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Pedagogy in a Pandemic: A Case Study of Blended Learning Challenges at a Technical University in Botswana

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Abstract

This paper explores the challenges encountered by students and teaching staff members during the implementation of blended learning at the Botswana International University of Science and Technology (BIUST) amid the Covid-19 pandemic. A mixed-methods research approach was adopted, guided by a descriptive case study design. The population of the study were BIUST staff and students. A total of 73 students and 53 teaching staff members were purposively selected to participate in the study. The research employed Diffusion of Innovation (DoI) theory and Social Constructivist theory. Structured surveys, semi-structured interviews, open-ended questionnaires, and document analysis were used to collect data. The use of triangulation methods strengthened the reliability and validity of the research findings. The findings indicated that participants faced numerous challenges, such as unreliable internet connections, increased workload for teaching staff members, a lack of digital literacy skills among students and teaching staff members, students' low engagement in the virtual learning environment, and inadequate training programs on blended learning. The participants recognised blended learning's value, but multiple obstacles made it difficult to implement it effectively during the pandemic. The study concluded that BIUST needed to develop stronger preparedness through investing in technological infrastructure, inclusive planning, and ongoing professional development on the application of digital tools for students and staff members.

Keywords: *Blended Learning, Challenges, COVID-19 Pandemic, Digital Tools, Higher Education.*

Introduction

This paper examines the challenges both academic staff and students encountered during Covid – 19 at BIUST. This is part of a larger study that investigated the implementation of blended learning at BIUST. Hence, the focus of this paper is only on the challenges encountered during the pandemic. The Covid-19 pandemic necessitated a rapid shift in educational delivery models globally. In Botswana, higher education institutions, including the Botswana International University of Science and Technology (BIUST), adopted blended learning as a response strategy during the outbreak of the Covid-19 pandemic. The introduction of blended learning at BIUST has not received a systematic, comprehensive, in-depth evaluation since its implementation. The absence of a thorough evaluation regarding the challenges presented by blended learning creates a major knowledge gap about how BIUST handled the transition to blended learning and its educational results.

Most higher education institutions adopted blended learning as their pedagogical model since the outbreak of the Covid-19 pandemic [1, 2]. The sudden closure of educational institutions during the Covid-19 pandemic forced universities to rapidly adopt blended learning as an emergency response for

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maintaining academic operations during the pandemic [3, 4]. The implementation of blended learning in poor and developing countries faces various barriers because of inadequate infrastructure, poor teaching methods, and insufficient digital skills [5, 6].

Research studies in Africa have shown that digital disparities, together with teacher training deficits and inadequate internet infrastructure, hinder the successful implementation of blended learning [7-9].

The majority of existing literature on blended learning focuses more on investigating general e-learning systems and institutional readiness, with minimal attention given to crisis-driven blended learning implementation from the perspective of both students and teaching staff [10-12]. There is a lack of sufficient data about the challenges of blended learning implementation in Botswana, particularly at BIUST, and this created an information gap about this particular context.

During the Covid-19 pandemic, the Botswana International University of Science and Technology (BIUST) adopted blended learning as a strategic response to continue offering education during a time of government-imposed lockdowns and health restrictions. Therefore, it was essential to find out whether the implementation of Blended learning at BIUST during the Covid-19 pandemic was smooth or not. This study explored what both teaching staff members and students at BIUST experienced during the Covid-19 pandemic. There was no documentation to that effect on such experiences, hence the necessity of this study.

Since the outbreak of the Covid-19 pandemic, most universities have been under pressure to embrace digital transformation[13]. This approach has been adopted by universities due to a major shift in adopting new pedagogical strategies to strengthen and promote mechanisms for digital universities, and the promotion of the democratisation of knowledge [13, 14]. Despite the adoption of these strategic initiatives, most universities in Sub-Saharan Africa continue to experience challenges with the blended learning implementation strategies [15].

Research highlights the importance of analysing the implementation of blended learning through a combination of theoretical frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), Task Technology Fit (TTF), Diffusion of Innovation Theory and Theory of Planned Behaviour (TPB) [16, 17]. These are used to analyse technological adoption by examining the perspectives and viewpoints of key stakeholders. For instance, the UTAUT serves as a model that is used to evaluate user technology adoption behaviours across different contexts by integrating various theoretical components.

In this regard, evaluating the challenges faced by students and teaching staff at BIUST becomes crucial when studying the implementation of blended learning during the Covid-19 pandemic, which underscores the need for this study. Such an evaluation highlights valuable lessons that will help develop better teaching and learning approaches and policies to manage future crises, thus validating the value of this study.

Research Objectives

The key research objectives of the study were to: a) examine the challenges experienced by students and teaching staff members during the implementation of blended learning at BIUST during the Covid-19 pandemic, and b) establish how the challenges encountered by students and staff members at BIUST can be overcome.

Theoretical Framework

The Diffusion of Innovation and Social Constructivist theories were adopted as Theoretical guidelines for this study.

