

An analysis of online learning and teaching at the Department of Electronic Engineering at a university of technology during the coronavirus pandemic in South Africa³

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ABSTRACT

The Department of Electronic Engineering at a South African University of Technology is currently conducting a research study to investigate the challenges associated with online teaching during the COVID-19 epidemic. Specifically, the study focuses on the perspective of educators in this context. In response to the outbreak, governments worldwide implemented nationwide lockdowns to curb the spread of the virus, leading educational institutions, including universities, to cease in-person instruction. This sudden shift disrupted the educational system, necessitating a rapid transition from traditional face-to-face teaching to online methods to fulfill the curriculum requirements. As faculty members encountered various difficulties in adapting to online teaching pedagogy, the research study concentrates on them as the primary participants. The research study provides recommendations that offer valuable guidance for improving the effectiveness of online teaching practices which may be applied outside of the pandemic to most online teaching pedagogies.

Keywords: COVID-19 impact, higher education institutions, online teaching, Learning Management System (LMS)

INTRODUCTION

Research Background

The COVID-19 virus, initially identified in Wuhan, China, in December 2019, quickly spread worldwide, affecting countries globally (Pokhrel & Chhetri, 2021). The ensuing pandemic led to widespread economic shutdowns and disruptions in education systems, as nations followed the World Health Organization's precautionary measures. To mitigate the spread of the virus and flatten the curve, strict lockdown measures were implemented, resulting in the closure of educational institutions and the suspension of in-person learning (Sintema, 2020). This disruption highlighted the challenges faced by developing nations and exacerbated existing societal inequalities, as e-learning became the predominant mode of education. Higher education institutions rapidly transitioned to online teaching and learning, utilizing new technologies and platforms to ensure continuity in the academic curriculum for 2020. However, this shift presented significant challenges for both educators and students, who grappled with the limitations of remote work without adequate infrastructure (Abdulkareem & Eidan,

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2020).

Problem statement and rationale

The COVID-19 pandemic caused significant disruptions in the higher education sector, leading to university closures and a sudden transition from face-to-face teaching to online instruction (Abdulkareem & Eidan, 2020). The Department of Electronic Engineering at a University of Technology in South Africa experienced this abrupt shift, which brought about substantial challenges. This research study aims to shed light on the prominent difficulties faced within the academic programme, focusing on the perspective of educators. The following topics are investigated in this study (Bania & Banerjee, 2020):

1. Assessment integrity during online testing: Students employ various techniques to cheat during online assessments, raising concerns about the reliability of the assessment process.
2. Educators' mental health and well-being during the pandemic: The study examines the impact of the pandemic on educators' emotional and psychological well-being.
3. Lack of formal pedagogies for effective remote and online teaching in the electronic engineering programme: The research addresses the absence of established strategies to enhance the quality of remote instruction.
4. Intermediate electricity disruptions from Eskom, South Africa's energy supplier: Frequent 'load shedding' by Eskom hampers consistent access to online platforms, leading to disruptions in online lessons, assessments, and meetings. This results in missed deadlines, assessments, and lost information due to network crashes.
5. Lack of leadership during the COVID-19 pandemic: The study explores the challenges arising from a lack of effective leadership in managing the crisis within the education system.

By investigating these areas, the research aims to provide valuable insights into the challenges faced by educators in the electronic engineering programme during the transition to online teaching and learning.

Aim and objectives

This research study aims to generate recommendations to ensure the development of an online teaching and learning strategy for the Department of Electronic Engineering at the Durban University of Technology in South Africa.

These recommendations have been constructed based on a SWOT analysis of the performance of the Department of Electronic Engineering during the current COVID-19 pandemic. The main aim of the research study is to uncover the impact of online teaching and learning during the COVID-19 pandemic.

The key objectives of this research project are:

- To identify the major challenges in the Department of Electronic Engineering from the educator's perspective.
- To execute a SWOT analysis of the current state of online teaching and learning in the Department of Electronic Engineering.
- To provide recommendations to the Department of Electronic Engineering that will help overcome possible challenges to the programme.

LITERATURE REVIEW

Online teaching

Online teaching has become known as a contradistinctive aim to traditional face-to-face teaching methods conducted in a classroom environment. Online education is commonly described as an educational experience utilizing numerous electronic or smart devices such as computers or laptops,

smartphones, and tablets. These electronic devices are usually internet compatible and enable the platform to be student-centered providing flexibility to the students (Zalat, Hamed & Bolbol, 2021). Online teaching offers both educators and students the opportunity to be independent of timetables or classrooms with the use of web-based software packages so they can participate in their space in their time. Each institution adopts a learning management system (LMS) or virtual learning environment (VLE) that would allow educators and students to access learning materials via the Internet. Some of the common software tools used for LMS are Moodle and Blackboard (Nortvig, Petersen & Balle, 2018).

Challenges of online teaching during the pandemic

The direct impact of the global COVID-19 pandemic on the higher education sectors has been devastating and many educators are wondering what the future holds for online teaching and will the current situation transform how higher education institutions' function going forward (He & Xiao, 2020). The advantages and disadvantages of the current shift to online teaching must be studied carefully to ensure corrective decisions are made for the continuation of quality education (Calonge et al., 2022).

During the COVID-19 pandemic, educators had to adapt rapidly to remote teaching in the face of universities closing their campuses abruptly, as a result, educators found themselves teaching in unfamiliar circumstances. Educators needed to ensure they created an environment that was conducive to student learning while meeting the standards of the higher institutions and the expectations of the students (Carrillo & Flores, 2020). The sudden shift from traditional teaching methods to online teaching was unexpected and more significantly, it was imposed onto numerous educators and higher education institutions. This brought about numerous challenges and opportunities. Some of the underlying challenges identified from published papers during the pandemic are:

- Lack of proper online infrastructure
- Educators' mental health during remote teaching
- Lack of experience from educators
- Large information disparity
- The complication that comes with functioning from a home environment
- Lack of mentoring and support for both educators and students
- Lack of technological competencies displayed by educators (König et al., 2020).

Pedagogy and technology for online education during the COVID-19 pandemic

During the global pandemic, online teaching was utilized as the only viable option to continue with the educational system (Gherhes et al., 2021). When considering educational pedagogy during the COVID-19 pandemic, it must be emphasized the unusual circumstances that educators have been thrust into without having inadequate training and resources as well as insufficient guidance from department leaders to manage the situation (Hollweck & Doucet, 2020).

Numerous research studies have examined pedagogical strategies for online teaching in education. These studies have revealed that an effective online programme, based on constructivist philosophy, should be applicable, synergetic, and practical (Kim & Bonk, 2006). Educators in higher education institutions have expressed that online instructional strategies create a supportive and encouraging environment for student inquiry, expand students' knowledge of the subject matter, and foster enthusiastic and critical reflection on their growth and experiences.

An interesting finding from a pedagogical practice survey indicates that 40% of educators consider it highly important for the online environment to include interactive laboratory work, data analysis, and data simulation (Kim & Bonk, 2006). The absence of these activities can create a significant gap between desired and actual online instructional practices in the programme. Technology has played a crucial role in driving the development and growth of online education, with many higher education institutions,

including universities, investing in educational software packages and tools. Over the past decade, the integration of blogs, wikis, and podcasts has become increasingly popular in online education, serving as effective teaching and learning aids (Kim & Bonk, 2006).

It is important to acknowledge that remote teaching during the pandemic was implemented as an emergency measure and cannot be directly compared to e-learning, home education, or regular online learning practices (Berry, Doucet & Owen, 2020). While these distance education methods provide valuable insights, their outcomes cannot be replicated in the context of a sudden closure of educational institutions, allowing little time for design thinking or reflection in establishing remote-based instructional programmes. The lack of clear guidelines from institutional management during the pandemic led to educators responding to vague or misinformation, resulting in frustration among educators, parents, and students (Hollweck & Doucet, 2020). It was unanimously agreed by all stakeholders that there was no clear vision for effective teaching during the pandemic (Hollweck & Doucet, 2020).

