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Exploring drivers of academic integrity violation in e-assessments by students during the emergency remote teaching

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Abstract
The unprecedented Covid-19 pandemic has suddenly driven higher education institutions towards emergency remote teaching (ERT) to save academic programmes. Despite the benefits brought by remote teaching, it has the potential to bring negative consequences such as compromised academic integrity resulting from the use of e-assessments in environments lacking sufficient pandemic response readiness and mechanisms. A few studies have been conducted on the academic integrity challenges of e-assessments during ERT in universities from a developing country perspective. This quantitative study aimed to examine challenges to the academic integrity of e-assessments during ERT through a literature survey and an online survey questionnaire, collecting and analysing data from a randomly selected sample of 201 students in a South African university. Through confirmatory factor analysis (CFA), findings revealed that individual and institutional factors negatively impact the lack of academic integrity when doing e-assessments. However, technological factors do not impact the academic integrity of students using e-assessments. Gender differences caused significantly different findings, but age differences did not. The study concludes with recommendations for improving policy and research around the academic integrity of e-assessments. This work reveals how university communities can be assisted to improve their understanding of academic integrity challenges and adopt measures to solve them.

Keywords: Drivers, academic integrity, e-assessments, dishonesty, first-year students, emergency remote teaching, South Africa.

1. Introduction

The unprecedented Covid-19 pandemic resulted in governments imposing lockdown restrictions as a way of maintaining physical distancing. With such developments, together with acceptance and uptake of digital technologies in different sectors (Lim & Wang, 2016), higher education institutions around the world had to close, and shift to the emergency remote teaching (ERT) to advance academic activities. Assessments are a pivotal part of knowledge creation in higher education (Godsell, 2021), as

learning in not only determined by the curriculum, but also how it's assessed (Ibarra-Sáiz et al., 2021). Emphasis is given by Stödberg (2012:591) that "assessment is a core activity in higher education", that ensures academic excellence. Recent challenges brought by the Covid-19 pandemic have resulted in higher education rapidly adopting information communication technologies (ICTs). Academic activities such as e-learning and e-academic advising have become crucial elements that afford novel prospects and methods to teaching, learning and assessment in higher education. As such, the Covid-19 pandemic drove higher education into a mode referred to as the emergency remote teaching (ERT), that brought with it, the need to rapidly integrate digital tools and technologies for different assessment methods (Villarroel et al., 2019; Neto et al., 2022). The emergency nature and the rapid integration of ICTs in assessments (e-assessments), potentially posed a threat to academic integrity in such assessments. This could be attributed to universities' lack of preparedness for pandemics, together with the emergent measures to catch-up on lost time and the need for completion of academic calendars. The sudden shift towards ERT potentially opened room for academic integrity compromises, as literature has always argued that e-assessments could be more amenable to academic integrity violation (Young, 2012; Dendir & Maxwell, 2020). Hussein et al. (2020), reported that while teaching and learning might be competently done remotely, performing e-assessments is fraught with challenges and risks. The main concern being the capability to safeguard academic integrity when assessments such as examinations are taken remotely, independently, and autonomously from invigilators (Coniam et al., 2021). Challenges pertaining to academic integrity have been viewed as barriers due to the potential widespread use of e-assessments (Mellar et al., 2018). These challenges on academic integrity are not a recent trend (JISC, 2007) since they also exist in conventional assessments as emphasised by Tsigaros and Fesakis (2020).

The integration of information communication technologies (ICTs) into assessments elevates the concerns of increased academic integrity risk levels, despite some propositions that ICT advances ways to curb these challenges (Mellar et al., 2018). While remote teaching may have benefited South African academic institutions, the ethical, moral challenges with respect to academic integrity violations cannot be ignored. The introduction of information technologies into academic activities and assessments have always been linked to the creation of opportunities for e-cheating (King & Case, 2014; Holden et al., 2021). Remote teaching has always been documented as exacerbating the challenges of cheating, plagiarism, and procrastination (Abdulhafeez et al., 2013; Muhammad et al., 2015; Muhammad & Shah, 2015; Muhammad et al., 2014). Enticements for academic integrity violations by students is more prominent in virtual environments compared to traditional learning spaces (Abdulhafeez et al., 2013), meaning that students have been more prone to act unethically during the ERT periods. The ERT might have exacerbated the situation as academics might not have adequately prepared methods of evaluating students' learning in remote environments, while preserving academic integrity.

