Physical Infrastructure Management and Curriculum Implementation in Public Universities in Northern Uganda

EMMANUEL ACIDRI BILETI[1]*, STEPHEN NDAWULA[1], HARRIET KEBIRUNGI[1] & JOSEPH RWOTHUMIO[1]

[1] *Kyambogo University, School of Education*

P.O. Box 1 Kyambogo, Kampala, Uganda

**Corresponding author: ORCID ID: https://orcid.org/ 0009-0009-1584-7881; email:emmabileti@rocketmail.com*

Accepted 18 September 2024, published 10 October 2024

https://doi.org/10.58653/nche.v12i1.7

Abstract

This study aimed to assess the level of curriculum implementation, evaluate the level of physical infrastructure management, and investigate the influence of physical infrastructure management in the areas of lecture room facilities, technology facilities and safety devices on curriculum implementation in public universities in Northern Uganda. The study employed a positivist approach. The sample consisted of 123 academic staff selected using a simple random sampling technique. Data was collected using a self-administered questionnaire and analysed using frequencies, percentages and means at the descriptive level, correlations at the bivariate level, and multiple linear regression at the multivariate level. The results showed that the level of curriculum implementation was low and the level of physical infrastructure management was moderate. Also, lecture room facilities had a significant positive influence on curriculum implementation. However, technology facilities and safety devices had a positive but insignificant influence on curriculum implementation. Therefore, it was concluded that physical infrastructure management, concentrating on lecture room facilities, technology equipment and safety devices, is vital for curriculum implementation in public universities. Thus, this study recommended that the government and public universities should make deliberate efforts to provide sufficient lecture room facilities, modern technology equipment and sufficient safety devices to further improve curriculum implementation, especially in activities such as preparation for teaching, content delivery and assessment of learning in the public universities.

Keywords: *Physical infrastructure management; curriculum implementation; Northern Uganda; Public universities*

Introduction

The concept of "curriculum implementation" entails putting into practice the officially prescribed courses of study, syllabuses and subjects with a focus on the preparation for teaching, content delivery and assessment of students' learning (Chaudhary, 2015). Globally, curriculum implementation in public universities dates back to the Italian University of Bologna in 1088, and the curriculum included degrees in grammar, rhetoric, logic, theology, canon law and notarial law, both secular and non-secular (Ruegg, 2021). Since then, a number of public universities have been established worldwide, but several stakeholders in countries like the USA, Europe and Asia have been concerned about the quality of the curriculum implemented in these universities. This has been exacerbated by the belief that academic staff's level of preparation for lectures is still low, there is less learner involvement during content delivery, and academic staff use limited approaches to assessment of learners (Anyiendah, 2017). In sub-Saharan Africa, universities often faced shortages of resources, including books, technology equipment and adequate lecture room facilities, which hindered effective teaching and assessment. In many of these universities, the academic staff members do not prepare well for lectures, students are not involved in the delivery of content and the academic staff employ old methods of assessment, which have contributed to increased concerns about curriculum implementation in public universities (Ajayi & Ayodele, 2015; Chaudhary, 2015). According to Moyahabo et al. (2018), tutors' pathetic preparation for teaching, heavy usage of traditional rote teaching-learning approaches and weak assessments of learning have been the main problems in public universities worldwide. A number of stakeholders have expressed concern about curriculum implementation in several public universities in countries like Nigeria, Senegal and Ghana. The recurrent infidelities in public universities related to learner assessments, content delivery and teaching preparation have validated these concerns (Kanake et al., 2015; Kweku, 2021).

In Uganda, numerous public universities have been established, and these universities have worked tirelessly towards improving the implementation of their curricula (Azikuru, Onen, & Ezati, 2017). However, the problems associated with curriculum implementation in public universities have continued to increase over the years. For example, Muganga et al. (2019) reported that over 60% of students in public universities in Uganda are not active participants in the classroom. Taye et al. (2019) reported that several students in public universities could not grasp the lessons sufficiently as some academic staff rushed to cover the content of the courses, leading to learners' memorising of content to simply pass examinations (Niyivuga et al., 2019). According to Govender (2018), to ensure that the curriculum is effectively implemented, infrastructure such as classrooms, laboratories and libraries must be provided in adequate quantities. Similarly, Alemiga and Kibukamusoke (2019) contend that for universities to successfully implement a curriculum, there is an urgent need for sufficient classrooms to alleviate the overcrowding of learners. Physical infrastructure management plays an essential part in ensuring effective implementation of a curriculum in the areas of preparation for teaching, content delivery and assessment of learning in public universities. Many universities in Uganda, including those in Northern Uganda, lack lecture rooms and facilities like chairs, tables and notice boards. There is inadequate technology equipment such as computers, projectors and safety devices.

Also, technology equipment and internet penetration are relatively low (Ajuaba et al., 2022). Therefore, it is vital to assess the levels of curriculum implementation, evaluate the level of physical infrastructure management, and investigate the influence of physical infrastructure management on curriculum implementation in public universities in Northern Uganda. However, a literature search revealed a dearth of studies showing how physical infrastructure management influences curriculum implementation in public universities. The study tested the following hypotheses that:

H_1 Lecture room facilities management has a statistically positive significant influence on curriculum implementation.

