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Original Article

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

Emmanuel Acidri Bileti[1*], *Stephen Ndawula, PhD*[1], *Harriet Kebirungi, PhD*[1] *& Joseph Rwothumio, PhD*[1]

[1] Kyambogo University, P. O. Box 1, Kyambogo, Uganda.
[*] Author for Correspondence ORCID ID: https://orcid.org/0009-0009-1584-7881; Email: emmabileti@rocketmail.com

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ABSTRACT

This study investigated the levels of curriculum implementation and didactic infrastructure management in public universities in Northern Uganda. It evaluated the influence of didactic infrastructure management on curriculum implementation in public universities in Northern Uganda. It was hypothesised that didactic infrastructure management has no significant relationship with curriculum implementation in public universities in Northern Uganda. The study was guided by a pragmatic worldview and embraced a concurrent mixed-methods research design. The study used a questionnaire to collect quantitative data from 123 respondents. Qualitative data was collected from 26 participants through interviews. Furthermore, eight focus group discussions were conducted. The quantitative data collected was analysed using descriptive statistics, correlation coefficient analysis and multiple linear regression techniques, while thematic analysis techniques were used to analyse qualitative data. The study revealed that, generally, the levels of curriculum implementation were low and didactic infrastructure management was moderate. The study results showed that didactic infrastructure management had a significant influence on curriculum implementation in public universities in Northern Uganda. The null hypothesis that didactic infrastructure management has no significant relationship with curriculum implementation in public universities in Northern Uganda was rejected. The study concluded that didactic infrastructure management is significant for curriculum implementation. Therefore, it was recommended that public universities in Northern Uganda improve the management of their didactic infrastructure, such as libraries, sports facilities, and halls, to further enhance curriculum implementation, especially in areas of preparation for teaching, content delivery, and assessment of learning.

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INTRODUCTION

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, science, 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 and Molopo (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, Gambia in 1841, 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 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, it was 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).

Furthermore, studies on Nigerian public universities found that the level of curriculum implementation was low and poor in the areas of teaching preparation, content delivery, and learning assessment (Ajayi & Ayodele 2015; Ayandele, 2016). Similarly, Olamo et al. (2019) studied challenges hindering the effective implementation of the harmonised modular curriculum: 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 also revealed that 56.7% of academic staff members did not deliver content in the classroom using learner-centred methods, highlighting the need for better curriculum implementation in Ethiopia's public universities.

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In Uganda, the National Council for Higher Education (NCHE, 2021; 2019) 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. 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 and Ssenkusu (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 learner's memorization (Niyivuga et al., 2019). According to Govender (2018), to ensure that the curriculum is effectively implemented, infrastructure such as libraries, sports facilities, and halls 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 the availability of libraries, sports facilities, and halls infrastructures plays an essential part in ensuring effective implementation of a curriculum in the areas of preparation for teaching, content delivery, and assessment of learning in public universities. 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 university infrastructure. Chika (2019) and Cuesta et al. (2016) classified university structures into physical, didactic, and service infrastructures. According to Jenkins (2019), much as universities have infrastructure, there is a scarcity of studies showing how didactic infrastructure management has influenced curriculum implementation in public universities.

In the recent past, public universities in Northern Uganda such as Lira, Muni, and Gulu, have experienced difficulties in curriculum implementation in the areas of preparation for teaching, content delivery, and assessment of learning (NCHE, 2019). According to Ezati et al. (2017), also Atibuni and Olema (2021), the difficulties in curriculum implementation in public universities arise from the academic staffs' low preparation for teaching, use of rote teaching methodology, and dishonesty in learner assessments. This study suggests that there is a need to improve curriculum implementation in public universities in Northern Uganda. Furthermore, a study by Mabonga and Tumweboneire (2021), also Mannion and Lynch (2021) reported problems of curriculum implementation in public universities in Northern Uganda as ineffective time management, learners' not receiving instant feedback, and learners' not receiving clear instructions from academic staff. According to Spreen and Knapczyk (2017) and Amone (2021), curriculum implementation in public universities in Northern Uganda has experienced inadequate preparation of instructional materials by academic staff, use of lecturer-centred teaching methods, and inability to timely communicate assessment feedback to learners.

According to Okello et al. (2018), there are internal and external assessment systems in public universities in Northern Uganda. Internal assessment is done by the in-house faculty and external assessment is carried out by external examiners/moderators. The assessment helps in sharing learning goals with others. It also helps to recognize the capabilities of the student. However, the quality of assessment of learning in these public universities in Northern Uganda has been declining over the years due to a lack of

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transparency in the assessment system. Okello et al. further reported that there are multiple assessments in universities in Northern Uganda in the form of presentations, projects, group discussions, assignments and tests. However, the academic staffs themselves have not put in a lot of effort towards planning and assessment of learning. Currently, public universities in Northern Uganda have faced diverse kinds of discontent and grievances raised by different stakeholders, including students and staff on curriculum implementation, notwithstanding the expanding university infrastructure. Previous studies have hardly examined how didactic infrastructure management influences curriculum implementation in public universities. Therefore, there is a need to investigate how management of didactic infrastructure, such as libraries, sports facilities, and halls, influences curriculum implementation in public universities in Northern Uganda.

