SERVICE INFRASTRUCTURE AND CURRICULUM IMPLEMENTATION IN PUBLIC UNIVERSITIES IN NORTHERN UGANDA

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Abstract:

This study examined the influence of service infrastructure on curriculum implementation in public universities in Northern Uganda. Service infrastructure was studied in terms of electricity, water, toilets, and healthcare facilities, while curriculum implementation was considered in terms of preparation for teaching, content delivery, and assessment of learning. It was hypothesised that service infrastructure has no significant influence on curriculum implementation in public universities in Northern Uganda. The study embraced a convergent parallel mixed-methods research design. Quantitative data was obtained from 123 respondents through questionnaires. Qualitative data was collected from 26 participants through interviews, 61 participants through FGDs, and observations. The study revealed that generally, the level of curriculum implementation was low at a mean of 2.58 (51.6%), the level of services infrastructure was moderate at a mean of 3.43 (68.6%), and the coefficient of determination (R^2) was at .214, implying that services infrastructure explained 21.4% of the variations in curriculum implementation in public universities in Northern Uganda. The null hypothesis that service infrastructure has no significant influence on curriculum implementation in public universities in Northern Uganda was rejected because the P-value of 0.000 was found to be less than the level of significance of 0.05. It was concluded that service infrastructure is a vital requirement for effective curriculum implementation in public universities in Northern Uganda. Therefore, it was recommended that the public universities further improve the state of their service infrastructure, like electricity, water, toilets, and health care facilities, to improve curriculum implementation, especially in areas of preparation for teaching, content delivery, and assessment of learning. Additional studies should be carried out on other factors contributing to 78.6% of the influence of curriculum implementation in public universities in Northern Uganda.

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1. Introduction

This notion of curriculum implementation refers to practices such as preparation for teaching, content delivery, and assessment of learning. Globally, curriculum implementation in public universities dates back to the Italian University of Bologna in 1088. The curriculum consisted of secular and non-secular degrees in grammar, rhetoric, logic, theology, canon law, and notarial law (Ruegg, 2021). Since then, a number of public universities have been established worldwide, but several stakeholders have been concerned about the quality of the curriculum implemented in these universities. Concerns about curriculum implementation in public universities have 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 (Anyiendah, 2017). Similarly, Moyahabo *et al.* (2018) reported that tutors' pathetic preparations for teaching, heavy usage of traditional rote teaching-learning approaches, and weak assessments of learning have been the main problems in public universities worldwide. In countries like Brazil, Moldova, Ukraine, and Albania, several stakeholders have been concerned about curriculum implementation infidelities in several public universities. These concerns have been supported by the fact that preparations for teaching, content delivery, and learner assessments are still recurring challenges in public universities (Kobia, 2015; Kweku, 2021).

In Sub-Saharan Africa, curriculum implementation in public universities dates back to the eighteenth century in countries like Sierra Leone in 1802, and Gambia and the Gold Coast in 1841 (Chika, 2019). Since then, lots of public universities have been established in the region, and curriculum implementation in these universities remains a subject for further scrutiny. The TISSA (2019) reported curriculum discrepancies in the areas of content delivery and the use of teaching aids in some public universities in sub-Saharan Africa. Similarly, in a study by Kabombwe (2019) and Mbugua (2019) on understanding a competency-based curriculum and education, the Zambian perspective discovered that several public universities in Zambia experience inconsistencies in the use of instructional resources for content delivery.

According to Forlin (2021), factors such as classrooms, general university infrastructure, and utilities are vital in implementing the curriculum in public universities. It is vital to note that curriculum implementation in most public universities in Sub-Saharan Africa has been perceived to be on the decline by several studies (Tronsmo *et al.*, 2018; Akiba, 2016; Cheng, 2015). Studies on Nigerian public universities found that the level of curriculum implementation was low in the areas of teaching preparation, content delivery, and learning assessment (Adesoji *et al.*, 2015; Ajayi *et al.*, 2015). Similarly, Olamo *et al.* (2019) studied challenges hindering the effective implementation of the harmonised modular curriculum in the case of three public

universities in Ethiopia. Their report showed that most (83.3%) of academic staff do not acquire the necessary facilities to implement the modular curriculum effectively. This report showed that the academic staff faced challenges in accomplishing their duties, such as preparation for teaching, content delivery, and assessment of learning. It further showed that 56.7% of academic staff did not use learner-centred methods in the delivery of content in class, hence showing the need to improve curriculum implementation in public universities in Ethiopia.

In Uganda, the National Council for Higher Education (NCHE, 2021) reported that there are eleven public universities in the country, including Makerere University, established in 1922; Kyambogo University, founded in 2002; and Mbarara University of Science and Technology, founded in 1989 (NCHE, 2019). Since then, these universities have worked tirelessly towards improving the quality of curriculum implementation (Ezati *et al.*, 2017). However, the problems of curriculum implementation in public universities have continued to increase over the years. 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 courses' contents. This has encouraged spoon-feeding and resulted in memorization by learners (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 a need for sufficient classrooms to alleviate the overcrowding of learners. This is to say that service infrastructures play an essential part in ensuring the effective implementation of a curriculum in the areas of preparation for teaching, content delivery, and assessment of learning in public universities. Furthermore, the NCHE (2018) guideline requires 10 hours per week as an ideal workload for a senior academic staff member used up on the preparation of teaching materials in universities in Uganda. However, Fefia (2021) noted that 71% of the senior academic staff in public universities spend less than 10 hours preparing teaching materials. This agrees with Wambui (2014), who reported that the curriculum is poorly implemented in 65% of public universities in Uganda. Among the key contributing factors is the poor state of service infrastructure in universities. According to Jenkins (2019), as much as universities have infrastructure, there is a scarcity of studies showing how service infrastructure has influenced curriculum implementation in public universities. Therefore, there is a need to investigate how service infrastructure such as electricity, water, toilets, and health care facilities influence curriculum implementation in public universities in Northern Uganda.

2. Study Objectives

The objectives of this study were to (1) assess how academic staff perceived the level of curriculum implementation in public universities in Northern Uganda, (2) evaluate the levels of service infrastructure in public universities in Northern Uganda, (3) examine the influence of service infrastructure on curriculum implementation in public universities in Northern Uganda, and test the hypothesis that service infrastructure has no significant influence on curriculum implementation in public universities in Northern Uganda.

3. Literature Review

This section presents the theory that underpins this study and a review of related literature. The theory describes the linkage between service infrastructure and curriculum implementation.

3.1 Theoretical Review: The Systems Theory

This research 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. Similarly, according to Knoll *et al.* (2020), systems theory looks at: input as raw materials, labour, infrastructure, finance, and information received from the environment; the process as operations, methods, and activities; and the output as goods, services, and information.

According to Patton *et al.* (2021), the main proposition of systems theory is that a system can be natural or man-made, such as a university, interconnected between various elements. Ueland *et al.* (2021) further revealed 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. Therefore, the theory looks at what takes place in a university in terms of the kind of inputs it receives and the interaction processes the inputs undergo, which eventually determine the resultant output of that university. In this study, service infrastructure is presented as an input in the curriculum implementation process. The inputs interact with the curriculum implementation activities such as preparation for teaching, content delivery, and assessment of learning in order to produce the planned educational outputs, namely employability skills and life-long skills. While the systems theory is a general theory that is not specifically focused on service infrastructure and its impact on curriculum implementation, it does suggest the importance of paying attention to the system (the university) as a whole. Therefore, based on systems theory, this study investigated service infrastructure as a component of a system and how it's used for improving curriculum implementation in public universities in Northern Uganda.

3.2 Service Infrastructure and Curriculum Implementation

This section discusses how service infrastructure influences curriculum implementation in public universities. Service infrastructure is essential and plays a vital role in curriculum implementation in public universities. Service infrastructure refers to electricity, water, toilets, and healthcare facilities that would likely improve preparations, content delivery, and assessment of learning. A number of scholars worldwide have investigated the relationship between service infrastructure and curriculum implementation in public universities. In relation to this, Saunders *et al.* (2017) identified electricity as the main service infrastructure in curriculum implementation in public universities.

According to Assoumpta and Andala (2020), the availability of utilities is quite important to achieving success in instructional delivery and assessment in the public university system. They further buttressed the fact that basic utilities such as electricity, gas, and toilets have to be adequate and in good condition for the curriculum to be implemented with fidelity. In support, Ndirangu *et al.* (2021) reported that well-constructed buildings with services such as electricity, water, and sewerage systems often contribute to better curriculum implementation in the university system.

3.2.1 Electricity Facilities and Curriculum Implementation

In support of this view, Ajayi (2020) emphasised the need to effectively use services like electricity and water in university systems across Africa. This would consistently improve the quality of academic staff's levels of preparation, content delivery, and assessment of learning. In a related study, Ganiyu *et al.* (2020) reported that adequate use of service infrastructure in universities in Nigeria is a solution for any curriculum implementation obstruction. Furthermore, in recent studies carried out by Kausar (2019), who studied the provision of services in some selected universities in Nigeria, his findings revealed that although services were adequately provided in some universities, they were not effectively utilized. He further emphasised the need to ensure effective and efficient use of the services. This implies that the availability of services alone does not enhance learning; rather, it is the adequate use of these services that can only help to improve curriculum implementation in universities.