H_2 Technology equipment management has a statistically positive significant influence on curriculum implementation.

H_3 Safety devices management has a statistically positive significant influence on curriculum implementation.

Literature Review

This section presents the theory that underpinned this study and the literature review that related physical infrastructure management aspects of lecture room facilities, technology equipment and safety devices to curriculum implementation, showing gaps that emerged from the study.

Theoretical Review

This study was guided by Von Bertalanffy's systems theory, which was developed in the 1920s (Tabor, 2021). Systems theory posits that a system focuses on the arrangement of and relations between the parts and how they work together as a whole. The way the parts are organised and how they interact with each other determines the properties of that system. Ueland et al. (2021) further reveal that in systems theory, the ultimate unit of analysis is that parts of a system must be related and designed to work as a whole entity, and it consists of six components: individual, microsystem, mesosystems, exosystem, macrosystem and the chronosystem. The six components of systems theory were used as a lens to guide the study, namely: (1) individual: recognising the unique needs, abilities and learning styles of each student are crucial. Tailoring the curriculum to accommodate diverse learners ensures that each student can achieve their full potential. (2) Microsystem: The immediate learning environment, including the classroom, family and peer groups, directly impacts student engagement and success. Effective curriculum implementation considers these primary contexts. (3) Mesosystems: Interactions between different microsystems, such as the relationship between home and school, can significantly affect curriculum implementation. Coordinated efforts between these systems can support a cohesive learning experience. (4) Exosystem: External factors, such as policies and resources, indirectly influence the curriculum and its implementation. Understanding these factors can help educators navigate and leverage them to support student learning. (5) Macrosystem: The broader cultural, societal and economic context shapes educational values, expectations and resources. A curriculum aligned with these wider contexts can promote relevance and inclusivity. (6) Chronosystem: Changes over time, including

technological advancements, shifting societal norms and educational reforms, influence curriculum implementation.

Furthermore, this theory is relevant for physical infrastructure management for a number of reasons: (1) it encourages a holistic view of infrastructure management, considering how different components interact and affect the overall system. (2) Infrastructure systems are interconnected, and it enables managers to understand that changes in one component can affect others. (3) It emphasises the need for scalable and flexible solutions to adapt to changing needs and technologies. Infrastructure planning should allow for future expansion and technological upgrades, ensuring long-term sustainability and adaptability. (4) It enables managers to understand that effective infrastructure management requires input from multiple stakeholders, including government agencies, private sector partners and the community. Hence, engaging stakeholders in the implementation phases ensures that diverse needs are met and fosters collaboration and support. (5) Systems theory promotes sustainable practices by considering the long-term impacts of infrastructure projects on the environment and society. (6) Systems theory views infrastructure as dynamic and adaptive, capable of evolving with changing conditions and demands.

Although systems theory is a broad theory that does not particularly address how physical infrastructure is managed and how it affects the way curriculum is implemented, it does highlight the need to consider the university as a whole. This study, which was informed by systems theory, looked at university infrastructure management as part of a system for enhancing the way science courses are implemented. Therefore, based on systems theory, this study investigated physical infrastructure management as a component of a system and how it is used for improving curriculum implementation in public universities in Northern Uganda.

Physical infrastructure management and curriculum implementation

Physical infrastructure management involves the oversight, maintenance and optimisation of physical assets such as lecture room facilities, technology equipment, safety devices and other essential facilities that support the functioning of communities and Organisations. It ensures that these assets are safe, functional and efficient throughout their lifecycle (Ajibola et al., 2017). Different scholars (Almaiah et al., 2020; Eze et al., 2018; Jegede et al., 2021; Mugizi, 2021; Mwirichia & Barchok, 2017; Nassirpour et al., 2018; Rumanyika & Galan, 2015; Siddique et al., 2019) have studied physical infrastructure in universities. These studies shed light on assets like lecture room facilities, technology equipment and safety devices in relation to curriculum implementation. However, empirical and contextual gaps emerge from the studies above. For example, regarding lecture room facilities, Eze et al. (2018) found that most Nigerian universities lacked adequate lecture room facilities, making curriculum implementation cumbersome. Siddique et al. (2019) found that most public universities in Pakistan had inadequate facilities like desks, chairs, tables or lockers. Nassirpour et al. (2018) also found that inadequate physical infrastructure negatively impacted curriculum implementation in public universities. Ajibola et al. (2017) found that modern classroom materials and equipment are essential for effective curriculum implementation. However, these studies did not focus on lecture room facilities in public universities in Northern Uganda, which is the focus of this study.

