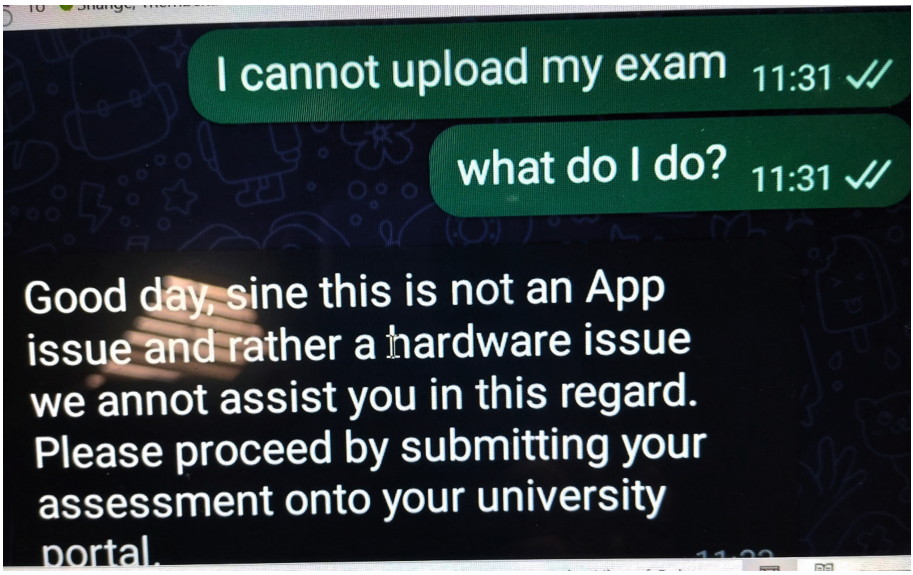

Fig. 2. Screenshot of a conversation between the student and the Invigilator app team

prepared themselves well. Only about 10% felt that the lecturers or the university had prepared them for using the Invigilator app. By the same token, only 10% said they had received no preparation for using this app.

However, what caught my attention was the conversation between a student and the Invigilator app consultant who told the student to submit the answer sheet in spite of the Invigilator app not working (see Fig. 2) yet the lecturers were not expected to address any queries relating to the Invigilator app. Furthermore, the Invigilator app Student user Guide specifically stated that students' work submitted without the Invigilator app would not be marked. In this instance, the student had sent a query to the Invigilator app team hoping to get a solution to the problem experienced but the Invigilator app team had referred the student back to the university to solve that query.

What the Students Enjoyed About the Invigilator App

When students were asked what they enjoyed about the app, some comments like the following one caught my attention: *"What I enjoyed most was the timing of when pictures were asked to be taken so that you reduce the anxiety that you might have on being watched on a webcam. You learn to time yourself accordingly so that you are within the submitting bracket too"* (SQf5). Similarly, when students were asked about how they thought preparation for using the Invigilator app could be improved, one student commented: "*…they should improve in giving us another chance to upload my selfie"* (SQf2).

Advice for Other Students

When students were asked to share what they would advise other fellow students about the Invigilator app, some of them flagged the time factor as an important consideration when using the app. This was confirmed by comments like: "*Follow the instructions*

*carefully and try to be as fast as possible to finish on time" (*SQf7*).* For this student, for one to be able to handle the time issue one needs to follow the instructions in the materials that were provided by the Invigilator app team and the guidance given by the module lecturers. A similar sentiment was expressed by another student summarising the issue with three words: "*Prepare in time*" (SQf9).

A lengthy comment by one student captured a few concerns when he provided this advice for other students:

The Invigilator should use voice recognition, it has to be linked with a laptop to us we are using laptop. Invigilator have need to have a laptop application what if someone loses a smartphone or her phone lose memory while she has to write exam, but he/she has a laptop… it means she won't be able to write because she don't have access to the Invigilator app but if the computer vision is available she will be able to write (SQm2).

It was problematic that students had to access the Invigilator app from a smartphone. Considering the social background that most of the students come from, it is possible that some of them did not have smartphones which is a requirement for accessing the Invigilator app.

6 Discussion

In this section, findings that were presented and analysed with regard to themes that appeared to emerge in relation to the literature review will be discussed.

6.1 Themes from Findings

6.1.1 Students Preparation for Using the Invigilator App

Some student interviewees highlighted a feeling that lecturers had a duty to teach them about the Invigilator app. From their comments, the students created an impression that as students they expected lecturers to prepare them for using the app by teaching them about it. This may indicate that students had confidence in their lecturers rather than in other external service providers of the app. In the view of Estira [2] even though students are motivated to learn online, they often cannot utilise online tools and are not self-sufficient in online communication. This may be one of the reasons why students expected their lecturers to teach them how to use the Invigilator app. On a different vein, other students were willing to learn about the Invigilator app on their own, and one got a sense that these students seemed to have had a level of self-efficacy as they were willing to look for information on their own.