It is important to note that the pedagogical methods employed during the pandemic for remote online teaching were not as simple as converting face-to-face lessons into video conferences or PowerPoint presentations uploaded onto learning management systems (LMS) such as Blackboard or Moodle (Hollweck & Doucet, 2020). Instead, more robust, and innovative pedagogies were needed, including providing direct and meaningful instruction that encourages critical thinking, individualizing subject material, and employing competency-based approaches to curricular content. Additionally, students should be given guidance to pace themselves during well-instructed lessons and offered opportunities for self-reflection. Educators must provide continuous and meaningful feedback to students as an integral part of the learning experience. Furthermore, the mental health and well-being of both educators and students must be prioritized in remote pedagogies during the pandemic (Hollweck & Doucet, 2020). Within the global educational community, there have been calls to prioritize students' basic needs before fully focusing on academic learning (Hollweck & Doucet, 2020).

Mental health and well-being during the pandemic at higher education institutions

The World Health Organization (WHO) advised governments to curb the spread of the COVID-19 virus by introducing national lockdowns to restrict the movement of non-essential businesses and services (Pokhrel & Chhetri, 2021). This meant that higher education institutions across South Africa had to close their campuses and staff had to work remotely while students returned home. Higher educational staff found themselves in a situation that placed their mental health and well-being at risk by constraining them to their households while attempting to save the academic curriculum. Studies have shown that national lockdowns can have a negative impact on the continuity of the academic curriculum in higher education institutions, as well as the mental health and well-being of academic staff and students. The South African government enforced the national lockdown since the beginning of the COVID-19 pandemic, and as a result, it further intensified the mental health issues among the institutional staff in the country such as depression, anxiety, and stress (van Niekerk & van Gent, 2021).

The United Nations (UN) made a statement raising concerns about the state of people's mental health and psychological well-being (PWB) during the COVID-19 pandemic (van Niekerk & van Gent, 2021). It warned that mental health should not be taken lightly and has the potential to inflict high levels of stress and anxiety. Guidelines were provided on how to address the situation. The UN recognizes that during a pandemic people tend to develop fear, concern, and anxiety when trying to deal with a threatening situation and so need to safeguard their mental health and well-being throughout the COVID-19 pandemic. However, the UN suggests that a large outbreak in mental health associations must be anticipated, given the past and present mental health illnesses and distress. The high level of poverty and unemployment in South Africa presented a major challenge when dealing with mental health and well-being in a developing country (van Niekerk & van Gent, 2021).

Research findings indicate that in South Africa, there has been a significant rise in depression and anxiety among academic staff in higher education even before the onset of the pandemic. This surge in mental health issues can be attributed to various factors identified in the study. These factors include work-related stress, heightened workloads, the implementation of performance evaluation methods by senior management that are often unattainable, the competitive nature of publishing in academic journals, and the prevalence of part-time employment (van Niekerk & van Gent, 2021).

Moreover, the research highlights the further impact on academic staff when confronted with additional challenges because of the sudden shift to online teaching. These include: the lack of clear guidelines for remote work, limited social interaction with students, increased administrative responsibilities, and a notable lack of support from management. These findings underline the significant impact of these conditions on the well-being and mental health of academic staff in the higher education sector (van Niekerk & van Gent, 2021). Further findings suggested that institutional staff felt a 'sense of uncertainty and anxiety about what is going to happen' during the pandemic and this saw a shift in their mental health from work-related stress to anxiety as the major fear among staff at the institution. Thus, it can be concluded that educators' competence and skills to conduct online teaching under the current circumstances is the primary contributor to their increased anxiety levels. It is understood that educators faced the COVID-19 pandemic in three stages: stage 1: vagueness and uncertainty, being challenged with new work methods; stage 2: exhaustion, driven by novel experiences and concerns; and stage 3: re-opening, developing novel emotions of doubt between educators in the institution (van Niekerk & van Gent, 2021).

METHODOLOGY

Research philosophy and approach

The research philosophy for this study is pragmatism. Pragmatism is prefaced on the notion that research can avoid the philosophical debates about the nature of truth and reality while focusing rather on the 'practical understandings' of solid, real-world problems just as online teaching and learning challenges during the pandemic presented in this research study (Kelly & Cordeiro, 2020).

The research methodologies that are best suited for use in the pragmatic paradigm support the application of both qualitative and quantitative research methods according to their need. The research conducted within the pragmatic paradigm draws on methodologies from qualitative and quantitative methods. This provides the advantage of transitioning between qualitative data and quantitative data, which is frequently regarded as incompatible. This allows researchers the opportunity to investigate and seek valuable information to connect these two different types of data (Kivunja & Kuyini, 2017). Pragmatism has demonstrated how it can link induction with deduction, subjectivities, objectivity, context and generality, intersubjectivity, and transferability. The strength of qualitative research is its transferability. Hence, in pragmatism, the transferability of the research is supported by the range and the detail of the data presented from the link between the quantitative and qualitative approaches. The pragmatic approach would be utilized in the research to connect theory from the literature to the data collected. Pragmatism permits the prospective and possibility to work between qualitative data and quantitative data. Pragmatism presents researchers with the opportunity to seek out valuable points of association between quantitative and qualitative data in the study (Tran, 2017). The approach used will be deductive as existing knowledge and theories would look to be validated in the study.

The research employed mixed methods with both a qualitative and quantitative phenomenological inquiry into participants' experience during online teaching in the Department of Electronic Engineering during the COVID-19 pandemic. While quantitative and qualitative research approaches are considered different, they complement each other when applied together in a study (Ahmad, et al., 2019).

Research design and strategy

This research applied the survey strategy for the collection of data. A total population of 40 staff members from the Department of Electronic and Computer Engineering were invited to participate in this study. A total of 24 participants responded through a set of online questionnaires, resulting in a 60% response rate. The advantage of using the survey in the research allows for numerous methods to recruit participants, collect data, and apply different techniques of instrumentation. Another reason why the survey strategy was employed in this research is that it can utilize quantitative research strategies such as questionnaires with numbers and graphs as well as qualitative research strategies with open-ended questions to aid this research in gathering data for the SWOT analysis. Hence, the survey strategy is well-suited for our mixed-method research. The limitation of utilizing the survey method in this study was that participants were on vacation leave for the end of the semester and participants may have not been motivated to complete the survey resulting in a lower response rate (Ponto, 2015).

The primary data for the research was collected with the aid of a questionnaire to form both quantitative and qualitative data. The survey was well structured so that the primary data collected from the small cohort of participants was quantitative and qualitative (Hox & Boeije, 2005). Having both types of data means that the quantitative data can be processed by applying both graphs and statistical methods of analysis to determine the relationship between the variables of the study. Quantitative data were gathered from the survey using closed-ended questions. Qualitative data are used to enhance and strengthen the quality of the survey as well as expand or refine the quantitative findings. This was achieved by inputting open-ended questions in the survey (Kabir, 2016). The primary data were collected using a cross-sectional survey, where a time limit of 30 days was given to participants to complete and submit their responses.

ANALYSIS AND FINDINGS

Analysis of the average mean of the 5-Point Likert Scale Questionnaire

The Likert scale responses were given the 5-point options, 'agree', 'somewhat agree', 'neutral', 'somewhat disagree,' and 'disagree'. Each one of these responses was assigned weightings as follows: Agree (5), somewhat agree (4), neutral (3), somewhat disagree (2), and disagree (1).

From Table 1, the 11 survey questions are represented by their corresponding average mean value and the most frequent response. The average mean provides a concise summary of the central tendency of the Likert scale responses. By focusing solely on the average mean, a clear and concise overview of the participant's overall level of agreement or disagreement with the statements is presented.