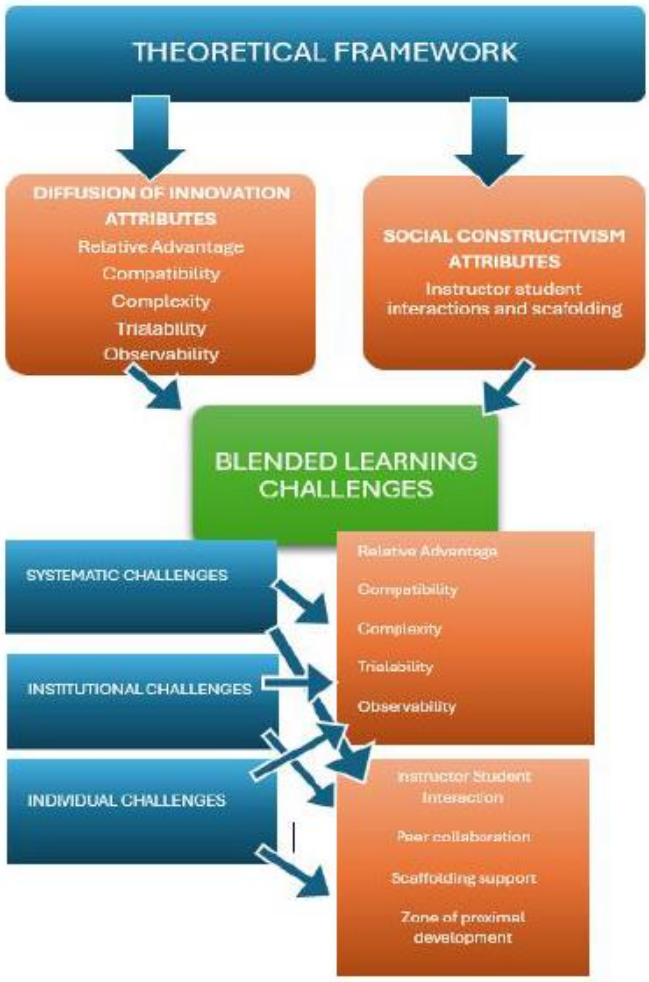

Figure 1. Theoretical framework showing the combination of diffusion of innovation theory and social constructivism

Figure 1 shows how the two theories, Diffusion of Innovation and Social Constructivist theories, together were used to identify the challenges faced by students and teaching staff members during the implementation of blended learning at BIUST during the Covid-19 pandemic. According to Rogers' Diffusion of Innovation theory, innovation adoption occurs based on perceived attributes, which include relative advantage, compatibility, complexity, trialability, and observability. In the context of blended learning, the relative advantage of blended learning depends on how students and staff perceive its effectiveness compared to traditional face-to-face teaching methods. The compatibility factor examines how well blended learning integrates with current teaching methods and institutional rules, and student learning patterns. The perceived difficulty of using digital platforms and tools represents complexity, which acts as a barrier to adoption when users find them too complicated. In addition, the ability to test blended learning through small-scale trials before full implementation helps stakeholders understand its value through trialability. The visibility of positive outcomes, such as improved engagement or flexibility, represents observability, which helps increase acceptance among stakeholders [18, 19]. In this study, these attributes have been used to identify the challenges encountered by students and teaching staff members at BIUST during the implementation of blended learning during the Covid-19 pandemic.

In addition, the Social Constructivist theory suggests that learning occurs in social environments that necessitate instructor-student interactions and scaffolding for active engagement [20]. In the context of this study, the blended learning environment at BIUST requires instructor-student collaboration, peer learning, and guided support to achieve meaningful engagement and knowledge construction. In addition, the digital scaffold helps students advance through their Zone of Proximal Development.

These theoretical models provide a strong framework for understanding the various challenges that blended learning presents in limited-resource learning environments.

This study is part of a larger study that highlighted that during the Covid-19 pandemic, BIUST launched multiple initiatives to support the implementation of blended learning at the institution. It is important to understand the challenges faced by students and teaching staff members at BIUST, and the measures to satisfy immediate stakeholder requirements. While the university implemented multiple strategies to maintain blended learning, there are no studies that focus on the challenges faced by students and teaching staff members during the implementation of blended learning at BIUST during the Covid-19 pandemic.

The study will guide future initiatives toward better inclusion and sustainability, and alignment with student and staff requirements to support the institution's digital transformation and educational excellence goals.

Methodology

Study Design

The study adopted a mixed-methods approach, incorporating both qualitative and quantitative data. A descriptive case study design was employed to provide an in-depth understanding of the institutional context and the experiences of stakeholders.

Study Site

The study was carried out at the Botswana International University of Science and Technology (BIUST). The university is situated approximately 270 kilometres from Gaborone in the Central District of Botswana. It was established by an Act of Parliament in 2009. BIUST continued to play a pivotal role in supporting Botswana's strategic shift from a resource-based to a knowledge-based economy. Originally founded with two main faculties—Engineering and Science—the institution transformed in 2024, restructuring into schools, including the School of Business and Professional Development. BIUST is a specialised institution focused on Science, Engineering, and Technology education, with a clear mandate to drive innovation, research, and human capital development in critical areas of national development.

During the Covid-19 pandemic, BIUST, like many other institutions globally, was compelled to adapt rapidly to ensure the continuity of teaching and learning. Faced with lockdowns and health restrictions, the university transitioned from traditional face-to-face instruction to a blended learning model that combined online platforms. Guided by its 2017 Teaching and Learning Policy, the university implemented several strategic interventions, including providing tablets to staff, installing classroom cameras, and delivering targeted training in digital pedagogy. While these efforts reflect BIUST's commitment to academic continuity and pedagogical innovation, the impact of such initiatives, especially on staff and student experiences, remains an area requiring deeper exploration; hence, this study critically assessed the challenges experienced during the implementation of blended learning at BIUST during the Covid-19 crisis.

Participants

The participants comprised 53 teaching staff members (lecturers, instructors, lab

technicians, and teaching assistants) and 73 students from various academic disciplines at BIUST.

Sampling

The research employed purposive sampling to choose participants from various schools within BIUST. The researchers applied this method to achieve balanced representation among different academic fields. In addition, purposive sampling was used to select participants who had experience with blended learning implementation at BIUST during the Covid-19 pandemic. The participants were selected purposively because they could provide detailed insights about blended learning at BIUST during the Covid-19 period. The research involved 73 students, together with 53 teaching staff members at BIUST.

