Examining the Namibian College of Open Learning's readiness for online assessments

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Abstract
This study investigated the readiness of the Namibian College of Open Learning (NAMCOL) to adopt online assessments in a virtual environment. Guided by the Technology Acceptance Model (TAM), the study evaluated the adequacy of NAMCOL's Information and Communication Technology (ICT) infrastructure and the readiness of students and educators to design, conduct, and participate in online assessments. A qualitative interpretivist multiple case design was used, and open-ended questionnaires were completed by 47 participants (eight programme overseers, 15 educators, and 24 students). Findings revealed mixed readiness levels across groups in which 12 (50%) students rated their computer skills as intermediate, while 21% (5) were beginners. Although 15 students (63%) accessed the internet through home Wi-Fi, 9 (37%) experienced unstable connectivity. A majority of 18 students (75%) felt ready for online assessments but cited poor network coverage, device limitations, and unfamiliarity with the Moodle platform as barriers. Educators reported full access to ICT devices and the internet connectivity; however only nine (60%) felt confident designing online assessments, indicating training gaps. Programme overseers expressed the greatest concern, with six (75%) stated that NAMCOL's current infrastructure, characterised by weak internet reliability, outdated equipment, and the absence of a proctoring system, was insufficient for online summative assessments. The study concluded that NAMCOL has emerging capacity for online assessment but faces significant infrastructure, connectivity, and digital skills challenges. Recommendations include upgrading ICT infrastructure, enhancing nationwide connectivity, offering continuous training for educators and students, piloting online assessments before full adoption, and strengthening technical support mechanisms. The research study contributed to the body of knowledge on the multi-faceted relationship of technological readiness, concern, and perceived benefits in online assessment deployment.

Keywords: *online assessment, NAMCOL, infrastructure readiness, digital skills, students' access, internet connectivity*

Introduction

Higher education institutions have been subjected to challenges when adopting online assessments, especially for Open and Distance Learning (ODL) students at institutions like NAMCOL, as inadequate preparedness often leads to issues such as high failure rates (Torun, 2020). It was imperative to evaluate online assessment readiness to determine whether NAMCOL is equipped to deal with the transformative nature of online learning (Chung et al., 2020; Suryanti et al., 2021). This change automatically implies employing a Learning Management System (LMS). For effective teaching and assessment, this requires prior planning and resource sharing (Figaredo et al., 2022). Therefore, this study evaluated NAMCOL's technological readiness in terms of infrastructure for online assessment, including an assessment of existing infrastructure and resources. Evaluating the technological infrastructure and resources at hand was included to successfully support online assessment processes.

Higher Education Institutions (HEIs) often introduce online assessments without comprehensive readiness (International Association of Universities, 2020; Naffi, 2020). Some key readiness factors include technological infrastructure, being capable of operational shifts, and being well-equipped with pedagogical knowledge for online learning environments (Engin, 2017). Online readiness is directly connected to stakeholder experiences in which the availability of resources, the readiness of staff, the accessibility of students and motivation are consequential (Ali, 2020). In addition, other factors, such as institutional support, access to resources, effective management and technology competence, are also required (Al-Fraihat et al., 2017). This paper sought to investigate the readiness of NAMCOL, its students and educators for online assessment,

an area of research which remains under-explored in Namibia.

Although some of the earlier studies have identified that students adopt a positive attitude towards the online assessment process due to its flexibility and the immediate feedback provided by the system (Bernik & Jereb, 2006), there are other significant issues such as funding, that play a crucial role in implementing an effective e-learning and online assessments model (Maatuk et al., 2022). A thorough search of databases has failed to identify a similar and general study on Namibian HEI's, students and instructors' readiness for online assessment and identification of efficient strategies. This research thus proposes to contribute to the paucity of knowledge in this area.

Research objectives

1. To evaluate the adequacy and reliability of NAMCOL's ICT infrastructure to support online assessment implementation.
2. To determine NAMCOL students' technological skills-based, and accessibility readiness for online assessment.
3. To examine educators' readiness to design, conduct, and evaluated online assessments.

Literature review

Online assessment

E-assessment or online assessment is defined as online computer-aided testing where the questions are delivered online and responses are submitted online (Mostafa, 2023). The assessment evaluates students' skills and knowledge using gadgets, such as laptops, computers, tablets or even smartphones (Mostafa, 2023). Although online assessments offer advantages such as flexibility, accessibility, and immediate feedback, literature highlights challenges. Challenges include poor internet connectivity, training needs, time management and academic integrity concerns. There are additional challenges that practitioners have to consider. Not everyone has a fast and stable internet connection, which can affect students' participation. A systematic review identified factors influencing online assessment adoption, including personnel training, network topography, system integration, and demand for hardware components (Muzaffar et al., 2021). In designing online assessments and preventing cheating, challenges also arise (Cwil, 2019). These factors also emphasize the challenge of the digital divide in terms of opportunities for students' online (Das et al., 2022).