Abdullahi *et al.* (2018), on service infrastructure in public universities in African countries, exposed that most public university buildings in Ondo State had pitiable services. For example, most fluorescent tubes for providing electricity were out of place, and this has negatively affected curriculum implementation in the universities in Ondo State. While many researchers have discussed how service infrastructure can improve curriculum implementation, many of these studies have been conducted in West Africa, Europe, the United States, and Canada. A few studies (Mugizi, 2021; Nasuna *et al.*, 2021) have already been carried out on the utilities and curriculum implementation in universities in Uganda. Unfortunately, none of these studies have been associated with curriculum implementation in public universities in Northern Uganda. Also, there are

theoretical limitations to some of these studies. The researcher acknowledged these as gaps requiring further investigation, hence the need for this study.

It is important to note that universities in Bangladesh need constant electricity for their day-to-day operations (Murshed, 2020). This statement is valid in the context of public universities in Northern Uganda that need reliable electricity to operate technological equipment during preparation, content delivery, and assessment of learning. According to Mncube *et al.* (2019), the budget for electricity supply in public universities in Northern Uganda is still inadequate. Though Lira and Gulu universities are connected to the national grid, the power supply seems to be irregular at these universities. In addition, Bonnet *et al.* (2022) showed that effective curriculum implementation occurs where universities have access to such facilities as reliable electricity and water, among others. Furthermore, in a study focusing on the effects of university electricity supply on learner attendance and dropout rates, Nazir and Khan (2021) found that in Pakistan, learners did not effectively attend lectures where there was no electricity. This study by Nazir and Khan concluded that while stable electricity enhances the quality of curriculum implementation, irregular electricity reduces the quality of curriculum implementation. Therefore, it is from these studies that electricity plays an important role in content delivery in a university. What this suggests is that, when universities are funded, consideration has to be given to the maintenance aspect of the electricity supply and adjust funding allocations accordingly.

In the context of Uganda, the NCHE (2019) report recognised electricity as the main driver for effective curriculum implementation in public universities. The implementation of the curriculum depends on a flourishing electricity supply, which is far from acceptable levels in public universities in Uganda. Moreover, the report goes on to say that the electricity supply in public universities is inadequate at 41%, leaving 59% of the university's time without reliable electricity. The same was noted with the insufficient installation of security lights covering only 27% of the universities. Later on, Okello *et al.* (2020) reported that universities in key urban areas in central and western Uganda had fairly good electricity supply; for example, Makerere University, Kyambogo University, and Mbarara University, among others. Universities in other parts of the country, such as Lira, Soroti, and Muni Universities, among others, had inadequate electricity supplies. This electricity supply has been slowly diminishing curriculum implementation aspects of preparation for teaching, delivery of lectures, and assessment of learning in public and private universities.

Furthermore, in connection with electricity services, Simpeh and Shakantu (2020) developed a prioritisation framework that can guide the provision and management of on-campus student housing facilities (SHF) at Southern Ghana universities. The study found that some services are perceived as "extremely important" and "basic," while others are seen as "unimportant" and "indifferent." Services, including fire extinguishers, were perceived by students as "extremely important." According to the investigators, a fire extinguisher is a handheld active fire protection device usually filled with a dry or wet chemical used to extinguish or control small fires, often in emergencies. It is not

intended for use on an out-of-control fire, such as one that has reached the ceiling and endangers the user. Typically, a fire extinguisher consists of a hand-held cylindrical pressure vessel containing an agent that can be discharged to extinguish a fire.

Ranellone *et al.* (2021) reported that when accessible and fully charged, fire extinguishers are an effective and proven means of fighting a fire during its early stages; however, fire extinguishers located in many public universities are subjected to costly vandalism and tampering that threaten their usefulness in times of need. The authors further reported that the price of installation and maintenance of these devices, along with the associated vandalism risks, is creating uncertainty about the general value of fire extinguishers in university settings. When used appropriately, fire extinguishers are an effective tool to stop fires at their earliest stages. For example, at Worcester Polytechnic Institute, an explosion ripped through an empty lecture hall. A nearby student grabbed a fire extinguisher and doused the flames, completely extinguishing the fire and saving the lives of fellow students. The presence of an accessible and fully charged fire extinguisher allowed the students to extinguish a fire, which could have been much more devastating than it was. As shown in this instance, properly used fire extinguishers can provide life safety in public universities. On the contrary, when fire extinguishers are missing, disasters can occur. Ranellone *et al.* (2021) brought out the importance of having fire extinguishers at Worcester Polytechnic Institute clearly in their study. Could it be that fire extinguishers are important in public universities in Northern Uganda? There has been a knowledge gap in information on how fire extinguisher services influenced curriculum implementation in public universities in Northern Uganda, which this study aimed to fill.

It is important to note that lighting arrestors are important service infrastructure in a university. A study by Hajji and Suharsono (2016) reported that electrical lightning arrestors are vital service infrastructure in universities. The authors looked at lightning arresters as devices installed to shield power lines, homes, and structures from dangerous power surges. As the name suggests, they're primarily designed to safeguard against damage caused by lightning strikes. However, they can also protect the structure from various other sources. Lightning arresters are cylindrical objects, one- to two feet long, consisting of a series inductor and a spark gap. These authors revealed that the installation of lightning arrestors is low in many university buildings, especially in Sub-Saharan Africa, which accounts for the highest (70%) occurrences of lightning strikes in Africa.

According to Tenzin (2023), many universities in sub-Saharan Africa think about the installation of lightning arrestors on infrastructure only after damages are caused by lightning. Tenzin further highlighted the necessity of lightning protection gadgets for university buildings because the safety of staff, students, and educational facilities is a top priority. The importance of lightning protection for universities cannot be overemphasized. Lightning is an often-underestimated weather hazard by many universities, even though a lightning strike can have a devastating impact. Unfortunately, school activities can endanger students, considering most lightning injuries occur in open

areas; therefore, children on playgrounds, sports fields, or in a gymnasium can be more at risk. Similarly, a lightning strike is capable of causing upsetting effects on the main university buildings, where hundreds of people are congregating and where there's likely to be a large concentration of electrical equipment such as computers, power outlets, and laboratory equipment. Fortunately, most lightning casualties can be avoided through a series of safety procedures and lightning protection. Much as several studies have been done on lightning arrestors in universities, the results showed there is still a knowledge gap on how lightning arrestors' installation influenced curriculum implementation in public universities in Northern Uganda, which this study aimed to fill.

3.2.2 Water Facilities and Curriculum Implementation

This study also stresses the water infrastructure in public universities in northern Uganda. According to Poi (2021), water supply and infrastructure are vital for the effective operation of universities. There is abundant literature on safe domestic water supply and hygienic sanitation. Yet, there is a paucity of research studies on water infrastructure in universities in Africa. The most common challenges that face water infrastructure in universities include broken pipes, poorly maintained water taps, and inadequate allocation of finances for water supply and infrastructure, leading to an irregular supply of water in the universities, which negatively impacts curriculum implementation. Additionally, Thongplew and Kotlakome (2019) reported that promoting the drinking of clean water and upholding better access to drinking water are important for students and staff in universities. Drinking clean water instead of sugary drinks could help eliminate obesity as well as reduce the risk of Type II diabetes among students and staff in universities. Drinking water can also help improve hydration status, potentially reducing the risk of well-being concerns such as headaches, stomachaches, and poorer cognitive function, which hinder students' class attendance and participation. Therefore, it is important to devote adequate resources to water infrastructure in universities. Ensuring adequate drinking water access is of particular concern for students' health and lecture participation.

It is important to note that although several national regulations require public universities in Uganda to provide access to safe drinking water, reports suggest that many universities do not have sufficient water infrastructure (Kenney *et al.*, 2020). The researchers further noted that water pollution has proven to be a substantial problem in many university faculties nationwide, particularly those with older water infrastructure. This is still valid in the context of universities, especially in Northern Uganda, which have thus struggled with how to provide adequate water to students and staff while ensuring the water provided is safe to drink. However, there is a need for the universities to begin providing water coolers and dispensers placed in the staff rooms and key areas for students. Similarly, the insufficiency of water infrastructure is perceived as one of the factors deterring effective curriculum implementation in many public universities (Du Plessis & Mestry, 2019). This study by Du Plessis *et al.* further mentioned vandalism and

theft of valuable water infrastructure such as pipes, fittings, and manhole covers as major challenges that had increased water infrastructure maintenance costs and reduced water utilization. The extent of vandalism and theft has a direct and significant impact on the curriculum implementation in universities. For example, lecturers concentrated more on preparation for teaching in universities that provided adequate water for drinking and running toilets (Poi, 2021). However, little is known about how water infrastructure has influenced curriculum implementation in public universities in Uganda. There has been a knowledge gap, which this study aimed to fill.

3.2.3 Toilet Facilities and Curriculum Implementation

Toilet facilities are considered a very crucial piece of infrastructure in any university. According to a study by Ugwu *et al.* (2018), toilets play an essential role in the health of students in universities. Proper waste disposal and management equates to cleaner waterways, a lower likelihood of lethal diseases and parasites, and improved gender equality and education. The researcher further reported that millions of university students worldwide do not have access to quality toilet infrastructure and therefore risk their health and safety. For example, Shittu *et al.* (2022) reported that most of the public universities in Lagos State, Nigeria, had toilet infrastructure constructed decades ago. Since the toilets are old, they have deteriorated to a state that is no longer safe for students. However, due to a lack of alternate options, the university management continued to use the dilapidated toilets, causing grave danger to the students and the faculty members. Kebirungi (2018) studied gender responsiveness in the provisioning and management of water and sanitation facilities in East African universities: a case of Makerere University, Uganda, and the University of Dar-es-Salaam, Tanzania. The author reported that the use of toilet infrastructure is deplorable in spite of a number of measures devised by students; for example, students spent time locating toilets with water and sanitary facilities in students' halls of residence or lecture theatres. Because most toilets lacked water and sanitary facilities and did not provide safety and privacy needs, some females postponed the use of sanitary facilities while students with special needs absconded from attending lectures. Where sanitary bins were not provided for female students to dispose of used sanitary towels, students dumped such towels in the toilets, placed them on the water cisterns' floor and others dumped them in water reservoir tanks. Handwritten materials targeting fresh students on how to use water and sanitary facilities were being pinned on walls, although these were later plucked out and used for anal cleansing in the absence of water and toilet papers. However, it is not clear if this is a similar state of affairs in public universities in Northern Uganda. This study aimed to determine how toilet infrastructure influenced curriculum implementation dimensions of preparation for lectures, content delivery, and assessment of learning in public universities in Northern Uganda.