Table 1:
The Likert Scale Range Findings

Question	Average Mean	Scale output
1. The transition from face-to-face teaching and learning to online teaching and learning has been smooth and effective during the pandemic.	1,33	Disagree
2. Educators were given the appropriate technical support to conduct online teaching and learning during the pandemic.	2,42	Somewhat Disagree
3. Students are performing better on their online assessments than during face-to-face assessments because they are cheating.	4,83	Agree
4. Online teaching and learning have been negatively impacted by load shedding in the country.	4,83	Agree
5. Online teaching and learning have been negatively impacted by students' data and network issues.	4,42	Agree
6. The Department of Electronic Engineering educators are adequately skilled and trained in online pedagogy.	2,17	Somewhat Disagree
7. Online simulation programs such as MATLAB and Multisim are adequate to replace traditional practicals.	1,5	Disagree
8. Educators were given adequate guidelines and policies for remote pedagogy during the pandemic.	2,25	Somewhat Disagree
9. The learning management system (LMS) Moodle is effective for online teaching and learning meeting the department's requirements.	2,42	Somewhat Disagree
10. Educators' mental health and well-being have been negatively impacted by online teaching and learning during the pandemic.	4,75	Agree
11. The qualification offered in the Department of Electronic Engineering can be effectively conducted using online teaching and learning tools only.	1,92	Somewhat Disagree

Analysis of the quantitative data

The responses from the survey questionnaire given to the staff members in the Department of Electronic Engineering were converted from weightings into percentage form and displayed graphically.

Analysis of Question 1:

The Likert scale response to Question 1, evaluates the transition from face-to-face teaching and learning to online teaching and learning during the pandemic, indicates a lack of satisfaction among the participants. The responses 'somewhat disagree' and 'disagree' collectively account for 100% of the participants surveyed.

Implications:

The percentage breakdown of responses in Figure 1 below shows that a significant majority (66.7%) of participants outright disagreed with the effectiveness and smoothness of the transition, while a smaller portion (33.3%) expressed a more moderate level of disagreement by choosing 'somewhat disagree'.

The high percentage of participants who disagreed suggests that the transition from face-to-face to online teaching and learning during the pandemic did not meet their expectations or requirements.

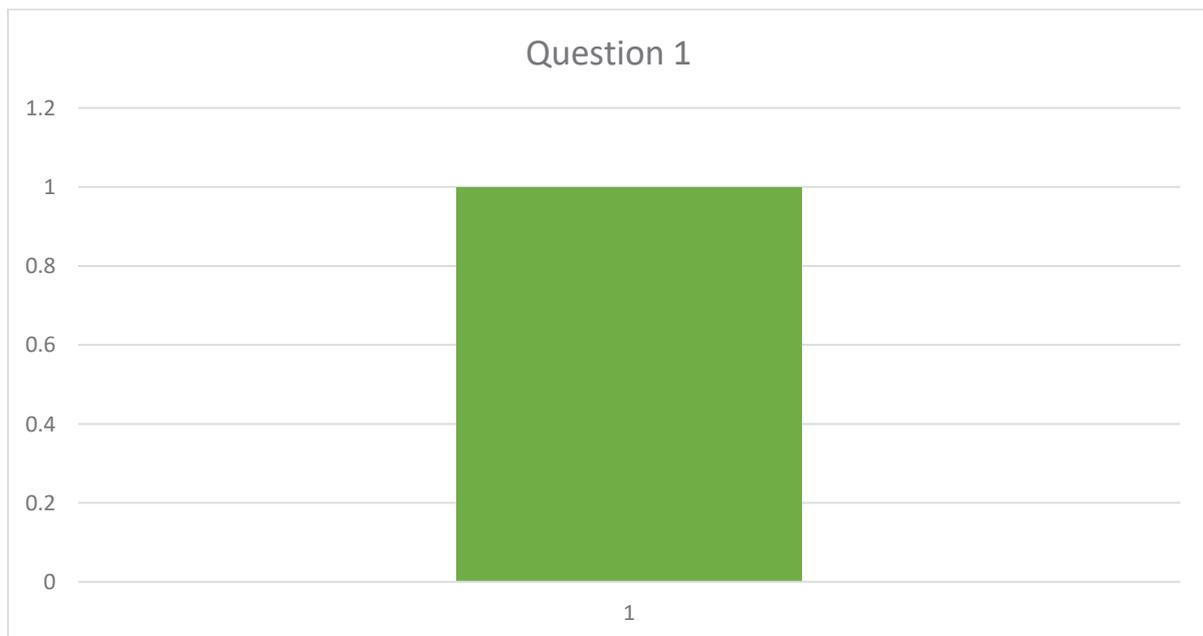
Challenges Faced: The responses indicate that a significant number of participants encountered difficulties during the transition, which might have negatively impacted their teaching effectiveness.

Potential Room for Improvement: The results show that there is a need to identify and address the specific issues and challenges faced by participants during the transition process to enhance the effectiveness of online teaching and learning.

Support and Training: Participants may have felt unprepared to adapt to online teaching methods. Providing adequate support, training, and resources to educators and learners could improve their experience during online instruction.

Pedagogical Adaptation: Understanding the reasons for the dissatisfaction can help identify areas that require pedagogical adjustments to ensure a more seamless transition between face-to-face and online teaching methods.

Figure 1:
Graphical representation of Question 1



Analysis of Question 2:

The Likert scale response to Question 2, which assesses whether educators received appropriate technical support for online teaching and learning during the pandemic, reveals a mixed and concerning sentiment among the participants. The responses in Figure 2 are distributed across all possible options, with 16.7% agreeing, 16.7% somewhat agreeing, 25% somewhat disagreeing, and 41.7% disagreeing.

Implications:

The fact that 41.7% of participants outright disagreed with receiving appropriate technical support suggests that a significant portion of educators felt inadequately supported during the transition to online teaching.

Mixed Perceptions: The distribution of responses across all options indicates a lack of consensus among

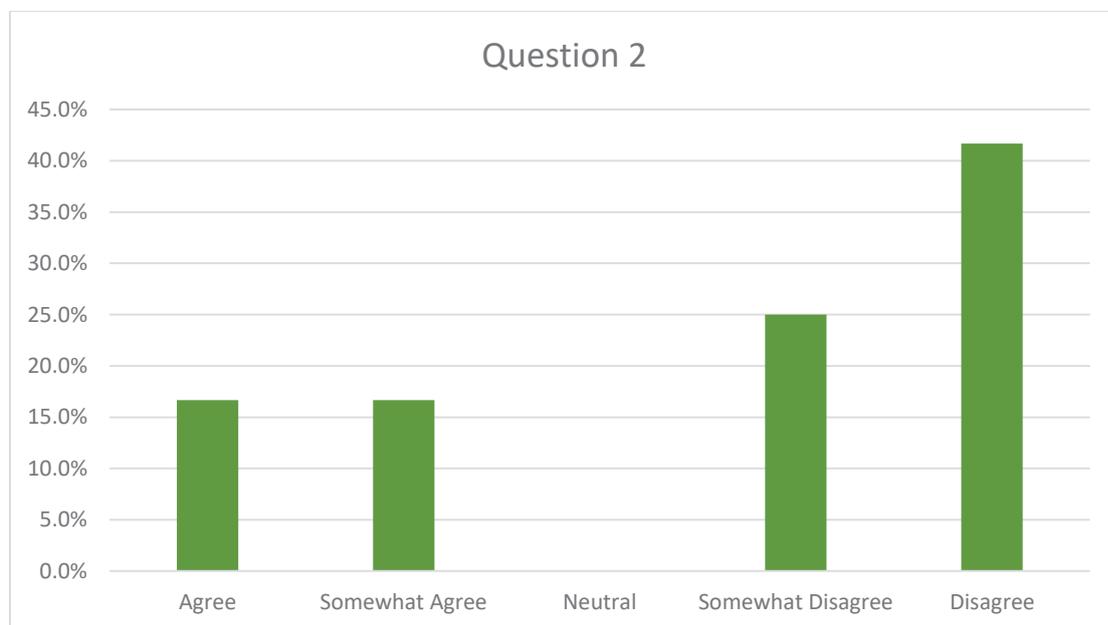
participants, with some educators feeling supported to some extent while others did not.

Challenges in Implementation: The relatively high percentage of respondents who somewhat disagreed (25%) and disagreed (41.7%) may indicate that educators faced challenges in implementing online teaching methods due to a lack of technical support.

Importance of Addressing Concerns: The responses indicate that a considerable number of educators did not receive the necessary technical assistance, emphasizing the need to address their concerns to improve the overall effectiveness of online teaching and learning.