Readiness for online assessment

Technological proficiency, skills, organisational concerns, integrity, and cybersecurity are some parameters that are required in online assessment, as stated by Nassar et al. (n. d). Readiness assessment encompasses three facets, which include institutions, students and academic staff; influenced by societal, financial, and infrastructural factors. A study conducted at Cairo University on the technical preparedness assessment of the academic staff to perform online assessments was found to have moderate to low overall results, meaning that there is a requirement for training (Nassar et al., n. d). Online assessment readiness includes institutions, students, and educators. It is also significant to highlight here that while some scholars focus on educators as one of the essential learner groups, there is a relative lack of voice for students as the primary beneficiaries of online learning, as posited by Chung et al. (2020). Therefore, this qualitative study aimed to establish the extent of students' technology access, skills and accessible to internet connections in Namibia to assist NAMCOL and its affiliates in preparing for online assessments. The feasibility of online assessments in Namibia would depend on the availability of appropriate technology, the skills that a student has in Information Technology (IT) and the quality of internet connections that students have to perform these assessments.

Online assessment in Namibia

Namibia places online assessments within its educational realm as part and parcel of a broader developmental aspiration. Such a stance emphasizes education as a crucial tool for economic and social development, especially in those areas where these services are limited. NAMCOL, despite striving to widen its Information and Communication Technology (ICT) and eLearning footprint (NAMCOL, 2021), finds itself at a crossroads due to challenges arising from the digital divide. An instance is seen with students enrolled for the Certificate in Early Childhood Development (CECD) programme who displays a preference towards traditional print formats over online materials owing to issues

related to internet accessibility (NAMCOL, 2017). This reflects challenges typically common within developing nations: lack of infrastructure support suppresses any meaningful effort towards fostering online learning. The present research thus examined NAMCOL's preparedness for online assessments

Theoretical framework

The Technology Acceptance Model (TAM), established by Davis (1989) was employed in this study. TAM focuses on the user's computer system acceptance, emphasising perceived usefulness and ease of use. Therefore, utilising the TAM framework was relevant in this study, as the underpinning construct was useful in predicting user acceptance of new technologies, particularly in online education environments. It is more frequently used to predict the extent of information system and technology acceptance, to understand issues involved in technology integration in teaching and learning, such as online assessments.

Mahlangu and Makwasha (2023) integrated Technology Acceptance Model (TAM) with the Technology-Organisation-Environment (TOE) framework, which expanded the degree of adoption behaviour in view of individual and organisational factors. Perceived usefulness and ease of the use, belonging to the TAM, it sheds light on the users' motivation; whereas, the TOE views the key elements of technical infrastructure, organisational conditions, and external environment that define the successful application of technology. In line with this, the present research adopted TAM with the aim of examining the acceptance of online assessment by NAMCOL programme coordinators, educators, and students while considering organisational and environmental factors that could influence its effective implementation. The highlighted factors included challenges and elements affecting the adoption decision to assist organisations in enhancing their technology capabilities. Situated in organisations with different levels of complexity, NAMCOL's technology adoption aims to adopt several principles, such as technology, organisation, environment and personal factors. TAM underpins the theoretical background for understanding the digital initiatives for Open and Distance Learning (ODL) institutions, examining the acceptance and effectiveness perceived regarding the online assessment problem, its opportunities, and associated threats. Previous studies (Padalia et al., 2023; Tawafak et al., 2023) primarily focused on students' perceptions of online learning; their preparedness and acceptance of online assessments have been relatively unexplored. This study uniquely targeted NAMCOL, an open and distance learning provider, evaluating its readiness for online assessment by staff and students. This study investigated multifaceted factors influencing technology adoption by applying TAM and extending it to the Technology-Organisation-Environment (TOE) framework. These include technology-related factors like internet access and device availability, organisational support, environmental considerations like academic integrity, and individual factors like digital skills and user perceptions (Mahlangu & Makwasha, 2023). This comprehensive approach aimed to reveal profound insights into NAMCOL's readiness for online assessment.

Research methodology

This study examined NAMCOL's preparedness to implement online assessments using an interpretivist paradigm, which emphasised understanding experiences and the meanings they attach to them (Ryan, 2018). Employing qualitative methods in a multiple-case study was deemed appropriate as it allows for in-depth understanding of readiness across key stakeholder groups (Hunziker & Blankenagel, 2024). The study adopted a purposeful sampling strategy because it is most suited to identifying individuals with specific traits that would make them ideal for the study. Purposeful sampling was used to explore the "lived experiences" of participants to determine readiness for online assessment of the phenomena being studied (Creswell, 2013). The final sample comprised 47 participants; 8 programme overseers, 15 educators, and 24 students from different NAMCOL centres.

Data collection and analysis procedures

Formal permission to conduct the research was obtained from NAMCOL's Chief Executive Officer through the Research and Quality Assurance Manager. Data was collected through open-ended online questionnaires. Programme overseers and educators received an online questionnaire with a link via email,

while students received the questionnaire link through email and text messages. Clicking the questionnaire link constituted informed consent. The use of open-ended questions enabled participants to share detailed view regarding online assessment readiness. Thematic analysis is a qualitative method used to identify, analyse, and report patterns within data (Moser & Korstjens, 2018). Thematic analysis was employed to analyse the qualitative responses from the open-ended questionnaires, systematically identifying recurring patterns and meanings. The process involved reading and rereading responses, making initial notes, and constructing codes for themes. The identified and underlying themes were combined into a coherent framework corresponding to the research objectives and served as a blueprint for presenting findings.

Findings

A sample size of 47 participants completed an online questionnaire, which consisted of educators, programme overseers, and students. Students comprised the majority, representing 51% (n=24), followed by educators at 32% (n=15) and programme overseers at 17% (n=8). Student responses were predominantly from the Khomas Region accounting for 25% (n=6) followed by the Zambezi Region at 21% (n=5). Educators were mainly based in Windhoek (73%, n=11) and Ongwediva (27%, n=4). Programme overseers were distributed across the Southern Region (50%, n=4), Head Office (38%, n=3), and the Central Region (12%, n=1). Programme overseers had varying tenures, ranging from 1 to 22 years, with 25% (n=2) having nine years of experience.

