

BLENDING LEARNING AMONGST HIGHER LEARNING INSTITUTIONS: EXPLORING ACADEMIC PERFORMANCE INDICATORS AND FACTORS

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ABSTRACT

Blended teaching and learning became a primary mode of instruction in South Africa following the 2020 COVID-19 lockdown. For any new educational delivery method to be effective, it must be assessed against the core goals of education. This study addresses a notable gap in comprehensive evaluations of blended learning after the pandemic, particularly in identifying success indicators and contributing factors within higher education institutions. The study aims to evaluate the effectiveness of blended learning during the COVID-19 pandemic in South African universities. It employs descriptive analysis, Poisson regression, and thematic content analysis, using publicly available secondary data. The pandemic accelerated the digital transformation of education, offering an opportunity to rethink traditional teaching models and align them with the demands of a digital age. To support this shift, the study presents theoretical and conceptual frameworks that explain the factors influencing the success of blended learning. It also recommends strategies to strengthen the resilience of the higher education sector, enabling it to better respond to future disruptions such as pandemics or technological shifts. Ultimately, the research adds to a deeper understanding of how blended learning can be effectively integrated into South Africa's evolving educational landscape.

Keywords: Blended Learning, COVID-19, Tertiary Learning Institutions, Online Learning, Resilient Higher Education Sector

INTRODUCTION

This study aims to evaluate the effectiveness of blended learning in South African higher education institutions during the COVID-19 pandemic. Blended learning encompasses multiple modes of engagement, including acquiring knowledge, conducting inquiry, and collaborative learning. Through these processes, students interact with both instructors and peers, promoting deeper cognitive development through iterative learning cycles. According to White et al. (2010), the inclusion of varied learning types within instructional design enhances overall learning outcomes.

The conversational framework serves as a practical and theory-driven model to guide the development of teaching and learning strategies, particularly in the context of growing reliance on educational technologies (Mare, Woyo, and Amadhila, 2022). This framework supports the integration of interactive and student-centered approaches into blended learning environments. Figure 1 illustrates the dynamic roles of both students and educators, highlighting their respective responsibilities and the essential interactions required for effective teaching and learning. These interactions form the foundation for a productive and engaging blended learning experience, which this study seeks to analyse in the context of higher education in South Africa.

The Conversational Framework in Figure 1 outlines six learning modes in a blended environment, supported by digital tools. It emphasizes teacher input, peer interaction, and collaborative learning. Educators are encouraged to incorporate all modes to create an engaging and comprehensive educational experience (Laurillard, 2012).

The global eruption of COVID-19 has affected everything around us and how we live. The pandemic has reshaped and reorganised how teaching and learning is conducted. COVID-19 was declared a global pandemic on 12 March 2020 (Batista and Gavilan 2022). Severe restrictions were implemented in all affected countries having a precarious effect on the lives of people and the economy, including the educational system and leading to almost complete closure of learning institutions. Due to the surge of the virus and the need for social distancing, affected countries had to respond to the threat of the virus by implementing a complete national lockdown as of 26 March 2020, Batista and Gavilan (2022) resulting in an immediate need for learning institutions' closure. The stringent restrictions and closure of learning institutions called for the urgent adoption of blended learning as the sole teaching and learning strategy (Bozkurt and Ramesh. 2020; Mare, Woyo, and Amadhila, 2022).

The COVID-19 pandemic forced global education systems to close, pushing higher education to adopt distance learning via online platforms. While businesses shut down, universities continued remotely, displacing students and confining faculty to their homes for a

prolonged, global-scale disruption (Bozkurt et al., 2020; White et al., 2020; Sarma, 2020). During the COVID-19 pandemic, higher education institutions were urged to enhance their innovation ecosystems to aid national economic recovery (Lues, Padayachee and DeJager, 2020). However, there is limited academic research on how blended learning was exclusively adopted during strict lockdowns. Existing frameworks often fail to address critical success factors for blended learning, especially in the Global South, where research remains underdeveloped (Bekele, Karkouti, and Amponsah, 2022). Our study connects learning theories with digital technologies to address these gaps. It finds that while online learning offers flexibility, disadvantaged students face major obstacles, including poor internet access, lack of devices, and limited digital literacy.

LITERATURE REVIEW

Resilient Higher Education Sector

The COVID-19 pandemic has had a profound effect on education systems across the globe, disrupting the learning of roughly 1.2 billion students (UNESCO, 2020a). It is estimated that more than 90 per cent of learners experienced interruptions to their education due to the shutdown of various industries and higher education institutions, exposing significant inequalities and weaknesses within global education frameworks (Tarricone, Mestan, and Teo, 2021). With governments opting to close public universities to protect public health, concerns emerged regarding the ability of these institutions and their faculty to effectively transition to online teaching, adapt curricula for remote learning, and reduce educational disruption (IIEP-UNESCO 2020b; Li and Lalani 2020; Save the Children 2020b; UNESCO 2020a; UNICEF 2020a). Although the higher education sector eventually shifted to remote instruction, the transition was uneven across regions, largely influenced by factors such as access to resources, internet connectivity, and the broader digital divide (Woldegiorgis, and Mhlanga, 2022). Institutions with historical advantages were generally faster in implementing online teaching and learning solutions following the government-imposed lockdowns.