With respect to technology equipment, this is a vital component in university curriculum implementation, enabling academic staff to deliver effective content (Ibrahim et al., 2020). Also, Almaiah et al. (2020) found in their study that technology equipment, such as projectors, computers, tablets and internet servers, significantly influences curriculum implementation. Jegede et al. (2021) emphasise the importance of technology and equipment for effective content delivery and supervision in the university system. Karakus (2021) also emphasises the need for sufficient and aesthetically pleasing technology equipment for universities to operate well. Rumanyika and Galan (2015) found that a lack of equipment hinders effective content delivery among academic staff in Tanzanian universities. Mwirichia and Barchok (2017) found that Kenyan universities were poorly equipped, negatively influencing content delivery. At the contextual level, except for the study by Mugizi (2021) done on university physical infrastructure in Uganda, all the other studies on physical infrastructure in universities were done outside Uganda. This study aims to explore the influence of technology equipment on curriculum implementation in public universities in Northern Uganda, hence the need for further research.

As regards safety devices, which are tools such as first aid kits, handwashing cans, sanitisers, gloves and laboratory goggles, among others, designed to protect academic staff and students from harm and prevent accidents or injuries in curriculum implementation, there are scholars (Williamson, 2018; Shirokova et al., 2017) who have studied safety devices and curriculum implementation. These studies were consistent in finding that safety devices have a positive and significant effect on curriculum implementation. Also highlighted was the need for sufficient safety devices in universities, including fire extinguishers, first aid kits, laboratory goggles and handwashing devices. Oketch (2016) notes that despite progress made by public universities in sub-Saharan Africa, most universities still have inadequate safety devices, which affects curriculum implementation. Ajuaba et al. (2022) and Kasule (2015) reported poor educational facilities, dilapidated equipment, poorly designed lecture rooms, inappropriate lighting, insufficient safety measures in fire emergencies, and a lack of personal protective equipment for staff, which has significantly affected the quality of the curriculum implemented in universities in Uganda. From the literature reviewed, it can be seen that several studies have been carried out on physical infrastructure in public universities by Ajuaba et al. (2022), Kasule (2015) and Oketch (2016), but their effect on curriculum implementation has not been shown. The researchers acknowledged the gaps in the literature requiring further investigation, hence the need for this study to establish the influence of physical infrastructure on curriculum implementation in public universities in Northern Uganda.

Methodology

This study employed a correlational research design and adopted the positivist approach because it emphasised observable and measurable facts and allowed the researchers to minimise bias and subjectivity, ensuring that findings were based on empirical evidence rather than personal beliefs or opinions. According to Creswell et al. (2018), the positivist approach typically involves quantitative methods, which allow for the statistical analysis of data. This can lead to precise and generalisable results, enabling researchers to draw broader conclusions from their studies. Furthermore, Savela (2018) points out that positivist

research often uses clear, concise and unambiguous language, which makes the findings easier to understand and communicate with others. This clarity is beneficial for the dissemination of knowledge and the application of research results in practical settings. We collected data from 123 academic staff using a self-administered questionnaire. The use of a questionnaire was preferred because of the large number of respondents that were targeted in this study. The questionnaire was subjected to a content validity index (CVI) and a Cronbach's alpha (α) test. The results are presented in Table 1 below.

Table 1: CVI and a Cronbach's alpha (α) test results

Constructs	CVI	α
Curriculum Implementation		
Preparation for teaching	0.83	0.85
Content delivery	0.86	0.84
Assessment of learning	0.82	0.77
Physical Infrastructure Management		
Lecture room facilities	0.85	0.79
Technology equipment	0.80	0.82
Safety devices	0.83	0.83

Source: Primary data

The results in Table 1 revealed that the content validity index (CVI) of the questionnaire was 0.84, which is above the threshold value of 0.70 (Eunseong & Kim, 2014). Also, a Cronbach's alpha (α) value of 0.878 indicating a good reliability. According to Eunseong and Kim (2014), a questionnaire can be used if its reliability is greater than 0.7. This allowed the researcher to consider the questionnaire reliable. The data collected was analysed using SPSS version 26.0 (spss.exe), showing frequencies, percentages and means, and standard deviations at the descriptive level, correlations at the bivariate level, and multiple linear regression at the multivariate level.

Results and Discussions

Results

The results on the influence of physical infrastructure management on curriculum implementation in public universities in Northern Uganda are presented in this section.

Demographic Characteristics

Table 2: Demographic information of the respondents

Items	Category	Frequency	Percentage
Gender	Male	77	62.6
	Female	46	37.4
	Sub-total	123	100
Age Bracket	25 – 35 years	38	30.9
	36 – 49 years	63	51.2
	Above 50 years	22	17.9
	Sub-total	123	100

Education Level of the Respondents	Doctoral degree	32	26.0
	Master's degree	88	71.5
	Post-graduate Diploma	3	2.4
	Sub-total	123	100
Rank of the Respondent	Professor	1	.8
	Associate Professor	4	3.3
	Senior Lecturer	3	2.4
	Lecturer	29	23.6
	Assistant Lecturer	86	69.9
	Sub-total	123	100
University of the Respondents	Lira University	27	22.0
	Muni University	38	30.9
	Gulu University	58	47.2
	Sub-total	123	100

Source: Primary data

The results in Table 2 shows the modal percentage of the respondents as males (62.6%), between the age bracket of 36 and 49 years, with a master's degree (71.5%), at the rank of assistant lecturer (69.9%) and from Gulu University (47.2%). This clearly meant that the number of males in public universities in Northern Uganda is bigger than that of their female counterparts. The study dealt with mature people who gave reliable views on university infrastructure and curriculum implementation in public universities in Northern Uganda. The respondents were literate, which enabled them to give clear and comprehensive responses, and all the respondents had sufficient ranks and gave objective answers to the questions raised in this study.