The debate around academic integrity in e-assessments is not yet concluded (Harton et al., 2019; Peled et al., 2019). Some scholars argue that academic integrity is more at

risk in face-to-face assessments (Watson & Sottile, 2010; Hart & Morgan, 2010), while other scholars argue that e-assessments are more prone to academic integrity risks (King & Guyette, 2009; Stuber-McEwen et al., 2009; Miller & Young-Jones, 2012). In addition, there is a divergence in literature around the mode of assessments and students' performance. Some scholars argue that e-assessments result in high students' performance (Fask et al., 2014; Alessio et al., 2017), while other scholars have reported no significant differences between online and face to face cheating behaviors (Miller & Young-Jones, 2012; Zumbo, 2021). Important contributions were made by Carless et al. (2017), Gore et al. (2009), Kyndt et al. (2011), Sadler (2016) and Ibarra-Sáiz et al. (2020), that assessments should be student centered, enabling creation of deeper meanings in line with professional demands. E-assessment topic has drawn increased attention by scholars being driven by the shifting higher education landscape and opportunities for e-assessment practice (Nicol, 2007). However, there seem to be silence by previous scholars on the contextual issues that affect the integrity of such e-assessments. As advanced by Selwyn (2010), the complex social realities of educational practice must be considered as technology on its own is not a solution. In addition, the sociotechnical perspectives that can affect academic integrity need consideration, as e-assessments must be appropriate to a digitally mediated society (Bearman et al., 2022). In response to the calls by Selwyn (2010) and Bearman et al. Ajjawi (2022), this study seeks to explore the drivers of academic integrity violation by university students from a South African sociotechnical context.

With ERT having been a common and vital phenomenon in recent Covid-19 times, academic integrity has become a fundamental topic of concern. It becomes important to have an account of the recent developments in relation to students' academic integrity, given the inconclusive e-assessments and academic integrity discussions. Therefore, this study seeks to explore drivers for higher education students' academic integrity violation through an institutional analysis framework. Once the prominent drivers are unpacked, measures can be put in place to address them and pave the way for improved academic integrity on e-assessments as the South African higher education institutions continue with blended learning that involves e-assessments post COVID-19.

2. Theoretical foundation

An ecosystem of innovation is composed of a variety of components, such as institutions, people, and other players who interact in the creation, dissemination, and application of knowledge (Fischer, 2001; Edquist, 2010). Technology conception must be diffused and transformed into new processes for innovation to take place (Samara et al., 2012). According to Lundvall (2007), innovation is a complex, interactive connection of nodes (i.e., institutions, people, and technology) that entails both the production of the innovation itself and a change in the competence of the involved agents who are to employ it (COFISA, 2010). As a result, the study examines the institutional, individual (students), and technological problems of e-assessments as a technological innovation in the context of emergency remote teaching. Due to the significant influence that institutions have on innovation, this study examines the innovation of e-assessments using an institutional analysis (IA) paradigm that was

modified from Dorward and Omamo (2005), Mudombi and Muchie (2014). An institutional approach's key benefit is its capacity to investigate the existence and development of an innovation that is significantly influenced by the environment in which the parties involved operate (Coriat & Weinstein, 2002). Additionally, the framework is purposefully abstract, allowing for use in various scenarios that contain institutional functions and impacts (Dorward & Omamo, 2005). By taking the material conditions and connecting them as resource conditions, the framework was modified for use in this study. In addition, community characteristics were taken into account, but not rules. The action contexts were modified in the study and connected to institutional setups. As a result, the study looked at resource availability, community characteristics, and institutional structure as key factors affecting the integrity in e-assessments. Figure 1 below provides a pictorial representation of the constructs under study as they influence academic integrity of e-assessments.