Study Objectives

The purpose of the study was to evaluate the influence of didactic infrastructure management on curriculum implementation in public universities in Northern Uganda. Specifically, to examine the levels of (a) curriculum implementation, (b) didactic infrastructure management in public universities in Northern Uganda, and (c) evaluate how didactic infrastructure management influences curriculum implementation in public universities in Northern Uganda. Furthermore, test the hypothesis that didactic infrastructure management has no significant relationship with curriculum implementation in public universities in Northern Uganda.

LITERATURE REVIEW

Theoretical Review

The systems theory established by Von Bertalanffy in the 1920s (Tabor, 2021) served as the foundation for this study. According to systems theory, the layout, relationships, and overall functioning of the components make up a system. The characteristics of that system are determined by the arrangement of its components and how they work together. In a similar vein, Knoll et al. (2020) state that systems theory considers the following: the process comprising of operations, techniques, and activities; the output made up of commodities, services, and information; and the input made up of labour, infrastructure, assets, and information acquired from the environment. According to Patton and McMahon (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, didactic infrastructure management 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 didactic infrastructure management 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 didactic infrastructure management as a component of a system and how it's used for improving curriculum implementation in public universities in Northern Uganda. This study presents didactic infrastructure management as an input in the curriculum implementation process. The curriculum implementation activities, which include preparation for teaching, content delivery, and assessment of learning, interact with the inputs to generate the intended educational outputs, which are lifelong and employability skills. Although the systems theory is a broad

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theory that does not particularly address didactic infrastructure management and how it affects the way curricula are implemented, it does highlight the significance of seeing a university as a system. Thus, this study examined didactic infrastructure as a system component and how it's managed to enhance curriculum implementation in public universities in Northern Uganda.

Empirical Review

Didactic infrastructure management and curriculum implementation

This section discusses how didactic infrastructure management influences curriculum implementation in public universities. Over the years, a number of scholars worldwide have investigated the linkage between didactic infrastructure management and curriculum implementation in public universities. Okoche (2017) reported that the quality of university structures impacts significantly on the implementation of the curriculum in universities in most African countries. Assoumpta and Andala (2020) showed that in Rwanda, a lack of adequate and appropriate didactic infrastructure management in universities has constrained the smooth preparation of charts, lesson plans, and assessments of students. However, little is known about how didactic infrastructure management influences curriculum implementation in public universities in Northern Uganda. It is against this backdrop that this study aimed to analyse how didactic infrastructure management influence curriculum implementation in public universities in Northern Uganda.

Furthermore, Norton (2023) reported that didactic infrastructure management such as libraries, halls, and sports grounds are also recognised as important factors that influence teaching and learning in universities. According to Norton, the availability and effective management of didactic infrastructure like laboratories, sports grounds, and libraries make the learning atmosphere favourable in universities. Rosenbaum et al. (2023) supported the same information and added that inputs such as didactic infrastructure management in universities make lectures very interesting and exciting. The researchers further reported that the nature of buildings affects content delivery in public universities. They explained that the university building must be not only a container but also a welcoming and attractive facility. The study further stated that buildings and toilets are some of the basic facilities that impact academic performance.

A study by Ebehikhalu and Dawam (2016) revealed that didactic infrastructure is very insufficient at Abubakar Tafawa Balewa University. They reported that most of the science-based programmes have one lecture room and one laboratory allocated to all levels of study. For example, the physics, chemistry, biology, mathematics, etc. programmes have one lecture room each for students from level one to the final year. This, in turn, resulted in complications in content delivery at the university. The management of lecture rooms, laboratories, and sports facilities are still insufficient to meet the desires of the university. The library at the university has inadequate reading space and has shelves that are not easily accessible. This has negatively influenced lecturers' levels of curriculum implementation in the areas concerning preparation of teaching aids, lecture notes, and choice of teaching methods. Could this be a similar situation in public universities in Northern Uganda? This study was meant to determine how didactic infrastructure management influenced curriculum implementation in public universities in Northern Uganda. Similarly, at Usman Danfodiyo University in Sokoto, which is in the north-western part of Nigeria, Ebehikhalu and Dawam (2016) further revealed that the number and size of lecture halls are insufficient, the number and size of the laboratories are largely inadequate, and almost all the sports grounds are obsolete. Similarly, Ayoko et al., (2023) reported that public universities in Nigeria had poor planning and maintenance of infrastructure such as classrooms, tables, exam halls, chairs, auditoria, desks, staff offices, seminar/conference/board rooms, laboratories, workshops, studios, farms, gymnasia, central libraries,

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specialized/professional libraries, faculty libraries, departmental libraries. The halls of residence for accommodation for students are grossly insufficient. Facilities for students, such as common rooms and kitchens in the halls, are in a deplorable state. The walls of some of the halls have severe cracks and are not safe for occupancy. Rooms are officially meant for eight (8) students, not less than fourteen (14). Even the official eight (8) students per room are still very much on the high side since the rooms are very small and poorly ventilated. The kitchen and common rooms have been converted into rooms for students and are so overcrowded that the students sarcastically call them zoos fit only for animal habitation. These conditions have negatively influenced curriculum implementation, especially students' participation during content delivery, time management, and class attendance. However, it is not clear if this is a similar state of affairs in public universities in Northern Uganda. This study sought to determine how management of didactic infrastructure like halls, sports fields, and libraries influenced curriculum implementation in public universities in Northern Uganda.