Descriptive Results on Curriculum Implementation

The study sought to assess how the academic staff perceived the level of curriculum implementation in public universities in Northern Uganda. The quantitative findings of the survey are presented in Table 3.

Table 3: Descriptive results on the academic staff perceptions on curriculum implementation

Curriculum Implementation items	Item Mean	
Preparation for teaching (*Aggregate* mean =2.43; SD=0.89)		
On preparation for teaching, the academic staff always:		
Prepare lectures following the course outline	2.06	
Formulate relevant objectives/competences prior to lectures	3.08	
Prepare relevant teaching methods and techniques prior to lectures	2.91	
Prepare relevant teaching and learning aids prior to lectures	2.63	
Prepare for lectures in accordance with the timetable	2.02	
Prepare and organise their lecture notes prior to lectures	2.02	
Adequately make a lecture work plan every semester	2.66	
Prepare reference materials and resources prior to lectures	2.78	

Make learner assessment plans prior to lectures	1.78	
Content delivery (*Aggregate* mean =2.79; SD=0.79)		
On content delivery, the academic staff always:		
Deliver lectures in line with objectives /competences planned	3.10	
Deliver contents with maximum clarity to learners during lectures	2.80	
Encourage interactive communications during lectures	2.03	
Use a variety of teaching and learning aids during lectures	2.67	
Use student-centred teaching methods and techniques during lectures	2.74	
Ensure a good teacher-student relationship during lectures	3.00	
Effectively manage time as planned during lectures	2.72	
Encourage lively lectures with humour	3.13	
Ensure logical flow and pace during lectures	3.17	
Register and follow up students' class attendance	2.71	
Control their emotions during lectures	2.68	
Assessment of learning (*Aggregate* mean =2.52; SD=0.89)		
On assessment of learning, the academic staff competently:		
Use formative assessment technique to assess students' performance	3.22	
Use summative assessment technique to assess students' performance	2.81	
Use diagnostic assessment technique to assess students' performance	2.54	
Use norm-referenced assessment technique to assess students' performance	2.24	
Use criterion assessment technique to assess students' performance	2.48	
Use benchmark assessment technique to assess students' performance	2.76	
Use classroom Assessment Technique (CAT) to assess students' performance	1.81	
Timely gives assessment feedback to students	2.32	
Overall Mean for Curriculum Implementation =2.58; SD=.85		

***Source*:** Primary data

Table 3 indicates the overall mean of curriculum implementation as 2.58 (51.6%) and a 0.85 standard deviation (SD). The results suggest that the respondents were largely of the view that curriculum implementation in public universities in Northern Uganda was low. In detail, the results revealed that the level of preparation for teaching was low, with an aggregate mean of 2.43 (48.6%) and a 0.89 SD. This suggests that there is a need for the academic staff in the three public universities to further improve their level of preparation for teaching, especially in the areas of teaching aids, methodologies, work and assessment plans, lecture notes and reference materials. In addition, the results exposed the levels of content delivery among the academic staff as moderate, with an aggregate mean of 2.79 (55.8%) and a 0.79 SD. The respondents found that academic staff delivered lectures with clarity and interaction, and the lecturer-learner relationship was good. However, improvements were needed in teaching aids, student-centred teaching, time management and lecture attendance tracking. The assessment of learning in public universities in Northern Uganda showed a mean of 2.52 (50.4%) and a 0.88 SD. The majority of respondents expressed the belief that assessment of learning is low among academic staff in the three

public universities, and recommended the use of various methods and timely feedback to improve assessment processes.

Descriptive Results on Physical Infrastructure Management

In order to stimulate the opinions of the respondents on physical infrastructure management so as to analyse whether it has an influence on curriculum implementation in public universities in Northern Uganda, the researchers administered a questionnaire covering three (3) dimensions, and the findings are presented in Table 4.

Table 4: Descriptive results on physical infrastructure management

Physical infrastructure management items	Item Means
Lecture Room Facilities (*Aggregate* mean =3.05; SD=0.89)	
In my lecture room there is a well-managed flip chart stand	2.19
In my lecture room chairs are adequate and well managed	3.75
In my lecture room chairs are comfortable	3.47
In my lecture room tables are adequate	3.21
In my lecture room tables are comfortable	3.06
In my lecture room there is a good notice board	2.54
In my lecture room there is a good whiteboard	3.25
In my lecture room there is a well-maintained and easy-to-use chalkboard	3.39
In my lecture room there is a good lectern/podium	2.58
Technology Equipment (*Aggregate* mean =2.1; SD=0.78)	
In my lecture room there is a functioning wall clock	2.38
In my lecture room there is a projector in good working condition	2.92
In my lecture room there is an LCD screen in good working condition	1.55
In my lecture room there is a reliable public address system	1.55
Safety Devices (*Aggregate* mean =2.67; SD=0.97)	
In my lecture room there is a fully equipped first aid kit	1.62
Handwashing cans/sanitisers are always available in my lecture room	2.05
Laboratory goggles and safety kits are made available for students and staff	2.35
The roof of my lecture room is very good	3.77
The wall of my lecture room is very clean and well-maintained	3.55
Overrall Mean for physical infrastructure management 2.60	