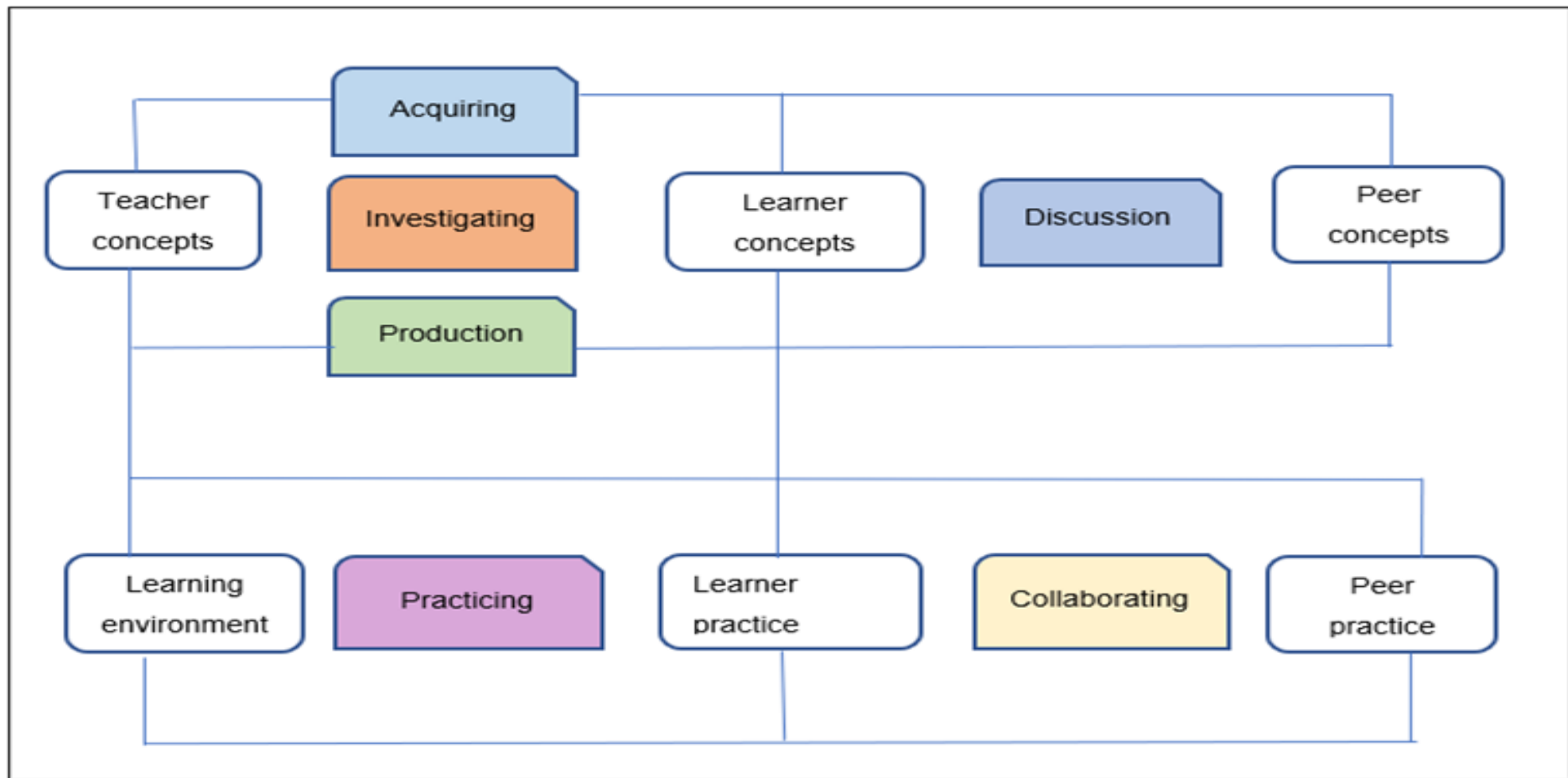


Figure 1: Laurillard's Conversational Framework

Source: Laurillard, (2000)

Many institutions managed to mobilize resources such as laptops for disadvantaged students and negotiated with service providers to supply data packages, enabling students to access learning remotely from their homes (Yekani and Surujlal, 2023). Historically advantaged and well-resourced higher education institutions were generally better positioned, having already incorporated advanced Information Communication Technologies (ICTs) and online programs into their learning management systems prior to the pandemic (Yekani and Surujlal, 2023). Although these institutions were not fully prepared for the abrupt shift caused by COVID-19, they had contingency plans that allowed a smoother transition to remote teaching when face-to-face learning was disrupted (Bekele, Endaylalu, and Solomon 2022). In contrast, historically disadvantaged universities faced greater challenges due to longstanding pedagogical and infrastructural inequalities, which were exacerbated by the pandemic (Letseka and Pitsoe, 2021). Students in these institutions struggled with limited access to technology, unreliable internet connectivity, and inadequate digital infrastructure, creating significant barriers for both learners and academic staff (Letseka and Pitsoe, 2021). Consequently, these universities were less equipped to pivot quickly to online learning platforms, underscoring the uneven preparedness across the higher education sector (Govender 2021).

The vulnerability among lecturers and students was also uneven, heavily influenced by institutional resources and support systems. Academic staff in well-resourced institutions benefited from better institutional backing, whereas those in less privileged universities faced greater difficulties navigating the digital divide and lacked sufficient digital proficiency to adapt effectively (USAf, 2021; Woldegiorgis, and Mhlanga, 2022). This disparity further highlighted the impact of pre-existing inequalities on the response to COVID-19 in South African higher education (Jantjies 2021). Some institutions had already embraced Fourth Industrial Revolution (4IR) technologies before the pandemic, recognizing their potential to transform teaching, learning, research, and innovation (ITWeb 2021). Leaders in these institutions advocated for aligning academic and research efforts with 4IR principles, anticipating that these technologies would enhance educational access and foster connections to emerging economic opportunities (UNIDO, 2020). However, despite the promise of 4IR, many public universities faced significant contextual challenges during the transition to remote learning, including infrastructural limitations and frequent electricity outages (UNIDO, 2020). Even institutions considered advanced in technology adoption encountered obstacles in adapting to the demands of emergency remote teaching (Strydom and Van der Merwe 2021).

The review in this section adds to the evolving body of knowledge and policy formulation by integrating findings from existing literature and policies related to emergency education,

with particular emphasis on how the higher education sector manages and responds to crises (USAf, 2021). Its objective is to equip policymakers with research-based recommendations aimed at enhancing equity and educational quality during emergencies (Tarricone, Mestan, and Teo 2021), while also promoting the development of a more resilient higher education system—one that is better prepared, more responsive, and capable of effective recovery in the face of future disruptions (ITWeb 2021).

The Adoption of Blended Learning in Higher Learning Institutions

Due to the constraints imposed by the COVID-19 pandemic, higher education institutions were compelled to shift their teaching and learning activities to online platforms (Drysedale et al. 2013). This transition affected both contact-based universities and open distance learning institutions, requiring them to implement blended learning approaches to sustain academic progress during the nationwide lockdown (Block 2010). The integration of Information Technology played a crucial role in enabling remote education by facilitating the delivery of knowledge and skills. However, the effectiveness of online learning is influenced by multiple factors such as stable internet access, suitable learning platforms, digital literacy, and the availability of necessary technological tools (Yang et al. 2021). Blended learning involves the use of various digital tools—including the internet, email, group chats, and video or audio conferencing—delivered primarily through computers. Essentially, it represents the use of electronic technologies to engage with educational content beyond the confines of traditional classroom environments.