Data Collection

Data were collected using the following tools:

1. Structured surveys with Likert-scale questions
2. Semi-structured interviews
3. Open-ended questionnaires
4. Document analysis of institutional reports and training materials

Various data collection tools were used to gather data. The research used open-ended questionnaires and online surveys to gather data from students and teaching staff members. The researcher used a five-point Likert scale to measure the challenges faced by students and teaching staff members during the implementation of blended learning at BIUST during the pandemic. The tools were used to collect qualitative data about student and teaching staff perspectives regarding the challenges they faced in the implementation of blended learning at BIUST during the pandemic.

Data Analysis

The researcher performed quantitative data analysis using SPSS software, while multiple researchers and statistical experts reviewed the qualitative coding for consistency. The research design provided a solid framework that allowed researchers to create a comprehensive report about the challenges presented by the implementation of blended learning at BIUST during the Covid-19 pandemic.

Quantitative data were analysed using descriptive statistics, while qualitative data were coded and thematically analysed. Data triangulation across instruments enhanced the reliability and depth of the analysis. The open-ended questionnaire responses underwent thematic analysis to extract qualitative data. The thematic analysis method enabled researchers to capture important personal teaching and learning experiences and their perceptions of teaching staff members and students regarding the implementation of blended learning at BIUST during the Covid-19 pandemic. The survey responses underwent both descriptive and inferential statistical analysis for quantitative data assessment. The reliability of the data online survey questionnaire was assessed using Cronbach's Alpha, which is a measure of internal consistency that is used to ensure that the survey items reliably assess the intended constructs.

The research provided a comprehensive understanding of the challenges of the implementation of blended learning experienced by students and teaching staff members at BIUST during the Covid-19 pandemic.

Validity

The gathered data showed important patterns and trends regarding the challenges faced by the participants during the implementation of blended learning at BIUST. Thematic analysis was used to identify recurring patterns and vital findings from student and teaching staff member responses. The data collection tools validated that participant responses were both reliable and valid.

Reliability

The study results showed consistency between the open-ended questionnaires and semi-structured interviews, and online survey data. The data collection tools were distributed at various points in time to different groups of participants. The participants were revisited multiple times through open-ended questionnaires and interviews to assess participants and obtain detailed information about BIUST blended learning implementation. The participants' responses demonstrated consistency, which proved both reliable and credible. This cuts across the teaching staff members and students.

Ethical Considerations

All participants received complete information about the study before the researcher obtained their consent through signed forms from those who chose to participate. The research team protected participant identities through anonymisation while ensuring complete confidentiality. The researchers stored the data on a computer system that required a secure password for access. The researchers maintained exclusive access to all information collected from respondents.

Results of the Study

Participants Demographic Information

Students Demographic Information

Table 1. Students' Demographic Information by Schools within the University

School	Frequency (=n)	Percentage (%)
School of Electric and Mechanical Engineering	29	39.7
School of Pure and Applied Science	13	17.8
School of Life Sciences	11	15.1
School of Earth Sciences and Engineering	19	26.0
Post graduate School	1	1.4
Total	73	100

Figure 2 shows the demographic distribution of students who participated in the study across different schools at BIUST. It reveals a diverse representation of the Schools and BIUST. The total number of respondents is 73. The School of Electric and Mechanical Engineering has the highest number of representatives, with 39.7% of participants. The School of Earth Sciences and Engineering is the second-highest represented School. It accounts for 26.0% of the respondents. The School of Pure and Applied Science and the School of Life Sciences have a representation of 17.8% and 15.1%, respectively. Notably, the Postgraduate School has the least representation, with a representation of only 1.4% of the total participants. The Postgraduate School had just been newly established as an independent school from the other schools during the time of data collection. Therefore, some of the students who could have selected the post-graduate school selected other schools that they belonged to, as they had not yet been officially transferred to the Post-graduate school.

Teaching Staff Members' Demographic Information

Table 2. Teaching staff members' Demographic information

Position	Frequency(=n)	Percentage(%)
Lecturer	21	39.6
Teaching Instructor	12	22.6
Laboratory Technician	9	17.0
Teacher Assistant	11	20.8
Total	53	100

Table 2 presents the distribution of teaching staff members who participated in the study by their position. The survey results indicate that a total of 53 participants took part in the study. Lecturers comprise the largest group of respondents, accounting for 21 (39.6%) of the total number of respondents. Teaching instructors made up twelve 12 responses (22.6%) while laboratory technicians had the lowest representation with nine 9 responses (16.9%), and teaching assistants made up 11 responses (20.7%).

Challenges Faced by Participants during the Implementation of Blended Learning at BIUST During the Covid-19 Pandemic

The implementation of blended learning at BIUST was not without its difficulties. Teaching staff members and students reported a range of difficulties; some shared commonalities, while others were unique to their roles. The results presented below combine both quantitative data and supporting qualitative responses to provide a comprehensive understanding of the nature and extent of the challenges experienced by both teaching staff members and students during the Covid-19 pandemic at BIUST.

Challenges Faced by Teaching Staff Members

Teaching staff members reported that the shift to blended learning presented some problems for them.

Figure 2 indicates that most teaching staff members, n = 42 (79.2%), experienced significant challenges during the Covid-19 pandemic. In contrast, the remaining participants, n = 11 (20.8%), did not experience major challenges. This suggests that most participants faced significant challenges, which likely hindered their ability to deliver effective instruction during the implementation phase.