***Source*:** Primary data

Table 4 shows the overall mean of physical infrastructure management as 2.60 (52%), with a 0.88 standard deviation (SD). These findings suggest that the respondents were generally of the opinion that the state of physical infrastructure management in public universities in Northern Uganda was moderate. More specifically, the results revealed that the level of lecturer room facilities was moderate, at an aggregate mean of 3.05 (61.0%). This means that lecture room facilities like flip charts, chairs, tables, notice boards and lecterns have been insufficient in the three public universities (Lira, Muni and Gulu). In respect to the state of technological equipment, the results revealed low levels, with an aggregate mean of 2.1 (42.0%) and a 0.78 SD. This implies that the respondents from the three public universities were of the view that the majority of the lecture rooms did not

have technology equipment such as functioning wall clocks, LCD screens and projectors in good working condition. Furthermore, the majority of the large lecture rooms lacked reliable public address systems. Therefore, most lecturers relied on traditional methods of teaching. With regard to whether public universities had safety devices in their lecture rooms, the results showed an aggregate mean of 2.67 (53.4%) and a 0.97 SD. This suggests that the majority of the respondents were of the view that lecture rooms in the three public universities had insufficient safety devices, such as a fully equipped first aid kit, handwashing cans and sanitisers. Furthermore, it was revealed that the condition of the roofs and walls of lecture rooms was good. According to NCHE (2014), the levels of university infrastructure are classified as 1 = unacceptable, 2 = acceptable, 3 = good and 4 = ideal. Therefore, the findings of this study indicate that the level of physical infrastructure management in the three public universities in Northern Uganda was within NCHE acceptable levels. This means that physical facilities like lecture room facilities, technology equipment and safety devices exist in the three public universities in Northern Uganda but are not sufficient for effective curriculum implementation. Hence, there is a need to expand physical infrastructure and its management in universities to further improve curriculum implementation.

Regression Analysis for Physical Infrastructure Management and Curriculum Implementation

The study conducted a regression analysis to determine the impact of physical infrastructure management on curriculum implementation in public universities in Northern Uganda, with the coefficient of determination presented in Table 5.

Table 5: Model summary for physical infrastructure management and curriculum implementation

Model	R	R Square	Adjusted R Square
1	0.551[a]	0.303	0.286
a. Predictors: (Constant), Safety devices, Technology equipment, Lecture room facilities			
b. Dependent Variable: Curriculum Implementation			

Table 5 shows the regression model summary, indicating a correlation coefficient of 0.551, an R2 value of 0.303 and an adjusted R square of 0.286. The R2 value indicates that management of physical infrastructure, such as lecture room facilities, safety devices and technology equipment, explained 30.3% of variations in curriculum implementation, while the remaining 69.7% can be explained by other factors. This indicates a strong correlation between physical infrastructure management and curriculum implementation.

Furthermore, the study generated an analysis of variance (ANOVA), and the results are presented in Table 6 below.

Table 6: ANOVA for physical infrastructure management and curriculum implementation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6498.550	3	2166.183	17.280	0.000b
	Residual	14917.856	119	125.360		
	Total	21416.407	122			
a. Dependent Variable: Curriculum Implementation						
b. Predictors: (Constant), Safety devices, Technology equipment, Lecture room facilities						

***Source*:** Primary data

In Table 6, the regression model was found to be statistically significant, with a p-value of 0.000b, which is less than 0.05. This indicates that physical infrastructure management significantly influences curriculum implementation in public universities in Northern Uganda. The study examined the degree to which each variable of physical infrastructure management influenced curriculum implementation, and the coefficients are presented in Table 7.

Table 7: Regression coefficients for physical infrastructure management and curriculum implementation

Model		Standardised Coefficients	Sig.
		Beta	p
1	(Constant)		0.000
	Lecture room facilities	0.409	0.000
	Technology equipment	0.094	0.257
	Safety devices	0.136	0.184
a. Dependent Variable: Curriculum Implementation			

Source: Primary data

The results in Table 7 indicate that lecture room facilities ($\beta = 0.409$, $p = 0.000 < 0.05$) had a significant positive influence on curriculum implementation. However, technology facilities ($\beta = 0.094$, $p = 0.257 > 0.05$) and safety devices ($\beta = 0.136$, $p = 84.14 > 0.05$) had a positive but insignificant influence on curriculum implementation. The results suggested that while hypothesis one was accepted, hypothesis two and three were rejected.

Discussion

The level of curriculum implementation

The study assessed the levels of curriculum implementation. The findings indicated a low level of curriculum implementation. This implies that preparation for teaching, content delivery and assessment of learning was still insufficient in public universities in Northern Uganda. These findings are in line with those of Chika (2019), Ivowi (2019) and Yunus (2019), who reported low levels of preparation of the course outlines, teaching methods and instructional resources in the public universities in Nigeria and Malaysia, respectively.