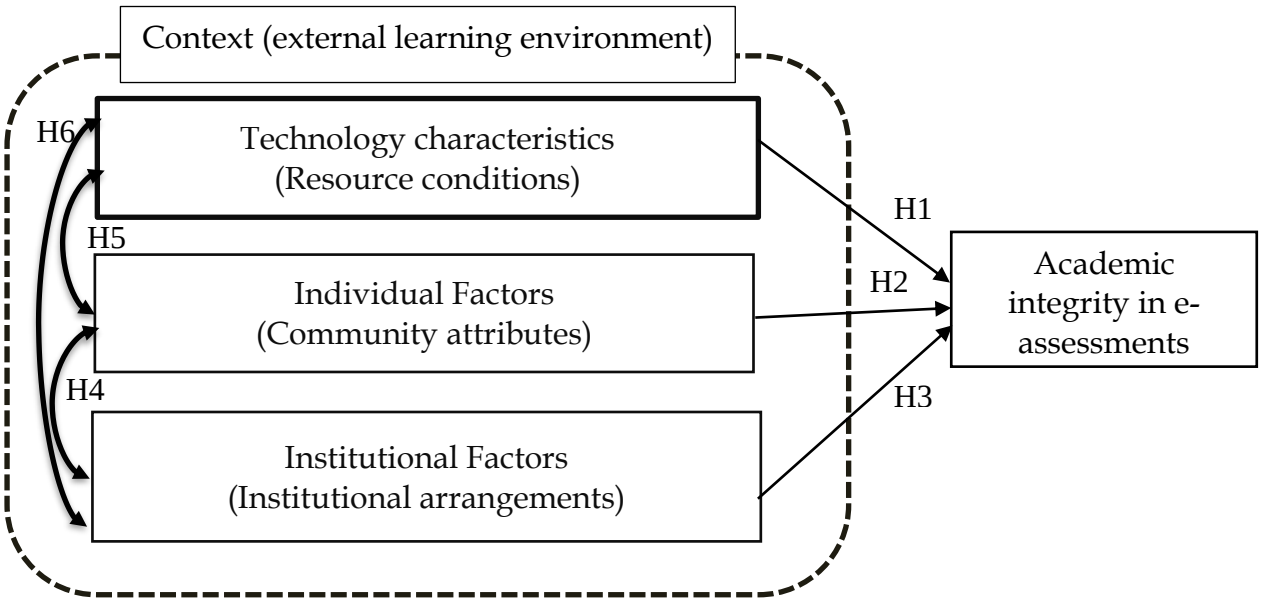


Figure 1: An Adapted Institutional Analysis Framework (*source: Dorward & Omamo (2005: 64); Mudombi and Muchie (2014: 5)*)

2.1.1 Institutional factors

Several studies have documented that there is a need for more suitable curriculum and course design, delivered in a supervised learning environment. The essentials of convenience, flexibility, and availability afforded by academic institutions entice students to commit academic dishonesty. Studies support the need for more suitable course design, delivered in a focused and highly supervised learning environment, including the preparation and application of policies that deal with academic integrity in remote learning (Muhammad et al., 2016). According to Bretag and Harper (2018), universities need to ensure a "systemic approach" in which academic integrity is inculcated and aligned to various institutional procedures and practices, including students' admissions, orientation, teaching and learning practices, academic advising, staff development, and the integration of technology for academic integrity. Students in ERT have had improper guidance on the conventions of academic integrity and have lacked face-to-face sessions with their lecturers and academic advisors.

Academic integrity culture pertains to institutional stances that uphold academic honesty, in addition to preventative measures and consequences to academic misconduct. As such, academic integrity values need to be reflected in the students' and lecturers' lack of tolerance of academic integrity violations, the extent of punishment imposed, and the existence of an institutional academic code of conduct. However, the general institutional academic culture seems to drive cheating perceptions and academic integrity violations by students (McCabe et al., 2002).

2.1.2 Context/External learning environment

The physical environment is part of the learning climate in which students learn (Ambrose et al., 2010). As such, the learning environment includes factors that have a direct effect on the motivation to study. While previous studies have discussed the learning climate in the context of students' self-esteem and attitudes (Chionh & Fraser, 2009), opportunities for self-directed learning (Tongsilp, 2013), and instructor or teacher fairness (Lemons & Seaton, 2011), the socio-economic aspect of the learning environment seems ignored. This applies especially in the context of developing countries such as South Africa. Factors such as electricity power cuts, problematic ICT infrastructure for remote connectivity, and learning environments (such as overpopulated homes) that are unconducive, have the potential to play a significant role in determining students' academic dishonesty. Pressure to perform academically in the form of good grades and academic ranking and the belief that their acts are within the boundaries of acceptable behavior (Connolly et al., 2006), can lead students to engage in academic integrity violation. This is relevant especially in the learning environment and context of student funding and support being based on academic performance. It is therefore essential to be cognizant of the fact that external factors can influence students' academic integrity in e-assessments during ERT.

2.1.3 Technology characteristics

In ERT, assessments are done and submitted via online learning management platforms. Some may argue that these learning management systems may deter students from academic dishonesty due to their flexibility and panic cheating avoidance (Stuber-McEwen et al., 2009). However, students' isolation in remote learning environments can also increase pressure and stress levels, leading them to be prone to academic dishonesty (Gibbons et al., 2002). This can be most prevalent in the context where bad network connectivity and electricity power cuts are rampant. Despite technology being constantly evolving, and new technology emerging, which can assist students in avoiding academic integrity violation (Christensen et al., 2010), scholars have attributed the rapid evolution of the internet to the rapid increase in opportunities for academic integrity dishonesty (Marsh, 2017; Mostrous & Kenber, 2016). This includes social media platforms for easy communication and file sharing, search engines, collaborative websites that afford students opportunities for easy, instant access to vast amounts of information using the convenient mobile handheld devices (Sayed & Lento, 2015). Students own mobile devices such as wearable smart watches and related devices (Christensen et al., 2010), that have the power to store course documents, that can be referred to during e-assessments. In addition, students

can share the electronic course documents during e-assessments (Sayed & Lento, 2015; Jones et al., 2008). Therefore, technology can also be considered as a source of influence in academic integrity violation in e-assessments.