Educators' employment durations ranged from 1 to 7 years, with 27% (n=4) reporting 5 or 2 years of employment. In terms of computer skills, 50% (n=12) of students and 75% (n=11) of educators considered themselves at an intermediate level, while 29% (n=7) of students and 27% (n=4) of educators viewed themselves as advanced, while 21% (n=5) of students identified as beginners. Students were primarily enrolled in the B. Ed (Hons) programmes (46%, n=11), mostly in their first year (75%, n=4), followed by second year students (17%, n=4) and third year students (8%, n=2).

Students' readiness level for online assessment

Devices used for online learning

The study assessed students' device preferences when accessing the eLearning platform. The data revealed that the majority of respondents (41%, n=10) opted for smartphones. Additionally, 32% (n=8) utilized a combination of laptops and smartphones, 18% (n=4) employed laptops and personal computers, and 9% (n=2) used WI-FI-enabled laptops. The data highlighted the preference of smartphones as the predominant choice among students for accessing online learning activities.

Online learning platform use comfortability

Students were asked whether they were comfortable using the eLearning platform. Twenty students (83%) indicated no, three students (13%) aid yes, and one student (4%) was not sure of their comfortability with the eLearning platform. This implied that a reasonable number of students were not comfortable enough to the online learning platform.

Students' source of Internet access, stability, strength and frequency of use

Regarding internet access for online learning, 15 students (63%) primarily used home Wi-Fi or nearby connections. Only one (4%) student used NAMCOL Computer-Based Learning Centres, while eight (33%) relied on sources like Phone Data, Data Pocket Wi-Fi, and library internet. In terms of stability, 15 students (63%) reported consistent connections, while nine students (37%) experienced instability. Internet usage included assignment submission reported by 19 students (79%), four students (17%) indicated research , and reading study materials was cited by one student (4%). students also used it for online business, social media, virtual presentations, and engaging with course content on platforms like YouTube and Facebook. Internet quality varied, with 38% (9 students) rating it as good, 8 students (33%) rated it as average, five students (21%) as excellent, and two students (8%) as poor. Usage frequency showed 17 students (71%) were frequent academic users, 3 students (13%) occasional, two students (8%) reported for assignment submission, and two (8%) students for exclusive course content engagement.

Poor Internet connection/network

Student internet experiences revealed concerns about poor connectivity, including coverage gaps, local issues, dissatisfaction with NAMCOL Wi-Fi devices, and students seeking alternative connections despite owning these devices. Despite their cost, students expressed frustration about limited device usefulness for academic tasks. Regarding readiness for online assessment, 18 students (75%) felt adequately prepared, while some had reservations due to network accessibility, device requirements, potential connectivity problems, learning curve (time and effort students needed to become comfortable with navigating the online assessment platform), unfamiliarity with the system, limited coverage, and personal internet instability. Those who were unsure cited unfamiliarity and system complexity, which in this context refers to technical complexity, such as the number of steps required to access assessments. While confident students displayed device familiarity. The data emphasised student readiness and suggested NAMCOL's potential for successful online assessment implementation.

Opinions about online assessment

Students generally held positive attitudes toward the potential introduction of online assessment, seeing it as beneficial, convenient, and cost-effective. Several students explicitly expressed support for the initiative. One student stated that *"I support online examinations. It is cheap and reduces the cost of travelling to examination centres. It allows learning too"* S22. Working students further appreciated the flexibility offered by online assessment and S23 noted that *"we would not need to apply for leave of absence."* It implies that working students could take online assessments at their workplaces. However, there were reservations related to concerns about impersonation. Thus, S24 mentioned that *"many students can give someone else to write for them."* Other students were concerned unequal technological proficiency, and internet access disparities. In which S2 cited that *"some of us who are not good at computers and have no stable internet will be disadvantaged."* Students also highlighted challenges such as Internet connectivity. S2 said that *"Internet loading is a problem, lack of data, poor Internet connections."* and S3 mentioned that *"if the network jams during online assessment… you will not finish writing, which can lead you to fail."* Preferred assessment venues included homes, libraries, or Computer-Based Learning Centres (CBLC). Students' primary concerns revolved around reliable Internet connectivity and power stability, including issues like loading problems, insufficient data, poor Internet connections, fear of network disruptions, and potential impacts on completion and performance. S9 noted *"the duration of time is short. If the internet went off, you will not finish writing the online exams."* Addressing these concerns requires a focus on technical issues to ensure smooth online assessment experiences and accommodating, flexible assessment modes while providing adequate training and support.

Educators readiness for online assessment

Supportive ICT infrastructure for online assessment activities

Educators unanimously confirmed having the necessary ICT infrastructure, including laptops and internet access for online assessment. Their engagement with eLearning platforms involves computers, laptops, smartphones, and internet connectivity, showcasing readiness for smooth online assessment execution. One of the educators, E1 cited that *"yes, I have access to the Internet."* Additionally, all educators indicated that they can access a computer, laptop, smartphone and internet. Educators expressed strong motivation for technological skill enhancement, attending online lesson training and assisting students with assignments. E2 noted that *"I was engaged in training on delivery of lessons online."* Another educator stated that *"we received online training on marking on the platform and uploading marks"* E3. Furthermore, E4 mentioned that *"NAMCOL offers training through Zoom meetings, although the time is limited and the network is sometimes unstable."* Despite challenges from session length and network instability, training preferences were varied. Educators sought online teaching technique training with specialised software for virtual presentations. They prioritised e-learning orientation with hands-on practise and also desire short courses for facilitation skills and ICT tool proficiency to enhance their capabilities.