Relatedly, the quality of content delivery was reported to be low. For example, some of the academic staff did not achieve all their set objectives during lectures, and there

were problems associated with academic staff stating vague or unclear objectives that led to confusion among students. Furthermore, the study revealed that assessment of learning was insufficient in the three public universities in Northern Uganda. For example, many of the academic staff preferred using traditional summative assessments, such as administering final examinations, which encourage rote memorisation rather than deep understanding and application of concepts. This hindered the development of critical thinking and problem-solving skills in students.

Similarly, it was reported that only a few of the academic staff effectively used a variety of methods, such as CATs, criteria, benchmarks and norm-referenced assessments. These findings are in line with Romanov et al.'s (2019) revelation of challenges in the preparation of the lecture objectives among many lecturers. This was attributed to knowledge gaps, as many of the lecturers in the universities were not trained teachers and lacked the necessary facilities. In agreement with the study, Imran et al. (2023) and Umezulike and Charles-Ibezim (2022) reported low levels of preparation of teaching methods and techniques and attributed them to a lack of pedagogical training, collegial teaching, resistance to change, burnout and heavy workload among the academic staff. Relatedly, Odundo et al. (2018) also reported low levels of preparation of the teaching aids in the public universities in Africa. Zykrina et al. (2022) reported problems of assessment in universities as arising from inadequate access to appropriate assessment tools, technology, and knowledge gaps among the academic staff. With the findings of the study being consistent with the findings of previous scholars elsewhere, it can be deduced that curriculum implementation is still low in public universities.

The level of physical infrastructure management

The study findings also indicated the level of physical infrastructure management. In detail, the respondents were generally of the opinion that physical infrastructure management in public universities in Northern Uganda was moderate. More specifically, the results revealed that the level of lecture room facilities was moderate. This means that lecture room facilities like flip charts, chairs, tables, notice boards and lecterns have been insufficient in the three public universities (Lira, Muni and Gulu). With respect to the state of technological equipment, the results revealed low levels; this implies that the respondents from the three public universities were of the view that the majority of the lecture rooms did not have technology equipment such as functioning wall clocks, LCD screens and projectors in good working condition. Furthermore, the majority of the large lecture rooms lacked reliable public address systems. This implies that most lecturers relied on traditional methods of teaching.

Furthermore, the study indicated the level of safety devices in lecture rooms as moderate. This implies that lecture rooms in the three public universities had some safety devices but had insufficient safety devices, such as a fully equipped first aid kit, handwashing cans and sanitisers. Furthermore, it was revealed that the condition of the roofs and walls of lecture rooms was good. This study findings agree with different scholars (Almaiah et al., 2020; Eze et al., 2018; Jegede et al., 2021; Mwirichia & Barchok, 2017; Nassirpour et al., 2018; Rumanyika & Galan, 2015; Siddique et al., 2019), who revealed low levels of physical infrastructure in universities. Therefore, the findings of this study indicate that the level of physical infrastructure management in the three public

universities in Northern Uganda was within NCHE acceptable levels. However, there is a need to expand physical infrastructure management in universities to further improve curriculum implementation.

Physical infrastructure management and curriculum implementation

This study sought to investigate the influence of physical infrastructure management on curriculum implementation in public universities in Northern Uganda. The findings indicated that physical infrastructure management had a moderately positive influence on curriculum implementation in public universities in Northern Uganda. In detail, lecture room facilities had a significant influence on curriculum implementation. This means that lecture room facility management is significant for curriculum implementation in public universities in Northern Uganda. The findings of the study were in agreement with those of Almaiah et al. (2020), who identified lecture room facilities like furniture as a crucial factor influencing curriculum implementation in a university system. These authors observed that lecture room facilities must be readily available for effective content delivery. The study furthermore confirms the findings of Jegede et al. (2021), who found that furniture is crucial for effective content delivery and supervision in the university system. They further buttressed the fact that the inadequacy of lecture room furniture that universities are experiencing is a perfect reflection of what is going on with curriculum implementation in the university system.

Additionally, the findings revealed that technology equipment had an insignificant influence on curriculum implementation. However, it was revealed that at the universities under study, most of the lecture rooms had inadequate projectors and wall clocks. This study finding agrees with those of Eze et al. (2018), who reported that most universities in sub-Saharan Africa do not have adequate technology equipment to facilitate academic staff's content delivery. This means that in the absence of adequate technology equipment, curriculum implementation activities, such as preparation for teaching, content delivery and assessment of learning, become cumbersome. Also, the findings of this study support Nassirpour et al.'s (2018) finding that technology equipment such as computers and projectors has an adverse effect on curriculum implementation.

The study findings further revealed that safety devices had an insignificant influence on curriculum implementation. This finding agrees with those of Fefia (2021), Oketch (2016) and Williamson (2018), who reported that most universities in sub-Saharan Africa had insufficient safety devices required to handle emergencies or accidents and a lack of personal protective equipment for staff and students, among others, which negatively affected their curriculum implementation activities. Furthermore, this report agreed with NCHE (2018) that a number of universities in Uganda were poorly equipped and lacked essential safety devices, which are necessary for curriculum implementation activities such as preparation for teaching, content delivery and assessment of learning. With the findings of the study being consistent with the results from the previous scholars, it can be deduced that physical infrastructure management has a positive and significant influence on curriculum implementation in public universities in Northern Uganda.