There are various platforms necessary to conduct online education that are vital to support inclusive education, such as blended learning with tools such as LMS Blackboard, MOOCS, MyTutor, CANVAS Ulwazi etc. When universities re-opened during the eased levels of the national lockdown, most higher learning institutions in South Africa had already adopted some form of blended learning (Pilli *et al.*, 2018). The majority of learners became affected by the new form of learning because most were used to the traditional face-to-face form of learning (Bozkurt et al. 2020). Nonetheless, virtual and digital correspondence was adopted by some learning institutions as the sole order and strategy for facilitating teaching and learning, regardless of some prevailing circumstances faced by other learning institutions (Sarma 2020). On a positive note, blended learning provided opportunities to learn from unforeseen circumstances, flexible learning possibilities, explore blended or hybrid learning and mixing synchronous learning with asynchronous learning, enhanced teaching and learning experiences as well as the fact that educators can interact with their students on the go from any location and lectures can be fixed at any time of convenience and improved digital skills in line with

emerging educational trends (Greener 2021).

In response to the challenge of sustaining educational continuity during the COVID-19 pandemic, South African public universities adopted various remote learning strategies. These included revising academic calendars and shifting to online curricula supported by digital learning materials (Jubane 2021). Without the global outbreak of COVID-19, the widespread adoption of online and blended learning models would likely not have occurred so rapidly. Many higher education institutions (HEIs) would have continued to favour traditional face-to-face instruction over the integration of technology-based pedagogies. However, the pandemic necessitated a swift transition. Sim et al. (2020) found that students were moderately receptive to online learning and increasingly open to digital learning methods, viewing them as part of the emerging educational norm. Many were already digitally literate and adapted quickly to the online environment.

To bridge gaps identified in earlier research, this study employs the anthropological concept of liminality to examine students' experiences with blended learning during the COVID-19 pandemic (Siegle 2023). This perspective is grounded in the framework proposed by Drysdale et al (2013), which explores learning through multiple dimensions, including outcomes, learner attitudes, instructional methods, interactions, demographic factors, and the use of technology. Blended learning, which merges online and in-person instruction, offers adaptable learning opportunities, though its success is shaped by a variety of interconnected elements. Rutherford and Pickup (2015) provide further insight by outlining six core dimensions that characterize students' learning journeys: disorientation, transformation, integration, constraint, difficulty, and reconstruction. Additionally, the study adopts a conceptual model that identifies critical factors and success indicators for effective blended learning. It underlines the importance of institutional and faculty-level coordination and collaboration to ensure effective implementation across diverse higher education contexts.

The framework in Figure 2 also highlights the dynamic interplay between its various dimensions, illustrating how each element continually influences the others. It underscores the interconnectedness of key components such as “learning, teaching, technology, and knowledge” (Bekele, Karkouti, and Amponsah 2022). Embedded within the framework are specific assumptions about the roles these elements play in the educational process. Furthermore, it captures the inherently multidisciplinary character of the educational technology field, drawing insights from pedagogy, psychology, technology, and instructional design.

METHODOLOGY

This study utilizes multiple data analysis techniques to evaluate the effectiveness of blended learning and to identify key success factors influencing its adoption within South African higher education during the COVID-19 pandemic. By combining descriptive statistics with thematic content analysis, the research draws on secondary data from institutional records, reports, surveys, and academic literature. Quantitative data from the Higher Education Management Information System (HEMIS) spanning 2019 to 2021 were analysed using Poisson regression to explore enrolment and graduation trends by field of study and qualification type, with significance determined at $p < 0.05$. The analysis is framed by a conceptual model emphasizing critical success indicators and factors for blended learning implementation. Ethical clearance was granted since the study relied solely on publicly accessible secondary data, with rigorous attention to data quality, accuracy, and result interpretation.

Thematic Analysis of Qualitative Research

The data, based on the use of blended learning before, during and after COVID-19 was collected and coded into themes in the following sections:

Theme 1: The use of the learning management system

Before the COVID-19 pandemic, Learning Management Systems (LMS) were primarily used by lecturers to upload lecture notes from face-to-face sessions, allowing students to access materials at their convenience and supplement classroom discussions. Although blended learning was already introduced by Higher Education Institutions (HEIs) prior to the pandemic, its adoption accelerated significantly during COVID-19 as an alternative mode of instruction. The LMS became a critical tool, serving as a virtual platform that enabled interaction between lecturers and students beyond the physical classroom. It was used to deliver live and recorded lectures, distribute learning resources, facilitate group discussions, administer quizzes and exams, and bridge the geographical gap among students, peers, and educators.

In the post-pandemic period, blended learning, supported by various technological tools, has demonstrated its value as an effective and efficient teaching method despite the initial challenges faced during implementation. Many universities have since secured licenses for eBook platforms, providing students with online access to textbooks and further enriching the digital learning environment.