2.1.4 Individual factors

Individual factors such as age and gender have the possibility to influence students' academic dishonesty. Literature reveals that academic misconduct rates were higher in males than in females (Simon et al., 2004; Smyth & Davis, 2004). In addition, a study by Smyth and Davis (2004) demonstrated that age had an impact on academic dishonesty, with younger students being more likely to cheat in assessments in comparison to older students. However, these studies were not conducted in emergency remote teaching contexts. Therefore, the study tested that:

2.1.5 Hypotheses

Hypothesis 1: The technological factors predict academic integrity in e-assessments.
Hypothesis 2: Individual factors predict academic dishonesty in e-assessments.
Hypothesis 3: Institutional factors predict academic dishonesty in e-assessments.
Hypothesis 4: There is a positive relation between institutional factors and individual factors
Hypothesis 5: There is a positive relation between individual factors and technology factors
Hypothesis 6: There is a positive relation between institutional factors and technology factors
Hypothesis 7: Gender predict the differences in the influence of institutional factors
Hypothesis 8: Gender predict the differences in the influence of individual factors
Hypothesis 9: Age predict the differences in influence of individual factors

3. Method

The study population comprised of first year students across faculties of the university. Stratified sampling was used to break down the population into six strata in accordance with the six faculties. Subsequently, random sampling was used to select 50 students from each stratum (faculty), making a total sample of 300 first-year university undergraduate students.

3.1.1 Design

The current study was designed to examine drivers of academic dishonesty in e-assessments by university first-year undergraduate students. The study proposed that institutional, technological, and individual factors were potential sources of academic dishonesty based on the institutional analysis framework. Therefore, the study aimed at examining the statistical significance of the constructs and the relationships among the constructs in the context of academic dishonesty.

3.1.2 Research Instruments

Being informed by the adapted institutional analysis framework, three potential sources of academic integrity namely, technological, institutional, and individual constructs each containing question items to be answered were presented to respondents (Appendix 1). The question items in the questionnaire were measured against a 5-point Likert scale to measure respondents' levels of agreements regarding potential drivers to academic dishonesty.

3.1.3 Procedure

The researcher administered the questionnaire online through SurveyMonkey, convenient for reaching the intended respondents. Links to the online questionnaire were sent out to targeted respondents through email addresses. As the respondents completed the questionnaires, SurveyMonkey tools enabled the researcher to track progress during response collection through instant alert messages. Respondents were encouraged to answer all questions. In line with ethical considerations, all participants were informed that participation in the study was on voluntary basis, with no financial rewards and respondents could withdraw from participation at any time. In addition, before completion of the online survey questionnaire, respondents would indicate their voluntary participation. The questionnaire briefly explained to respondents that all collected data will be used for research purposes only, with privacy, confidentiality maintained. After completion of the survey questionnaire, respondents were thanked for their effort and time.

4. Analysis and results

Descriptive statistics and Pearson correlations were tested on the collected data by use of Statistical Package for the Social Sciences (SPSS), to establish the relationship among variables. In addition, data analysis is based on calculations of constructs scores to make statistical calculations such as one sample statistic, analysis of variance, correlations, and regression analysis. From the original 202 electronic responses, one incomplete response was dropped leaving 201 complete responses for analysis.

4.1 Descriptive statistics

Table 1-Students' demographics

Characteristics		Percentage
Gender:	Male	48.8%
	Female	51.2%
Age:	17-18	28.4%
	19-20	43.3%
	21-22	20.4%
	23-25	7.0%
	More than 25 years	1.0%
Average daily online presence:	0-2 hours	0.5%
	2-4 hours	9.0%
	4-6 hours	27.9%
	6-8 hours	47.3%
	8-10 hours	13.4%
	More than 10 hours	2.0%
Respondent faculty:	Arts and design	21.9%
	Management sciences	24.4%
	Accounting and informatics	17.9%

Applied sciences	16.4%
Health sciences	9.0%
Engineering and built environment	10.4%

Table 2- Use of ICTs for formal online academic activities

		Frequency	Percent	Valid %	Cumulative %
Valid	> 2 years	1	.5	.5	.5
	2 - <4 years	18	9.0	9.0	9.5
	4 - <6 years	56	27.9	27.9	37.3
	6 - <8 years	95	47.3	47.3	84.6
	8 - <10 years	27	13.4	13.4	98.0
	> 10 years	4	2.0	2.0	100.0
	Total	201	100.0	100.0	

Table 1 above reveals that a significant of 75.2% indicated that students spend on average from 4 to less than 8 hours a day conducting online academic activities, p<.001. Furthermore, a significant 92.5% have been using ICT in a formal learning environment for less than 8 years, p<.001. A significant 77.2% completed from 51 to 99 percent of their assignments in real time, p<.001. Analysis through one-sample t-test to determine if the average score is significantly different from the central score of '3' indicates that ICTs are significantly important for academic activities, M=4.51, p<.001. However, there is a significant lack of alignment between 1st year students' ICT skills and the skills needed for online academic activities, M=2.58, p<.001.