In relation to halls of residence and student welfare, Kuyok (2017) reported that there are no halls of residence in several public universities in South Sudan. This is due to the modern approach to higher education that dissociates from student welfare activities such as accommodation and feeding, leaving them to market forces and private provision so as to concentrate on core academic activities. However, it is not good for public universities to pull out totally from issues of students' accommodation and welfare for the following main reasons: firstly, students with disabilities deserve special provisions that private providers may not be able or willing to offer. Secondly, public universities located in rural areas, where private accommodation and facilities may not be easily available, are duty-bound to give students welfare facilities. Thirdly, even where private sector student welfare is readily available, the institutions have a duty to ensure that the facilities are conducive to a proper learning environment. Therefore, the overall observation is that the available student accommodation in several public and private universities and colleges across South Sudan falls short of expectations. Hostels tend to be crowded, located in environments that are non-conducive for learners, and often lack security controls. Poor accommodation led to serious disruption of curriculum implementation, especially in aspects of students' preparation for learning and participation during lectures and assessments. Kuyok brought out the state of didactic infrastructure in public universities in South Sudan clearly in his study. Could this be the case with public universities in Northern Uganda? There has been a gap in information on how didactic infrastructure management influenced curriculum implementation aspects of preparations for teaching, content delivery, and assessment in the context of public universities in Northern Uganda, which this study aimed to fill.

Furthermore, McCowan (2018) investigated the quality of higher education in Kenya, addressing the conundrum. The author reported the insufficient management of didactic infrastructure like libraries, sports fields, and halls in most of the public universities in Kenya. The existing halls were initially designed for a few students and have become overstretched and degraded. There is a need to urgently expand didactic infrastructure to meet the Kenya Commission for University Education (KCUE) requirement in terms of space per student-building area ratio. Overall, the state of the facilities in the public universities in Kenya is far from adequate, both in number and quality. Most of the library furnishings are dilapidated, and relevant equipment is lacking. The libraries are not conducive to learning. They are poorly ventilated, have inadequate lighting, are overcrowded, and are stuffy. Additionally, there was only one football field.

Similar observations were made by Wanangeye and George (2016) that several public universities in Kenya suffer from effective management of didactic infrastructure like libraries, recreational and sports facilities, lecture theatres, and student's halls of residence. Many lecturers either share or

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lack offices. This negatively impacted the lecturer's quality of preparation for teaching, choice of content delivery methodology, and assessment of learners. A similar study by Mukhwana et al. (2017) revealed the inadequacy of library infrastructure in several public universities in Kenya, and he further reported that sports fields are in a sorry state and several halls are dilapidated. It is evident that the didactic infrastructure management at the universities is grossly inadequate. The universities are in dire need of a new and fully equipped library, sports fields, and halls of residence if standards are to be met in implementing curriculum. The study concurred with Mukhwana et al. (2017), who reported that most of the public universities in Kenya do not have adequate libraries with current books, journals, and periodicals. Several students' and halls are dilapidated, and the living conditions of the students are precarious. This, in turn, negatively affected the curriculum implementation. For example, inadequate library facilities had resulted in low levels of preparation of lecture notes, instructional materials, and reference materials for teaching at the university.

However, all these studies did not look at how didactic infrastructure management influences curriculum implementation in Northern Uganda, which was the focus of this study. While a number of researchers have pointed out how didactic infrastructure can improve curriculum implementation, many of these investigations were carried out in the context of countries in West Africa, Europe, the USA, and Canada. A few studies (Nasuna et al., 2021) have already been carried out on university didactic infrastructures in Uganda. Unfortunately, none of these studies focussed on didactic infrastructure management and its influence on curriculum implementation in public universities in Northern Uganda. Also, there are limitations in some of these studies due to the small sample size used. The researcher acknowledged these as gaps requiring further investigation, hence the need for this study.

METHODOLOGY

In order to give a thorough understanding of the topic, this study employed a concurrent mixed methods design and a pragmatic philosophical position. This allowed the researchers to analyse the various perspectives of respondents derived from both qualitative and quantitative data. Concurrent mixed method design facilitates the convergence or merging of quantitative and qualitative data to enable researchers to offer a thorough understanding of the study topic. According to Creswell and Creswell (2018) when using this method, the researcher usually gathers both types of data at around the same time and incorporates the data into the interpretation of the final findings. Academic registrars, academic staff, estate officers, and student leaders made up the sample size of 210 participants. Data were gathered using a focus group discussion guide, interview guide, and questionnaire. Because so many respondents were the focus of this study, these instruments were used. As advised, validity and reliability were more than 0.7 (Eunseong & Kim, 2014). As a result, it was thought that the data was credible. Descriptive and inferential statistical methods were employed to examine the quantitative data, while theme analysis was employed to analyse the qualitative data. Additionally, the study was approved by Kyambogo University Directorate of research and graduate training, cleared by Gulu University Research Ethical Committee, Uganda National Council for Science and Technology. Lastly, permission was sought from deputy vice chancellors in charge of academics from the three universities to obtain data. The outcomes of the study are shown in the section that follows.

RESULTS AND DISCUSSIONS

Demographic Information

Table 1 shows the demographic characteristics of the respondents who provided information. The information captured was the gender, age bracket, education level, rank, and university of the respondents.