Impact on Educator Performance: Inadequate technical support might have hindered educators' ability to conduct online classes effectively, impacting the quality of education and student engagement.

Figure 2:
Graphical representation of Question 2



Analysis of Question 3:

The Likert scale response to Question 3, addresses whether students are performing better on their online assessments due to cheating, reveals a concerning sentiment among the participants. Figure 3 below shows the vast majority (83.3%) agreed with the statement, and a smaller proportion (16.7%) somewhat agreed.

Implications:

The overwhelming agreement (83.3%) suggests that a significant number of participants believe that students are indeed performing better on online assessments due to cheating.

Academic Integrity Concerns: The high agreement percentage raises serious concerns about academic integrity and the validity of online assessments.

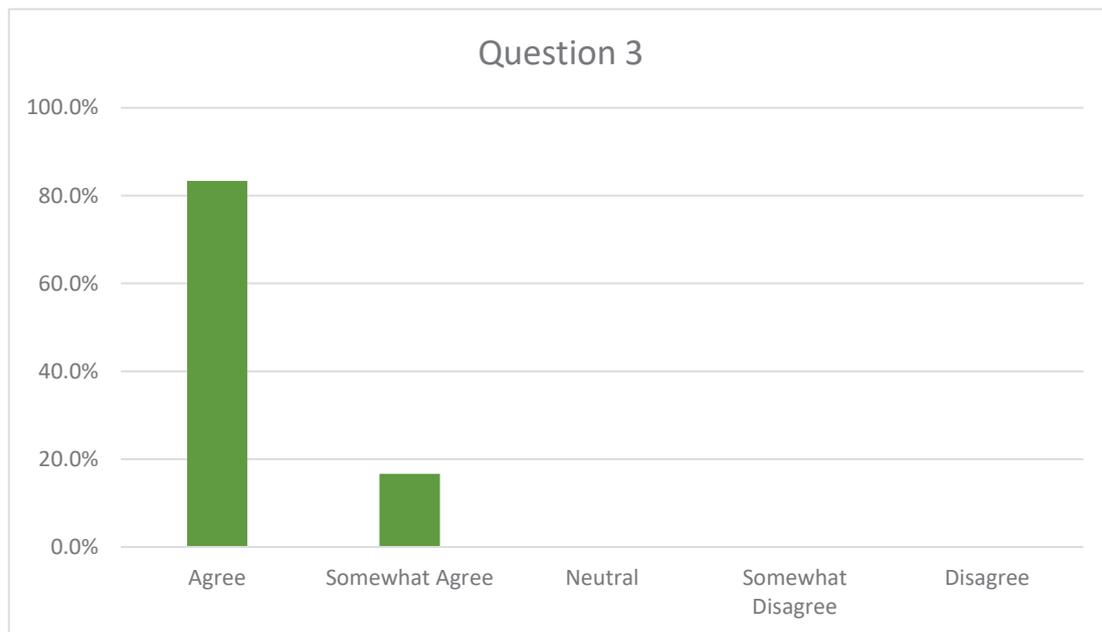
Assessment Security: The perception of widespread cheating on online assessments indicates potential

vulnerabilities in the assessment security measures, requiring attention and improvement.

Impact on Student Evaluation: If a large portion of participants believe that cheating is rampant, it may influence how students are evaluated and undermine confidence in their academic achievements.

Need for Investigation: The response highlights the need for a thorough investigation into the validity of online assessments and the factors contributing to the perceived increase in cheating.

Figure 3:
Graphical representation of Question 3



Analysis of Question 4:

The Likert scale response to Question 4, examines the impact of load shedding on online teaching and learning, reveals a significant and concerning sentiment among the participants. Figure 4 below shows a vast majority (83.3%) agreed with the statement, and a smaller proportion (16.7%) somewhat agreed.

Implications:

Severe Impact of Load Shedding: The high agreement percentage (83.3%) indicates that load shedding has had a substantial negative impact on online teaching and learning in the country.

Disruptions in Teaching and Learning: Load shedding can disrupt online classes, causing power outages, and connectivity issues, and hindering the seamless delivery of educational content.

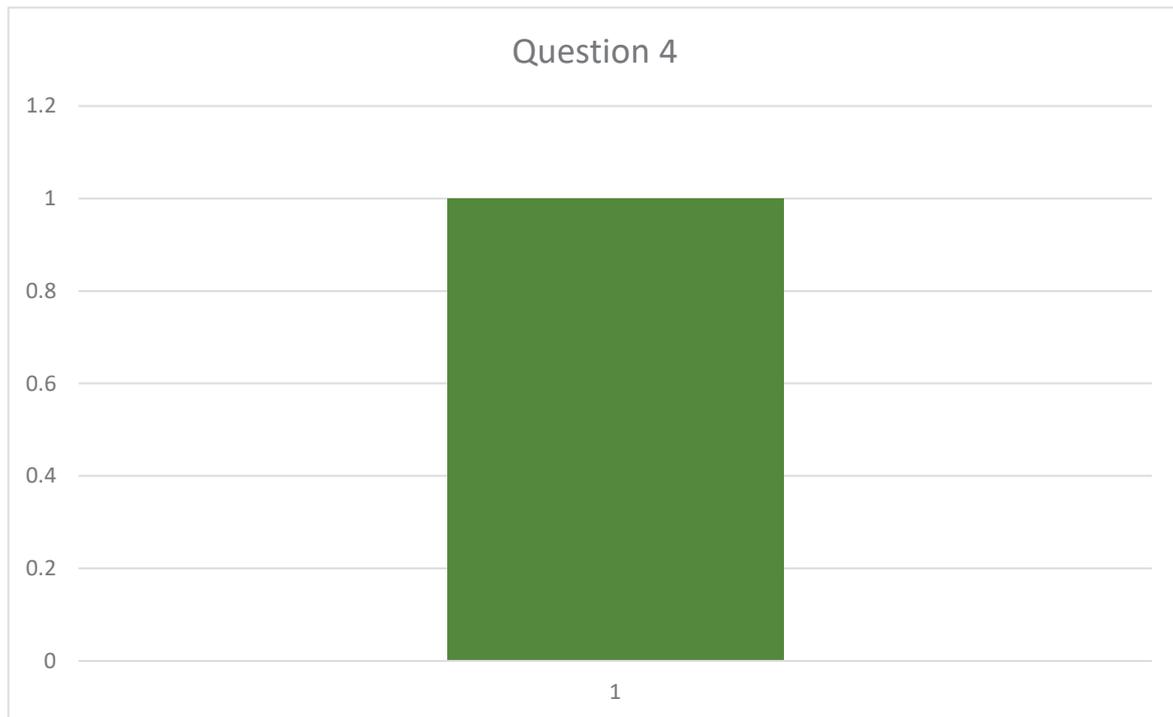
Technological Challenges: The response suggests that the country's load-shedding situation poses significant challenges in providing consistent and reliable access to online resources and platforms.

Inequitable Learning Experience: Load shedding may lead to inequitable learning experiences, as some students might have more reliable access to electricity and the internet than others.

Stress and Frustration: Frequent disruptions due to load shedding can lead to increased stress and

frustration among educators and students, affecting their engagement and performance. Need for Mitigation Strategies: The high agreement percentage highlights the urgency of implementing mitigation strategies to address the impact of load shedding on online teaching and learning.

Figure 4:
Graphical representation of Question 4



Analysis of Question 5

The Likert scale response to Question 5, explores the impact of students' data and network issues on online teaching, indicates a significant concern among the participants. Figure 5 below shows the majority (66.7%) agreed with the statement, a substantial portion (25%) somewhat agreed, and a smaller percentage (8.3%) disagreed.

Implications:

Impact of Data and Network Issues: The high percentage of participants who agreed (66.7%) and somewhat agreed (25%) suggests that students' data and network issues have had a notable negative impact on online teaching and learning.