4.2 Factor analysis

The 2-factor solution was applied to the model selected to verify construct validity and reliability. Factor analysis with oblimin rotation was applied to the 19 items. Two factors were extracted which account for 51.46% of the variance in the data. A Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .940 and a significant Bartlett's test both indicate that the data was adequate for successful and reliable extraction. Rotation converged in five iterations. During the process, Item 2.9 (low motivation for studying) was dropped because it did not load strongly enough onto any factor. Factor loadings <.33 were excluded so that the solution could easily be read.

Table 3 below shows how the institutional and individual factors statistically emerged from the data analysis. Items fitting into the learning technologies context were loaded under institutional factors, as institutions are responsible for taking care of the technological issues associated with their teaching and learning. In addition, items fitting into the learning environment context were bundled into institutional factors. Therefore, results reveal that institutional context factors and individual context factors posed as challenges to academic integrity in e-assessments in the institution studied. Accordingly, H1, H5 and H6 were not supported, as the technological factor proved to be invalid from the survey data. Resultantly, H2 and H3 proved statistically supported from the survey data.

Table 3 - Factor loadings

	Factor	
	Institutional	**Individual**
Assessments on untaught content	.877	
Electricity load shedding during assessments	.786	
Unconducive environments for proper learning	.782	
Pressure to perform	.747	
Poor mentoring on academic integrity	.728	
Inability to manage time for proper studying	.694	
Unavailability of technology required for completing assessments	.677	
Difficulty using the complex technology required to complete the assessments	.665	
Lack of consequences for cheating	.635	
Network and connectivity problems	.634	
High technology costs	.622	
Availability of opportunities for academic integrity violations	.598	
Absence of proper monitoring mechanisms	.586	
Having no ICT skills and knowledge for proper research	.562	
Lack of knowledge about plagiarism leading to unintentional cheating	.530	
The belief that everyone cheats when conducting e-assessments		.589
The abundant amount of information available online that is easily copied and pasted.		.586
Ease of information sharing during e-assessments		.574

4.3 Confirmatory Factor Analysis (CFA)

This proposed measurement model was then analysed using CFA (a component of SEM). At this stage, item 2.6 (Lack of knowledge about plagiarism leading to unintentional cheating) was dropped from factor 1 because its low loading resulted in the lack of convergent validity. Following this, and for the same reason, item 2.7 (The belief that everyone cheats when conducting e-assessments) was dropped from factor 2. Table 4 below, summarises item loadings as well as reliability and validity statistics.

Table 4 - Confirmatory Factor Analysis

Construct	Measured variables		Loadings
Institutional factors	2.1	Electricity load shedding during assessments	0.715
	2.2	Network and connectivity problems	0.632
	2.3	Unconducive environments for proper learning	0.763