3.2.4 Healthcare Facilities and Curriculum Implementation

Healthcare facilities are important parts of service infrastructure in public universities. Several scholars have taken an interest in studying healthcare facilities in public universities and their influence on curriculum implementation in universities (Cattamanchi *et al.*, 2015; Oladejo, 2014; Sahu, 2020). A study conducted by Cattamanchi *et al.* (2015) reported that the state of health facilities in universities in Nigeria is pathetic, hence deterring curriculum implementation. This is especially true with the pathetic state of the outpatient rooms in university health facilities; there are unreliable ambulance services, insufficient admission and emergency delivery facilities, and poorly equipped diagnostic laboratories and counselling rooms. The pathetic state of health facilities in universities greatly affects the quality of curriculum implementation by academic staff and students in areas of preparation for lectures, content delivery, and assessment of learning.

Similarly, Sahu (2020), in his study about the effect of healthcare facilities on teaching and learning in universities in Senegal, established that the quality of healthcare facilities in public universities, such as outpatient spaces, adequate counselling rooms, and adequate health unit furniture, significantly contributed to improved curriculum implementation, especially in the areas of preparation for teaching, content delivery in lectures, and assessment of learning. However, Oladejo (2014) argues that healthcare facilities in public universities have little effect on curriculum implementation in southeast Nigeria. The scholar, meanwhile, advocates for the use of sophisticated healthcare equipment and machinery, modern diagnostic laboratories, outpatient spaces, counselling rooms, and furniture facilitated by public universities to enhance curriculum implementation. Similarly, Ogunode *et al.* (2021), however, advised that for better curriculum implementation, public universities should strengthen their healthcare facilities and services to students and staff. This view is also supported by other scholars, such as Shittu *et al.* (2022), who pointed out that healthcare facilities in public universities should have more sophisticated machinery and medical equipment to significantly influence curriculum implementation in the universities. Although the studies above indicated that healthcare facilities in universities impacted curriculum implementation, the studies were primarily conducted in the context of developed as well as West African countries. This study was conducted to fill the contextual gap.

4. Methodology

This study adopted a pragmatism philosophical stance and a convergent parallel mixed methods design because it allowed the researcher to compare the different perspectives of respondents drawn from qualitative and quantitative data, which provided a comprehensive analysis of the research problem. According to Creswell *et al.* (2018), convergent mixed method design helps researchers converge or merge quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In this design, the investigator typically collects both forms of data at roughly the same time

and then integrates the information into the interpretation of the overall results. A sample size of 210 participants consisting of academic registrars, faculty deans, heads of department, academic staff, estate officers, and 61 student leaders provided the sample. A questionnaire, interview guide, focus group discussion, and observation checklist were used for data collection. These tools were preferred because of the large number of respondents that were targeted in this study. Validity and reliability were above 0.7, as recommended (Eunseong & Kim, 2014). Therefore, the data collected was considered reliable. Quantitative data was analysed using descriptive and inferential statistical techniques, while for qualitative data, a thematic analysis method was used. In the next section of the paper, the results of the study are presented.

5. Results and Discussions

In this section, the results on the influence of service infrastructure on curriculum implementation in public universities in Northern Uganda are presented.

5.1 Demographic Characteristics
The modal percentage of the respondents was males (62.6%), between the age bracket of 36-49 years, with a Master's degree (71.5%), at the rank of assistant lecturer (69.9%), and from Gulu University (47.2%), as in Table 1.

Table 1: 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	Doctorate 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 1 clearly mean that the number of males in public universities in Northern Uganda is higher compared to 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.

5.2 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.

Table 2: Descriptive Results on the Academic Staff Perceptions on Curriculum Implementation

Curriculum Implementation items	Item Mean
Preparation for teaching (Aggregate mean = 2.43; SD = .89)	
On preparation for teaching, the academic staff:	
1. Always prepare lectures following the course outline.	2.06
2. Always formulate relevant objectives/competences prior to lectures.	3.08
3. Always prepare relevant teaching methods and techniques prior to lectures.	2.91
4. Always prepare relevant teaching and learning aids prior to lectures.	2.63
5. Effectively prepare for lectures in accordance with the timetable.	2.02
6. Adequately prepare and organise my lecture notes prior to lectures.	2.02
7. Adequately make lecture work plan every semester.	2.66
8. Adequately prepare reference materials and resources prior to lectures.	2.78
9. Always make learner assessment plans prior to lectures.	1.78
Content delivery (Aggregate mean = 2.79; SD = .79)	
On Content delivery, the academic staff:	
1. Always deliver lectures in line with objectives /competences planned.	3.10
2. Always deliver contents with maximum clarity to learners during lectures.	2.80
3. Always encourage interactive communications during lectures.	2.03
4. Always use variety of teaching and learning aids during lectures.	2.67
5. Always use student-centred teaching methods and techniques during lectures.	2.74
6. Always ensure good teacher-student relationship during lectures.	3.00
7. Effectively manage time as planned during lectures.	2.72
8. Always encourage lively lectures with humour.	3.13
9. Always ensure logical flow and pace during lectures.	3.17
10. Always register and follow up students' class attendance.	2.71
11. Always control emotions during lectures.	2.68
Assessment of learning (Aggregate mean = 2.52; SD = .89)	
On assessment of learning, the academic staff:	
1. Competently use formative assessment technique to assess students' performance.	3.22
2. Competently use summative assessment technique to assess students' performance.	2.81
3. Competently use diagnostic assessment technique to assess students' performance.	2.54
4. Competently use norm-referenced assessment technique to assess students' performance.	2.24
5. Competently use criterion assessment technique to assess students' performance.	2.48
6. Competently use bench mark assessment technique to assess students' performance.	2.76
7. Competently use classroom Assessment Technique (CAT) to assess students' performance.	1.81
8. Timely give assessment feedback to students.	2.32
Overall Mean for Curriculum Implementation = 2.58; SD = .85	
Legend: 1.00 – 1.79 = Very Low, 1.80 – 2.59 = Low, 2.60 – 3.39 = Moderate, 3.40 – 4.19 = High and 4.20 – 5.00 = Very High	

Source: Primary data.

The findings from the survey are presented in Table 2. Table 2 indicates the overall mean of curriculum implementation as 2.58 (51.6%) and a 0.85 standard deviation (SD), which was closer to zero, suggesting that the views of the respondents on curriculum implementation were reliable. The results suggest that the respondents generally believed 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 at 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. Additionally, the results revealed 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. This indicates the respondents were of the view that lectures were delivered by academic staff as planned with maximum clarity and interaction. The lecturer-learner relationship during lectures was very good. However, there was a need for academic staff to further improve their use of teaching aids, embrace student-centred teaching methodology with interactive communication, effectively manage time, and closely follow up on students' lecture attendance. Furthermore, the results of the assessment of learning in public universities in Northern Uganda showed an aggregate mean of 2.52 (50.4%) and a 0.88 SD. This suggests that the majority of the respondents were of the opinion that the assessment of learning was still low among academic staff in the three public universities. The results revealed the need to use a variety of methods, such as norm-referenced, interim, diagnostic, criterion, and benchmark assessments, and promptly give assessment feedback to students.

5.3 Qualitative Findings

The qualitative findings from interviews and FGDs indicated diverse views of participants with regard to curriculum implementation in public universities in Northern Uganda. The qualitative results were aligned with three main themes: academic staff Perceptions on preparation for teaching, content delivery, and assessment of learning are presented below.

5.3.1 Preparation for Teaching

One of the outstanding areas of curriculum implementation is the preparation of course outlines. The preparation process of a course outline requires careful consideration to ensure that the objectives of the course are met and that students have a clear understanding of what to expect. Furthermore, it was revealed that specific details of course outlines varied from one university to another. However, there was a general pattern used by all the universities in preparing the course outline as required and approved by the Uganda National Council for Higher Education. Generally, the participants reported that the preparation of the course outline was low among the academic staff in the three public universities in Northern Uganda. One of the participants reported that:

"…the quality of preparation of course outlines by some academic staff at our university is still low. This has resulted in a lack of clarity and direction for the students and inconsistency in delivering course content. Inadequate student engagement and motivation, miscommunication between the academic staff and students regarding expectations, assignments, and other important information. This has resulted in frustration and a breakdown in the learning process."

The study found that academic staff perceived lecture objectives as guides that are specific, measurable statements that describe what students should know and be able to do after completing a course. These objectives help guide the design and delivery of the topic, providing a clear framework for both academic staff and students. It was further revealed that lecture objectives play a crucial role in the overall effectiveness of teaching and learning. The participants revealed that the lecture objectives provide academic staff with a clear roadmap for designing and delivering the topic. They help academic staff align content, activities, and assessments to ensure that the learning experience is focused and coherent. Clear and well-defined course objectives help students understand what is expected of them. This clarity enhances student engagement and motivation by providing a clear purpose for their learning. Generally, the participants reported that setting good-quality lecture objectives before teaching was low among the academic staff in the three public universities in Northern Uganda. A participant reported that:

"One of the main challenges with our academic staff is the knowledge gap on how to formulate objectives that are clear and easy to understand. Some of them use ambiguous language or vague terms that lead to confusion and state objectives that are too broad."