Previous online assessment experience

Eight educators (53%) of the 15 reported having prior online assessment experience,

while 47% (n=7) lacked exposure. Experiences range from being students in online assessment to taking assessments at other institutions. The data implied that the potential for peer training, as educators with prior experience could have equipped those without exposure, thereby fostering skills proficiency for online assessment.

Required infrastructure and its capacity for online assessment implementation for NAMCOL

Educators' opinions on NAMCOL's online assessment preparedness varied. Approximately eight (53%) educator expressed confidence in NAMCOL's infrastructure, with E4 noted that *"yes, because they have a platform already."* E5 indicated that *"NAMCOL already has an infrastructure where students upload their assignments; it just needs to be extended to allow online summative assessments."* Educators emphasised the need for uninterrupted platform access, as one educator stated that *"if they can find a permanent solution to reduce downtime... it will be possible to host online summative assessments."*

In contrast, seven educators (47%) raised concerns, including power outages and logistical issues with online invigilation. E8 highlighted that *"concerns exist regarding how students will complete these summative assessments… the connectivity and data issues are a concern."* Another educator questioned overall readiness, stated that *"the college faces numerous challenges… insufficient support and system failure"* E9. Furthermore, E10 stressed infrastructural weaknesses, by stating that *"first, they should improve on physical ICT infrastructures. An again, on capacity, more technicians are needed."* Some educators also questioned whether NAMCOL could support students' technology needs, with E13 remarked that *"students are in isolated areas without network access… the majority lack computer literacy."*

Suggested improvements focused on enhanced infrastructure and support, and providing laptops or devices to both staff and students. Overall, the data highlighted differing perspectives among educators, with one educator (7%) optimistic about the eLearning platform and others calling for solutions to technical and operational challenges for successful online assessments.

Required skills to develop online assessment questions (design and development)

Educators' competence in creating online assessment questions was evaluated. Nine educators (60%) felt confident, while six educators (40%) admitted a lack of proficiency. Those who felt confident referenced prior training and experiences, with E10 noted that *"yes, I have done CDTOC"*, whereas, E14 stated that *"I have developed online summative assessments for UNAM."* Other educators highlighted platform familiarity, as E15 has explained *"the online summative assessment is more or less the same as the online test and quiz… I have little training during the IT module. I will be able to set summative assessments on Moodle through my years of using Moodle."*

One of the educators felt less proficient and cited that *"no, this is one area which is lacking, and not yet wholly advanced, but at least I have the basic skills."* This suggested that many were skilled, possibly reducing training needs. Proficient educators mentioned advanced technology skills, the University of Namibia (UNAM) assessment development experience, familiarity with online platforms, and past training. Desired skills included advanced IT training, comprehensive skills, and full assessment paper development training. An inclusive programme covering these aspects seems vital for equipping educators effectively.

Type of training required for online assessment questions development

Educators outlined diverse training requirements to enhance online assessment question development skills. These encompassed the following:

1. *Training on utilising assessment software/programmes* for effective use of online assessment tools.
2. *Guidance on structuring online assessment content* to ensure well-organised questions.
3. *Relevant IT skills for online question creation* highlighting the importance of technical proficiency.
4. *Basic training in setting up online assessment and tools analysis* for a comprehensive understanding of the assessment setup process.

Additionally, educators unfamiliar with online assessment expressed a general need for

comprehensive training to ensure everyone thoroughly understood the online assessment creation process. One of the educators cited that *"I need the training to acquire skills to use all the programmes to develop the online summative assessment"* E3. Another educator mentioned that *"training on how to develop such assessments from the IT department"* E1. These training needs underscored the importance of addressing diverse skill levels and providing comprehensive support.

Readiness of NAMCOL students for online assessment

Educators held diverse opinions on NAMCOL students' readiness for online assessment. Educators were confident, citing students existing exposure to eLearning and their ability to learn through practise. One educator (E4) explained that *"yes, they are already exposed to eLearning"*; whereas, E5 emphasised that *"COVID-19 taught us lesson…whether the students are ready or not, NAMCOL should start practicing so the students will be ready."* Educators added that readiness would improve with the introduction of structured training. E8 noted that *"students need to be trained on how to use the eLearning portal fully."* In contrast, other educators expressed reservations due to uneven adaptation, geographic limitations, technical disparities, and unreliable internet. E12 explained that *"no …NAMCOL students are distributed nationwide, with some in isolated areas without network access."* Another educator (E1) stated that *"some are not yet computer literate… many are already struggling to attend online classes."* Concerns also emerged about students' ability to carry out online tasks. Educators E4 and E14 noted that *"some students are still struggling to access the eLearning platform"* and *"some of these students are struggling to type their assignments…online for them would be a considerable challenge"* respectively.

Overall, educators' views presented a subtle perspective, with some advocating practise and training, while others underscored practical challenges. These insights could guide NAMCOL's decision of transitioning to online assessment.