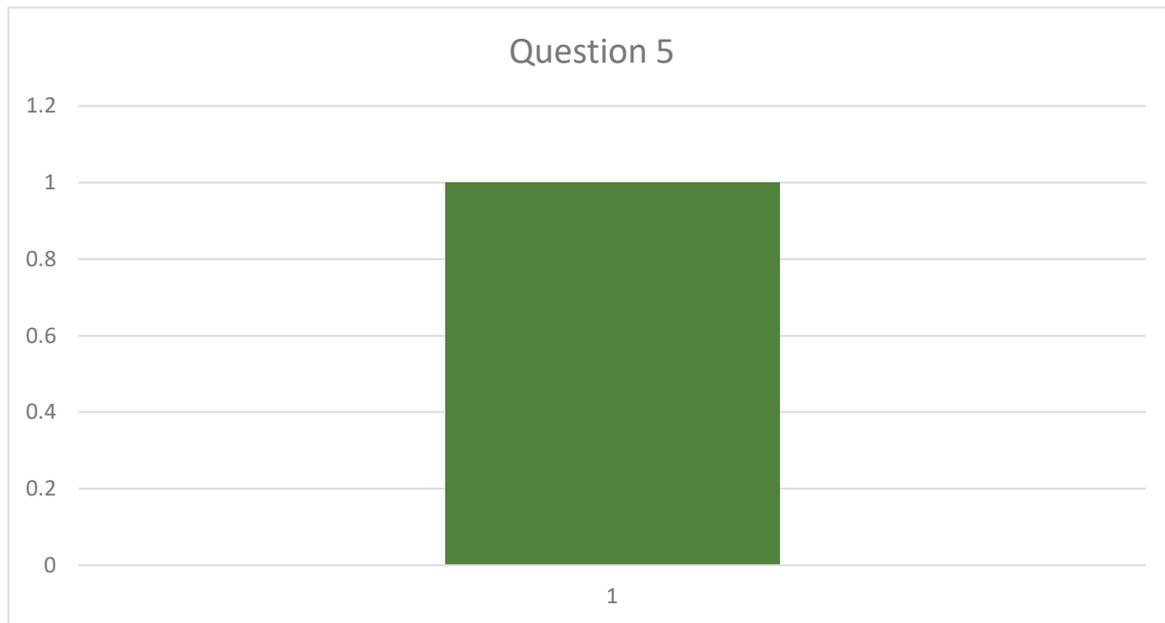
Disruptions in Learning: Data and network problems can disrupt students' ability to access online classes, resources, and interactive platforms, affecting the continuity of their learning.

Inequitable Learning Experience: Students facing data and network challenges might experience inequities in their online learning experience, as they may be unable to participate fully or access all educational content.

Need for Improved Connectivity: The response highlights the need for improved internet connectivity and data access for students to facilitate effective online learning.

Importance of Addressing Technical Challenges: Addressing students' data and network issues is crucial to ensure an inclusive and accessible online learning environment for all learners.

Figure 5:
Graphical representation of Question 5



Analysis of Question 6:

The Likert scale response to Question 6, which assesses whether the Department of Electronic Engineering educators are adequately skilled and trained in online pedagogy, reveals a mixed sentiment among the participants. The responses in Figure 6 below show distribution across various options, with 16.7% somewhat agreeing, 16.7% remaining neutral, 33.3% somewhat disagreeing, and 33.3% agreeing.

Implications:

Lack of Consensus: The distribution of responses across different options indicates a lack of consensus among the participants regarding the educators' online pedagogy skills and training.

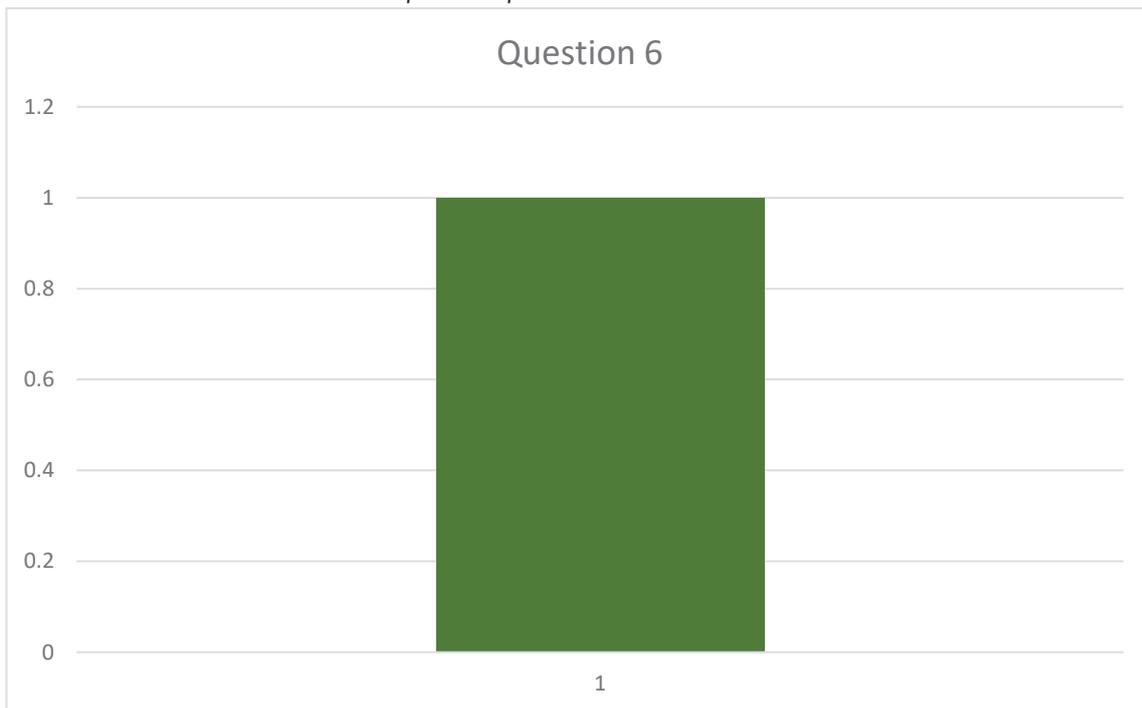
Skill and Training Gaps: The relatively high percentages of participants who somewhat disagree and remain neutral suggest the existence of potential skill and training gaps among some educators in the department.

Need for Improvement: The mixed responses highlight the importance of addressing the challenges related to online pedagogy to enhance the effectiveness of online teaching and learning.

Impact on Student Experience: Educators' proficiency in online pedagogy can significantly impact the quality of the student learning experience and engagement in online classes.

Importance of Professional Development: The results underscore the significance of providing ongoing professional development opportunities for educators to enhance their online teaching skills.

Figure 6:
Graphical representation of Question 6



Analysis of Question 7:

The Likert scale response to Question 7, evaluates whether online simulation programs like MATLAB and Multisim adequate replacements for traditional practicals are, indicates a negative sentiment among the participants. The responses in Figure 7 below show a distribution across different options, with 16.7% being neutral, 25% somewhat agreeing, and 50% disagreeing.

Implications:

Low Agreement: The combined percentage of participants who somewhat agree and agree (25%) is significantly lower than the percentage who disagree (50%), indicating a lack of support for online simulation programs as replacements for traditional practicals.