Additionally, the study found that academic staff perceived teaching methods and techniques as strategies and approaches that academic staff use to facilitate learning and help students acquire knowledge and skills. It was revealed that preparation for teaching often involves choosing a combination of methods, and the choice of method depends on factors such as the subject matter, learning objectives, and the characteristics of the students. Additionally, flexibility and the ability to adapt teaching methods to different situations contribute to successful teaching outcomes. In general, the participants informed me that the preparation of teaching methods and techniques was low among the academic staff in the three public universities in Northern Uganda. One of the participants reported that:

"...preparation of teaching methods and techniques prior to lectures by some of our academic staff is still low. There is heavy reliance on lecture methods where the academic staff present information to the students through spoken words..."

A study by Odundo *et al.* (2018) confirmed that preparation of relevant teaching methods and techniques prior to teaching is still low and often ignored by some academic

staff, more specifically at the University of Nairobi, Kenya. The reasons for this were that some of the academic staff may not have received formal training in pedagogy or teaching methods. Academic staff often have demanding schedules, balancing teaching with research and potentially personal responsibilities; hence, they focus more on content delivery than thoughtful preparation of the teaching methods. These findings are in line with those of Imran *et al.* (2023) and Umezulike *et al.* (2022). These scholars attributed the low levels of preparation of the teaching methods and techniques to a lack of pedagogical training, collegiality teaching, and resistance to change, burnout, and a heavy workload among the academic staff. The academic staff at the three universities concurred with the above scholars and revealed that preparation for courses is still low among some academic staff. They exposed that it's crucial to recognise that many academic staff are deeply committed to effective teaching and continually seek ways to enhance their teaching methods. Addressing the challenges outlined above may involve institutional support, professional development opportunities, and a cultural shift that recognises and rewards excellence in teaching alongside research achievements. Additionally, creating a collaborative environment where faculty can share successful teaching practices can contribute to more effective curriculum implementation.

Also, it was revealed that the preparation of teaching aids is an essential aspect of effective teaching. Teaching aids are tools or materials that facilitate the learning process, making it more engaging and understandable for students. The preparation of appropriate teaching aids was low among the academic staff. There was laxity among academic staff to prepare adequate teaching aids prior to teaching. Generally, the academic staff reported that the quality of preparation of teaching aids was low among the academic staff in the three public universities in Northern Uganda. One of the academic staff interviewed reported that:

> *"Selecting teaching aids that align with the learning objectives and the students' needs is still a challenge among some staff at our university. Also, preparation of multimedia presentations, slides, or videos to enhance visual learning was still low among academic staff."*

Similarly, during interviews, academic staff explained a lecture plan as a structured document that details the key components and elements of a lecture or teaching session. It serves as a guide for academic staff or presenters to organise and deliver content effectively. The purpose of a lecture plan is to ensure that the learning objectives are met and that the information is presented in a logical and coherent manner. Although the academic staff pointed out that making lecture plans is one of the key duties of the academic staff in public universities in Northern Uganda, the majority of the academic staff do not regularly make plans for their lectures. One of the participants explained that:

"The manner in which academic staff make lecture plans is low. This is worse for the professors, who may have multiple courses to prepare for, administrative responsibilities, and other time-consuming tasks, leaving them with limited time to develop detailed and effective lecture plans."

A study also reported that many academic staff in public universities do not make lecture plans (Megawaty & Saputri, 2023). This is because they are accustomed to traditional teaching methods, such as lectures, without extensive planning. They feel that their current approach is effective and see little need for a more structured plan. Therefore, it should be noted that a well-structured lecture plan helps educators stay organised, maintain focus, and deliver content in a way that maximises student understanding and engagement.

Additionally, the study findings indicate that academic staff perceived lecture notes as a written record or summary of information presented during a lecture. They serve as a tool to help students review and reinforce the material covered in class. Lecture notes typically include key concepts, important facts, explanations, examples, and any additional information that the instructor emphasises during the lecture. It was further revealed that preparing a lecture note is a significant part of teaching. Lecture notes are valuable study tools that help aid examination preparation and serve as a quick reference for key course content. In general, the participants reported the quality of preparation of lecture notes to be fair among the academic staff in the three public universities in Northern Uganda. On the contrary, a participant stated that:

"The quality of lecture notes prepared by some of our academic staff is still low. They tend to face time constraints, leading to the hurried preparation of lecture notes. This has resulted in having incomplete or poorly organised materials."

These findings are in line with those of Kabombwe (2019) and Taole (2015), who observed that the preparation of lecture notes was still low among lecturers in most universities in Zambia. These scholars attributed the low levels of preparation of the lecture notes to inadequate technological equipment in their universities. The academic staff in the three universities concurred with the above scholars and revealed that the quality of lecture notes prepared has been low among some academic staff. Therefore, public universities need to consider providing ongoing professional development opportunities for academic staff, promoting a culture of collaboration and feedback, and offering support for the integration of technology in teaching. Encouraging a focus on student-centred learning and providing avenues for academic staff to share effective teaching practices that can contribute to the improvement in the preparation of lecture notes is required.

Additionally, the study findings indicate that academic staff perceive assessment plans as a tool for creating effective assessment plans in a university setting, which is crucial for ensuring that students are evaluated fairly and that the learning objectives of

the courses are met. Assessment plans should be designed to assess not only students' knowledge but also their skills and abilities. Generally, the academic staff reported that the making of assessment plans by the academic staff was low in the three public universities in Northern Uganda. For example, one of the participants reported that only a few academic staff at our university prepare assessment plans. This has led to several problems that affect students. Staff who assess students without a structured assessment plan in most cases have irregularities. This has resulted in uneven standards and mistakes in reflecting students' actual learning achievements.

5.3.2 Content Delivery

Regarding academic staff perceptions of content delivery, the study findings indicate that academic staff believed ensuring complete coverage of lecture objectives was crucial for the success of a learning session. To enhance coverage, the university academic staff are obliged to set clear objectives, develop a structured lecture plan, use active learning techniques, and conclude their lecture with a summary of key takeaways and a brief recap of the objectives. However, one of the main challenges facing complete coverage of lecture objectives in universities is time constraints. It was revealed that limited time during a number of lectures made some of the academic staff struggle in an attempt to complete set objectives within the available time. This has potentially led to rushed or incomplete coverage of lecture objectives. Generally, the participants reported that coverage of set objectives during learning was fair among the academic staff in the three public universities in Northern Uganda. For example, one of the participants interviewed informed me that:

> *"In our university, some of the academic staff do not achieve all their set objectives during lectures. This was mainly as a result of having large class sizes and setting vague lecture objectives and competencies."*

Furthermore, the study revealed that the perceptions of academic staff on lecture objectives and competences varied based on university priorities, philosophies, and the specific context of the academic environment. In general, academic staff played a crucial role in shaping the overall direction and policies of their universities, and their views on lecture objectives and competences were often influenced by several factors, such as relevance to industry and the job market. Academic staff emphasised formulating lecture objectives that prepare students for real-world challenges and make them competitive in the job market. They valued lectures that focused on developing practical skills and competencies relevant to current job needs. Also, academic staff promoted objectives that promoted student engagement and success. Objectives that foster critical thinking, problem-solving, and active participation in the learning process were viewed positively. The academic staff informed me that while stating lesson objectives is a common and valuable practice in education, there were challenges or problems associated with it. For example, objectives that were vague or unclear led to confusion among students. If the

language is too broad or imprecise, students may struggle to understand what is expected of them. Some of the lecture objectives focused solely on content-based objectives that neglected the development of essential skills such as critical thinking, problem-solving, and creativity. Additionally, the study revealed that some academic staff formulate objectives that focus on what students are expected to know or do but neglect metacognitive skills such as self-reflection, self-regulation, and awareness of one's learning process.

The study found that academic staff perceptions of lecture room communications varied based on their priorities, goals, and experiences within their universities. Generally, the academic staff reported that lecture room communications were less interactive in the three public universities in Northern Uganda. From interviews with a participant, it was revealed that:

> *"In our university, communications have been less interactive and not inclusive during lectures. There is a need for all academic staff to prioritise communication methods that are inclusive and accessible to all students. This includes considering the needs of students with disabilities and providing alternative communication methods when necessary."*

Also, this study discovered that, generally, the use of teaching aids was still low and irregular among academic staff in public universities in Northern Uganda. It was revealed that printed materials and chalkboards were among the most frequently used teaching aids by the academic staff. In addition, the academic staff preferred to use chalkboards, as they were always available in most of the lecture rooms. Meanwhile, the use of models, pictures, videos, charts, podcasts, and quizzes was recorded as low. Among the teaching aids, podcasts and televisions had the lowest usage level in teaching and learning activities. Furthermore, a participant revealed that:

> *"The use of teaching aids like podcasts, pictures, and videos by our academic staff is still low. Thus, many of the academic staff prefer the use of chalkboards in their teaching and learning activities."*

Similarly, an analysis of interviews in the three public universities in Northern Uganda showed that effective teaching methods and techniques play a crucial role in delivering engaging and informative lectures. The study revealed that teaching methods are essential in universities. But then, the use of a variety of teaching methods by the academic staff is still low. It was revealed that students have diverse learning preferences and styles ranging from visual to auditory to kinesthetic. Therefore, by employing a range of methods, academic staff can address the needs of various students and ensure that every one of them has the opportunity to grasp and retain information effectively. In general, the academic staff reported that only a handful of the academic staff use a variety of teaching methods and techniques in the three public universities in Northern Uganda.