Table 1 indicates that a modal percentage of the respondents was male (62.6%), between the age

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bracket of 36 and 49 years, with a master's degree (71.5%), at the rank of assistant lecturer (69.9%), and from Gulu University (47.2%). This meant that there were more male opinions in the study than those of females. Furthermore, because 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 information, and all the respondents had sufficient ranks and gave objective answers to the questions raised in this study.

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	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

Level of Curriculum Implementation

The study sought to assess how academic staff perceived the level of curriculum implementation in public universities in Northern Uganda. The quantitative findings from the survey are presented in *Table 2*.

Table 2 indicates the overall mean of curriculum implementation in public universities in Northern Uganda was 2.58 (51.6%), with a 0.85 standard deviation (SD). The respondents generally believed that curriculum implementation in these universities was low. The level of preparation for teaching was also low, with an aggregate mean of 2.43 (48.6%) and a 0.89 SD. This suggests that there is a need for improvement in teaching preparation, particularly in areas such as teaching aids, methodologies, work and assessment plans, lecture notes, and reference materials. Content delivery among academic staff was moderate, with an aggregate mean of 2.79 (55.8%) and a 0.79 SD. The lecturer-learner relationship during lectures was good, but there is a need for improvement in teaching aid use, student-centred teaching methodology, effective time management, and student attendance tracking. The assessment of learning was also low, with an aggregate mean of 2.52 (50.4%) and a 0.88 SD. The study recommends using various assessment methods and providing timely feedback to students.

On the side of the qualitative findings, there were similarities on the understandings of participants in regard to curriculum implementation in public universities in Northern Uganda. The qualitative findings were aligned with three key themes:

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preparation for teaching, content delivery and assessment of learning.

Table 2: Descriptive Results on Curriculum Implementation

Curriculum Implementation items	Mean
Preparation for teaching (*Aggregate* mean =2.43; SD=.89)	
On preparation for teaching, the academic staff always:	
Prepare lectures following the course outline	2.06
Formulate relevant objectives/competences prior to lectures	3.08
Prepare relevant teaching methods and techniques prior to lectures	2.91
Prepare relevant teaching and learning aids prior to lectures	2.63
Prepare for lectures in accordance with the timetable	2.02
Prepare and organise their lecture notes prior to lectures	2.02
Adequately make lecture work plan every semester	2.66
Prepare reference materials and resources prior to lectures	2.78
Make learner assessment plans prior to lectures	1.78
Content delivery (*Aggregate* mean =2.79; SD=.79)	
On Content delivery, the academic staff always:	
Deliver lectures in line with objectives /competences planned	3.10
Deliver contents with maximum clarity to learners during lectures	2.80
Encourage interactive communications during lectures	2.03
Use variety of teaching and learning aids during lectures	2.67
Use student - centred teaching methods and techniques during lectures	2.74
Ensure good teacher- student relationship during lectures	3.00
Effectively manage time as planned during lectures	2.72
Encourage lively lectures with humour	3.13
Ensure logical flow and pace during lectures	3.17
Register and follow up students' class attendance	2.71
Control their emotions during lectures	2.68
Assessment of learning (*Aggregate* mean =2.52; SD=.89)	
On assessment of learning, the academic staff competently:	
Use formative assessment technique to assess students' performance	3.22
Use summative assessment technique to assess students' performance	2.81
Use diagnostic assessment technique to assess students' performance	2.54
Use norm-referenced assessment technique to assess students' performance	2.24
Use criterion assessment technique to assess students' performance	2.48
Use benchmark assessment technique to assess students' performance	2.76
Use classroom Assessment Technique (CAT) to assess students' performance	1.81
Timely gives assessment feedback to students	2.32
Overall Mean for Curriculum Implementation =2.58; SD=.85	

Legend 3: *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

Preparation for Teaching

The study aimed to assess academic staff's perceptions of preparation for teaching in public universities in Northern Uganda. The staff's primary duties included lectures, seminars, tutorials, and learning materials. However, they generally perceived the preparation status as low, focusing on aspects like course outlines, lecture objectives, teaching methods, teaching aids, lecture plans, and assessment plans. For example, the study found that academic staff perceive course outlines as a tool providing a detailed overview of a course's content, objectives, and structure. However, the preparation of course outlines is generally low among the staff in the three public universities in Northern Uganda, leading to a lack of clarity, inconsistency in delivering course content, inadequate student engagement, miscommunication, and frustration

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in the learning process. Lecture objectives are perceived as guides for students, but the staff reported low-quality set-ups. A main challenge is the knowledge gap on how to formulate clear, easy-to-understand objectives. Regular training is needed to enable staff to set clear objectives and adapt teaching methods to different situations. Academic staff also reported low preparation of teaching aids, which are essential tools or materials that facilitate the learning process.

However, there was laxity among academic staff in preparing adequate teaching aids prior to teaching. Some staff reported selecting teaching aids that align with learning objectives and students' needs, while others struggled with multimedia presentations, slides, or videos to enhance visual learning. To address these challenges, universities need to invest in professional development opportunities for faculty, provide adequate resources and support services, foster a culture of innovation and collaboration, and create policies that prioritise the integration of effective teaching aids into the curriculum. The study reveals that academic staff in public universities in Northern Uganda do not regularly prepare lecture plans, despite the importance of this task. Many staff members, particularly professors, struggle with time constraints and administrative responsibilities, leading to a lack of detailed and effective lecture plans. This is particularly concerning for experienced staff who rely on their expertise and experience to guide them through class sessions. The study also highlights the lack of preparation of lecture notes, which are written records or summaries of information presented during a lecture. These notes serve as a tool for students to review and reinforce the material covered in class. The quality of lecture notes is generally fair among staff in three public universities in Northern Uganda. However, some staff members, particularly teaching assistants, have not received formal training in effective teaching methods or access to resources, such as textbooks.