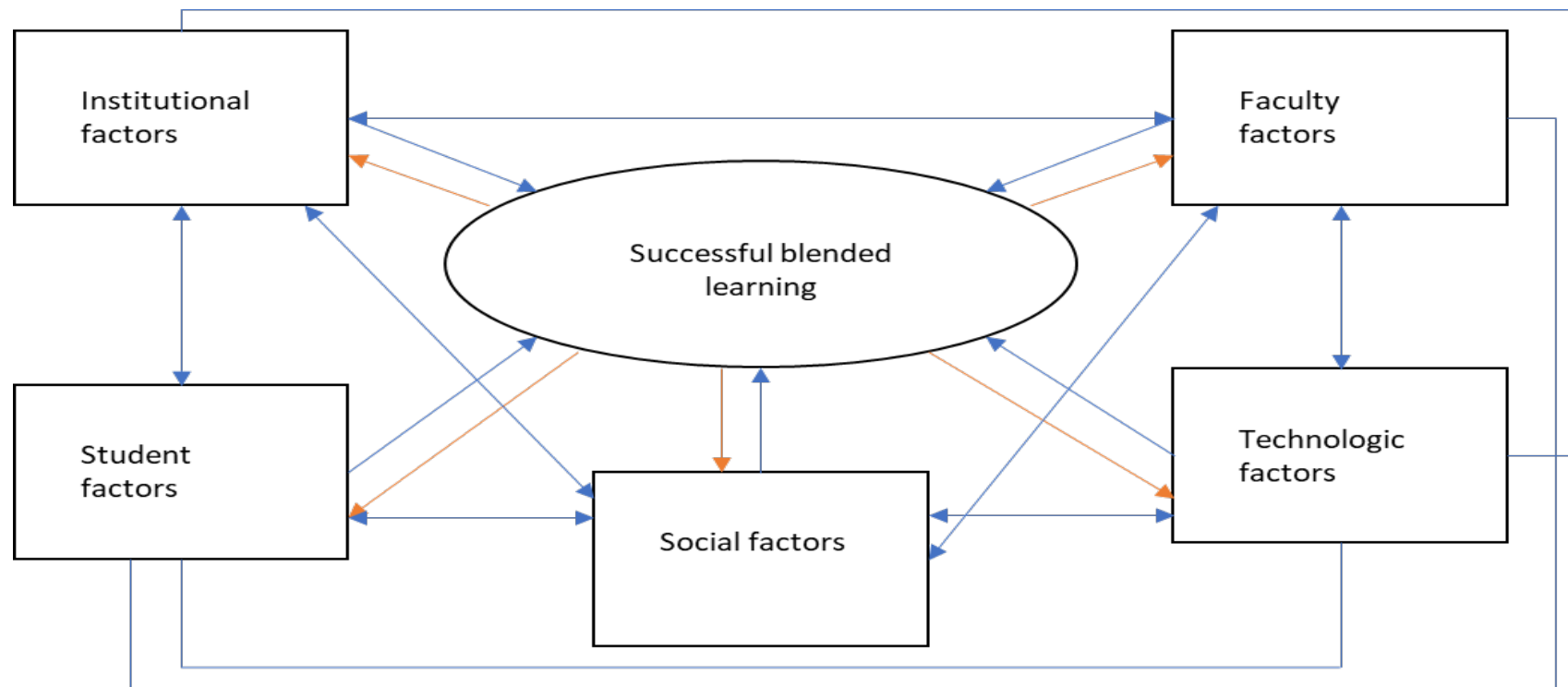


Figure 2: Blended learning conceptual framework

Source: Bekele, Karkouti, and Amponsah (2022)

Theme 2: Resources including finances, human capital and capability

Human resources, defined as the individuals responsible for carrying out specific tasks, are crucial to the successful implementation of any system (Wright and McMahan, 2011). Therefore, it is essential that these personnel receive adequate training to effectively operate the software. Additionally, sufficient budget allocation is necessary to support both the training process and the deployment of the blended learning platform. Proper investment helps ensure smooth functionality, minimizes technical downtime, and addresses potential system capacity issues.

Theme 3: Engagement of stakeholders

Engaging stakeholders is essential, as they must understand and adapt to the changes occurring within universities, given their direct or indirect involvement. Active engagement and training of academic staff are crucial to minimizing resistance and ensuring the successful implementation of blended learning. Activities such as seminars and workshops play a key role in securing user buy-in, reducing hesitation toward shifting from traditional teaching methods, and helping lecturers appreciate the advantages of adopting blended learning systems.

Theme 4: A robust and reliable IT infrastructure

Effective blended learning hinges on the availability of reliable ICT infrastructure and digital platforms that enable remote or off-campus access. Ongoing financial investment is critical to maintain and upgrade infrastructure, equipment, communication systems, and technical support to meet the evolving needs of users. This study employs thematic content analysis to explore the primary factors that influence both the success and challenges associated with blended learning. As a result, it offers an in-depth and context-specific understanding of how blended learning functions within South Africa's higher education landscape, combining rich descriptions with analytical interpretation to accurately reflect the complexities of the phenomenon under study.

RESULTS AND DISCUSSIONS

Empirical Results

Table 1 illustrates 2021 academic year students' enrolment statistics. The majority of students were from African descent (80% females and 78.8% males), followed by whites (9.6% females and 11.1% males) and coloureds (5.9% females and 5.1% males). There was a greater gender disparity in attendance methods with the distant learning technique, as more African female students (83.3%) than African male students (81.2%) were registered in 2021.

Nonetheless, in comparison to White male students, fewer White female students registered in 2021. Less gender difference was observed in terms of contact technique, with the exception of the Coloured group, where more Coloured female students were enrolled for the year 2021 than coloured male students.

Table 1: Number of students enrolled in public higher education institutions by attendance method, population group, and gender

Group	Contact N (%)		Distance N (%)		Total N (%)	
	Female	Male	Female	Male	Female	Male
African	297812 (77,6%)	233630 (77,8%)	226525 (83,3%)	91198 (81,2%)	524337 (80%)	324828 (78,8%)
Coloured	24897 (6,5%)	15741 (5,2%)	13483 (5%)	5170 (4,6%)	38380 (5,9%)	20911 (5,1%)
Indian/Asian	13783 (3,6%)	11119 (3,7%)	9697 (3,6%)	4305 (3,8%)	23480 (3,6%)	15424 (3,7%)
White	42222 (11%)	35073 (11,7%)	20806 (7,7%)	10816 (9,6%)	63028 (9,6%)	45889 (11,1%)
Unspecified	4818 (1,3%)	4604 (1,5%)	1384 (0,5%)	772 (0,7%)	6202 (0,9%)	5376 (1,3%)
Total	383532	300167	271895	112261	655427	412428

Source: own compilation

Table 2 presents the distribution of full-time equivalent (FTE) student enrolments in public higher education institutions by mode of attendance and primary field of study. In 2021, a total of 787,228 FTE students were enrolled, with 68.6 per cent attending through contact-based learning and 31.4 per cent opting for remote or distance education. Among those engaged in distance learning, the largest proportion were enrolled in other humanities (43.2%), followed by education (22.4%) and business and management (21.5%). Conversely, contact learning was most common among students in the Science, Engineering, and Technology (SET) disciplines, accounting for 37.3% of in-person enrolments, followed by other humanities (27.6%) and business and management (22.3%).