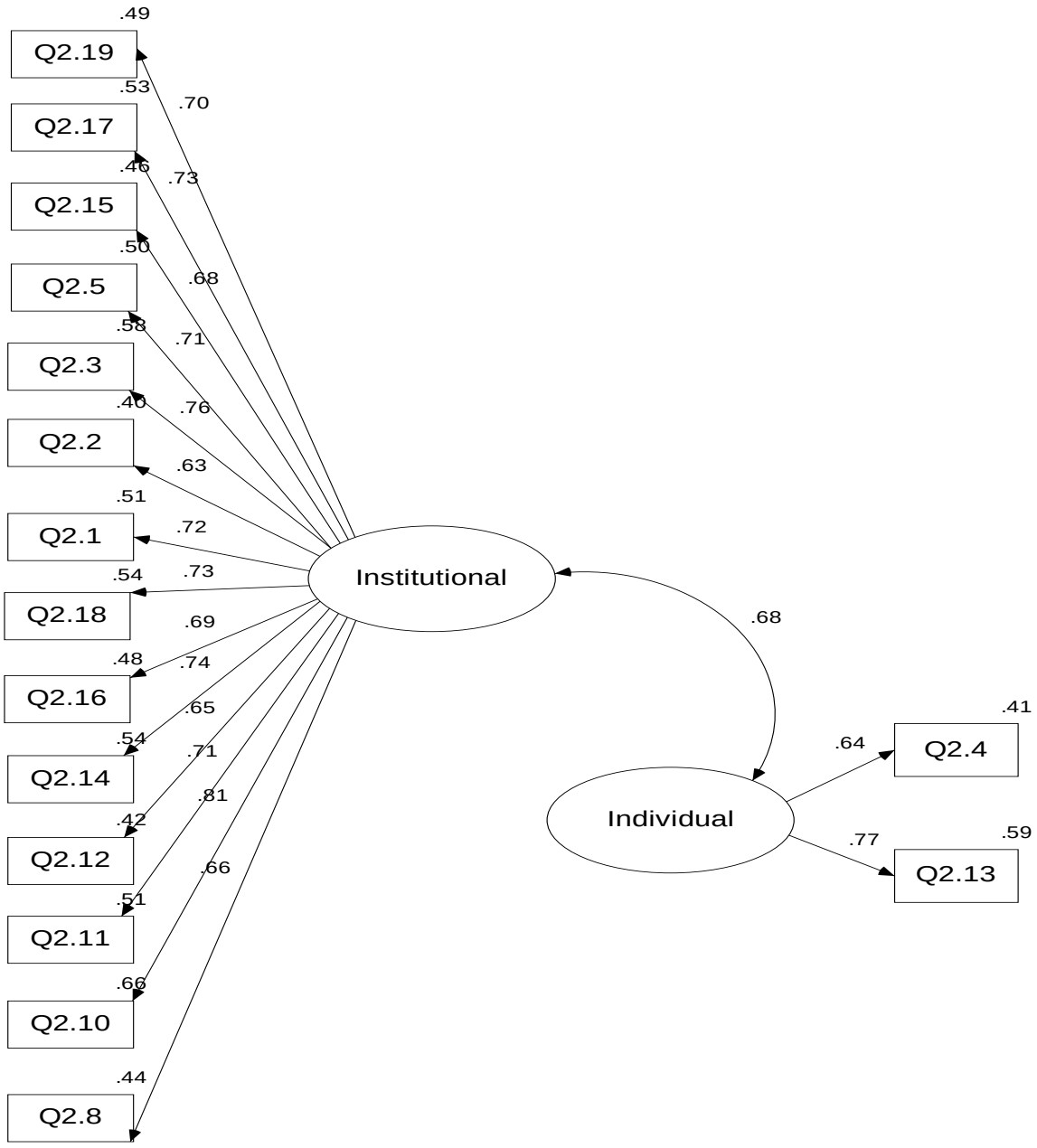
	2.5	Inability to manage time for proper studying	0.709
	2.8	Having no ICT skills and knowledge for proper research	0.663
	2.10	Pressure to perform	0.814
	2.11	Unavailability of technology required for completing assessments	0.712
	2.12	High technology costs	0.645
	2.14	Difficulty using the complex technology required to complete the assessments	0.736
	2.15	Assessments on untaught content	0.679
	2.16	Absence of proper monitoring mechanisms	0.690
	2.17	Availability of opportunities for academic integrity violations	0.731
	2.18	Lack of consequences for cheating	0.734
	2.19	Poor mentoring on academic integrity	0.702
		Composite reliability (CR)	0.934
		Average variance extracted (AVE)	0.505
		Maximum shared square variance (MSV)	0.460
Individual factors	2.4	The abundant amount of information available online that is easily copied and pasted.	0.643
	2.13	Ease of information sharing during e-assessments.	0.768
		Composite reliability (CR)	0.666
		Average variance extracted (AVE)	0.502
		Maximum shared square variance (MSV)	0.460
Model fit indices		**X^2 / df = 2.213 (p<.001); IFI = .926; CFI = .925; TLI = .913; RMSEA = .078**	

4.3.1 Explanations of the thresholds for reliability, validity and model fit.
Reliability is attained when CR > .7 and all loadings >.5; *Convergent validity* is attained when CR > AVE and AVE > .5; *Discriminant validity* is attained when AVE > MSV. These are all attained and hence construct validity and reliability have been shown to exist for the individual factor construct. Table 4 indicates some model fit statistics which show that the measurement model is an adequate fit. CFI is a normed fit index in the sense that it ranges between 0 and 1, with higher values signifying a better fit (West et al., 2012).

5. Discussion
The results support some of the hypotheses predicted, however some hypotheses predicted were rejected. Interestingly technological factors did not demonstrate an influence on students' academic integrity in e-assessments, resulting in further analysis on the individual and institutional factors. Having determined the

composition of these 2 factors, composite scores were calculated by finding the average of the individual item scores. Further analysis using the variables: institutional and individual factors reveals that they are strongly correlated with each other, $r = .530$, $p<.001$. Therefore, H4 is accepted. The study suggests that institutions hold strong forces that can influence individuals' behaviour in relation to technology use. Analysis was conducted to probe the existence of significant differences in institutional factors and individual factors across gender. Through independent samples t-tests, results revealed that male students (M=4.25) agreed significantly more than female students (M=4.08) that institutional factors would cause them to cheat online, $t (158.621) = 2.325$, $p=.021$. Therefore, H7 is accepted. Gender differences predict the differences on the influence of institutional factors in academic integrity violation. This result coincides with findings by several authors (Caruana et al., 2000; Norton et al., 2001; Aggarwal et al., 2002) who reported that male students admitted to a significantly higher coincidence of academic dishonesty, in comparison to female students. However, a study by Roig and DeTommaso (1995) found that gender differences and academic dishonesty were not significantly correlated. In addition, male students (M=3.68) agree significantly more than females (M=3.49) that individual factors would cause them to cheat online, $t (185.133) = 1.983$, $p=.049$. Therefore, H8 is accepted.