Content Delivery

The study aimed to assess the academic staff's perceptions of content delivery in three public universities in Northern Uganda. Content delivery is a crucial aspect of curriculum implementation, and academic staff believe that ensuring complete coverage of lecture objectives is crucial for the success of a learning session. However, time constraints are a major challenge, as some staff struggle to complete set objectives within the available time. The study found that academic staff in the three public universities in Northern Uganda generally reported that coverage of set objectives during learning was fair. However, they also noted 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. They valued lectures that focused on developing practical skills and competencies relevant to current job needs, promoted objectives that promoted student engagement and success, and emphasised the importance of formulating objectives that prepare students for real-world challenges and make them competitive in the job market. The study also revealed that academic staff's perceptions of lecture room communications varied based on their priorities, goals, and experiences within their universities. They reported that lecture room communications were 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, including considering the needs of students with disabilities and providing alternative communication methods when necessary.

The study also found that the use of teaching aids during content delivery was generally low and irregular among academic staff in public universities in Northern Uganda. Printed materials and chalkboards were the most frequently used teaching aids by the academic staff, while models, pictures, videos, charts, podcasts, and quizzes were recorded as low. Podcasts and televisions had the lowest usage level in teaching and learning activities. The findings of this study are

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in line with the quantitative findings of Gudu and Jesse (2023), who found that the use of technology-based teaching aids was limited among teachers at technical schools in Kenya. Therefore, the use of technology-based teaching aids should be encouraged to improve the quality of content delivery in public universities in Northern Uganda. The study reveals that effective teaching methods are crucial for delivering engaging lectures in three public universities in Northern Uganda. However, the use of various teaching methods by academic staff is low due to students' diverse learning preferences. To address this, staff should employ project-based learning, problem-based learning, learning stations, and contract-based learning methods. The lecture method is predominantly used, but it has limitations like passive learning and limited interaction between student-teacher and student-student. Active student involvement is essential for better retention. The academic staff-student relationship is crucial for the educational experience, with some universities reporting moderate or good relationships. A positive relationship can lead to stronger socio-emotional skills, increased academic knowledge absorption, and confidence in exploration and risk-taking.

Assessment of Learning

Assessment of learning is a crucial process in education, evaluating and measuring students' knowledge, skills, and understanding of a subject or curriculum. It serves several important purposes in education, including providing feedback to students, informing instructional decisions, and assessing the effectiveness of teaching methods. In public universities in Northern Uganda, academic staff perceive formative and summative assessments as essential tools for improving teaching and learning. Formative assessment is an ongoing process used by lecturers and students to monitor student learning, identify areas of difficulty, and adjust instruction accordingly. It takes various forms, such as quizzes, discussions, polls, group activities, homework assignments, and more. However, many academic staff in public universities in Northern Uganda do not effectively use formative assessment due to its time-consuming nature, large class sizes, and lack of adequate training or professional development. Active involvement of students in the formative assessment process is key, but some academic staff exclude students from the process. Challenges faced by academic staff when using formative assessment include a lack of instructional material and equipment, the absence of laboratory chemicals and technicians, inadequate skills of academic staff to integrate varied formative assessment strategies, large numbers of students in a lecture room, student absenteeism, lecturers overloaded with multiple assignments, large content coverage, a shortage of instructional time, and limited classroom facilities.

In addition, 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. It aims to summarise and judge the overall performance and understanding of students. Some of the summative assessment practices include traditional written examinations, portfolios showing a collection of a student's work overtime, and students presenting information or projects orally. Despite these challenges, academic staff in public universities in Northern Uganda report that the use of summative assessment is high among the academic staff. However, they face challenges such as focusing on a final outcome, promoting rote memorization rather than deep understanding and application of concepts, and providing limited feedback to students. To address these challenges, academic staff and universities should consider incorporating a mix of assessment types, emphasising formative assessments for continuous feedback, and aligning summative assessments with the overall educational goals and values of the learning environment.

Additionally, ongoing professional development for academic staff in assessment design and implementation can help improve the effectiveness of summative assessments. Also, academic staff in three public universities in Northern Uganda reported low use of norm-

Article DOI: https://doi.org/10.37284/eajes.7.2.1992

referenced assessment techniques, which are ineffective and resource-intensive. Criterion assessment techniques provide valuable feedback, but the academic staff faces challenges like a lack of knowledge and inadequate training in using them. Benchmark assessment techniques were moderately used but may not account for diverse learning styles. The staff also faced challenges in using classroom assessment techniques (CATs), like time constraints and a lack of understanding. In summary, curriculum implementation in these universities is low, with preparation for teaching and assessment of learning being the most affected.

Level of Didactic Infrastructure Management

The researcher also sought the opinions of the respondents on the level of didactic infrastructure management, and the findings are presented in *Table 3* below.