Sufficient IT and web skills are required for online assessment

Educators' views on students' IT and web skills for online assessment revealed a divided perspective. A substantial portion (47%, N=7) believed students lacked the necessary skills, citing e-learning platform access challenges and unfamiliarity with essential software. E14 stated that *"no, some students are still struggling to access the eLearning platform"* while E5 emphasised that *"some need to be trained on using computers and all the software needed."* The urgency of this skills gap was highlighted further, with E7 mentioned that *"one of the critical areas that NAMCOL needs to look into as a matter of urgency."* In contrast, five educators (33%) acknowledged adequate skills but noted variations due to laptops and IT proficiencies varying among students. This view was reflected in the comment by E8 who said that *"yes, for some and no for most."*

This variegated readiness highlighted diverse technology access and skills. Educators' assessments underscored the need for comprehensive measures to enhance IT skills and ensure equitable technical access, which is vital for successful online assessment implementation.

Online assessment introduction concerns for NAMCOL

Educators voiced concerns about NAMCOL's potential shift to online assessment. Reservations centred training for assessment setters, supplying internet devices to students, and addressing students' limited computer skills. One of the educators, E9 stressed the importance of capacity building by noting that *"my concern is about the training of examiners and also to provide internet devices to the students."* A digital literacy gap amount student was also highlighted. E10 said that *"most of the students will be left out due to their limited computer skills."* In addition, E11 questioned that *"how are the students going to be invigilated."*

These reservations highlight the need to empower stakeholders and ensure technology access. Apprehensions about digital disparities and their impact on engagement align with existing research (Schradie, 2018). Challenges in maintaining assessment integrity through invigilation methods were raised in line with scholarly discussions. Uneven internet connectivity was a significant barrier, reflecting broader online education concerns. Overall, educators' views comprised diverse issues, including assessment quality, technology access, digital literacy, invigilation strategies, and internet connectivity challenges.

Programme overseers views

Readiness for online assessment implementation for NAMCOL

The study examined eight (17%) NAMCOL programme overseers' perspectives on NAMCOLs' readiness to adopt online assessment for tertiary-level programmes. Responses varied, with six programme overseers (75%) expressing scepticism about NAMCOL's readiness due to issues like limited network coverage and infrastructure challenges. However, five programme overseers (25%) held optimistic views, citing NAMCOL's advanced infrastructure.

Programme overseers also expressed uncertainty or unfamiliarity with online assessment tools, highlighting concerns about coordinators' and students' technological literacy and learning centre computer quality. Based on that aspect, PO7 stated that *"no, our students are on a distance mode… they are scattered all over the country, and there is network coverage issued. Online summative assessment is practically impossible."* PO1 echoed infrastructure concerns, indicated that *"no, currently some of NAMCOLs' infrastructure to support online summative assessment is not up to date or strong enough."* Programme overseers expressed unfamiliarity or uncertainty with online assessment tools. The raised concerns about technological literacy and the quality of computers at different centres were explained by PO8 that *"given the technological literacy of the coordinators and students, NAMCOL is not ready."*

Overall, while six programme overseers (75%) were sceptical, two programme overseers (25%) were optimistic, emphasizing the importance of addressing technology proficiency and resource quality for successful online assessment integration.

NAMCOL infrastructure required for online assessment implementation

Programme overseers' perspectives on the Namibian College of Open Learning's infrastructure for online assessment varied widely. Several overseers underscored the inadequacy of infrastructure and the need for better connectivity management. One programme overseer stated that *"no proper infrastructure to do that"* (PO1). Programme overseers noted issues with weak internet connectivity, limited financial provisions, and the absence of a proctoring system on the Moodle eLearning platform. PO4 mentioned that *"NAMCOL's Internet infrastructure is not strong enough."* Concerns extended to financial and equipment limitations, with po5 explained that *"not at the moment, but budgetary provision can be made."* Another programme overseer, PO6 highlighted the absence of essential assessment tools by stating that *"NAMCOL only has the Moodle eLearning platform without a proctoring system."* However, there were cautious optimists who attributed these limitations to students' connectivity challenges. Programme overseers strongly advocated for additional resources, such as computers and redundant internet lines replacement. Two programme overseers, PO7 and PO8 stated that *"yes, it does, the student connectivity may be the only limitation and those may be few"* and *"computers to cater for students who don't have access to laptops. ...a redundant Internet line for incidents where the primary line might be disrupted"* respectively.

In a nutshell, the analysis revealed a consensus among overseers that NAMCOL's infrastructure is inadequate for successful online assessment. While stable internet, Computer-Based Learning Centre (CBLC) facilities, and the Moodle platform were present, connectivity issues and the absence of a proctoring system were identified as significant limitations. The overall discourse highlighted the need for more proficient infrastructure management to improve the readiness for online assessment at NAMCOL.

Reliability of NAMCOL infrastructure to support online assessment

Views on NAMCOL's online assessment infrastructure were divided. Programme overseers found it inadequate due to network limitations and access issues with e-learning systems and the student portal. One programme overseer stated that *"I don't think it's reliable enough as we always have challenges with our eLearning and students' portals"* (PO3); whereas, PO4 emphasised the weakness of the current setup by noting that *"NAMCOL's internet infrastructure is not strong enough."* In addition, PO1 highlighted coverage gaps affecting students nationwide by explaining that *"the TN mobile that students have does not cover the connectivity in some areas in the country, and the students are only given internet devices and not computers."* They viewed the current internet setup as

insufficient. In contrast, a few programme overseers suggested improvements like computer labs and redundant internet lines. One of the programme overseers, PO7 recommended that *"upgrading the computer labs and installing a redundant line."* The seven programme overseers (88%) disagreed with NAMCOL's infrastructure adequacy, citing inconsistent student experiences due to insufficient distributed internet devices and an unreliable e-learning platform. Two of the programme overseers, PO1 and PO4 voiced that *"no proper infrastructure to do that"* and *"some of NAMCOLs' infrastructure to support online summative assessment is not up to date or strong enough,"* respectively.