Conclusion

It was concluded that curriculum implementation was low yet a vital component in public universities in Northern Uganda. Preparation for teaching by identification of the right teaching aids, methodologies, work and assessment plans, lecture notes and reference materials was low among the academic staff. Content delivery by the academic staff involved teaching aids, student-centred teaching methods, time management and lecture attendance tracking, which were moderately used. Assessment of learning by means of diagnostic, normative reference, criteria, CAT and benchmark techniques was believed to be low. Additionally, physical infrastructure management was moderate. Most lecture rooms had comfortable but inadequate chairs and tables. There were insufficient flip chart stands, notice boards, lecterns and whiteboards. Furthermore, it was concluded that a typical lecture room had no reliable technology equipment such as functioning wall clocks, projectors, LCD screens or a public address system. Additionally, a typical lecture room had a good roofing system and a clean wall but lacked first aid kits, handwashing cans, laboratory goggles and other kits. Further, lecture room facilities had a significant influence on curriculum implementation, while technology equipment and safety devices had a statistically insignificant influence on curriculum implementation in public universities in Northern Uganda. Overall, physical infrastructure management had a statistically significant influence on curriculum implementation in public universities in Northern Uganda.

Recommendation

This study recommends that the government and public universities should make deliberate efforts in a number of areas. First, there should be improvement in the low levels of curriculum implementation through ensuring adequate preparation for teaching, through identification of the right teaching aids, methodologies, work and assessment plans, lecture notes and reference materials by the academic staff. During content delivery, the academic staff should ensure adequate use of teaching aids, student-centred teaching methods and time management, and also constantly track lecture attendance. Second, there should be improvement in the management of lecture room facilities such as chairs, tables, flip chart stands, notice boards and whiteboards, besides the provision of good lecterns with aesthetically pleasing surroundings in every lecture room to ensure enhanced curriculum implementation. Third, it should be ensured that the required lecture room facilities are adequate and comfortable to use. Sufficient technology equipment should be planned for and provided, for instance reliable public address systems, computers and projectors, LCD screens, radios and wall clocks, in every lecture room to improve curriculum implementation. Sufficient safety devices, such as first aid kits, handwashing cans, laboratory goggles and safety kits, should be provided to further improve curriculum implementation in public universities.

Limitations

The study projected the use of mixed methods for data collection using self-administered questionnaires, interviews, observations and focus group discussions. However, owing to time and financial limitations, only a self-administered questionnaire was used, hence

the positivist approach. The study was carried out in three public universities in Northern Uganda out of thirteen public universities in Uganda, and only considered curriculum implementation at the undergraduate level.

Areas for Further Research

This study sought to investigate the influence of physical infrastructure management on curriculum implementation in public universities in Northern Uganda. However, owing to time and financial factors, the findings of this study could not be generalised to other universities in Uganda. This study, therefore, recommends further studies on similar concepts, especially in other public universities in Uganda. Furthermore, future studies in similar areas should be carried out using a pragmatic approach.

References

Ajibola, M. O., Iroham, C. O., & Eluyele, P. (2017). Students' satisfaction with major academic facilities in private universities in Ogun State, Nigeria. *Covenant Journal of Business and Social Sciences, 8*(1). https://doi.org/10.20370/cjbss.v8i1.509

Ajuaba, D. B., Ssentamu, P. N., & Cutright, M. (2023). The influence of learning practices on quality assurance mechanisms in selected universities in Uganda. *European Journal of Education Studies, 10*(9). http://dx.doi.org/10.46827/ejes.v10i9.4982

Alemiga, J., & Kibukamusoke, M. (2019). Determinants of the quality of academic staff in the process of teaching and learning in private universities in Uganda. *Africa's Public Service Delivery and Performance Review, 7*(1), 1-9.

Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies, 25*, 5261–5280.

Anyiendah, M. (2017). Challenges faced by teachers when teaching English in public primary schools in Kenya. *Front. Educ. 2,* 13. https://doi.org/10.3389/feduc.2017.00013.

Azikuru, L.M. E., Onen, D., & Ezati, B.A. (2017). Staffing and the quality of teaching in universities. *European Journal of Education Studies, 3*(3), 21–36. https://doi.org/10.5281/zeno.268381

Chaudhary, G. K. (2015). Factors affecting curriculum implementation for students. *International Journal of Applied Research, 1*(12), 984–986.

Chika, E. (2019). Contemporary education curriculum in Africa. Research Gates. 10.1007/978- 981-13-6635-2_4.

Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2018). The utilisation of e-learning facilities in the educational delivery system of Nigeria: A study of M-University. *International Journal of Educational Technology in Higher Education, 15*(1), 1–20.

Fefia, D. B. (2021) Curriculum implementation and students' academic performance in Muni University. *BU, 63*(5), 64–80, 100.