When one of the participants was asked about the teaching methods used by the academic staff in her department, she said:

"The lecture method is predominantly used by academic staff in our department, yet it has many limitations, which include passive learning."

These findings are in line with Gudu and Jesse (2023), who reported that academic staff in many universities in Sub-Saharan Africa predominantly use the lecture method. This made assessing individual student understanding and progress a challenge, especially in a large lecture setting. Therefore, it is significant for academic staff to use a variety of teaching methods and techniques, such as project-based learning, problem-based learning, learning stations, and contract-based learning methods. Also, apply techniques such as group discussion, questioning, demonstration, etc. Academic staff ought to create dynamic and effective lectures that cater to the diverse needs of students, fostering a positive and interactive learning environment.

Furthermore, the academic staff-student relationship is a crucial aspect of the educational experience and plays a significant role in the academic and personal development of students (Vanner *et al.*, 2022). From interviews, the academic staff perceived that a positive and supportive relationship between teachers and students can contribute to a healthy learning environment, fostering intellectual growth, emotional well-being, and social development. Generally, it was reported that academic staff-student relationships were moderate or good in the three public universities in Northern Uganda. One of the participants interviewed reported that:

"Trust is the foundation of any healthy relationship. Most academic staff and students have trust and respect for each other. Our academic staff created an environment where students felt safe expressing their thoughts and opinions without fear of judgment. Also, most of our academic staff are approachable, listen actively, and communicate expectations clearly to students."

Effective time management in class is crucial for maximising your learning experience and academic success (Agustian *et al.*, 2023). From interviews, it was revealed that punctuality is a key component of time management: arriving on time for classes to make the most of the entire session. Being punctual helps academic staff to settle in, prepare mentally, and avoid missing important information. Generally, the participants reported that time management was insufficient among most of the academic staff in the three public universities in Northern Uganda. One of the participants reported that:

"A number of academic staff at our university, in most cases, do not arrive on time for classes. This has resulted in delaying tasks or studying until the last minute. Also, they are being easily distracted by phones, social media, or other students."

This statement above confirms the insufficiencies associated with academic staff in time management during teaching. To mitigate these problems, academic staff ought to be punctual for lectures, avoid procrastination, follow lecture timetables, and have clear strategies for teaching.

5.3.3 Assessment of Learning

Regarding academic staff perceptions of assessment of learning in public universities in Northern Uganda, the study evaluated specifically formative and summative assessments. Furthermore, other assessment standards such as diagnostic, norm-referenced, criterion, interim (benchmark), classroom assessment technique (CAT), and assessment feedback are presented below. To start with, formative assessment was perceived as a process used by lecturers and students during the learning process to provide feedback that can be used to improve teaching and learning. This type of assessment is ongoing and occurs throughout the learning experience (Stanja *et al.*, 2023). During interviews with participants, it was revealed that the primary purpose of formative assessment is to monitor student learning, identify areas of difficulty, and adjust instruction accordingly. It helps the academic staff understand how well students are grasping the material in real-time, allowing for timely adjustments to teaching strategies, pacing, and content delivery. Additionally, formative assessment provides students with feedback on their progress, helping them understand their strengths and areas that need improvement. It takes various forms, including quizzes, discussions, polls, group activities, homework assignments, and more. They are not usually graded but focus on providing constructive feedback and facilitating a deeper understanding of the subject matter. In general, during interviews, it was established that the academic staff carry out formative assessments in the public universities in Northern Uganda. The level at which many of the academic staff use formative assessment to provide feedback to students or inform them of their progress is still low. The primary goal of formative assessment is to improve the capacity of the learner to attain the intended outcomes. Thus, information resulting from formative assessment serves as feedback for improvement rather than for purposes of grading.

Also, the study revealed that summative assessment is a method of evaluating students' learning and academic achievement at the end of an instructional period, typically a unit, semester, or school year. Unlike formative assessment, which focuses on ongoing feedback to improve learning, as discussed earlier, summative assessment aims to summarise and judge the overall performance and understanding of students. Some of the summative assessment practices include: the traditional written examinations at the end of a course or semester covering the entire curriculum; portfolios showing a collection of a student's work over time, showcasing their achievements, progress, and skills in various areas; students presenting information or projects orally, allowing for assessment of communication skills, content knowledge, and presentation abilities. Generally, the participants reported that the use of summative assessment was high among the academic staff in the three public universities in Northern Uganda. While

summative assessments serve the crucial purpose of evaluating overall student learning, there are various challenges and issues that academic staff and universities face when implementing them. For example, one of the participants informed us that:

"Summative assessments often focus on a final outcome, which may not capture the full range of a student's abilities or growth over time. This narrow focus can lead to a limited understanding of a student's overall development."

Similarly, the academic staff interviewed referred to norm-referenced assessment as a method of evaluating and interpreting test performance in relation to a group of individuals who have taken the same test, often referred to as the norming group. The purpose of norm-referenced assessments is to compare an individual's performance to that of a larger population, providing information about how well the individual performs in comparison to others. Common examples of norm-referenced assessments include standardised achievement tests and intelligence tests. Generally, the participants reported that the use of norm-referenced assessment was low among the academic staff in the three public universities in Northern Uganda. There are various challenges and issues that academic staff and universities face when using norm-referenced assessment. For example, one of the participants informed us that:

"A few of our academic staff effectively use norm-referenced assessment. This type of assessment cannot address individual differences; these assessments focus on group comparisons, and the academic staff found it challenging to tailor instruction to individual learning needs. Students with unique learning styles or those who need differentiated instruction did not receive the support they required."

In addition, criterion-referenced assessment is a method of evaluating and interpreting test performance based on predetermined criteria or specific learning objectives. Lei *et al.* (2023). The academic staff perceived criterion-referenced assessments as a method that focuses on determining whether a student has achieved specific skills or knowledge. They further stated that criterion-referenced assessments are designed to measure a student's performance against explicit learning objectives or criteria. These criteria are typically established in advance and are directly linked to the content and skills that students are expected to master. Criterion-referenced assessments often include clear performance standards or rubrics that outline the expected level of proficiency for each criterion. These standards help communicate expectations to both academic staff and students. Additionally, criterion-referenced assessments provide valuable feedback to students and teachers about areas of strength and areas that need improvement. This feedback is often detailed and can guide instructional planning. Examples of criterion-referenced assessments include quizzes, unit tests, end-of-course exams, and project assessments. In general, the participants reported that the use of criterion assessment techniques was low among the academic staff in the three public

universities in Northern Uganda. The low use of criterion assessment techniques among academic staff in public universities can be attributed to various factors. Understanding these causes is crucial for devising effective strategies to promote the adoption of criterion assessment. For example, one of the participants informed us that:

> *"Many academic staff in our university experience a lack of knowledge on criterion-referenced assessments. They are not fully aware of the benefits and importance of criterion assessment techniques. Lack of knowledge about these methods has resulted in a reluctance to incorporate them into teaching practices."*

Furthermore, "benchmark assessment technique" has been perceived by academic staff in universities as a method used by academic staff to evaluate the performance, efficiency, or capabilities of students by comparing them against established standards or benchmarks. Benchmark assessments are administered from time to time throughout the university academic year, at identified times during a curriculum classification, to evaluate students' knowledge and skills compared to a clear set of longer-term learning aims. The design and choice of benchmark assessments are driven by the purpose, intended users, and uses of the instruments. Benchmark assessment can inform policy, instructional planning, and decision-making at the classroom and/or district levels. The academic staff further revealed that the aim of benchmark assessment techniques is to establish areas for improvement, set performance standards, and make informed decisions based on the comparisons made. It's a valuable tool for universities and individual academic staff to gauge their performance and strive for continuous improvement. Generally, the participants perceived that the use of the benchmark assessment technique was moderate among the academic staff in the three public universities in Northern Uganda. While benchmark assessment techniques in teaching can provide important insights into student improvement and instructional effectiveness, some academic staff face problems using them. For example, one of the participants informed us that:

> *"Benchmark assessments are often standardised, and the one-size-fits-all approach may not account for diverse learning styles, backgrounds, or abilities. Students may be disadvantaged if the assessments do not align with their individual needs."*

In addition, the participants perceived classroom assessment techniques (CATs) as a technique designed to provide academic staff with feedback on students' learning and understanding during the teaching and learning process. These techniques are intended to help academic staff make informed decisions about their teaching methods and to identify areas where students may need additional support. CATs are often quick, simple, and non-graded, focusing on the ongoing improvement of teaching and learning. They identified some of the CATs as follows: 1) One-Minute Paper: At the end of a class session, the lecturer asks students to take one minute to write down the most important

concept they learned during that session. 2) Concept mapping, where students create a visual representation of the relationships between key concepts in a particular topic. 3) Think-Pair-Share, where the academic staff pose a question or present a problem and have students think about it individually. Then, pair them up to discuss their thoughts before sharing them with the larger group. This encourages active engagement and peer discussion. 4) Running lecture room opinion polls where the academic staff use a quick show of hands or clicker response system to gauge students' opinions on a topic or their level of understanding. This can provide a snapshot of the class's overall comprehension. 5) Self-assessment surveys, where academic staff provide students with a self-assessment questionnaire where they can reflect on their understanding, study habits, and areas for improvement. This helps students become more aware of their learning process and can guide them in setting goals.

5.4 Descriptive Results on Service Infrastructure

In order to stimulate the opinions of the respondents on service infrastructure so as to analyse whether it has an influence on curriculum implementation in public universities in Northern Uganda, the researcher administered a questionnaire covering four (4) dimensions to which the respondents were required to show their level of agreement or disagreement, and the findings are presented in Table 3.