Table 3: Descriptive results on didactic infrastructure management

Didactic infrastructure management items	Mean
Library facilities (*Aggregate* mean =3.56; SD=.93)	
The University library has adequate reading space	3.47
The University library has adequate Parking yard	3.50
The University library has easily accessible shelves	3.77
The University library has distinct zones for different uses	3.68
The University library has spacious walkways	3.54
The University library has the required storage cabinet	3.38
Sports facilities (*Aggregate* mean =2.60; SD=1.11)	
The university has a well-planned athletics field	3.18
The University has a well-maintained football ground	3.37
The University has a well-planned basketball field	2.46
The University has a well-planned tennis court	2.13
The University has a well-planned volleyball ground	2.52
The University has a well-organised Rugby ground	1.97
The University has a well-maintained netball field	2.59
Halls (*Aggregate* mean =2.85; SD=1.22)	
The university has a well aerated dining hall	1.67
The University has a spacious multipurpose hall	2.80
The University has a spacious exhibition hall	2.39
The University has adequate student halls of residence	1.78
The University has a well aerated council hall	3.27
The University has a spacious and well organised concert hall	2.41
Overall Mean for Didactic infrastructure management =2.85; SD=1.08	2.85

Legend 3: *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 *Table 3* show the overall mean of didactic infrastructure management as 2.85 (57%), with a 1.08 standard deviation (SD). The results suggest that the respondents were generally of the opinion that the level of didactic infrastructure management in public universities in Northern Uganda was moderate. In detail, the results revealed that the level of library facilities was high at an aggregate mean of 3.56 (71.2%) and a 0.93 SD. This means that library facilities like flip charts, chairs, tables, notice boards, and lecterns have been good but are still insufficient at the three public universities (Lira, Muni, and Gulu).

In respect to the level of sports facilities, the results revealed moderate levels, with an aggregate mean of 2.60 (52.0%) and a 1.11 SD. This indicates that the respondents from the three public universities were of the view that facilities like athletic fields, football grounds, basketball fields, tennis courts, volleyball grounds, rugby grounds, and netball fields are operating below an acceptable level. Furthermore, most of the facilities were not well planned, organised, and

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maintained. Therefore, there is an urgent need to invest in the construction of modern sports facilities in the three public universities in Northern Uganda.

Furthermore, on the state of halls in public universities in Northern Uganda, the results showed an aggregate mean of 2.39 (47.8%) and a 1.22 SD. This suggests that the majority of the respondents were of the opinion that the level of halls in the three public universities was low. For example, the universities lacked spacious, well-aerated, and adequate dining halls, multipurpose halls, exhibition halls, and concert halls. Furthermore, the study revealed that there were no good university-owned students' halls of residence; the few owned by the private sector were in appalling conditions. However, council halls were found to be well-aerated and in moderately good condition.

According to NCHE (2018), the levels of university infrastructure are classified as 1 = unacceptable, 2 = acceptable, 3 = good, and 4 = ideal. Therefore, the findings of this study indicate that the level of infrastructure in the three public universities in Northern Uganda falls within acceptable levels. This means that management of didactic infrastructure like libraries, sports facilities, and halls is insufficient. Hence, there is a need to expand management of didactic infrastructure in universities to further improve curriculum implementation.

On the side of the qualitative findings, there were varied understandings of participants in regard to didactic infrastructure management in public universities in Northern Uganda. The qualitative findings were aligned with three key themes: libraries, sports facilities, and halls.

Library

On the position of library facilities, FGDs were conducted with student leaders. Student leaders at three public universities in Northern Uganda reported good library facilities, but found inadequate reading spaces and limited access to books. In Gulu University, most leaders reported insufficiency in computer facilities, a computer laboratory for disabled students, discussion rooms, and a well-equipped training unit. This lack of prioritization for library facilities led to inadequate preparation for teaching, content delivery, and assessment of learning. The universities also lacked funds to expand and construct larger library facilities, confirming previous findings that library facilities were insufficient but not a top priority for university stakeholders.

The study found that all three public universities in Northern Uganda had library facilities, but they were not sufficient for students and staff, affecting curriculum implementation. Muni University had an unacceptable library space ratio of 1 metre square per 4 students, while Lira and Gulu universities had worse levels. The availability and use of libraries make the learning atmosphere favourable in universities, and the nature of library buildings affects preparation for teaching. The study also supports Mukhwana and Kande's (2017) report that most public universities in Sub-Saharan Africa lack adequate library facilities with current books and journals. The inadequacy of library facilities contributes to inefficiency in curriculum implementation activities, such as teaching preparation, content delivery, and learning assessment. Universities should make deliberate efforts to expand their libraries and meet NCHE-accepted standards for improved curriculum implementation.

Sports Facilities

The study conducted field visits (FGDs) with student leaders at three public universities in Northern Uganda revealed the deplorable state of sports facilities. At Lira University, some sports facilities were improvised but significant for practical lessons in sports science courses. These facilities had poor line demarcations, no dressing rooms, and rampant injuries among players due to rough fields. Estate officers also reported that while football, netball, volleyball, and athletics fields were available, less attention was paid to their maintenance, leading to soil erosion, anthills, and footpath damage. The study found that the lack of sports facilities in universities led to ineffective implementation of sports science

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curricula and the teaching of too much theory to sports science students. Accessibility of sports facilities significantly influences students' participation in sports science activities.