These consistent views called for infrastructural upgrades, emphasising the need for improved computer labs and internet connectivity at Computer-Based Learning Centres (CBLCs). This highlights NAMCOL's challenge in establishing a reliable online assessment infrastructure.

Opinions about replacing pen-on-paper assessment with online assessment

Programme overseers provided insights on migrating from traditional to online assessment at NAMCOL. Diverse perspectives included connectivity concerns, suggesting the current setup's unsuitability. PO1 explained that *"our students are on a distance mode of study; they are scattered all over the country, and there are network coverage issues. Online summative assessment is practically impossible"*, while PO2 cited that *"there are too many complaints from students regarding the eLearning platform."*

Other overseers indicated that even through NAMCOL has infrastructure in place; it will not be able to support full migration. PO4 cited that *"it perhaps needs to be managed efficiently; NAMCOLs' internet infrastructure is not strong enough."* Programme overseers proposed trial phases test to assess readiness, with PO1 emphasised that *"there must be a trial run perhaps to test the infrastructure that is available."* Programme overseers emphasised potential cost savings, convenience, and modernisation, contingent on adequate infrastructure and digital literacy support; with PO3 noted that *"fully support for online summative assessment, as it will benefit both the students and NAMCOL in terms of traveling, venue cost [and] invigilators costs."* Programme overseers also accentuated the importance of safeguards against Artificial Intelligence related malpractices to prevent standard compromising. One programme overseer, PO6 cited that *"the platform should be able to prevent Artificial Intelligence materials."* Conditional endorsement was prevalent, suggesting optional online assessments to accommodate diverse student needs, if infrastructure and digital literacy gaps are addressed. PO8 cited that *"provided that we have all infrastructures in place… online examination will be highly supported."*

In summary, six (75%) of overseers supported the transition to online assessment with infrastructure and literacy conditions, while the remaining two (25%) overseers were cautious due to connectivity concerns. The call for trial phases indicated a balanced approach.

Additional infrastructure required to implement online assessment at NAMCOL

Programme overseers had varying perspectives on the infrastructure required for successful online assessment at NAMCOL. Programme overseers underlined the need for laptops, improved connectivity, and enhanced IT programmes, without specifying details. Two programme overseers, PO1 and PO4 noted that *"laptops… and speak to service providers to enhance connectivity to all corners of Namibia"* and *"efficient pocket Wi-Fi for students"*, respectively. Some programme overseers emphasised computer labs, mobile device access, efficient pocket Wi-Fi, and reliable hardware and software like computers and Moodle. PO5 indicated that *"computer labs…laptops / iPads, and a reliable/stable Moodle platform."* Security measures, including CCTV, were proposed by PO6 mentioning that *"CCTV."*

One viewpoint considered the existing infrastructure sufficient and suggested additional support staff. Another highlighted the importance of replacing a redundant internet link for uninterrupted connectivity. PO7 noted that *"at this stage all is in place. Only support staff is needed."* In terms of connectivity, PO8 said that *"redundant internet link."* These diverse perspectives underscored the multifaceted infrastructure needs for NAMCOL's online assessment, emphasising comprehensive provisions for practical, effective assessment, encompassing technology, connectivity, and security.

Skills improvement for programme overseers, educators and students toward new technologies

An examination of NAMCOL's efforts to boost technological skill enhancement among programme overseers revealed diverse perspectives. Five (63%) overseers acknowledged active efforts, citing the eLearning platform, the student portal, continuous training, and eLearning platforms for teaching. Two programme overseers, PO3 noted that *"students are mandated to buy pocked WiFi"*; PO1 cited that *"all assignments are submitted online and tutor-markers do mark online"* while PO2 affirmed that *"training is offered at regular intervals…on new educational technology as well as familiarisation with new software features."* However, three (37%) overseers expressed uncertainty regarding skills enhancement efforts due to uneven regional access and inconsistent communication.

PO7 stated that *"I am not aware of such interventions"* and PO3 reported that *"central region is excluded as this is done only in some regions."* Regarding training for online assessment design, five (63%) overseers confirmed participation in the 'Designing and Developing Online Assessments' course, PO1 indicated *"the training has been provided and short course meant for staff skills development is available."* However, four (50%) overseers were unaware of this course, indicating potential communication gaps. PO5 mentioned that *"no training was provided, or if it was, I am not aware of it"*. There was a consensus on the provision of continuous technology training, with a desire for more comprehensive and frequent opportunities to address gaps. The efforts of the Central region and the ICTs division were highlighted. Overall, NAMCOL's efforts to enhance technological skills showed variability, with proactive approaches, uncertainty, and calls for expanded training noted.