Table 3 shows that the overall mean of service infrastructure was 3.43 (68.6%) with a 1.13 standard deviation (SD), which was far from zero, suggesting that the views of the respondents on service infrastructure were significantly varied towards the mean, which is the central location. These findings suggest that the respondents were generally of the opinion that the level of service infrastructure in public universities in Northern Uganda was high. More specifically, the results revealed that the level of electricity facilities and supply was high at an aggregate mean of 3.75 (75.0%) and a 1.04 SD. This means that most of the buildings have good electricity connectivity with alternative sources of power, and most buildings have adequate lighting and lightning arrestors in the three public universities (Lira, Muni, and Gulu). In addition, the results revealed moderate levels of water facilities and supply, with an aggregate mean of 3.18 (63.6%) and a 1.12 SD. This implies that the respondents from the three public universities were of the view that water facilities and supply still need to be further strengthened to reach the ideal levels as set by NCHE (2018). It was found that the universities were connected to clean water and tracked water usage regularly. However, the universities lacked reliable alternative sources of water and, in most cases, could not promptly repair broken water pipes and taps. In regard to whether public universities had quality toilet facilities, the results showed an aggregate mean of 3.49 (69.8%) and a 1.12 SD. This suggests that the majority of the respondents were of the view that toilet facilities in the three public universities were below the ideal levels.

Table 3: Descriptive Results on Service Infrastructure

Service infrastructure items	Item Means
Electricity (Aggregate mean = 3.75; SD = 1.04)	
1. The university is connected to reliable electricity.	3.82
2. The university has alternative sources of electricity.	4.03
3. The university has adequate security lights.	3.56
4. The university has adequate fire extinguishers.	3.59
5. The university has lightning arrestors installed on all the buildings.	3.76
Water (Aggregate mean = 3.18; SD = 1.12)	
1. The university is connected to clean water source.	4.00
2. The university has alternative sources of water.	3.07
3. The university provides students clean drinking water.	2.70
4. The university tracks water usage regularly.	2.76
5. The university promptly repairs broken water pipes and taps.	3.35
Toilets (Aggregate mean = 3.49; SD = 1.12)	
1. The university has adequate toilet stances.	3.60
2. The toilet facilities of the university are always clean and well labeled.	3.66
3. The university toilets have enough waste/trash bins.	3.46
4. The university toilets are regularly fumigated.	3.22
5. The University has well maintained sewerage lines.	3.49
Healthcare Facility (Aggregate mean =3 .29; SD = 1.24)	
1. The university healthcare facility has a well-designed outpatient room.	3.85
2. The university healthcare facility has reliable ambulance for emergency cases.	3.37
3. The university healthcare facility has adequate admission rooms.	3.23
4. The university healthcare facility has emergency delivery room.	2.99
5. The university healthcare facility has a well-equipped diagnostic laboratory.	3.15
6. The university healthcare facility has a well-equipped counseling room.	3.20
Overall Mean for Service Infrastructure 3.43, SD = 1.13	
Legend: 1.00 – 1.79 = Very Low, 1.80 – 2.59 = Low, 2.60 – 3.39 = Moderate, 3.40 – 4.19 = High and 4.20 – 5.00 = Very High	

Source: Primary data.

According to NCHE (2018), the ideal student-toilet room ratio is 12:1 for male students, 8:1 for female students, 12:2 for male urinals, and 5:1 for the physically challenged. However, it was revealed that toilet facilities are available but not sufficient or disability-friendly. In regard to the quality of healthcare facilities, the results showed an aggregate mean of 3.43 (68.6%) and a 1.13 SD. This suggests that the majority of the respondents were of the view that healthcare facilities in the three public universities were available on campus and highly equipped, but most of them, especially Gulu and Muni, operate as sick bays. Lastly, in line with NCHE (2018), the level of service infrastructure is classified as 1 = unacceptable, 2 = acceptable, 3 = good, and 4 = ideal. Therefore, the findings of this study indicate that the level of service infrastructure in the three public universities in Northern Uganda is acceptable. This means that electricity, water, toilets, and healthcare facilities exist in the three public universities in Northern Uganda but are not sufficient. Hence, there is a need to expand service infrastructure in universities to further improve curriculum implementation.

5.5 Qualitative Findings

On the side of the qualitative findings, the participants' opinions of the service infrastructure in Northern Ugandan public universities varied. The qualitative findings were aligned with four key themes: electricity, water, toilets, and healthcare facilities.

5.5.1 Electricity Facilities

It was found out that the universities were connected to reliable electricity, which is UMEME in the case of Lira and Gulu universities and WENRECO for Muni University. The study further revealed that the universities had solar systems and generators as an alternative source of electricity. However, very low installation coverage was reported for security lights, fire extinguishers, and lightning arrestors. Similarly, the results confirmed solar and generators as alternative sources of electricity in universities. However, even though there were alternative sources of electricity, one of the estate officers revealed that electricity facilities remained inadequate, resulting in an unreliable electricity supply for teaching and learning activities. This finding, contradicted the data collected through a questionnaire, where some academic staff revealed that electricity facilities were adequate in their universities.

Another estates officer had this to say:

"We get electricity from three different sources: WENRECO, solar, and generators. Nevertheless, electricity facilities are expensive to manage. There are frequent power outages; hence, we could not use our science laboratory equipment like PCR machines and high-capacity fridges for preserving teaching resources."

One estate officer during the interview reported that:

"We currently have inadequate electricity facilities. We resorted to using solar power during the day and a generator during the night, but the cost of diesel has proved this option costly. This inadequacy in electricity is inconveniencing to our academic staff, who use ICT gadgets to prepare lecture materials and content delivery."

A scrutiny of the interviews with estate officers confirmed that electricity facilities are inadequate in the three public universities in Northern Uganda. Therefore, the inadequacy of electricity facilities in the universities was one of the main limitations to preparations for teaching and the use of digital instructional resources by the lecturers. This implies that planting more electricity facilities in universities is key. Therefore, university management needs to provide additional electricity facilities and equipment in order to offer an improved level of preparation for teaching and content delivery.

An observation was done on the status of electricity facilities in the public universities in Northern Uganda. The findings were in agreement with the quantitative results that all three public universities in Northern Uganda had alternative electricity facilities. For example, Muni University had WENRECO as the main source of electricity.

Also, a well-protected solar panel and 1,500 KV generator provided alternative sources of power. All the universities under study had alternative sources of electricity. It was revealed that, in spite of the alternative sources of electricity, cases of power blackouts were high. This had an undesirable impact on the quality of preparations, content delivery, and assessment of learning. This result also supports previous investigations by Saunders *et al.* (2017), who identified electricity as the main service infrastructure required for effective curriculum implementation in any university. Similarly, Assoumpta and Andala (2020) opine that the availability of electricity is quite important for successful content delivery and assessment of learning in the public university system. In support, Ndirangu *et al.* (2021) reported that well-constructed buildings with services such as electricity often contribute to better curriculum implementation in the university system. Also, in support, Nepal *et al.* (2015) reported that for effective implementation of the curriculum in any university setting, there must be the provision of services like electricity.

Egegwu and Iruaganachi (2021) highlight that adequate use of service infrastructure had a significant influence on the implementation of the curriculum in universities in Nigeria. In support of this view, Ajayi (2020) emphasised the need to adequately build facilities like electricity in university systems across Africa. This would consistently improve the quality of academic staff's levels of preparation, content delivery, and assessment of learning. These assertions are supported by the finding of this study that reliable electricity facilities at a university are essential for curriculum implementation. Therefore, the three public universities in Northern Uganda need to further expand their electricity facilities to match the increasing demands. These electricity facilities are crucial for curriculum implementation, especially in aiding in the in the preparation of instructional materials and lecture notes, the use of PowerPoint for content delivery, and carrying out laboratory experiments. There should be deliberate efforts by the universities to ensure electricity is reliable, with alternative sources, security lights, well-serviced fire extinguishers, and lightning arrestors installed on all the buildings to ensure smooth curriculum implementation.

5.5.2 Water Facilities

On the status of water facilities in the three public universities in Northern Uganda, FDGs were conducted with student leaders. The student leaders revealed that water facilities in their universities were inadequate. For example, clean drinking water points were not provided, and this forced students to move outside the university campuses in search of either free or purchased water. Therefore, drinking water points ought to be constructed in suitable, visible, and recognised locations. Similarly, during FGD with the student leaders, it was discovered that water facilities were unreliable as some broken water pipes and taps were not promptly repaired. It was further revealed that a decline in water facilities also led to a decline in the quality of preparation for teaching, content delivery, and assessment of learning. Similarly, it was revealed that the three public universities were served by piped water connections from NWSC. The universities had alternative

sources of water, mainly rain and boreholes. However, one estate officer describes the situation of water facilities as appalling and says that:

"Currently, the campus uses about 70 m3 per day, among the population of 4,000 people. The normal water consumption per day on campus could have been 160 m3. But there is a shortfall of 80 m3, necessitating expanding the reservoir capacity."

A study of water facilities in the three public universities in Northern Uganda showed that there were shortfalls in water supply, hence the need to construct larger water tanks. Shortfalls in water facilities affected students learning. For example, in the laboratories, some equipment requires water for cleaning, and the inadequacy of the water facilities has caused delays in the preparation of lectures and the delivery of lectures.

Other estates officers revealed that:

"Our university does not regularly track water usage and operationalization of water facilities due to limited and wide human resource gaps and funds. As such, broken water pipes and taps are not fitted promptly. Delays in fitting these broken water pipes and taps even complicate curriculum implementation activities."