Previous studies (Ayoko, 2023; Kuyok, 2017; Mukhwana & Kande, 2017; Nyok, 2023) have consistently shown that sports facilities significantly impact students' academic performance in universities across various countries. In the sub-Saharan African context, the lack of accessible sports fields and equipment was one of the main obstacles to sport science and physical education activities among students (Nthangeni et al., 2021). Studies have shown that the absence of standard sports facilities was one of the main obstacles to participating in sports science classes at universities. In Saudi Arabia, the lack of sports facilities was the greatest obstacle to teaching sports science courses and accounted for 74% of all obstacles (Alsubaie & Omer, 2015). The study recommends that the three public universities in Northern Uganda invest in the construction of modern sports facilities like athletics, football, baseball, basketball, and volleyball fields. These facilities are crucial in curriculum implementation, especially for delivering practical courses for students of sports science and physical education. Therefore, universities must make concentrated efforts to construct modern sports facilities such as athletic fields, football fields, basketball fields, tennis courts, volleyball fields, rugby fields, and netball fields to help improve curriculum implementation.

Halls

Regarding the status of halls in the three public universities in Northern Uganda, FGDs were conducted with student leaders. Student leaders at three universities in Northern Uganda have identified the need for modern dining, multipurpose exhibition, and residence halls, as well as council and concert halls, to improve curriculum implementation. However, all three universities had no halls of residence for students, leading to adverse effects on time management, ease of discussing, and proximity to classes. The lack of prioritization for hall construction by university managers and stakeholder groups further exacerbated the situation. Interviews revealed that halls were still inadequate and not fully prioritized, with some arguing that universities are obliged to have modern dining, concerts, exhibitions, and larger lecture halls in accordance with the NCHE guidelines. However, due to limited funds and competing priorities, the construction of halls was not prioritized. The increasing student population and preference for a safe environment on campus have led to a higher demand for halls of residence, indicating that halls are still insufficient and in a deplorable state. Offering students good exhibitions, concerts, and larger lecture halls is crucial for improving curriculum implementation, particularly in content delivery areas like teaching aids, art and design exhibitions, and performance art displays.

Therefore, much as the quantitative result indicates that didactic infrastructure management was moderate in public universities in Northern Uganda, findings from this qualitative study revealed inadequacies in didactic infrastructure management. For example, there were no halls of residence in the three public universities in Northern Uganda. This also agrees with those of Kuyok (2017) and Nyok (2023), who reported that there are no halls of residence in several public universities in South Sudan and Kenya, respectively. This is due to the modern approach to higher education that dissociates from student welfare activities such as accommodation and feeding. However, they reported that it is not good for public universities to pull out totally from issues of students' accommodation and welfare because students with disabilities deserve special provision that private providers may not be able or willing to offer. Some public universities are located in rural areas, where private accommodation and facilities may not be easily available. Therefore, there should be deliberate efforts by the universities to provide larger and more modern dining, multipurpose, exhibition, and concert halls. Furthermore, they ought to construct halls of residence to improve curriculum implementation.

Article DOI: https://doi.org/10.37284/eajes.7.2.1992

Correlation Analysis for Didactic Infrastructure Management and Curriculum Implementation

The researchers aimed to determine whether there is a correlation between didactic infrastructure management and curriculum implementation in public universities in Northern Uganda. Pearson correlation analysis was generated to compute the degree and direction of the relationship between the two variables, and the results are presented in *Table 4*.

Table 4: Correlation analysis for didactic infrastructure management and curriculum implementation

		Didactic infrastructure management	Curriculum implementation
Didactic infrastructure management	Pearson Correlation	1	.292**
	Sig. (2-tailed)		.001
	N	123	123
Curriculum Implementation	Pearson Correlation	.292**	1
	Sig. (2-tailed)	.001	
	N	123	123

***. Correlation is significant at the 0.01 level (2-tailed).*

Source: Primary data

Table 4 shows there was a weak positive correlation between didactic infrastructure management and curriculum implementation in public universities in Northern Uganda (r =.292**, p = 0.001, n = 123). This implied that as didactic infrastructure management increases, curriculum implementation in public universities in Northern Uganda also increases. Furthermore, this result meant the null hypothesis that didactic infrastructure management has no relationship with curriculum implementation in public universities in Northern Uganda was rejected because the p-value of 0.001 was found to be less than the significance level of 0.01. Therefore, an alternative hypothesis that didactic infrastructure management has a significant relationship with curriculum implementation in public universities in Northern Uganda was adopted.

Regression Analysis for Didactic Infrastructure Management and Curriculum Implementation

The study carried out a regression analysis to establish whether didactic infrastructure management 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 for didactic infrastructure management and curriculum implementation

Model	R	R Square	Adjusted R Square
1	.413[a]	.171	.150

a. Predictors: (Constant), Library, Sports facilities, Halls,
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. According to Creswell et al. (2019), an R value is a common way of measuring a linear correlation between two variables, while an R^2 value shows how well the model predicts the outcome of the dependent variable. The R^2 indicated how the management of didactic infrastructure (library, sports, and halls) explained variations in the dependent variable (curriculum implementation). The model summary reveals that the correlation coefficient (R) is 0.413 and (R^2) is 0.171. This implies that didactic infrastructure management explained 17.1% (.171*100%) of variations in curriculum

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implementation, while the remaining 82.9% of variation can be explained by other factors.