Table 2: Number of Full-Time Equivalent student enrolment in public HEIs, by attendance mode and major field of study, 2021

	Science, Engineering and Technology		Business and Management		Education		Other Humanities		Total	
	N	%	N	%	N	%	N	%	N	%
Distance	31760	12,9%	53058	21,5%	55421	22,4%	106855	43,2%	247094	31.4%
Contact	201343	37,3%	120714	22,3%	69068	12,8%	149009	27,6%	540134	68.6%
Total	233103	29,6%	173772	22,1%	124489	15,8%	255865	32,5%	787228	100%

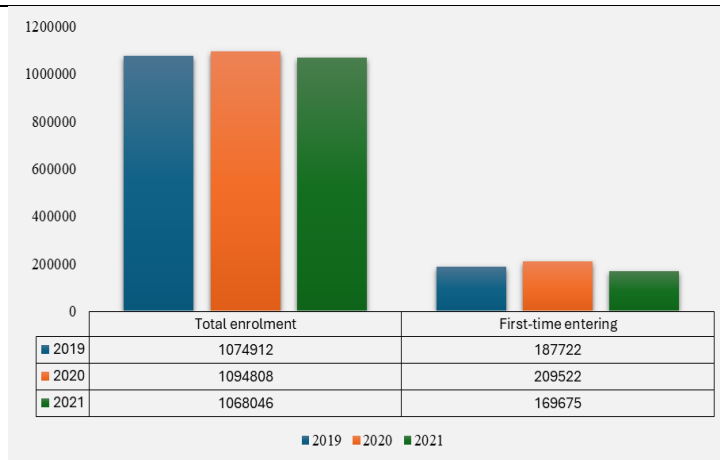
Source: own compilation

Figure 4 shows change in number of students enrolled or graduated in public South African universities by attendance mode, major field of study and qualification type between 2019, 2020 and 2021.

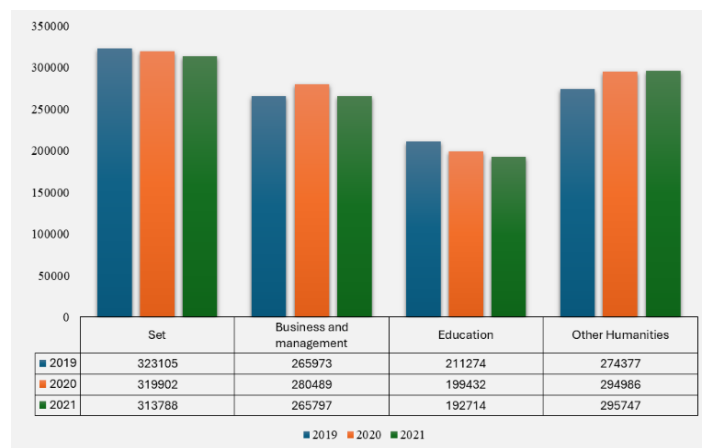
Table 3: Poisson regression models for number of first-time undergraduate students enrolled in public HEIs, 2019 – 2021

Time period	IRR ^a	95% CI	P value
Total enrolment			
2019 vs. 2020	1.02	1.02, 1.02	<0.001
2020 vs. 2021	0.98	0.97, 0.98	<0.001
First-time entering			
2019 vs. 2020	1.12	1.11, 1.12	<0.001
2020 vs. 2021	0.81	0.80, 0.82	<0.001

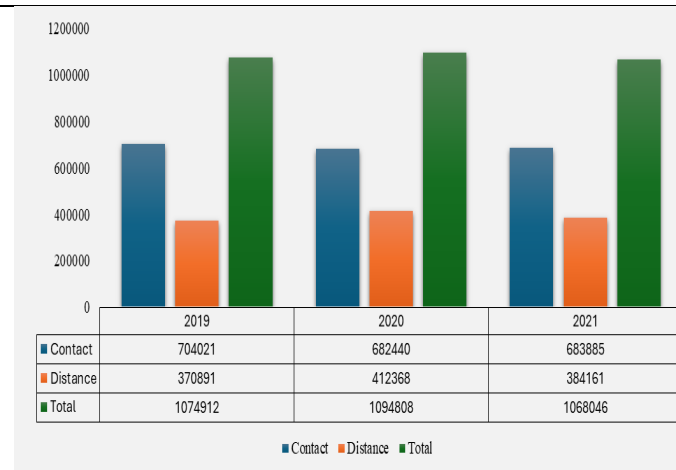
^a Reference group is the prior period, that is, total enrolment 2020 versus 2019 (ref); total enrolment 2021 versus 2020 (ref); first-time entering 2020 versus 2019 (ref); first-time entering 2021 versus 2020 (ref). p-value <0.05 was highlighted in bold to show significance. CI, confidence interval; IRR, incidence rate ratio.



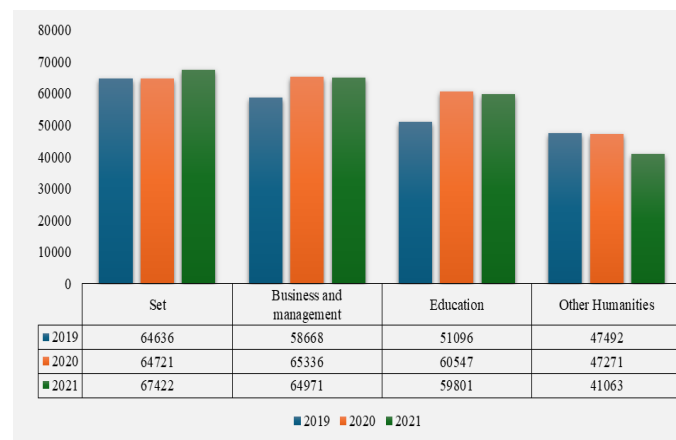
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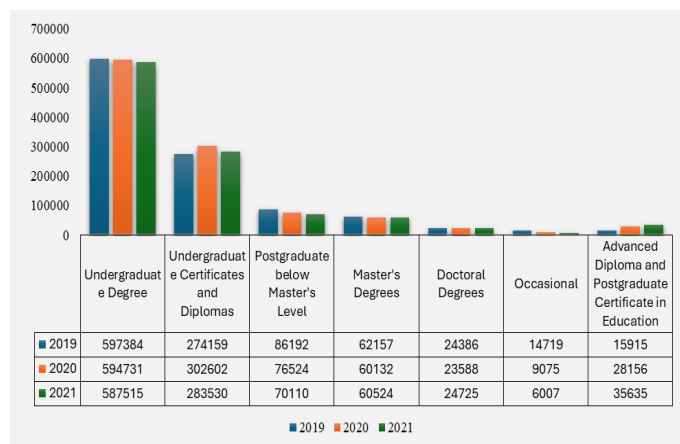
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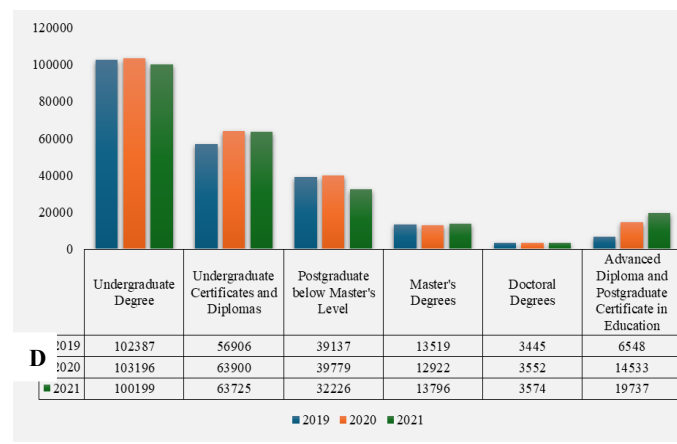
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Graph A: Number of first-time undergraduate students enrolled in public HEIs, 2019 – 2021