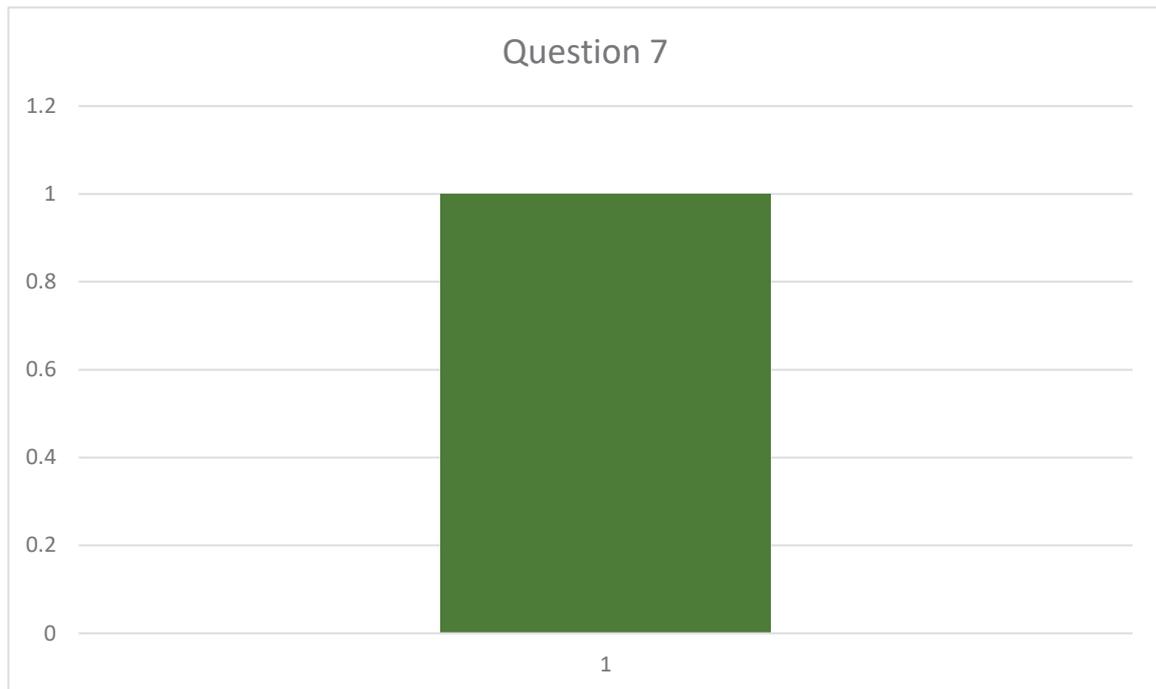
Concerns about Adequacy: The relatively high percentage of participants disagreeing suggests that many believe online simulation programs may not adequately replace the hands-on experience offered by traditional practicals.

Importance of Hands-On Learning: The responses highlight the value participants place on hands-on learning experiences, which are not fully replicated through online simulations.

Impact on Skill Development: Participants' reluctance to see online simulations as adequate replacements raises concerns about the potential impact on students' practical skills and abilities.⁸

Need for Hybrid Approaches: The mixed responses indicate that a combination of both traditional practicals and online simulations might be more effective in providing a comprehensive learning experience.

Figure 7:
Graphical representation of Question 7



Analysis of Question 8:

The Likert scale response to Question 8, which assesses whether educators were given adequate guidelines and policies for remote pedagogy during the pandemic, reveals a concerning sentiment among the participants. The responses in Figure 8 below show a distribution across different options, with only 16.7% agreeing, 8.3% somewhat agreeing, 8.3% remaining neutral, 16.7% somewhat disagreeing, and 50% disagreeing.

Implications:

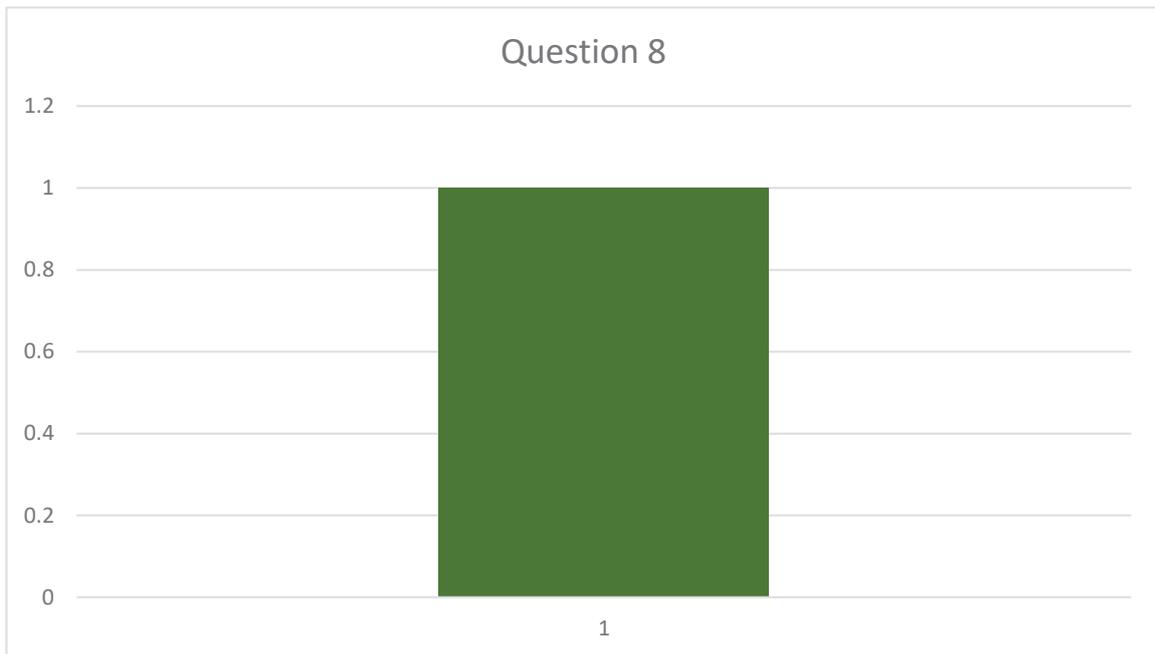
Lack of Agreement: The combined percentage of participants who agree and somewhat agree (25%) is significantly lower than the percentage who disagree (50%), indicating a lack of consensus on whether educators were provided with adequate guidelines and policies.

Concerns About Support: The relatively high percentage of participants disagreeing suggests that many educators felt they did not receive sufficient support in navigating remote pedagogy during the pandemic.

Impact on Pedagogical Quality: The responses raise concerns about the potential impact of inadequate guidelines and policies on the quality of remote teaching and learning experiences.

Importance of Clear Guidance: The mixed responses highlight the importance of clear and comprehensive guidelines and policies to help educators effectively adapt to remote teaching.

Figure 8:
Graphical representation of Question 8



Analysis of Question 9:

The Likert scale response to Question 9, evaluates the effectiveness of the learning management system (LMS) Moodle for online teaching and learning, reveals a mixed sentiment among the participants. The responses (see below) are distributed across various options, with only 16.7% agreeing, 8.3% somewhat agreeing, 8.3% remaining neutral, 16.7% somewhat disagreeing, and 41.7% disagreeing.

Implications:

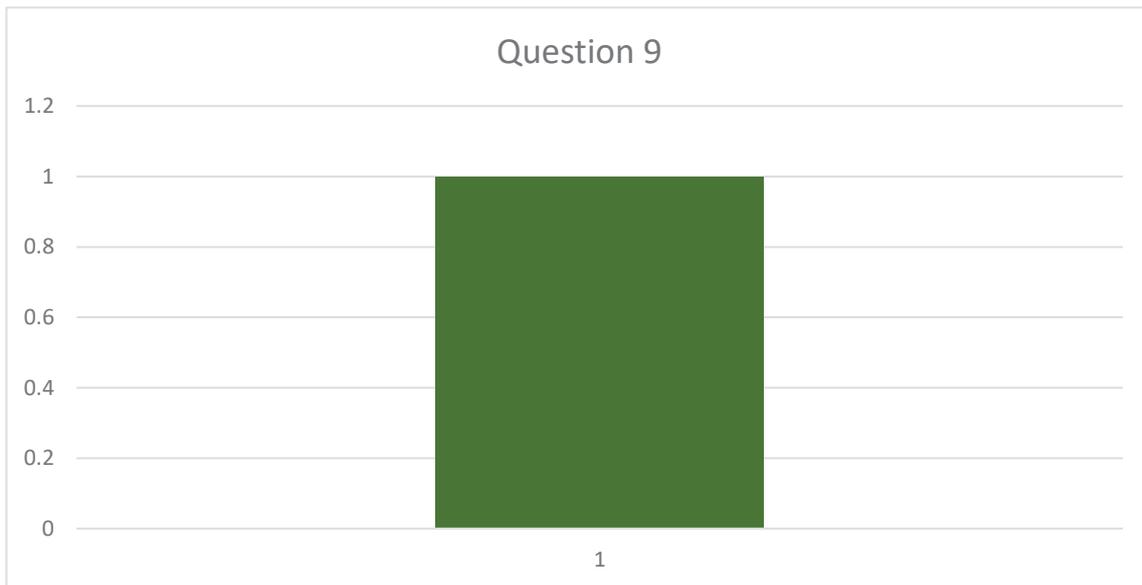
Lack of Agreement: The combined percentage of participants who agree and somewhat agree (25%) is significantly lower than the percentage who disagree (58.4%), indicating a lack of consensus on Moodle's effectiveness in meeting the department's requirements.