Computer literacy competency for online assessment

Programme overseers' perceptions of students' and educators' computer literacy for online assessment emphasised the need for further training. Two programme overseers, PO6 noted that *"much training is required to equip both students and educators"* while PO2 said that *"a number of them…are struggling continuously with the eLearning platform."* Inadequate current levels prompted calls for focused efforts to bridge competency gaps. Challenges with e-learning platform navigation reinforced computer literacy deficiencies and highlighted the challenges of digital learning. These viewpoints underpinned the urgency of comprehensive training to improve computer literacy for successful online assessment engagement.

Required ICT support infrastructure

Programme overseers' views on ICT support infrastructure access for students and educators revealed a nuanced situation. Students were supplied with internet pocket Wi-Fi, unlike educators. PO3 noted *"students are given internet pocket Wi-Fi and no computers are given to them, educators are not given any internet devices for this usage."* Regional disparities and limited coverage in remote areas hindered connectivity. PO4 highlighted that *"there are students that live in remote areas where internet coverage is very limited"* while PO5 added that *"not quite good enough…we face challenges with internet in rural areas."* Additionally, hardware absence like smartphones and computers in rural regions exacerbated access issues, as PO6 stated that *"most of our students also don't have access to smartphones / laptops / computers"*. The insights depicted a complex scenario with varying levels of access to ICTs support, highlighting partial coverage, regional connectivity disparities, and hardware limitations.

Recommendations to NAMCOL in response to readiness for online assessment implementation

Programme overseers' recommendations to NAMCOL for online assessment readiness encompassed diverse strategies. A holistic approach emphasizes robust IT training, device provisioning, and increased staffing. PO1 stressed that *"vigorous training on IT-related matters, provide the devices required and choose the right service provider whose connectivity is visible in all corners of the country…staff members must also be increased."* Considering students, video lecture-based training was suggested due to device concerns. PO6 recommended that *"training should be provided to students on using the eLearning platform in the form of video lecturers."* Infrastructure enhancement called for computer-equipped centres, device

distribution, and improved connectivity. PO5 noted that *"all centres should be equipped with computers… provide students with smartphones, and laptops."* Pragmatic advice accentuates the necessity of complete tool readiness before implementation. The programme overseer, PO4 stated that *"NAMCOL needs to put all necessary tools in place first in order to consider online summative assessments."* Comprehensive infrastructure is vital for reliability and security. On that note, PO7 stressed that *"to have all required infrastructure in place to ensure reliability and security of summative online assessment."* Proctoring system adoption was proposed, contingent on trial tests, orientations, device provisioning, and monitoring resources. PO6 recommended that *"NAMCOL ensure that the tool to monitor students' behaviour for online summative assessment is in place, and a trial test should be done."* These recommendations underline the multifaceted readiness aspects encompassing training, infrastructure, and monitoring essential for successful online assessment implementation at NAMCOL.

Discussions of findings

Readiness for online assessment implementation for NAMCOL

The research question about NAMCOL's infrastructure readiness for online assessment was: "What is the readiness level of NAMCOL in terms of infrastructure to implement online assessment?" Among programme overseers, six (75%) concluded NAMCOL was not ready for online assessment, while six (25%) disagreed. Concerns included under-equipped Learning Centres and outdated computers. Educators' response data showed a balanced view, with seven (47%) indicating readiness and eight (53%) not, citing Moodle platform issues. Neutral responses suggested backup systems for power-related disruptions. Overall, a notable portion of educators expressed uncertainty due to infrastructure limitations and the Moodle platform constraints. The above concerns delineate the importance of NAMCOL's readiness for online assessment.

Reliability of NAMCOL infrastructure to support online assessment

The programme overseers' data highlighted the inadequacy of NAMCOL's current infrastructure for successful online assessment implementation. While internet connectivity and Computer-Based Learning Centres (CBLCs) were available, the network's strength was insufficient for online assessment demands. The study by Al-Amin et al. (2021) found low online class attendance related to inadequate technology infrastructure, including limited internet access and a shortage of digital devices. Providing students with Telecom Namibia (TN) pocket Wi-Fi devices loaded with data was hindered by limited network coverage, especially in remote areas. The Moodle eLearning platform, if well-managed, holds potential. However, stable internet, up-to-date computers, and a functional online proctoring system are prerequisites for successful online assessment. Students required laptops, reliable pocket Wi-Fi, and an optimised Moodle platform. Educators' response data also expressed concerns about infrastructure, highlighting challenges for both students and educators. This underscored the importance of robust infrastructure for effective online assessment delivery, as student difficulties with platform access emphasise the significance of stable connectivity for successful online learning.

Skills development towards new technologies

Educators, students, and staff at NAMCOL unanimously recognised the vital role of skill enhancement through technology adoption. The shift to online assignment submissions and marking has been a catalyst for skill development, motivating students to become proficient with the NAMCOL Moodle eLearning platform and encouraging educators to embrace technological advancements. Annual training sessions served as skill enhancers and refreshers for educators' technological competencies. This data underscored the pivotal role of ongoing skill development in effective technology integration among educators, students, and staff, aligning with Mahlangu and Makwasha's (2023) emphasis on extensive training for the proficient use of online assessment tools. Mutelo (2022) also emphasised the importance of teachers having strong technological skills for e-learning readiness, highlighting the need for practical training. Ultimately, promoting positive attitudes towards online assessment methods aligns with lifelong learning principles, the adaptability required in technology-driven environments, and the recognized value of training initiatives for successful technology adoption.