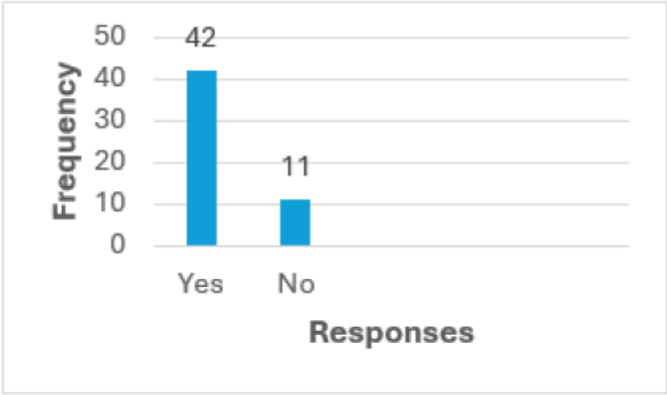

Figure 2. Teaching Staff Members' Responses to the Statement: Did you encounter any significant challenges with blended learning during the COVID-19 pandemic?

The high number of affirmative responses indicates that BIUST lacked sufficient preparation to implement blended learning effectively for teaching needs during the pandemic.

Technical Challenges

When specifically asked whether teaching staff members experienced some technical issues, such as internet connectivity problems and software-related problems, while implementing blended learning at BIUST during the Covid-19 pandemic, the responses presented in Figure 4 confirm that technical challenges were among the most prominent barriers encountered by the teaching staff members.

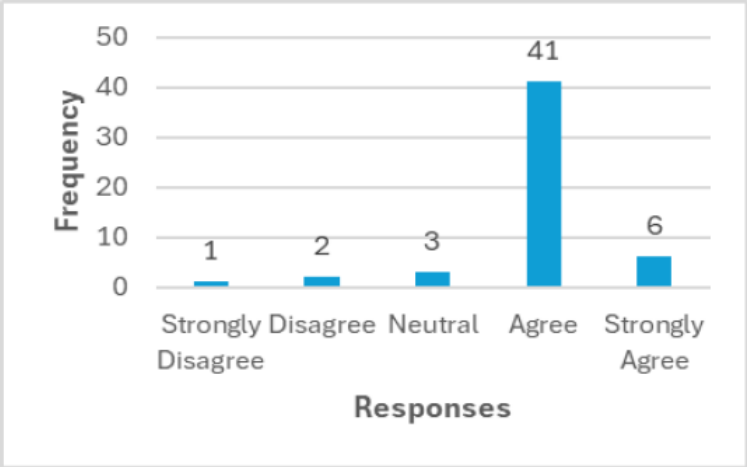

Figure 3. Teaching Staff Members' Responses to the Statement: I experienced technical issues (e.g., internet connectivity, software problems) while implementing blended learning.

Figure 3 above shows that a total of n = 41 (77.4%) teaching staff members agreed that they experienced technical issues, and 11.3% of participants (n = 6) strongly agreed with the statement. The results show that technical problems occurred frequently during the implementation of blended learning at BIUST during the Covid-19 pandemic. Only a small number of participants, n = 2 (3.8%), disagreed with the statement, and n = 1 (1.9%) strongly disagreed. The minority of the responses indicate that most teaching staff members encountered technical problems.

The quantitative results were further confirmed by the qualitative data, in which participants expressed frustrations over persistent connectivity problems.

One lecturer (TS-L2) reported:

"Internet connectivity is a real issue. Sometimes, I lose connection in the middle of a lecture, and it's frustrating. It disrupts the flow, and students lose interest."

A Teaching instructor (TS-TI 3) shared a similar concern:

"Live classes were constantly interrupted. Video freezes, audio disappears—students can't follow, and we end up having to start over or record sessions separately."

A laboratory technician (TS-LT 1) added a similar perspective:

"Sometimes the internet fails, and I have to cancel and reschedule. That throws everything off. It disrupts the momentum."

These verbatim illustrate the extent to which technical issues undermined the teaching process during the implementation of blended learning at BIUST. The results also indicate that connectivity issues disrupted learning continuity, frustrated teaching staff members, and also undermined the quality and continuity of learning at BIUST. The available technological infrastructure could not always support consistent teaching and learning, particularly during synchronous delivery.

Instructional Overload in a Blended Learning Context

Teaching staff members were asked whether the transition to blended learning led to an increase in their workload. The responses reflected a divided perception among participants.

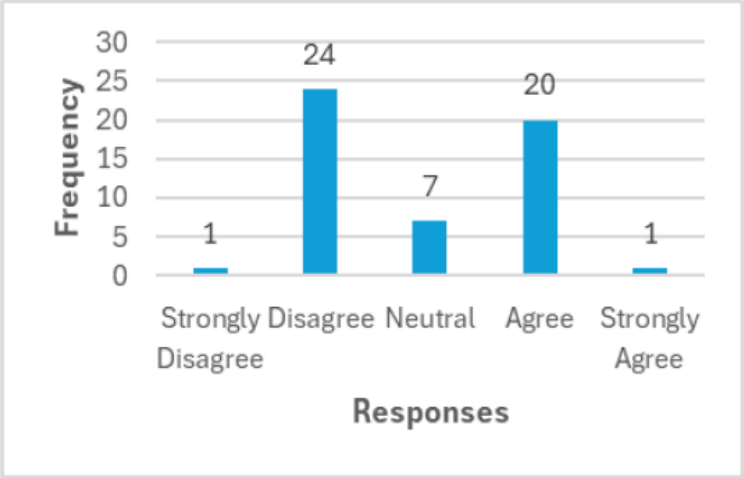

Figure 4. Teaching Staff Members' Responses to the Statement: The workload increased due to the transition to blended learning**.**

The results presented in Figure 4 show that n = 21 (37.7%) teaching staff members either agreed or strongly agreed that their workload increased due to the transition to blended learning at BIUST during the Covid-19 pandemic. In contrast, n = 24 (45.3%) disagreed. The survey results showed that n = 9 (17.0%) participants chose to remain neutral in their responses. The teaching staff members indicated that staff members who faced workload increases were responsible for creating educational materials for both classroom and online delivery. Those who perceived an increase in workload attributed it to the need to prepare instructional content in both face-to-face and online formats.