Concerns About LMS Effectiveness: The relatively high percentage of participants disagreeing suggests that many participants do not believe Moodle fully meets the department's requirements for online teaching and learning.

Need for Improvement: The mixed responses highlight the need to identify specific areas where Moodle may be falling short and take measures to enhance its effectiveness.

Impact on Teaching and Learning: The perceived effectiveness of the LMS can significantly impact the overall quality of online teaching and learning experiences.

Figure 9:
Graphical representation of Question 9



Analysis of Question 10:

The Likert scale response to Question 10, which assesses the impact of online teaching and learning during the pandemic on educators' mental health and well-being, reveals a concerning sentiment among the participants as shown below. The majority (75%) agreed with the statement, and a smaller proportion (25%) somewhat agreed.

Implications:

High Agreement: The combined percentage of participants who agree and somewhat agree (100%) indicates a strong consensus that educators' mental health and well-being have been negatively impacted by online teaching and learning during the pandemic.

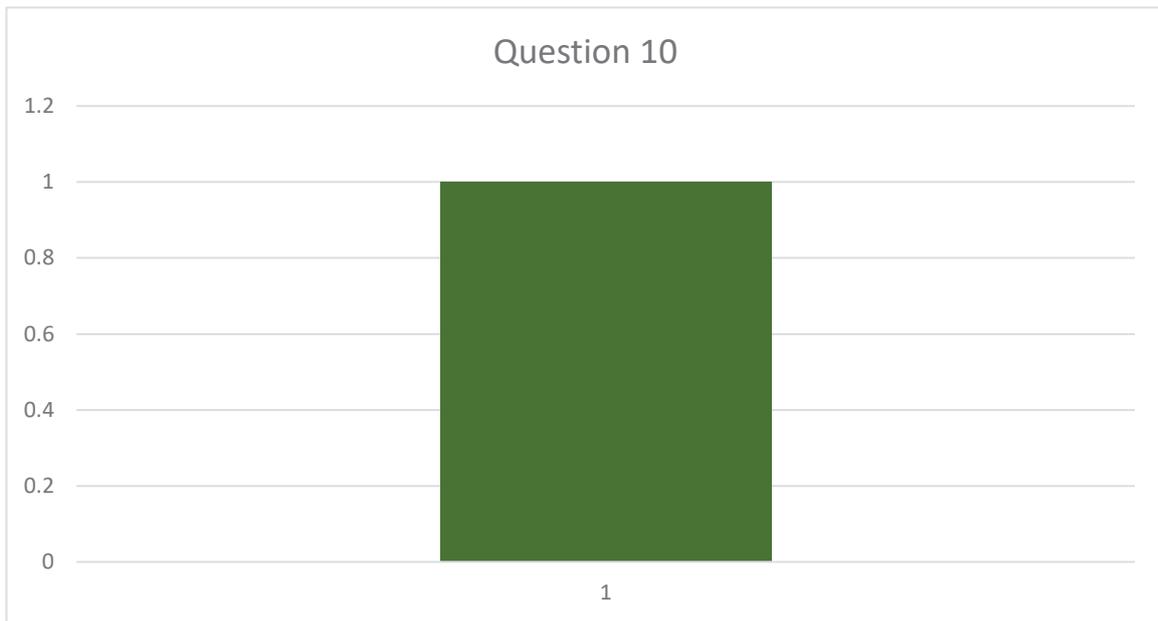
Stress and Challenges: The high agreement percentage highlights the significant stress and challenges educators faced while transitioning to online teaching and coping with the uncertainties and changes brought about by the pandemic.

Importance of Mental Health Support: The response underscores the importance of providing adequate support and resources to address educators' mental health and well-being during challenging times.

Potential Impact on Teaching Quality: The negative impact on educators' mental health may affect their teaching effectiveness and overall job satisfaction.

Need for Work-Life Balance: The responses emphasize the need to ensure a healthy work-life balance for educators to prevent burnout and promote well-being.

Figure 10:
Graphical representation of Question 10



Analysis of Question 11:

The Likert scale response to Question 11, which assesses the effectiveness of conducting the qualification offered in the Department of Electronic Engineering using online teaching and learning tools only, reveals a concerning sentiment among the participants. The responses, as shown below, are distributed across various options, with 25% somewhat agreeing, 16.7% somewhat disagreeing, and 58.3% disagreeing.

Implications:

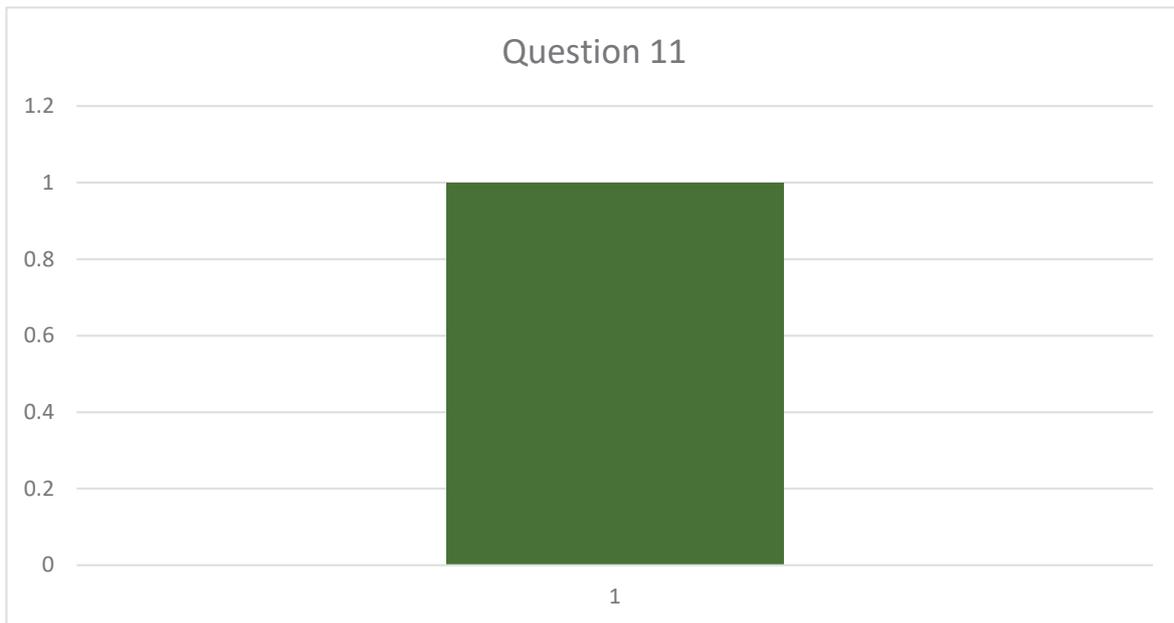
Lack of Agreement: The combined percentage of participants who somewhat agree and somewhat disagree (41.7%) is significantly lower than the percentage who disagree (58.3%), indicating a lack of consensus on whether online teaching and learning tools alone are effective for conducting the qualification.

Concerns About Online-Only Delivery: The relatively high percentage of participants disagreeing suggests that many believe online teaching and learning tools alone may not be sufficient to effectively deliver the qualification.

Importance of Blended Approach: The mixed responses highlight the importance of a blended approach that incorporates both online and in-person teaching methods.

Potential Limitations of Online Tools: The responses raise concerns about the potential limitations of online tools in delivering practical components and hands-on learning experiences.

Figure 11:
Graphical representation of Question 11



SWOT analysis of the qualitative data collected from the survey

The staff members (participants) in the Department of Electronic Engineering were asked to complete a four-question survey focused on the strengths, weaknesses, opportunities, and threats to the department from the educator’s perspective. The participants’ responses to each SWOT-related question are categorized by linking keywords and meanings in each statement in Table 2.