However, to determine 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 Didactic Infrastructure Management and Curriculum Implementation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3658.116	3	1219.372	8.171	.000[b]
	Residual	17758.290	119	149.229		
	Total	21416.407	122			

a. Dependent Variable: Curriculum Implementation
b. Predictors: (Constant), Halls, Library, Sport facilities

Source: Primary data

The results in *Table 6* indicated the calculated p-value of 0.000b is less than 0.05, and the regression model was found to be statistically significant (F = 8.171, df = 3, p-value = 0.000). This means that didactic infrastructure management has a statistically significant influence on curriculum implementation in public universities in Northern Uganda. Lastly, to test for the influence of each aspect of didactic infrastructure managed on curriculum implementation, multiple regression analyses were carried out. The results are presented in *Table 7*.

Table 7: Regression Coefficients for Didactic infrastructure management and Curriculum Implementation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	79.308	6.383		12.425	.000
	Library	1.048	.312	.310	3.360	.001
	Sport facilities	.327	.223	.139	1.466	.000
	Halls	.709	.260	.253	2.730	.007

a. Dependent Variable: Curriculum Implementation

Source: Primary data

The results in *Table 7* show that the coefficient linking libraries, the first aspect of didactic infrastructure managed, with curriculum implementation is positive, with a beta (β) value of 0.310. This result suggests that a unit change in library facilities brings about a 0.310 increase in curriculum implementation; other factors held constant. The observed sig. (p) value of 0.001, lower than the critical sig. value of 0.05, implies that libraries have a statistically significant influence on curriculum implementation in the three public universities in Northern Uganda. In addition, the results show that the coefficient relating sports facilities, the second aspect of didactic infrastructure managed with curriculum implementation, is positive with a beta (β) value of 0.139. This result suggests that a unit change in sports facilities brings about 0.139 increases in curriculum implementation, with other factors held constant. The observed sig. (p) value of 0.000, lower than the critical sig. value of 0.05, implies that sports facilities had a statistically significant influence on curriculum implementation in the three public universities in Northern Uganda.

Lastly, the results indicate that the coefficient relating halls to curriculum implementation is positive, with a beta (β) value of 0.253. This result suggests that a unit change in halls brings about a 0.253 increase in curriculum implementation; other factors remained constant. The observed sig. (p) value of 0.007, lower than the critical sig. value of 0.05, implies that halls 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 library

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facilities had a more significant influence on curriculum implementation. Therefore, the results from correlation analysis established that didactic infrastructure management had a positive and statistically significant correlation with curriculum implementation in public universities in Northern Uganda. Furthermore, the results from regression analysis confirmed that didactic infrastructure management has a statistically significant positive influence on curriculum implementation in public universities in Northern Uganda. Therefore, the study rejected the null hypothesis that didactic infrastructure management has no significant influence on curriculum implementation in public universities in Northern Uganda.

In short, the study revealed that management of didactic infrastructure (library, sports facilities, and halls) in the three public universities in Northern Uganda had a significant influence on curriculum implementation. Also, it was revealed that libraries were available but operated below NCHE-accepted standards in terms of reading space, parking yard, accessibility to bookshelves, walk-ins, and storage cabinets. The universities lacked modern sports facilities such as athletic fields, football fields, basketball fields, tennis courts, volleyball courts, rugby fields, and netball fields. Additionally, it was concluded that the universities did not have larger and more modern dining, multipurpose, exhibition, and council and concert halls. Furthermore, there were no university halls of residence, hence affecting curriculum implementation.

CONCLUSION

In light of the study findings, it was concluded that didactic infrastructure management in the three public universities in Northern Uganda had a statistically significant influence on curriculum implementation in public universities in Northern Uganda. Also, it was concluded that libraries were available but operated below NCHE-accepted standards in terms of reading space, parking yard, accessibility to bookshelves, walk-ins, and storage cabinets. The universities studied lacked modern sports facilities such as athletic fields, football fields, basketball fields, tennis courts, volleyball fields, rugby fields, and netball fields. Additionally, it was concluded that the universities lacked more spacious and contemporary dining, multipurpose, exhibition, council, and concert facilities. Furthermore, there were no university halls of residence, hence affecting curriculum implementation.

Recommendation

Built on the research findings, the following recommendations are hereby made to ensure that didactic infrastructure is well managed to effectively contributes to curriculum implementation in public universities in Northern Uganda: a) There should be deliberate efforts by the universities to ensure their libraries are expanded and meet the NCHE accepted standards in terms of reading space, parking yard, accessibility to book shelves, walkways, and storage cabinets to have an improved curriculum implementation; b) Universities have to make concentrated efforts to construct modern sports facilities such as athletic fields, football fields, basketball fields, tennis courts, volleyball fields, rugby fields, and netball fields to improve curriculum implementation; and c) There should be deliberate efforts by the universities to provide larger and more modern dining, multipurpose, exhibition, council, and concert halls. Furthermore, the universities ought to construct modern halls of residence to improve curriculum implementation.

CONFLICTS OF INTEREST

The author(s) declared no conflicts of interest with respect to the research finances, authorship, and/or publication of this article.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analysed during the study are available from the corresponding author on reasonable request.

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