Concerns in the online assessment adoption

Data analysis echoed previous studies (Alotaibi, 2021; Jaap et al., 2021; Sarkar et al., 2021; Elsalem et al., 2020; Bloom et al., 2018), highlighting significant concerns regarding the introduction of online assessment. Students' main apprehensions centred on technical challenges, particularly the lack of necessary devices for online assessment. This emphasised the need for comprehensive capacity-building measures. Shifting from traditional to online assessment, while potentially cost saving, raised concerns about unequal internet coverage, potentially limiting equitable access. These concerns underscore the importance of a well-planned transition process, balancing cost-effectiveness with technological accessibility, as emphasised in existing research. Strategically addressing these concerns will be crucial for the effective implementation of online assessment at NAMCOL.

Required supportive ICT infrastructure and skills to ensure designing and developing online assessment activities

The data analysis revealed NAMCOL's training efforts for educators and course developers, focusing on online assessment activities' planning, design, and development. Initiatives like the "Certificate in Developing and Teaching Online Courses" (CDTOC) and "Certificate in Designing and Developing Online Assessments" (CDDOA) short courses are aimed at enhancing skills. However, not all educators were required to undergo training, suggesting that only a subset engaged in developing their online assessment skills. Programme overseers accentuated the importance of improving educators' computer literacy abilities. They mentioned that educators typically had access to ICT support infrastructure in their operational towns and NAMCOL centres, providing facilities for device use. Eight (53%) of educators had prior experience in online assessment from other institutions due to concurrent part-time employment. These findings highlighted the significance of training and support for educators and students in online assessment design and execution, aligning with research advocating effective professional development for educators and equitable technology availability.

Devices used for online assessment

Students required specific devices, like internet-enabled laptops or smartphones, for online assessment engagement. NAMCOL addressed this need by providing pocket Wi-Fi dongles to all students at the beginning of the academic year. Programme overseers noted that, to some extent, students possessed the necessary ICT infrastructure for online assessment activities. However, concerns persisted regarding limited internet coverage in extremely remote regions, despite the monthly data provided with the dongles. The data analysis also delved into students' device preferences for effective online learning and assessment completion, encompassing smartphones, laptops, personal computers, and desktop computers. This exploration aligned with the need for adaptable options to accommodate diverse student preferences and contexts (Hashemi, 2021). The provision of pocket Wi-Fi devices and associated coverage challenges echoed previous research on technology access and infrastructure in educational settings (Selwyn, 2021).

Students source of Internet access, stability, strength and frequency of use

NAMCOL strives to provide stable internet access, equipping students with pocket Wi-Fi and offering campus Wi-Fi and Computer-Based Learning Centres (CBLCs). Yet, improvements were needed in computer upgrades and connectivity. Internet usage patterns varied by learning mode; fully online students relied heavily on it for learning and communication, while print mode students primarily used it for assignments and results. Stable internet is crucial for effective online learning (Gillet-Swan, 2017), and NAMCOL's efforts to address, coverage and signal strength interferences persist. CBLCs are a positive resource, aligning with initiatives to enhance access (Correa et al., 2017). Recognising diverse usage patterns is vital in designing effective online learning platforms (Facer & Selwyn, 2021).

Readiness and acceptance of online assessment implementation by students

Students' readiness and acceptance of online assessment have complex implications, as evidenced in this study. Numerous students faced difficulties using NAMCOL's open-source Moodle platform, mirroring common struggles in unfamiliar online learning

environments (Parker et al., 2021). Poor internet connectivity issues highlighted the digital divide's impact on education. Proactive measures are needed to address network problems and potential assessment process issues, emphasising robust technical support, stable internet access, and power failure solutions (Lawrence & Tar, 2018). Student perspectives on online assessment implementation showed a mix of anticipation and reservations. While recognizing potential benefits like cost reduction and convenience, concerns about implementation challenges persisted (Selwyn, 2021). Educators' opinions on student readiness varied, with 12 educators advocating for implementation regardless of readiness, while 3s stressed equitable preparedness across diverse student populations (Warschauer & Zheng, 2014). Overall, the findings revealed a nuanced landscape of student perspectives on online assessment implementation, encompassing discomfort, connectivity challenges, and mixed sentiments. Educators' differing views aligned with the broader discourse on institutional technology adoption readiness.

The limitations of the study

This study on NAMCOL's readiness for online assessments had limitations; the sample might not represent all perspectives, self-reported data might be biased, qualitative responses were open to interpretation, regional disparities in infrastructure might be overlooked, it is time bound, and it ignored other aspects of online learning.

Recommendations

The NAMCOL, as an institution should:

- Upgrade ICT infrastructure, including fast and reliable internet, built in a way that recovers quickly in the event of failure, modern computers, and online proctoring.
- Provide comprehensive training for educators and students on online assessment tools.
- Ensure equitable access through partnering with service providers to expand coverage.
- Conduct pilot testing of the online assessment system, including platform functionality and support mechanisms for identified courses before full implementation.
- Establish strong technical support for students and educators by providing real time assistance with login issues, system navigation, and troubleshooting during assessments.

Conclusion

In conclusion, assessing NAMCOL's online assessment readiness revealed strengths and challenges. Infrastructure concerns persisted, with insufficient support for the transition. Comprehensive mandatory training is vital for educators and students. Connectivity, accessibility, and student preparedness pose concerns, yet proper measures make success feasible. Addressing infrastructure gaps, targeted training, and equitable access can foster effective online assessment. NAMCOL must recognize benefits and challenges, follow recommendations, and engage stakeholders to ensure successful online assessment implementation, enriching student learning and assessment processes.

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