Table 2:
SWOT Analysis of Respondent's Responses

STRENGTHS	WEAKNESSES
<p>Research: The department seems to have a strong focus on research, which can enhance the academic reputation and contribute to advancements in the field.</p>	<p>Lack of Communication and Meetings: Poor communication and infrequent meetings can lead to misunderstandings, lack of collaboration, and hinder the flow of information.</p> <p>No Formal Guidelines: The absence of formal guidelines can result in uncertainty and inconsistency in decision-making processes.</p> <p>Lack of Support from Management: Insufficient support from management may lead to demotivated staff and hinder their productivity.</p> <p>Fewer Educators and Staff Reduction: A shortage of educators and staff due to retrenchment and resignations can strain the department's capacity and increase workloads on existing employees.</p> <p>Inadequate Infrastructure and Resources: The</p>

	<p>department's inability to accommodate student numbers and a lack of resources might negatively impact the learning experience.</p> <p>Shortage of Skilled Educators: The retirement of experienced educators can result in a lack of expertise and knowledge transfer within the department.</p> <p>Weak Management and Leadership: Weak leadership may lead to unclear direction, inefficient decision-making, and staff dissatisfaction.</p> <p>Fear of Discussing Challenges: An environment where staff are afraid to voice their challenges to management can hinder problem-solving and improvement efforts.</p> <p>Lack of Accommodations for Disruptions: Failure to accommodate disruptions to the academic program might result in further challenges for both students and educators.</p> <p>Ineffective Solutions from Management: Management's inability to provide effective solutions to identified problems can impede progress and cause frustration among staff.</p> <p>Enforcing Key Performance Indicators during the Pandemic: Imposing strict performance indicators during a pandemic may be counterproductive and demoralize staff.</p> <p>Impact of No Hands-On Practicals: The absence of hands-on practicals for students can negatively affect their learning outcomes and preparedness for real-world scenarios.</p>
<p>Research and Collaboration: Leveraging research opportunities can lead to academic advancements and potential collaborations with other institutions or industries.</p> <p>Staff Collaboration for Solutions: Encouraging teamwork and collaboration among staff can lead to innovative solutions for departmental challenges.</p> <p>Development of Online Pedagogy: Investing in the development of online teaching methods can improve the department's ability to adapt to changing educational landscapes.</p> <p>Hybrid Teaching and Learning: Implementing hybrid teaching approaches can offer flexibility to students and provide a better learning experience.</p> <p>Training Staff on Technologies: Providing training for staff on emerging technologies</p>	<p>Staff Turnover: High staff turnover can disrupt the department's stability and continuity, leading to a loss of institutional knowledge.</p> <p>Quality Issues with Online Assessments: Poorly managed online assessments can compromise the academic integrity and quality of education.</p> <p>Accreditation Concerns: A potential loss of accreditation can severely impact the reputation and credibility of the department's qualification.</p> <p>Low Staff Morale and Well-being: A negative work environment, poor support, and mental health issues can reduce productivity and increase staff attrition.</p> <p>Retention of Experienced Staff: Difficulty retaining experienced staff might lead to losing expertise and disrupt the department's continuity.</p> <p>Hostile Work Environment: A hostile work environment can lead to decreased productivity</p>

can enhance their teaching abilities and student engagement.

and collaboration among staff.

Impact on Quality of Graduates: Insufficient direction and leadership may result in graduates lacking the necessary skills and qualifications desired by employers.

Industry Confidence in the Qualification: A loss of confidence from the industry in the department's qualification can affect job prospects for graduates.

Insufficient Direction and Leadership: Lack of clear direction and leadership can hinder progress and hinder the department's ability to address challenges effectively.

CONCLUSION AND RECOMMENDATIONS

The analysis of the Likert scale responses has important implications for the Department of Electronic Engineering's online teaching practices. Participants expressed a lack of consensus and significant concerns regarding the effectiveness of online tools for conducting the qualification. The high percentage of disagreement suggests that online teaching and learning tools alone may not fully meet the department's requirements, especially in delivering practical components and hands-on learning experiences. This highlights the importance of adopting a blended approach that combines online tools with in-person teaching methods to address the limitations of online-only delivery. Additionally, the analysis emphasizes the need for continuous evaluation, professional development, and student feedback to optimize the use of online tools and enhance the overall quality of the qualification delivery. The SWOT analysis highlights several critical areas for the department to address. Capitalizing on research opportunities, improving communication, providing better support and resources, and promoting staff collaboration are potential areas for improvement. Addressing the threats of staff turnover, accreditation concerns, and maintaining staff morale and well-being should also be prioritized. To seize opportunities and mitigate threats effectively, the department must develop clear strategies and implement actionable plans to improve overall performance and achieve its goals. By implementing these recommendations, the department can work towards creating a more comprehensive and impactful learning experience for students while effectively addressing the challenges posed by online teaching and learning during the pandemic and beyond.

Contribution to knowledge

The analysis of survey responses regarding online teaching practices in the Department of Electronic Engineering contributes valuable insights to the field of education during the pandemic and highlights significant implications for improving instructional approaches. The study revealed that participants were skeptical about the effectiveness of conducting the qualification solely through online teaching tools. The findings emphasize the need for a balanced and blended approach that incorporates both online tools and in-person teaching methods, particularly for delivering practical components and hands-on learning experiences. This contribution sheds light on the challenges educators face in navigating remote pedagogy and the potential impact on students' learning outcomes. The study underscores the importance of continuous evaluation, professional development, and student feedback to optimize the use of online tools and ensure a comprehensive and impactful learning experience. By addressing these implications, educational institutions can better adapt to remote teaching during challenging times, fostering resilience and innovation in the field of online education.

Recommendations to the Department of Electronic Engineering

The provided recommendations offer valuable guidance for improving the effectiveness of online

teaching practices in the Department of Electronic Engineering. By conducting a detailed analysis of survey responses and addressing the identified challenges, the department can enhance instructional approaches and ensure a more positive learning experience. Offering training and support to educators and students in digital literacy and online tools will bolster their proficiency in online teaching.

Establishing clear communication channels and investing in technological infrastructure will create a more seamless and user-friendly learning environment. By continuously reviewing and adapting pedagogical approaches, the department can engage students effectively during remote learning. The cyclical assessment process will enable continuous improvement and ensure the department remains adaptable in challenging times.

Additionally, the recommendations for technical support underscore the importance of assessing educators' needs and providing tailored assistance to enhance their proficiency in using technology effectively. Collaboration with the IT department will ensure seamless integration of technology in teaching and learning.

To maintain academic integrity, the department should implement robust security measures for online assessments and promote a culture of academic honesty. Diversifying assessment strategies and encouraging active learning will reduce opportunities for cheating and improve student engagement.

To address challenges posed by load shedding and students' data and network issues, developing contingency plans, offering offline resources, and collaborating with utility providers will ensure uninterrupted access to education. Supporting educators' mental health and well-being will foster a positive teaching environment and ultimately benefit student learning outcomes.

Furthermore, evaluating the effectiveness of online simulation programs and addressing skill development concerns will complement traditional practicals. Improving guidelines and policies for remote pedagogy and optimizing the Learning Management System will enhance the online learning experience.

By incorporating these recommendations, the Department of Electronic Engineering can effectively adapt to the demands of online education during the pandemic and foster resilience and innovation in the field of online teaching and learning.

Recommendations for future work

This research study has uncovered several significant findings and conclusions. It aimed to evoke further discussions and research leading to the final dissertation. The researcher believes that this research study will stimulate further research given the impact of the topic globally. As this research study was limited to the educator's perspective, the following recommendations are presented as an opportunity for additional research in the field. Further investigation into online learning from a student's perspective. This should expose the numerous challenges that are experienced by students living in a developing nation. Online teaching and learning must be considered during the pandemic when students are on campus and have access to technology and necessities, as well as during national lockdowns when students are back home in rural villages and towns. A strategy for online teaching and learning must be considered to be inclusive of the external factors of the institution such as the high unemployment rate of the country, lack of service delivery, and the mental health and well-being of the students. These all have a direct impact on the student's performance in academia.

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