Furthermore, the study demonstrates that individual challenges are weakly correlated with students' age, $rho = .163$, $p=.021$. Therefore, H9 is rejected. However, older age is associated with more agreement that individual factors would influence them to cheat in e-assessments. Individual factors are weakly correlated with age, $rho = .186$, $p=.008$. Interestingly, more experience in ICT use is associated with more agreement that individual factors would cause them to cheat in e-assessments.



X^2 / df = 2.213 (p<.001); IFI = .926; CFI = .925; TLI = .913; RMSEA = .078

Figure 2 - The final model

From the findings, it is evident that academic integrity of e-assessments is mainly influenced by institutional and individual context factors, despite other studies focusing on the impact of technology on academic dishonesty. Sayed and Lento (2015) postulate that the extent of technology's influence on academic dishonesty is contextual based (i.e., institutional). Institutional context factors have the potential to pose as strong forces of academic dishonesty. This is consistent with Cummings et al. (2009) and Gächter and Schulz (2016), who separately agree that the degree of dishonesty in society depends on its institutions. From an institutional perspective, the findings demonstrate that assessments given in times of electricity load-shedding have been confirmed as having exerted pressure on students to violate academic integrity rules.

As students were requested by academic institutions to leave their residences and go home, some students found themselves in environments not conducive for online learning. This has been prevalent for students who come from rural areas and townships which are characterized by poor network infrastructure and connectivity. This finding resonates with Guangul et al. (2020), who reported that infrastructure challenges affect commitment by students, which can go on to affect students' academic integrity especially relating to assessments. However, two studies (Marinoni et al., 2020; Alsoufi et al., 2020) conclude that unsuitable infrastructure alone is not responsible for cheating in online learning environments, pointing to the fact that the challenges are multi-faceted. Findings revealed that pressure to perform perpetuates, leading to academic dishonesty, and can be attributed to massification and commercialization of the higher education in South Africa. In addition, findings resonating with Brimble (2016), revealed that poor students time management skills lead to temptations to violate academic integrity rules, as they feel under pressure to academically perform.

In addition, the study demonstrates flaws in the assessment of the curriculum gave opportunities for academic integrity violations. This finding resonates with Slade et al. (2022:15) who postulated that, throughout the ERT, the essential shift to mainly digital assessment arrangements progressed with "little change" to the disciplinary practices. The curriculum needed to be redesigned in line with the new challenges brought by ERT.

From the findings, it is evident that as the institution transitioned into ERT, there was limited planning around assessments in line with the shortcomings that ERT brought. As supported by Ibarra-Sáiz et al. (2020), assessment practices needed to be improved through redesigning of the assessments to meet the new demands, such as of ERT. E-assessments needed to be tailored to meet the demands of online learning (Verhoef & Coetser, 2021). Assessment strategies greatly influence students' approach to learning (Myyry & Joutsenvirt, 2015) and students need to be afforded opportunities to prove their understanding of knowledge and skills in varied situations (Maki, 2002). According to Teclehaimanot et al. (2018), assessments should be tailored at evaluating students' performance against specific learning objectives. In the absence of academic integrity enforcement, it becomes difficult to determine if the real objectives of assessments are attained. Institutional challenges have also been reported by Eaton (2020), whose study postulates that there is a challenge in institutions of learning on adapting their assessment practices for relevance in online learning. Thus far there is an absence of monitoring mechanisms such as online proctoring (Gamage et al., 2020). In the absence of tangible consequence management, students were left with no option but to do what they could do to pass.

In addition, results highlighted students' lack of ICT skills as a risk to academic integrity. Emergency remote teaching is characterized by learning via online platforms and learning management systems (LMS) that demand a certain level of ICT skills and knowledge. Teclehaimanot et al. (2018) argues that institutions need to proactively design support mechanisms for students throughout their academic

journey. Support could be in the form training and development of staff and students for authentic e-assessments as reported by (Roddy et al., 2017; Abuhammad, 2020). The cost of acquiring necessary digital devices and data for connectivity has hindered students from upholding academic integrity. Emphasis is given by Du Preez and Le Grange (2020), who suggested that learning institutions need to provide technological support in the form of devices and data in remote learning contexts, as such actions can lessen, and in some instances, eradicate academic dishonesty.