This is consistent with qualitative results. A laboratory technician (TS-LT 3) shared:

"Blended learning takes more time than traditional methods. Preparing for blended sessions takes hours. I record extra content, respond to more emails, and deal with technical issues, all of which extend my working hours."

Similarly, a lecturer (TS-L4) highlighted the need to constantly adapt materials:

"There's always something to revise or reformat. A PowerPoint for in-class use doesn't always translate well online. You have to rework your material constantly."

What emerges from these responses is more than just a mere expression of dissatisfaction. The remarks reflect the compounded demands introduced by the implementation of blended learning at BIUST during the Covid-19 pandemic. It shows that the shift to blended learning required teaching staff members to juggle dual modes of delivery. The increase in teaching staff workload indicates the necessity for workload management strategies and institutional support to maintain the successful implementation of blended learning.

Challenges with Student Adaptation and Engagement in Blended Learning

The teaching staff members identified maintenance of student engagement as another significant problem in online learning environments. The survey results showed that educators widely agreed that students struggled to adapt to the blended learning approach at BIUST during the implementation of the system.

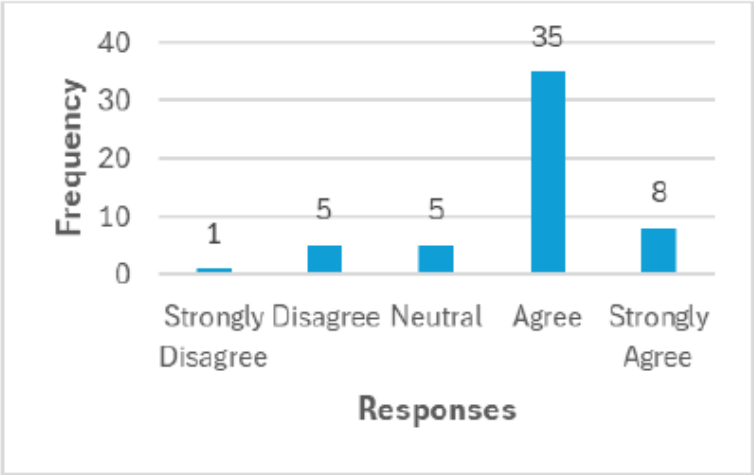

Figure 5: Teaching Staff Members' Responses to the Statement: Students faced difficulties in adapting to blended learning methods.

As illustrated in Figure 5, the results show that a significant majority of teaching staff members, n = 43 (81.1%), either agreed or strongly agreed that students struggled to adapt to the blended learning approach. It is important to note that this may reflect some deeper underlying issues. This overwhelming affirmation suggests a deeper issue that extends beyond surface-level resistance to change. The teaching staff members identified some of the factors that contributed to the adaptation challenges: students' unfamiliarity with online learning environments, unstable internet connectivity, limited access to digital devices and unfamiliarity with learning management systems.

These limitations not only hindered students' ability to participate fully but also compromised the teaching staff's capacity to effectively deliver content and monitor progress. The quantitative data is supported by qualitative evidence gathered from participants.

A lecturer (TS-L5) recounted:

"Some students didn't attend classes regularly due to poor internet connection. When they did attend, they hardly participated. It felt like I was talking to myself."

Another lecturer (TS-L6) described the loss of real-time engagement:

"In a physical class, I can tell when someone is lost or disengaged. When they attend online classes, they turn off their cameras and stay silent. It's impossible to tell who's with you and who's not."

These verbatim reflections highlight the difficulty teaching staff faced in maintaining meaningful interaction with students in an online setting. The digital learning environment made it difficult for educators to monitor student engagement because traditional classroom body language and dynamics were absent. The digital environment made it difficult for educators to determine student understanding while they struggled to offer immediate assistance and promote active student participation.

Inadequate and Generalised Training for Teaching Staff

Teaching staff members expressed doubts about the adequacy and usefulness of the training they received to help them transition to blended learning. The participants acknowledged that BIUST provided training sessions about Blackboard platform usage, but several participants stated that the training sessions lacked sufficient depth and duration to meet their instructional requirements. A lecturer (TS-L2) reported that:

"The training was helpful, but it was short and generic. I never got to explore all the features of Blackboard."

Similarly, a teaching instructor (TS-TI 4) expressed:

"I struggled to integrate external tools into Blackboard, and more hands-on sessions would have helped. We needed more training, not just a quick overview."

These verbatim highlights that while initial training was appreciated, it was insufficient for many teaching staff members, particularly those who wanted to use advanced features on blended learning tools and applications. to the need for ongoing, differentiated professional development at BIUST. The results show that a standardised, one-size-fits-all approach was not adequate for equipping all teaching staff with the competencies required to navigate blended learning effectively.

Challenges Faced by Students

The data collected from student responses reveals that students experienced several notable challenges in the implementation of blended learning at BIUST during the Covid-19 pandemic.

Balancing Blended Learning with Other Responsibilities

Students were asked whether they found it challenging to balance blended learning with other personal, academic, or social responsibilities. While the shift to blended learning introduced new opportunities for flexible engagement, for many students, it presented practical challenges that affected students' learning experience.