Graph B: Number of students enrolled in public HEIs by attendance mode, 2019 - 2021

Graph C: Number of students enrolled in public HEIs by major field of study, 2019 – 2021

Graph D: Number of graduates from public HEIs by major field of study, 2019 – 2021

Graph E: Number of students enrolled in public HEIs by qualification type, 2019 – 2021

Graph F: Number of graduates from public HEIs by qualification type, 2019 – 2021

Figure 4: Number of students enrolled or graduated in public South African universities

Source: Secondary data

Number of first-time undergraduate students enrolled in public HEIs, 2019 – 2021

Overall, the number of students enrolled in public universities increased by 2 per cent from 2019 to 2020; but declined by 2 per cent from 2020 to 2021 (Fig. 4A and Table 3). However, first-time enrolment rose by 12 per cent from 2019 to 2020 and fell by 19 per cent from 2020 to 2021.

Table 4: Poisson regression models for number of students enrolled in public HEIs by attendance mode, 2019 – 2021

Time period	IRR ^a	95% CI	P value
Contact			
2019 vs. 2020	0.97	0.96, 0.97	<0.001
2020 vs. 2021	1.00	1.00, 1.01	0.216
Distance			
2019 vs. 2020	1.11	1.11, 1.12	<0.001
2020 vs. 2021	0.93	0.93, 0.94	<0.001
Total			
2019 vs. 2020	1.02	1.01, 1.02	<0.001
2020 vs. 2021	0.98	0.97, 0.98	<0.001

^a Reference group is the prior period, that is, contact 2020 versus 2019 (ref); contact 2021 versus 2020 (ref); distance 2020 versus 2019 (ref); distance 2021 versus 2020 (ref); total 2020 versus 2019 (ref); total 2021 versus 2020 (ref). *p*-value <0.05 was highlighted in bold to show significance. CI, confidence interval; IRR, incidence rate ratio.

Number of students enrolled in public HEIs by attendance mode, 2019 - 2021

Number of students enrolled in public universities increased by 2 per cent from 2019 to 2020 and decreased by 2 per cent from 2020 to 2021 as shown in Table 4. In addition, the distance learning approach also reflects the same pattern, where students enrolled increased by 11 per cent from 2019 to 2020 and decreased by 9 per cent from 2020 to 2021. Face-to-face learning, on the other hand, decreased by 3 per cent between 2019 and 2020 and show no significant change between 2020 and 2021.

Table 5: Poisson regression models for number of students enrolled or graduated in public universities by major field of study, 2019 – 2021

Time period	Number of students enrolled in public HEIs by major field of study, 2019 – 2021			Number of graduates from public HEIs by major field of study, 2019 – 2021		
	IRR ^a	95% CI	P value	IRR ^a	95% CI	P value
Set						
2019 vs. 2020	0.99	0.99, 1.00	<0.001	1.00	0.99, 1.01	0.813
2020 vs. 2021	0.98	0.98, 0.99	<0.001	1.04	1.03, 1.05	<0.001
Business and management						
2019 vs. 2020	1.05	1.05, 1.06	<0.001	1.11	1.10, 1.13	<0.001
2020 vs. 2021	0.95	0.94, 0.95	<0.001	0.99	0.98, 1.01	0.312

Time period	Number of students enrolled in public HEIs by major field of study, 2019 – 2021			Number of graduates from public HEIs by major field of study, 2019 – 2021		
	IRR ^a	95% CI	P value	IRR ^a	95% CI	P value
Education						
2019 vs. 2020	0.94	0.94, 0.95	<0.001	1.18	1.17, 1.20	<0.001
2020 vs. 2021	0.97	0.96, 0.97	<0.001	0.99	0.98, 1.00	0.032
Other Humanities						
2019 vs. 2020	1.08	1.07, 1.08	<0.001	1.00	0.98, 1.01	0.473
2020 vs. 2021	1.00	1.00, 1.01	0.322	0.87	0.86, 0.88	<0.001

^a Reference group is the prior period, that is, set 2020 versus 2019 (ref); set 2021 versus 2020 (ref); business and management 2020 versus 2019 (ref); business and management 2021 versus 2020 (ref); education 2020 versus 2019 (ref); education 2021 versus 2020 (ref); other humanities 2020 versus 2019 (ref); other humanities 2021 versus 2020 (ref). p-value <0.05 was highlighted in bold to show significance. CI, confidence interval; IRR, incidence rate ratio.

Number of students enrolled or graduated in public university by major field of study, 2019 – 2021

Table 5 outlines the number of students enrolled in and graduating from public universities across major fields of study between 2019 and 2021. Enrolment in Science, Engineering, and Technology (SET) programs declined by 1 per cent from 2019 to 2020, and by a further 2 per cent from 2020 to 2021. Despite this, the number of SET graduates rose modestly by 4 per cent between 2020 and 2021. In the business and management field, enrolments increased by 5 per cent from 2019 to 2020 but declined by the same margin the following year. Graduations in this field grew by 11 per cent from 2019 to 2020, with little change noted between 2020 and 2021. Education enrolments dropped by 6 per cent in the first period and an additional 3 per cent in the second, though the graduation rate experienced a notable 18 per cent increase between 2019 and 2020. Meanwhile, enrolment in other humanities rose by 8 per cent from 2019 to 2020, but the number of graduates declined by 13 per cent in 2021 compared to the previous year.