6. Conclusions and recommendations

Promoting academic integrity has been a challenge during the emergency remote teaching period, as institutions of learning migrated running assessments onto online platforms. This research explored sources of students' academic integrity violations in e-assessments in the higher education environment. The study findings conclude that institutions are a strong source of students' academic dishonesty. As such, the study recommends that the potential for academic dishonesty should be handled by institutions using proactive measures to develop authentic strategies for better academic performance without compromising academic integrity. Conventionally, it is assumed that students are solely responsibile for their academic integrity, but academic integrity is in fact a responsibility of the university community as suggested by Saddiqui (2016).

The study recommends that the institution needs to provide students with academic support and resources which are of vital importance throughout students' academic journey. Curriculum redesign for alignment to remote teaching is therefore imperative. Direct migration from face-to-face assessment strategies has made room for academic integrity compromises. As such, the study recommends redesigning the teaching and learning policies, and the assessment policies. These policies need to then be implemented in a way that affords open ongoing dialogue with students about academic integrity and the associated consequences of the compromise they so often introduce. Information technology-based constraints, notifications, pop-ups, and discussion forums should be used to constantly remind students of the imperatives of academic honesty. In conclusion, first year university undergraduate students' voices regarding academic integrity should be heard and taken into consideration in the design of curriculum, the assessments, and the provision of the needed support in the context of online teaching and learning.

7. Limitations and future work

Findings from this study should be considered in the light of a few limitations. Generalisability of the findings is limited as they are specific to a specific academic context characterized by a small group of first year undergraduate students in one institution of higher education. Longitudinal studies could be conducted in the future to study the phenomenon from a wider population. In addition, a study of a similar nature could be conducted to make comparative analysis of differences in academic integrity by academic year of study.

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Appendix 1

Exploring drivers of academic integrity violation in e-assessments by students during the emergency remote teaching.

Section A: Demographics

1.1 What is your gender

Male	Female

1.2 What is your age

17-22 years	23-28 years	29-34 years	35-40 years	More than 40 years

1.3 What is the average daily time you spend conducting online academic activities?

0-2 hours	3-4 hours	5-6 hours	7-8 hours	9-10 hours	More than 10 hours

1.4 Which faculty do you belong in the university? (*Select ONE option only).*

Arts and design	Management sciences	Accounting and informatics	Applied sciences	Health sciences	Engineering and built environment

1.5 How long have you been using information communication technologies (ICT) in a formal learning environment? *(Please tick as appropriate)*

Less than 3 years	4-7 years	8-11 years	12-15 years	More than 15 years

1.6 How often do you use ICTs for your assessment activities? On a scale from 1 *(Very infrequently) to 5 (Very frequently).*

Very infrequently				Very frequently
1	2	3	4	5

1.7 How critical are ICTs to you in executing your assessments activities? On a scale from 1 *(Very unimportant) to 5 (Very important).*

Very unimportant				Very important
1	2	3	4	5

1.8 How frequently are ICTs used by your lecturers for assessments? On a scale from 1 *(Very infrequently) to 5 (Very frequently).*

Very infrequently				Very frequently
1	2	3	4	5

1.9 How would you describe the alignment between your ICT skills and needed skills for online assessments? On a scale from 1 *(Not at all aligned) to 5 (Very well aligned).*

Not at all aligned	Very well aligned

1	2	3	4	5

Section B

Indicate your agreement that the following situations would cause you to cheat in online assessments**.** On a scale from 1 *(Strongly disagree)* to 5 *(Strongly agree).*

	Strongly disagree				Strongly agree
	1	**2**	**3**	**4**	**5**
2.2 Individual factors					
2.2.1 Inability to manage time for proper studying					
2.2.2 Academic inexperience leading to unintentionally cheating					
2.2.3 The belief that everyone cheats when conducting online assessments					
2.2.4 Having no ICT skills and knowledge for proper research					
2.2.5 Low motivation for studying					
2.2.6 Pressure to perform					
2.2.7 Unconducive home environments for proper learning					
2.3 Technology characteristics					
2.3.1 Unavailability of technology required for taking assessments					
2.3.2 High technology costs					
2.3.3 Easy of students' online interaction					
2.3.4 High complexity of technology use					
2.3.5 Network and connectivity problems					
2.3.6 Availability of answers from online resources					
2.4 Institutional factors					
2.4.1 Poor assessment practices					
2.4.2 Lack of proper monitoring mechanisms					
2.4.3 Online curriculum integration problems					
2.4.4 Lack of cheating consequences management					
2.4.5 Poor mentoring on academic integrity					
2.4.6 Load shedding during assessments					

The end, thank you for participation!!!