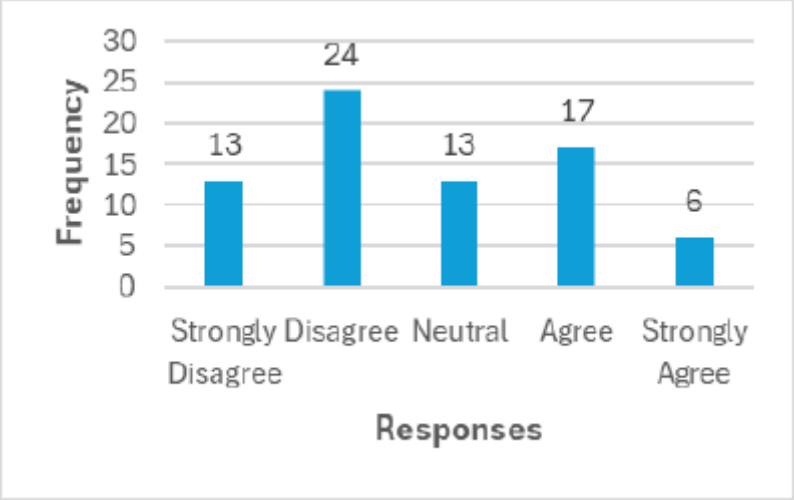

Figure 6. Students' Responses to the Statement: "I found it challenging to balance blended learning with other responsibilities**."**

Figure 6 shows that students who disagreed with the statement outnumbered those who strongly disagreed with n = 24 (32.9%) and n = 13 (17.8%), respectively. The total number of participants who did not find balancing blended learning with other responsibilities difficult was n = 37 (50.7%). The survey results show that n = 17 (23.3%) of participants agreed and n = 6 (8.2%) strongly agreed that they experienced challenges in managing and balancing blended learning and responsibilities. The remaining n = 13 (17.8%) participants chose a neutral stance, which may indicate they had mixed feelings or were uncertain about their experiences.

The study reveals a multifaceted situation because numerous students appreciated blended learning flexibility yet numerous others struggled with maintaining structure and balance. Students needed to take full responsibility for their time management because blended learning eliminated both fixed schedules and structured learning environments. Students who depended on traditional classroom structures for their academic habits found it especially difficult to

adapt to the absence of external scheduling systems. The quantitative findings were supported by qualitative feedback.

A student (ST7) reported:

"The freedom to choose when to engage with the material sometimes leads to poor time management."

Another student (ST8) echoed this challenge:

"I find it hard to keep up with the workload. I miss the structured environment of traditional classrooms, where there's a clear routine."

These verbatim show how autonomy, while empowering, can become a barrier when not supported by appropriate scaffolding. For students who are accustomed to traditional, routine-driven instruction and externally imposed schedules, the shift to a more flexible model required a level of self-discipline that some struggled to maintain.

The results indicate that BIUST should establish support systems that include time management training and scheduled teaching and learning plans to assist students in effectively handling the requirements of the blended approach.

Accessing and Navigating Blended Learning Resources

Students were asked about their challenges in obtaining essential resources, including textbooks and online materials, which are needed for successful blended learning participation. The responses revealed a wide range of experiences, with no dominant consensus across the group.

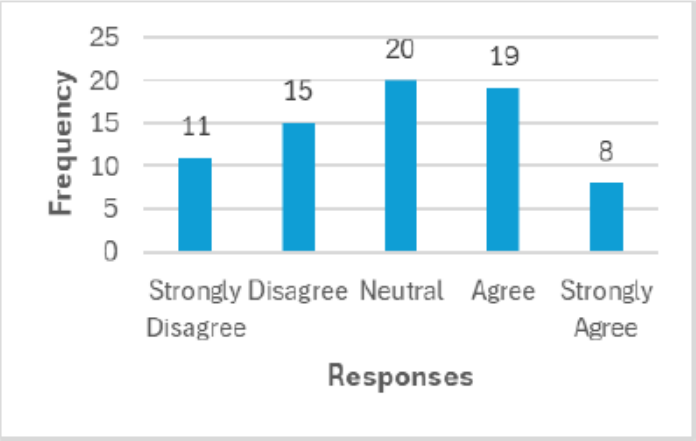

Figure 7. Students' Responses to the Statement: "I experienced difficulty accessing necessary resources (e.g., textbooks, online materials) for blended learning."

Figure 7 shows that n = 19 (25.0%) of students agreed, and n = 8 (10.5%) strongly agreed that they had difficulty accessing necessary resources. This amounts to a total of n = 27 (35.5%) students who acknowledged facing some degree of difficulty in accessing the necessary resources for the successful implementation of blended learning at BIUST during the Covid-19 pandemic. In contrast, the figure shows that n = 15 (19.7%) of students disagreed with the statement that they had trouble accessing necessary resources. An additional n = 11 (14.5%) strongly disagreed with the statement. A total of n = 26 (34.2%) students did not perceive access to BL resources as a significant challenge.

The mixed opinions about blended learning demonstrate a complex reality. Although many students valued the flexibility offered by blended learning, a substantial number found it challenging to. Students who needed required materials for participation managed to obtain and use them without major difficulties, but others encountered barriers that prevented them from fully participating. The challenge extended beyond students' ability to access physical materials. Students demonstrated poor information literacy skills and struggled to

navigate online content ethically, according to qualitative feedback.

A student (ST 9) reported:

"I often find conflicting information, and it's tough to know what to trust. Understanding the ethical use of information, especially in the context of AI, is something I think we are missing in our training."

Similarly, another student (ST 10) highlighted the need for greater support in evaluating digital sources:

"We need more guidance on how to select credible sources on the internet, specifically the ethical use of AI."