Table 6: Poisson regression models for number of students enrolled or graduated in public university by qualification type, 2019 – 2021

Time period	Number of students enrolled in public HEIs by qualification type, 2019 – 2021			Number of graduates from public HEIs by qualification type, 2019 – 2021		
	IRR ^a	95% CI	P value	IRR ^a	95% CI	P value
Undergraduate Degree						
2019 vs. 2020	0.99	0.99, 1.00	0.015	1.01	1.00, 1.02	0.074
2020 vs. 2021	0.99	0.98, 0.99	<0.001	0.97	0.96, 0.98	<0.001
Undergraduate Certificates and Diplomas						
2019 vs. 2020	1.10	1.10, 1.11	<0.001	1.12	1.11, 1.14	<0.001
2020 vs. 2021	0.94	0.93, 0.94	<0.001	1.00	0.99, 1.01	0.624
Postgraduate below Master's Level						
2019 vs. 2020	0.88	0.88, 0.90	<0.001	1.02	1.00, 1.03	0.022
2020 vs. 2021	0.91	0.91, 0.93	<0.001	0.81	0.80, 0.82	<0.001

Time period	Number of students enrolled in public HEIs by qualification type, 2019 – 2021			Number of graduates from public HEIs by qualification type, 2019 – 2021		
	IRR ^a	95% CI	P value	IRR ^a	95% CI	P value
Master's Degrees						
2019 vs. 2020	0.97	0.96, 0.98	<0.001	0.96	0.93, 0.98	<0.001
2020 vs. 2021	1.01	1.00, 1.02	0.259	1.07	1.04, 1.09	<0.001
Doctoral Degrees						
2019 vs. 2020	0.97	0.95, 0.98	<0.001	1.03	0.98, 1.08	0.201
2020 vs. 2021	1.05	1.03, 1.07	<0.001	1.01	0.96, 1.05	0.794
Advanced Diploma and Postgraduate Certificate in Education						
2019 vs. 2020	1.77	1.74, 1.80	<0.001	2.22	2.16, 2.29	<0.001
2020 vs. 2021	1.27	1.25, 1.29	<0.001	1.36	1.33, 1.39	<0.001

^a Reference group is the prior period, that is, undergraduate degree 2020 versus 2019 (ref); undergraduate degree 2021 versus 2020 (ref); undergraduate certificates and diplomas 2020 versus 2019 (ref); undergraduate certificates and diplomas 2021 versus 2020 (ref); postgraduate below master's level 2020 versus 2019 (ref); postgraduate below master's level 2021 versus 2020 (ref); master's degrees 2020 versus 2019 (ref); master's degrees 2021 versus 2020 (ref); doctoral degrees 2020 versus 2019 (ref); doctoral degrees 2021 versus 2020 (ref); advanced diploma and postgraduate certificate in education 2020 versus 2019 (ref); advanced diploma and postgraduate certificate in education 2021 versus 2020 (ref). p-value <0.05 was highlighted in bold to show significance. CI, confidence interval; IRR, incidence rate ratio.

Number of students enrolled or graduated in public university by qualification type, 2019 – 2021

Table 6 above shows the number of students enrolled or graduated from public universities based on qualification type. Students enrolled in undergraduate programmes declined by 1 per cent from 2019 to 2020 and 2020 to 2021, respectively. Between 2020 and 2021, the number of undergraduates who graduated decreased by only 3 per cent. The number of students enrolling in undergraduate certifications and diplomas increased by 10 per cent between 2019 and 2020, but then decreased by 6 per cent from 2020 to 2021. The number of students who graduated increased by 12 per cent between 2019 and 2020, but there was no significant difference between 2020 and 2021. Students enrolled for postgraduate below master's level decreased by 12 per cent and 9 per cent from 2019 to 2020 and 2020 to 2021, respectively. However, the number of graduations increased by 2 per cent between 2019 and 2020 and declined by 19 per cent in 2020 and 2021. Student enrolled for master's degree decreased by 3 per cent between 2019 and 2020. In addition, the number of graduations also dropped by 4 per cent from 2019 to 2020; however, increased by 7 per cent from 2020 to 2021. The students who were registered for doctoral degree decreased by 3 per cent between 2019 and 2020, but then increased by 5 per cent from 2020 to 2021. Lastly, the students enrolled for advanced diploma and postgraduate certificate in education increased by 77 per cent and 27 per cent from 2019 to 2020 and 2020 to 2021, respectively. Also, the number of graduations increased by 122 per cent and 36 per cent from 2019 to 2020 and 2020 to 2021, respectively.

DISCUSSIONS

Policy Gaps and Infrastructure Disparities

While the adoption of blended learning was crucial during the pandemic, deeper systemic issues in South Africa's higher education sector, particularly in policy and infrastructure, have hindered equitable access. Policy gaps regarding digital learning are most evident in the lack of clear frameworks for technological investment in historically disadvantaged institutions. These institutions, already struggling with inadequate resources, faced severe difficulties in moving to digital platforms, which worsened the digital divide (Woldegiorgis, and Mhlanga, 2022). Beyond the immediate context of the pandemic, long-term policy interventions are required to address the disparities in digital infrastructure, such as unequal access to high-speed internet and modern educational technology, which continue to affect student performance and educational equity. A national policy push towards a uniform digital infrastructure could help mitigate these gaps, ensuring that all institutions are equally prepared for future disruptions. This is especially important given the continued rise of digital learning in post-pandemic education.

Connectivism and Online Technologies

Connectivism highlights the importance of learners building networks by interacting with diverse information sources and peers to enhance their learning and problem-solving skills. Unlike traditional learning theories that focus on individual knowledge construction, connectivism stresses the role of technology and the internet in facilitating these connections. It encourages active exploration, experimentation, and collaborative learning as essential components of education (Park and Shea 2020).

Financing Education

Financing education is a critical government responsibility to ensure equitable access for all, regardless of socioeconomic background. Effective funding mechanisms, such as scholarships, grants, and loans, help bridge financial gaps and promote inclusive education (Zumeta and Kinne, 2018 Chu and Hoang 2020). For example, Kenya's government partnered with telecom companies to provide free data for educational purposes, expanding digital learning

opportunities (Kiambati, et al. 2022). In South Africa, initiatives like the National Student Financial Aid Scheme (NSFAS) and the National Research Foundation (NRF) support students from disadvantaged backgrounds, making education a social and economic investment.