6.1.2 Frustration with the Invigilator App

Some students had expressed frustration with the Invigilator app as they had not enjoyed the experience. Some of the concerns cited by the students were electricity loadshedding, lack of help from the Invigilator app team, problems with uploading exam answer sheets, and poor time management on the students' side. This is in line with the observations by previous studies that the use of e-proctoring may induce stress and test anxiety [11]. Another issue of interest that was raised by some female students is the concern

regarding uploading of selfies. This supports the view by Chawki and Shazly [8] that female students and staff tend to be more cautious about sharing their webcams, as they are more likely to be harassed and exposed to aggressive behaviours in an online setting. It is therefore possible that for the student (SQf2) it was important to upload a photo that would represent her image in a manner that would satisfy her. Students seem to be particularly concerned about their peers' perceptions of them [8].

Another issue that was flagged by the students is the problem with uploading their exam scripts on the system. For students like (SQf4) her comments "*I had trouble knowing whether my script is uploaded or not*" indicates that some students were pre-occupied with making sure that their exams were submitted, and this caused frustrated. Students may not feel sufficiently technically skilled or may be afraid to make mistakes that will affect successful submission of their exam [14].

6.1.3 Invigilator App Usage Habits

Most students (90%) had indicated that they had used the internet before; therefore, computer skills were not regarded as a serious challenge. Instead, only 30% rated their digital skills as fair while the rest rated themselves between good and excellent. De Santis et al. [5] opine that during the period of emergency, teachers and students developed their confidence with online learning tools. Most of the students (60%) also seemed to be enthusiastic about e-proctoring as compared to in-person invigilation. Considering the challenges that the students had experienced with the Invigilator app, one would have expected more students to have a negative attitude towards e-proctoring.

When students were asked where they sought help when they experienced problems with the Invigilator app a majority of the students (70%) had contacted the invigilator app team, while about (20%) had either asked their family members or other students for help. This is problematic as this was a breach of instructions which would lead to the student being flagged for disciplinary measures. Sometimes students may not have control over the environment in which they take exams like noise in the background, and this may lead to harsh consequences like outright failure of the exam [5].

From the conversations that the students had with the Invigilator app team it seemed that at times the team would refer the students back to the university lecturers when they could not solve some of the queries pertaining to the app. This back and forth would be a cause for anxiety especially if it involved downloading the exam paper or uploading the answer sheet. Additionally, it indicates a misalignment with the instructions given to the lecturers that students had to contact the Invigilator app team whenever they experienced problems about the app.

6.1.4 The Students' Views About the Invigilator App

As far as the students' views about the Invigilator app are concerned, responses to the questionnaires and interviews showed that students were quite excited about taking selfies while using the Invigilator app. In fact, some students even seemed to have a positive attitude towards using the webcam (SQf2 and SQf5). It is worth noting that the comment by (SQf2 about) "*upload my selfie*" was uttered by a female participant. While some researchers on online exam integrity seem to be concerned about the invasion of

the student's privacy rights when using the webcam, the students themselves did not seem to have had an issue with that. Other scholars' content that if students and teachers are required to share their webcams, this may inadvertently lead to them sharing aspects of their private lives as part of on-line teaching and assessment [5].

6.1.5 Advising Other Students About the Invigilator App

It also became evident from some comments that a few students had gained confidence after they had started using the Invigilator app and spoke positively about it. This is in line with what previous studied found, that students who have used e-proctoring systems previously (whether automated or manual) were significantly more confident when using it for assessment purposes [8]. On a positive note, one student (SQf9) provided encouraging feedback about the Invigilator app when she said: "*The Invigilator app is not difficult once you learn how to use it, you will panic when you start using it before you start your exam because it is the first time you used the app, but once the exam start you will enjoy using the app during the exam, trust me.*" A comment like this shows that despite all the problems experienced by the students, they still had positive stories to tell about the Invigilator app.

7 Conclusion

This paper sought to examine the students' experiences of and perspectives of e-proctoring challenges relating to the Invigilator app when they wrote a recent exam. From the students' responses in the interviews and questionnaires it was concluded that both the lecturers and the university had provided preparation for the students to use the app, but the students still felt inadequately prepared. Even though about 99% of the students used the Invigilator app for the first time during this exam, they still preferred invigilation through the app as opposed to physical invigilation. What also seemed to have been a motivating factor was that the students wrote their exams from home. Another observation from the students' responses is that even though they were positive about the app, it would appear that they did not trust it fully. Gordon et al. [8] contend that some researchers regard digital surveillance as "a tool of oppression and social control". It is worth noting that the use of the Invigilator app highlighted interconnectedness that took place during this exam session, thus confirming the relevance of the theory of connectivism in this paper. More research is needed to develop more user-friendly digital surveillance tools that can be trusted by all the users.

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