These reflections bring to light a critical dimension of resource access which extends beyond the availability of students to critically engage with, evaluate, and ethically use digital content within blended learning settings. The results indicate that certain students did not receive sufficient training in digital literacy, particularly in understanding credibility, relevance, and ethical standards in the context of AI-generated information.

Therefore, the challenge of accessing resources in blended learning requires evaluation beyond infrastructure and distribution systems. It must also include institutional support. The gap needs to be addressed to enable students to achieve full benefits from blended learning environments, particularly during disruptions like the Covid-19 pandemic.

Technical difficulties during the implementation of blended learning at BIUST

The students were asked if they encountered any technical problems, such as internet connectivity issues or software problems, while participating in blended learning at BIUST. The responses indicated that technical challenges were another major barrier for the majority of students.

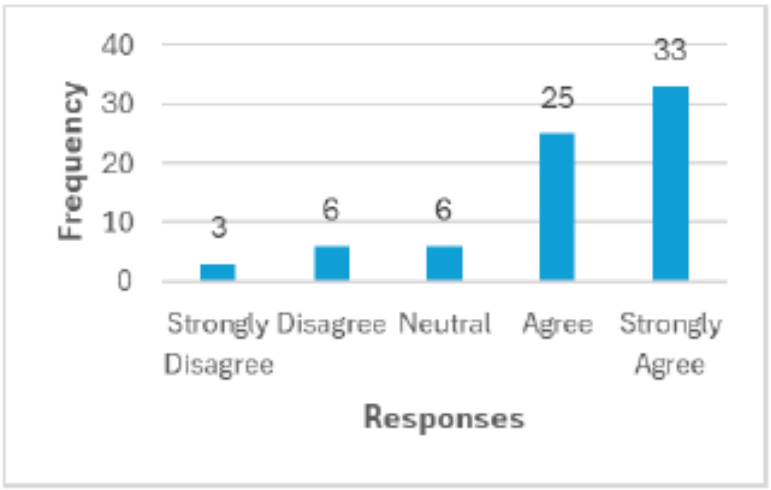

Figure 8. Students' Responses to the Statement: "I faced technical difficulties (e.g., internet connectivity, software issues) while participating in blended learning."

Figure 8 shows that 33 participants (45.2%) strongly agreed that they experienced some challenges with technical issues regarding the implementation of blended learning, and 25 participants (34.2%) also agreed with the statement. In addition, the survey results showed that n = 6 (8.2%) of the respondents disagreed with the statement, and n = 3 (4.1%) strongly disagreed. The remaining n = 6 (8.2%) participants expressed no opinion about the statement.

The survey results indicate that most BIUST students did not have access to technical resources. The results reveal possible institutional shortcomings in providing adequate support for students to fully participate in digital aspects of blended learning. The majority of students reported

difficulties with digital learning because they lacked access to digital tools or online experience, but a few students did not encounter these problems. The quantitative data aligns with qualitative feedback from students.

A student (ST 11) reported:

"Some of us are not familiar with some online learning tools. It would be so helpful if there were workshops or tutorials that show us step-by-step how to use these platforms correctly."

Another student (ST 12) elaborated on the difficulty of navigating digital platforms:

"Navigating platforms like Blackboard can be challenging. While I can get the basics done, I don't feel confident using advanced tools on Blackboard... we are learning as we go, which slows down the whole process."

These reflections illustrate that technical difficulties extended beyond connectivity or hardware issues. The lack of structured guidance about digital platform usage was also a part of this problem. There is a need for continuous support, together with specialised training in digital literacy. This can help students learn advanced features so that they can be able to effectively use learning management systems such as Blackboard.

In conclusion, the implementation of blended learning at BIUST presented some challenges for teaching staff members and students, yet their challenges showed distinct patterns. The shared technological and digital literacy problems indicate common system-wide obstacles, but the workload perceptions and engagement levels, and resource access differences show how role-based expectations influenced individual experiences about the implementation of blended learning at BIUST during the Covid-19 pandemic. This shows that there is a need for an improved, inclusive method of planning and support. The implementation of structured training programs, better infrastructure, and enhanced student support systems will create an equitable and effective blended learning experience for all stakeholders at BIUST.

Discussion of Findings

The findings of the study revealed that there were several challenges that students and teaching staff members experienced during the implementation of blended learning at BIUST during the Covid-19 pandemic.

The findings indicate that most teaching staff at BIUST faced major obstacles during blended learning implementation during the peak of the Covid-19 pandemic. The data shows that most teaching staff members faced technical problems along with increased workloads, low student participation, and inadequate training. The identified challenges indicated that the educational system lacked both the necessary infrastructure and readiness to support blended learning environments.

In addition, the findings showed that 79.2% of teaching staff members experienced major challenges during the implementation phase. Many participants encountered technical problems that included internet connection problems and software system issues. These findings reflect the findings of other studies where similar challenges related to the implementation of blended learning were reported. For example, studies have shown that many educational institutions in developing countries did not possess the technological infrastructure needed to deliver successful online learning [3, 7]. Furthermore, [6] a similar conclusion was reached in a study that discovered that technical problems disrupted the delivery of blended learning during the pandemic.

Most participants stated that internet instability caused both lesson interruptions and reduced student interest. Participants such as TS-L2 and TS-TI3 expressed frustration about the frequent loss of internet connectivity and the freezing of video feeds, and delayed communication. The study shows that unstable internet connections blocked learning

opportunities, which resulted in poor instructional quality. This is consistent with findings of [5, 9]found similar results in their research, which showed that virtual classroom disruptions caused students to lose interest in learning.