Continuous Quality Improvement

The COVID-19 pandemic fast-tracked the transition to online and blended learning, compelling academic staff to rapidly adjust to virtual instruction, often with minimal previous exposure or training. Successful online education depends on instructors' understanding of best practices, teaching strategies, and digital tools. Preparing educators through training in online course navigation, learning styles, simulations, and mentorship improves course quality and student engagement. Continuous quality improvement ensures that blended and online learning environments meet evolving educational needs and provide effective learning experiences. Furthermore, for sustainable integration of blended learning into higher education, ongoing professional development for educators is essential. It is recommended that institutions invest in continuous training programs focused on digital pedagogy, technological fluency, and curriculum design tailored for blended environments. Workshops and certification programmes should be regularly offered to educators, ensuring they remain adept at using new teaching tools and platforms.

Humanising the Learning Content

In the post-pandemic era, where completely blended learning courses will be the main course offerings, lecturers should incorporate an inclusive online learning approach with rich human connections to create a lasting impact which can also challenge students to accomplish their full academic potential. Given the educators' experience in face-to-face and blended learning, lecturers should focus on the following key factors to humanize classes:

Building a social presence and orientation in blended learning

In blended learning, instructors should create a clear and organized course structure that allows students easy access to modules, assignments, and key information such as syllabi, calendars, and deadlines from the start. Providing access to educational resources, university policies, and online libraries helps students plan effectively and fosters a positive learning environment. Early activities like introductory posts and initial discussions build trust and establish a strong foundation for teaching and cognitive presence.

Student collaboration and removal of the sense of isolation

To reduce student isolation and encourage engagement, educators can implement collaborative activities such as role-playing, debates, brainstorming, and team-based case studies. During online sessions, pausing to have students summarize content or using breakout rooms for small group discussions promotes active learning and clarifies understanding. These collaborative strategies also help students connect with peers and instructors, reducing feelings of isolation while developing teamwork skills essential for future careers.

Bridging the Digital Divide

Technology has become a cornerstone of student learning, particularly in the aftermath of the COVID-19 pandemic. Reliable access to the internet, digital devices, and Wi-Fi is now essential; however, many students continue to face barriers due to the persistent digital divide. Addressing this divide is critical for improving learners' capacity to engage in study, collaboration, and problem-solving within modern educational settings. In the Southern African Development Community (SADC) region, deeper structural challenges—especially related to policy and infrastructure—have further obstructed equitable digital access. Notably, there is a lack of comprehensive frameworks guiding technological investment, particularly in historically disadvantaged institutions. These institutions, already constrained by limited resources, experienced significant obstacles in transitioning to online platforms, thereby widening the existing digital gap. Beyond the pandemic's immediate impact, sustainable policy reforms are urgently needed to rectify inequalities in digital infrastructure, such as disparities in broadband connectivity and access to up-to-date educational technologies. The implementation of a unified national digital infrastructure policy is essential to ensure all higher education institutions are equally equipped to adapt to future disruptions and to promote long-term educational equity.

CONCLUSION AND POLICY IMPLICATIONS

Sustainable adoption of blended learning in higher education requires ongoing professional development for educators. Institutions must prioritize continuous training focused on digital pedagogy, technological proficiency, and curriculum design tailored to blended environments. Offering regular workshops and certification programs ensures that educators stay updated with emerging teaching tools and platforms. Simultaneously, investing in robust digital infrastructure, especially at historically disadvantaged universities, is critical. This investment

includes expanding access to high-speed internet, providing necessary devices to students, and establishing comprehensive IT support systems capable of managing disruptions. Inclusivity must be a central consideration to ensure all students, regardless of socio-economic background, can participate fully.

Emergency preparedness is another essential component. Academic stakeholders should be equipped to quickly adapt to unforeseen changes by allocating resources toward additional pedagogical training that enhances both teaching presence and cognitive engagement. Beyond technology integration, higher education institutions must implement rigorous quality assurance processes and continuous improvement strategies to effectively manage change and elevate teaching and learning quality. While digital technologies will play an increasingly central role in future education systems, resilient education models need to support multiple learning modalities. Classrooms and assessments should remain focal points for educational reforms to monitor learning progress effectively, regardless of whether instruction is face-to-face, online, or blended. Building resilience in education requires agility among all stakeholders, including governments, institutional leaders, lecturers, students, and sponsors. Clear delineation of roles and adequate support through training in quality and change management, as well as fostering student resilience, are essential.

The Blended Teaching and Learning Conceptual Framework introduced in this study reflects a paradigm shift from passive to active learning. It transforms the classroom from a primarily presentational setting into an interactive environment where learners engage in reading, speaking, listening, and critical thinking. This framework facilitates both collaborative and independent learning and integrates online with face-to-face components to accommodate diverse learning styles. Evidence shows that blended learning improves student outcomes by lowering dropout rates, increasing test scores, and enhancing motivation, while also maintaining a personal connection between educators and learners.

However, the study acknowledges limitations due to reliance on secondary data, which may underrepresent smaller or under-resourced institutions, skewing findings toward better-equipped universities. To mitigate this, multiple data sources were cross-referenced to validate trends, but further primary research is recommended to provide a more comprehensive view, especially regarding dropout rates linked to digital access issues. Increased student engagement and the adoption of online platforms during the pandemic exemplify this dynamic. Notably, higher enrolment rates among African female students in distance learning support the framework's emphasis on peer interaction and inclusivity. The thematic analysis of stakeholder engagement further reinforces how digital tools promoted collaboration during the crisis.

In summary, this study highlights the importance of continuous professional development, robust infrastructure, inclusivity, emergency preparedness, and quality assurance for the successful and sustainable implementation of blended learning. It also underscores the value of active learning frameworks like Laurillard's to guide effective educational practices in a rapidly evolving digital landscape. This study's reliance on secondary data may bias results toward well-resourced institutions, underrepresenting smaller or disadvantaged universities. Its focus on South African higher education during COVID-19 limits generalizability to other contexts and post-pandemic periods. The lack of primary qualitative data restricts understanding of personal experiences, and digital access challenges may be underreported. Future research should include qualitative approaches, comparative and longitudinal studies, and emphasize equity and access issues. In addition, evaluating educator training and exploring innovative technology and pedagogy in blended learning will be essential to improve teaching and learning outcomes in diverse settings.

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