These interviews with estate officers established that water facilities were inadequate in the three public universities in Northern Uganda. Therefore, irregularities in tracking water usage and delays in repairing broken pipes and water taps were the main limitations to the quality of lecturers' preparations for teaching and content delivery. This implied that prompt repairs, tracking water usage, and the installation of more water facilities in universities are important in improving curriculum implementation. Therefore, university management needs to improve water facilities in order to improve the level of preparation for teaching and content delivery.

An observation was made on the status of water facilities in the public universities in Northern Uganda. The findings were in agreement with previous results of this study, which found that all three public universities in Northern Uganda had unreliable water facilities. For example, at Lira University, only a 6,000-litre water tank had been installed to serve a huge lecture block. It was observed that most of the public universities under study did not promptly repair their broken water pipes, taps, and leakages. This finding agrees with Poi (2021), who reported that the most common challenges that face water infrastructure in universities include broken pipes, poorly maintained water taps, and an irregular supply of water in the universities, which negatively impacts curriculum implementation. Additionally, it was observed that the universities under study did not have points for students to tap clean drinking water. This finding also agrees with those of Thongplew and Kotlakome (2019), who reported that creating taps for clean drinking water and upholding better access to drinking water is important for students and staff in universities. For example, drinking clean water instead of sugary drinks could help

eliminate obesity as well as reduce the risk of Type II diabetes among students and staff in universities. Drinking water could also help improve hydration status, potentially reducing the risk of well-being concerns such as headaches, stomachaches, and poorer cognitive function, which hinder students' class attendance and participation. Therefore, universities have to ensure that major buildings are connected to clean drinking water from alternative sources. Furthermore, ensure that water usage is regularly tracked and broken water pipes and taps are promptly repaired to help improve curriculum implementation.

5.5.3 Toilet Facilities

On the nature of toilet facilities in the three public universities in Northern Uganda, FGDs were conducted with student leaders. The participants reported that the toilet facilities available were in fairly good condition. Furthermore, it was revealed that all toilet facilities were well labelled for male and female categories. Also, during FGDs with the student leaders, it was revealed that most of the toilets had fairly well-maintained sewerage lines. However, the participants from the three universities under study revealed the inadequacy of toilet stances for both male and female students. They further revealed that the cleanliness of the toilets was a big challenge. The major problems were that toilets were not regularly cleaned; hard papers were mostly used instead of toilet papers for anal cleansing; and the users did not flash water at all times. These practices kept the waste materials pilling in the toilet pans and blocking the sewerage lines. Such practices tend to make most students uncomfortable when using toilet facilities in universities. The analysis of interviews with estate officers in the three public universities agrees with the previous quantitative findings that the toilet facilities in the universities were generally fairly good. However, less attention has been paid to the maintenance of the toilet facilities. The provision of toilet facilities for persons with disabilities by the universities was also said to be inadequate. When one estate officer was asked about the state of toilet facilities at his university, he said:

> *"Most of our toilets are in good condition but lack good waste or sanitary bins. Nevertheless, students, more specifically in the female category, instead resorted to throwing waste materials on the toilet floor or simply dropping them in toilet pans, triggering blockages in the sewerage lines."*

Another estates officer had this to say:

> *"Ideally, one toilet stance is meant to serve 10 males, one toilet stance is meant to serve 8 females, and one toilet stance is meant to serve 5 students with a disability, as guided by the NCHE policy framework. Yet, our university is currently operating at unacceptable levels, as one toilet stance serves over 40 male students and one toilet stance serves over 32 females. One toilet stance serves over 20 students with disabilities. This is inconveniencing to our students."*

A scrutiny of the interviews with estate officers confirmed the existence of fairly good water-borne toilet facilities. However, the results revealed inadequacy in terms of toilet stance-student ratio, provision of waste/sanitary bins, and cleanliness of the facilities. Therefore, discomfort the students face in the use of these toilet facilities in their universities was one of the main limitations to their active participation in lectures. This implies that offering students adequate, clean, and well-maintained toilet facilities is important. This will significantly improve students' comfort during content delivery and assessments.

An observation was made on the status of toilet facilities in the public universities in Northern Uganda. The findings were in agreement with the previous results of this study, which found that all the public universities under study had fairly good water-borne toilet facilities. However, these toilet facilities were not regularly fumigated or cleaned, and they lacked adequate waste bins. Furthermore, it was observed that all the universities had inadequate toilet facilities as compared to the number of students and were operating at deplorable levels, as one toilet stance served over 40 male students, over 32 females, and over 20 students with disabilities. This study's findings agree with those of Kebirungi (2018), Shittu *et al.* (2022), and Ugwu *et al.* (2018). For example, Kebirungi (2018) studied gender responsiveness in the provisioning and management of water and sanitation facilities in East African universities: a case of Makerere University, Uganda, and the University of Dar-es-Salaam, Tanzania. The authors reported that the use of toilet infrastructure is deplorable, in spite of a number of measures devised by students. According to the author, students spent time locating toilets with water and sanitary facilities in students' halls of residence or lecture theatres. Because most toilets lacked water and sanitary facilities, they did not provide safety and privacy. This made some females postpone the use of sanitary facilities, while students with special needs absconded from attending lectures. Where sanitary bins were not provided for female students to dispose of used sanitary towels, students dumped such towels in the toilets, placed them on the water cisterns' floor and dumped them in water reservoir tanks. Handwritten materials targeting fresh students on how to use water and sanitary facilities were being pinned on walls, although these were later plucked out and used for anal cleansing in the absence of water and toilet papers.

According to a study by Ugwu *et al.* (2018), toilets play an essential role in the health of students in universities. Proper waste disposal and management equates to cleaner waterways, a lower likelihood of lethal diseases and parasites, and improved gender equality and education. The researcher further reported that millions of university students worldwide do not have access to quality toilet infrastructure and therefore risk their health and safety. Similarly, Shittu *et al.* (2022) reported that most of the public universities in Lagos State, Nigeria, had toilet infrastructure constructed decades ago. Since the toilets are old, they have deteriorated to a state that is no longer safe for students. However, due to a lack of alternate options, the university continued to use the dilapidated toilets, causing grave danger to the students and their lecture activities. These reports indicate that the availability of toilet facilities at the university is

essential for curriculum implementation. Therefore, the three public universities in Northern Uganda need to provide ideal toilet stances, ensure regular fumigation and cleaning of toilet facilities, adequately provide waste bins, and maintain the sewerage lines. This indicated that offering students ideal, clean, and well-maintained toilet facilities is vital. This will significantly improve students' comfort during content delivery and assessments.

5.5.4 Healthcare Facilities

On the state of health care facilities in the three public universities in Northern Uganda, FGDs were conducted with student leaders. The participants reported a fairly good state of healthcare facilities at Muni and Lira universities. For example, the study revealed that Lira University had a teaching hospital with fairly sufficient healthcare facilities like a well-designed outpatient room, a reliable ambulance, reasonable admission rooms, and a delivery room. Muni University had a good grade II health centre with an outpatient room, fairly good laboratory equipment, and a counselling room, yet it lacked a reliable ambulance to handle referral cases. In the case of Gulu University, the participants reported the availability of reliable ambulance and counselling rooms, yet they faced an appalling state of outpatient rooms and ill-equipped diagnostic laboratory equipment. It was reported that the healthcare services at Gulu University were offered in a building that was not specifically designed as a medical unit; hence, the facilities were deplorable for medical students to have their hands-on training. This led to inconveniences and delays in curriculum implementation activities. This implied that having well-equipped healthcare facilities or specialised teaching hospitals is critical in public universities in Northern Uganda, especially in training medical students with practical skills. The analysis of interviews with estate officers in the three public universities slightly agrees with the quantitative findings of the study that generally healthcare facilities in the universities were fairly good. However, the current facilities were still unacceptable for running specialised teaching hospitals. When one estate officer was asked about the state of healthcare facilities at his university, he said:

> "*Our university does not have acceptable healthcare facilities, and as a result, our medical students endure moving long distances to referral hospitals for their practical skills and training. Plans to construct a specialised teaching hospital are in place, but the university management lacks funds to start the project.*"

A scrutiny of the interviews with estate officers established the unacceptable state of healthcare facilities in public universities in Northern Uganda. Therefore, this inacceptable state of healthcare facilities in universities has narrowed the scope of service delivery to students, staff, and the community. Also, medical students pursuing courses like nursing, medicine, and surgery, among others, had fewer opportunities for practical training and experiencing the use of various health facilities and tools. Therefore, public universities in Northern Uganda need to establish specialised teaching hospitals in order

to offer improved service delivery to students, staff, and the community and to offer a variety of training opportunities for their medical students.