Furthermore, the findings revealed that teaching staff members experienced higher workloads because they needed to handle both physical classroom teaching and online instruction. The survey results showed that 37.7% of participants believed their workload intensified during the transition to blended learning. The staff members needed to develop content for both online and in-person platforms while modifying materials and offering additional support to students. This is consistent with the findings of [4, 11], who discovered that educators in blended learning environments often experience an increase in their workload and time management challenges, especially when schools make sudden pedagogical changes.

Nevertheless, the findings of the study also highlighted that a portion of the teaching staff showed disagreement with the statement that *the workload increased due to the transition to blended learning* through their responses. This could stem from variations between departments and course structures, and personal preferences for individual teaching approaches among teaching staff members at BIUST. The laboratory technician (TS-LT3) explained that the requirement to transform materials for dual instruction methods extended the workday duration. Likewise, a lecturer (TS-L4) acknowledged that the process of converting classroom PowerPoints into online content proved challenging. These findings reveal that blended learning requires different levels of demands across various roles and academic disciplines.

The study findings also demonstrated that teaching staff members struggled to keep students actively engaged. The findings revealed that 81.1% of students had challenges adapting to the blended learning approach during its implementation at BIUST during the pandemic. The findings match findings from prior studies, which identified reduced student participation and the absence of real-time cues as major challenges in online education [8, 12]. The current study corroborates this through TS-L5 and TS-L6, who observed that visual engagement disappeared, and students failed to respond during classes, making it difficult to monitor student attentiveness.

The virtual classes at BIUST lacked the feedback cues that students would normally receive from facial expressions and body language, which are present in classroom environments. The study indicates that the absence of visual and verbal interaction made it challenging for teaching staff to detect students who were struggling or to provide immediate pedagogical support. This indicates the requirement for interactive and inclusive virtual classroom designs.

Another important finding is that a significant number of teaching staff members felt the training provided to them for blended learning implementation was insufficient. While BIUST provided training on the Blackboard platform, some staff members noted that the Blackboard platform training at BIUST was too short and did not provide enough practical experience. These observations are supported by the findings of [10,13], who found that short and generic training programs did not prepare teachers adequately for online teaching. The participants in this study believed that the training sessions did not teach them advanced functions or external tool integration, which would have improved teaching quality.

The results indicate that future training initiatives should implement differentiated strategies based on staff needs and experience levels to ensure successful blended learning implementation. Furthermore, the institutional approach should focus on providing continuous

support through follow-up workshops and peer-assisted learning models.

This study also identified student-related challenges. A significant number of students encountered some challenges when trying to manage their blended learning responsibilities with their personal life, academic, and social responsibilities. The survey results showed that while 50.7% of students disagreed with the statement, *I found it challenging to balance blended learning with other responsibilities,* and 31.5% admitted that they faced difficulties in handling multiple roles. The research results match the findings of a study by [2, 14], which show that flexible learning models without structured routines create academic discipline problems mainly for students who struggle with self-regulation. ST7 and ST8 positions explained that the autonomy in blended learning sometimes caused them to procrastinate and lose motivation.

Moreover, the findings revealed that 35.5% of students encountered problems accessing learning materials, including online textbooks and online content. Students ST9 and ST10 explained that although resources were available, they did not possess the necessary digital literacy skills to properly evaluate and use information ethically. These findings mirror studies which emphasised that university students need critical information literacy training in digital settings [15, 21].

The findings also showed that a substantial number of participants (79.4%) encountered technical problems, ranging from poor internet connectivity and difficulties navigating platforms such as Blackboard during the implementation of blended learning at BIUST during the Covid-19. The findings revealed that these problems went beyond the technical aspects. Participants (ST11 and ST12) explained that insufficient training on learning platform usage led to confusion, which negatively affected their learning speed. The findings support the conclusion that digital unfamiliarity stands as a primary obstacle for students to succeed in blended learning environments [1, 17].

Conclusion

The study revealed multiple challenges which teaching staff members and students faced when implementing blended learning at BIUST. The teaching staff members were particularly burdened by challenges, which included increased workload, insufficient training, and technical system interruptions. Students experienced difficulties in managing their responsibilities, accessing online resources and navigating digital platforms. These findings point to a pressing need for BIUST to improve their technical infrastructure while providing specific professional development and establishing formal and structured teacher and student support systems to deliver blended learning effectively and equitably.

Implications for Future Research

The study had implications. First, future research should investigate the fundamental reasons behind digital skill deficiencies in university students while developing lasting solutions and evaluating specialised professional development programs for blended learning environments.

Second, future research is vital to evaluate strategic interventions to address these challenges effectively so that higher education institutions can establish more resilient and inclusive blended learning systems.

Limitations of the study

The research took place at Botswana International University of Science and Technology (BIUST) as a single site, which restricts the ability to generalise results to other educational institutions with different infrastructure and student population characteristics. The research sample size was appropriate for case study research, but it might not have represented all possible experiences that exist between different faculties and

departments. The study's institutional focus and participant selection restricted the depth and representativeness of the gathered insights because of these limitations.

Recommendations

Based on the current study's findings, higher education institutions should invest in strengthening digital infrastructure to support uninterrupted online and blended learning delivery. Additionally, teaching staff should be offered continuous professional development programs focused on digital pedagogy, while students should be provided with targeted training in digital literacy and responsible online learning practices. Educational institutions like BIUST should also establish clear support structures, including help desks and peer-support networks, to assist both students and staff during future pandemics, which may result in abrupt transitions to new teaching pedagogies. Furthermore, inclusive planning models that involve important stakeholders at all levels should be adopted to ensure that implementation strategies are practical, equitable, and sustainable in future crisis contexts.

Conflict of Interest

The author is employed by the organisation where the study was conducted. However, the research was carried out independently and objectively.

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