Govender, S. (2018). South African teachers' perspectives on support received in implementing curriculum changes. *South African Journal of Education, 38*(1). https://doi.org/10.15700/saje.v38ns2a1484

Ibrahim, A. O., Titilayo, A. A., Suleiman, Y., & Ishola, M. A. (2020). Information and communication technology (ICT) utilization: A veritable tool for academic staff effectiveness in Nigerian polytechnics. *Humanities & Social Sciences Latvia, 28*(2).

Jegede, D., Jacob, O. N., & Musa, A. (2021). Problems facing academic staff of Nigerian universities and the way forward. *International Journal on Integrated Education, 4*(1), 230–241.

Jenkins, A. (2019). *Introducing human resource management* (8th ed.). Huddersfield: Pearson.

Kanake K.L., Kipngeno, B.H., Wanja N.M., & Kobia, J.M. (2015). Teachers' participation in curriculum conceptualization and effective implementation of the secondary school curriculum in Kenya. *International Journal of Education and Research, 3*(7).

Karakus, G. (2021). A literary review on curriculum implementation problems. *Shanlax International Journal of Education, 9*(3), 201–220.

Kasule. W. G. (2015). Impact of work environment on academic staff job performance: Case of a Uganda University. *International Journal of Advances in Management and Economics, 4*(4), 95–103.

Knoll, J., Matthes, J., & Heiss, R. (2020). The social media political participation model: A goal systems theory perspective. *Convergence, 26*(1), 135–156.

Kweku, D. (2021). The influence of school type on pupils' proficiency in selected school subjects: Implications for curriculum implementation in Ghana. *Global Journal of Educational Research, 20,* 1–16. 10.4314/gjedr.v20i1.1.

Moyahabo, R., & Molapo, V. P. (2018). *Politicising curriculum implementation: The case of primary schools.* Pretoria: South African Journal of Education.

Muganga, L., & Ssenkusu, P. (2019). Teacher-centered vs. student-centered: An examination of student teachers' perceptionss about pedagogical practices at Uganda's Makerere University. *Cultural and Pedagogical Inquiry, 11*(2), 16–40.

Mwirichia, W., Jagero, N., & Barchok, H. (2017). Impact of massification on resource adequacy in public and private universities in Kenya. I*nternational Journal of Education, 9*(3), 60–66.

Nassirpour, A., Galasso, C., & D'Ayala, D. (2018). Multi-hazard physical vulnerability prioritization of school infrastructure in the Philippines. In *11th National Conference on Earthquake Engineering 2018, NCEE 2018: Integrating Science, Engineering, and Policy* (Vol. 10, pp. 6456–6467). Earthquake Engineering Research Institute.

NCHE (2018) *The state of higher education and training in Uganda: A report on higher education delivery and institutions.* Scribbr. www.unche.or.ug

NCHE (2019). T*he state of higher education and training in Uganda: A report on higher education delivery and institutions.* Scribbr. https://unche.or.ug/the-state-of-higher-education-and-training-in-uganda-2018-19.

NCHE (2021). The state of higher education and training in Uganda: A report on higher education delivery and institutions. Scribbr. https://unche.or.ug

Niyivuga, B., Otara, A., & Tuyishime, D. (2019). Monitoring and evaluation practices and academic staff motivation: Implications in higher education within Rwandan context. *SAGE Open, 9*(1), 2158244019829564.

Oketch, M. (2016). Financing higher education in sub-Saharan Africa: Some reflections and implications for sustainable development. *Higher Education, 72,* 525–539.

Patton, W., & McMahon, M. (2021). The systems theory framework of career development. In *Career development and systems theory* (pp. 67–107). Brill.

Ruegg, W. (2021). *A history of the university in Europe: Volume 4, universities since 1945* (vol. 4). Cambridge University Press.

Rumanyika, J.D., & Galan, R. M. (2015). Challenges for teaching and learning information and communication technology courses in higher learning institutions in Tanzania: A review. *Information and Knowledge Management, 5*(2), 1–12.

Savela, T. (2018). The advantages and disadvantages of quantitative methods in schoolscape research. *Linguistics and Education, 44*, 31–44

Siddique, M. A., Tagar, A. A., Khoso, Z. A., & Tagar, H. K. (2019). Role of infrastructure to improve quantity and enhance quality of school education in Sindh Province of Pakistan. *Advances in Social Sciences Research Journal, 6*(3) 198–206.

Tabor, J. (2021). Ranking of management factors for safe maintenance system based on Grey Systems Theory. *Production Engineering Archives, 27*(3), 196–202.

Taye, M., Sang, G., & Muthanna, A. (2019). Organizational culture and its influence on the performance of higher education institutions: The case of a state university in Beijing. *International Journal of Research Studies in Education, 8*(2), 77–90.

Ueland, J. S., Hinds, T. L., & Floyd, N. D. (2021). Equity at the edge of chaos: Applying complex adaptive systems theory to higher education. *New Directions for Institutional Research, 2021*(189–192), 121–138.

Williamson, B. (2018). The hidden architecture of higher education: Building a big data infrastructure for the 'smarter university'. *International Journal of Educational Technology in Higher Education, 15*, 1–26.