An observation was made on the status of healthcare facilities in the public universities in Northern Uganda. The findings from observation were in agreement with the results from quantitative studies, which found that all three public universities in Northern Uganda had some healthcare facilities for students, staff, and the community. However, it was observed that these health facilities were only good for the basic treatments of a few students and staff. The state of healthcare facilities in public universities in Northern Uganda needs to be further improved. For example, the healthcare building at Gulu University is improvised and lacks the required standards, including car parking spaces and service areas. This calls for a need to have specialised teaching hospitals in the universities in Northern Uganda. This study's findings agree with those of Cattamanchi *et al.* (2015), Oladejo (2014), and Sahu (2020). Specifically, a study carried out by Cattamanchi *et al.* (2015) reported that the state of health facilities in universities in Nigeria is pathetic, hence deterring curriculum implementation. This is especially true with the pathetic state of the outpatient rooms in university health facilities; there are unreliable ambulance services, insufficient admission and emergency delivery facilities, and poorly equipped diagnostic laboratories and counselling rooms. The pathetic state of health facilities in universities greatly affects the quality of curriculum implementation by academic staff and students in areas of preparation for lectures, content delivery, and assessment of learning. Similarly, Sahu (2020), in his study about the effect of healthcare facilities on teaching and learning in universities in Senegal, established that the quality of healthcare facilities, such as outpatient spaces, adequate counselling rooms, and adequate health unit furniture, significantly contributed to improved curriculum implementation. Similarly, Ogunode *et al.* (2021) advised that public universities should strengthen their healthcare facilities and services for students and staff for better curriculum implementation. This view is also supported by other scholars, such as Shittu *et al.* (2022), who pointed out that healthcare facilities in public universities should have more sophisticated machinery and medical equipment to significantly influence curriculum implementation at the universities. This result indicates that the availability of healthcare facilities at the university is essential for curriculum implementation. Hence, public universities in Northern Uganda must set up specialised teaching hospitals with state-of-the-art amenities like outpatient rooms, reliable ambulances, admission, counselling, and delivery rooms in order to strengthen curriculum implementation, particularly with regard to having practical medical lectures and how students who are enrolled in medical courses have their practical skills assessed.

Furthermore, a Pearson correlation analysis was carried out to establish the degree and direction of the correlation between the two variables, and the results are presented in Table 4.

Table 4: Correlation Analysis for Service Infrastructure and Curriculum Implementation

		Service Infrastructure	Curriculum Implementation
Services Infrastructure	Pearson Correlation	1	.416**
	Sig. (2-tailed)		.000
	N	123	123
Curriculum Implementation	Pearson Correlation	.416**	1
	Sig. (2-tailed)	.000	
	N	123	123
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary data.

Table 4 shows there was a moderately positive correlation between service infrastructure and curriculum implementation in public universities in Northern Uganda (r =.416**, p = 0.000, n = 123). This implies that as service infrastructure increases, curriculum implementation in public universities in Northern Uganda also increases. Furthermore, this result meant the null hypothesis ($H_0 2$) that service infrastructure has no significant influence on curriculum implementation in public universities in Northern Uganda was rejected because the p-value of 0.000 was found to be less than the significance level of 0.01. Therefore, an alternative hypothesis that service infrastructure has a significant influence on curriculum implementation in public universities in Northern Uganda was adopted. The study further carried out a regression analysis to examine whether service infrastructure has a significant influence on curriculum implementation in public universities in Northern Uganda. The coefficient of determination (R square) under regression analysis is presented in Table 5.

Table 5: Model Summary of Regression Analysis for
Service Infrastructure and Curriculum Implementation

Model Summary[b]			
Model	**R**	**R Square**	**Adjusted R Square**
1	.463[a]	.214	.188
a. Predictors: (Constant), Electricity, Water, Toilets, Health Centres			
b. Dependent Variable: Curriculum Implementation			

Source: Primary data.

Table 5 above indicates the model summary of regression and provides R and R squared (R^2) values. The R^2 indicated how service infrastructure constructs (electricity, water, toilets, and healthcare facilities) explained variations in the dependent variable (curriculum implementation). The model summary reveals that the correlation coefficient (R) is 0.463, and the correlation coefficient the correlation coefficient (R2) is 0.214. This implies that service infrastructure explained 21.4% (.214*100%) of the variations in curriculum implementation, while the remaining (78.6%) variation can be explained by other factors.

However, to examine whether the overall regression model is a good fit for the data, the researcher proceeded to generate an Analysis of Variance (ANOVA), whose results are presented in Table 6.

Table 6: ANOVA for Service Infrastructure and Curriculum Implementation

ANOVAª						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	4593.270	4	1148.318	8.054	.000ᵇ
	Residual	16823.136	118	142.569		
	Total	21416.407	122			
a. Dependent Variable: Curriculum Implementation						
b. Predictors: (Constant), Health Centres, Electricity, Toilets, Water						

Source: Primary data.

Table 6 indicates the calculated p-value of 0.000b is less than 0.05, and the regression model was found to be statistically significant (F = 8.054, df = 4, p-value = 0.000). This means that service infrastructure has a statistically significant influence on curriculum implementation in public universities in Northern Uganda.

Lastly, to test for the influence of each aspect of service infrastructure on curriculum implementation, multiple regression analyses were carried out. The results are presented in Table 7.

Table 7: Regression Coefficients for Service Infrastructure and Curriculum Implementation

Coefficientsª						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	79.327	6.749		11.754	.000
	Electricity	.001	.407	.020	.003	.001
	Water	.007	.393	.068	.018	.000
	Toilets	1.264	.352	.408	3.593	.000
	Health Care	.233	.267	.091	.873	.001
a. Dependent Variable: Curriculum Implementation						

Source: Primary data.

Table 7 indicates that the coefficient involving electricity, the first aspect of service infrastructure with curriculum implementation, is positive with a betas (β) value of 0.020. This result suggests that a unit change in electricity brings about a 0.020 (02.0%) increase in the curriculum implementation, with other factors held constant. The observed sig. (p) value of 0.001, which is lower than the critical sig. value of 0.05, implies that electricity has a statistically significant influence on curriculum implementation in the three public universities in Northern Uganda. In addition, the results show that the coefficient relating water gadgets, the second dimension of service infrastructure, with curriculum implementation is positive, with a beta (β) value of 0.068. This result suggests that a unit change in water gadgets brings about 0.068 (06.8%) increases in curriculum implementation and other factors held constant. The observed sig (p) value of 0.000,

which is lower than the critical sig. value of 0.05, implies that water gadgets had a statistically significant influence on curriculum implementation in the three public universities in Northern Uganda.

Furthermore, the results indicate that the coefficient relating toilets, the third aspect of service infrastructure with curriculum implementation, is positive with a beta (β) value of 0.408. This result suggests that a unit change in toilets brings about a 0.408 (40.8%) increase in the curriculum implementation, with other factors held constant. The observed sig (p) value of 0.000, which is lower than the critical sig. value of 0.05, implies that toilets had a statistically significant influence on curriculum implementation in the three public universities in Northern Uganda. Lastly, the results indicate that the coefficient relating healthcare facilities to curriculum implementation is positive, with a beta (β) value of 0.091. This result suggests that a unit change in healthcare facilities brings about a 0.091 (09.1%) increase in curriculum implementation, with other factors held constant. The observed sig. (p) value of 0.001 is lower than the critical sig. value of 0.05, implying that healthcare facilities had a statistically significant influence on curriculum implementation in the three public universities in Northern Uganda. Therefore, the degrees of the respective betas (β) suggested that toilets had a more significant influence on curriculum implementation. Additionally, the results from correlation analysis established that service infrastructure had a positive and statistically significant correlation with curriculum implementation in public universities in Northern Uganda. Similarly, the results from regression analysis confirmed that service infrastructure has a statistically significant positive influence on curriculum implementation in public universities in Northern Uganda. Therefore, the study rejected the null hypothesis (H01) that service infrastructure has no significant influence on curriculum implementation in public universities in Northern Uganda.

Therefore, the study found that service infrastructures had a statistically significant influence on curriculum implementation in public universities in Northern Uganda. Also, it was concluded that electricity, security lights, fire extinguishers, and lightning arrestors were installed on the key buildings but were still inadequate and unreliable. The universities had problems getting clean drinking water; they had unreliable alternative water sources. Water usage was not regularly tracked. Broken water pipes and taps were not promptly repaired. Also, it was concluded that the universities had inadequate, clean, and well-labelled toilets. Most of the toilets have no waste bins and are not regularly fumigated. Lastly, a typical university had health care facilities with insufficient outpatient rooms, reliable ambulances, admissions, counselling, and delivery rooms. Furthermore, diagnostic laboratories were not well equipped. The lack of these facilities also affected the training of medical students with practical skills within the university.

6. Conclusion

In light of the study findings, it was concluded that service infrastructure had a statistically significant influence on curriculum implementation in public universities in Northern Uganda. Also, it was concluded that electricity, security lights, fire extinguishers, and lightning arrestors were installed on the key buildings but were still inadequate and unreliable. The universities had problems getting clean drinking water; they had unreliable alternative water sources. Furthermore, water usage was not regularly tracked. Broken water pipes and taps were not promptly repaired. Also, it was concluded that the universities had inadequately clean and well-labelled toilets. Most of the toilets had no waste bins and were not regularly fumigated. Additionally, a typical university had health care facilities with insufficient outpatient rooms, reliable ambulances, admissions, counselling, and delivery rooms. Furthermore, diagnostic laboratories were not well equipped. The lack of these facilities also affected the training of medical students with practical skills within the university.

6.1 Recommendation
The study recommends that public universities in Northern Uganda should ensure: a) electricity is reliable, with alternative sources, security lights are adequately installed, fire extinguishers are well serviced and lightning arrestors installed on all the buildings; b) clean drinking water is connected to the major buildings, water is to draw from alternative sources and ensure water usage is regularly tracked, broken water pipes and taps are quickly repaired, and c) toilet stances are adequate, clean, regularly fumigated and well labelled with waste bins, and sewerage lines are well maintained, d) Universities ought to make deliberate efforts to build modern health care facilities with sufficient outpatient rooms, reliable ambulance, admission, counselling and delivery rooms. Furthermore, ensure that there are well-equipped diagnostic laboratories. This will significantly improve the status of healthcare facilities, thereby improving students' health and comfort during content delivery and assessments.

Declaration of Conflicts of Interest
The author(s) declares no potential conflicts of interest.

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