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The Purpose of the Publication

The Journal of Issues and Practice in Education (JIPE) is a refereed journal produced by the Faculty of Education of the Open University of Tanzania. It is published twice a year, that is June and December. The journal is designed to inform both academics and the public about issues and practices in the field of education.

The journal provides academics with a forum to share experiences and knowledge. It also informs the public about issues pertinent to their day-to-day educational experiences. We believe that sharing information about education is important not only for academic, professional, and career development, but also for informed policymakers and community activities in the field of education.

EDITORIAL

The Journal of Issues and Practice in Education (JIPE), Volume 17, Number 2 (December 2025), presents a timely and analytically rich collection of studies that address contemporary challenges in education systems, particularly in African and Global South contexts. This issue advances scholarly conversations on how educational institutions respond to learner diversity, socio-economic pressures, and instructional complexity, while remaining attentive to equity, inclusion, and educational quality.

A unifying thread across the contributions in this issue is the tension between access and quality in education. The lead article on the work-study nexus at Valley View University in Ghana foregrounds a challenge increasingly faced by higher education institutions worldwide: how students navigate the competing demands of paid work and academic study. Drawing on Role Strain Theory, the study demonstrates that while work-study programmes can enhance financial security, employability skills, and time management, they may simultaneously intensify stress, fatigue, and academic risk when institutional safeguards are weak. These findings resonate strongly with broader debates in adult education and lifelong learning, where participation is often mediated by economic necessity rather than choice. The study offers evidence-based recommendations highly relevant to policymakers and university administrators designing student support systems in resource-constrained environments.

Complementing this higher education focus, the article on teachers' perceptions and classroom experiences of ability grouping in Tanzanian secondary schools shifts attention to pedagogical decision-making at the school level. Grounded in Social Constructivist theory, the study reveals that ability grouping is neither inherently beneficial nor detrimental; rather, its impact depends on contextual factors, including teacher facilitation, school culture, and institutional support. While teachers acknowledged the instructional efficiency and classroom management advantages of ability grouping, they also raised critical concerns about its potential to undermine learner motivation and self-esteem, particularly among low-performing students. These findings contribute to ongoing international debates on differentiated instruction and inclusive education, highlighting the need for context-sensitive and reflective pedagogical practices.

Taken together, the articles in this issue underscore the importance of moving beyond simplistic policy prescriptions. Whether addressing student employment in universities or instructional grouping in secondary schools, the

evidence presented here suggests that educational practices must be designed with a nuanced understanding of learners' lived realities. In an era marked by rising educational costs, expanding participation, and increasing diversity of learners, institutions must balance efficiency with care, and innovation with equity.

This issue of JIPE therefore makes a significant contribution to scholarship on education in practice. It not only enriches theoretical discussions but also provides actionable insights for educators, administrators, and policymakers committed to improving educational experiences across contexts. As always, the journal remains dedicated to fostering rigorous research that bridges theory and practice, and we trust that readers will find this issue both intellectually stimulating and practically valuable.

Dr. Mohamed Msoroka

Editor-In-Chief, *Journal of Issues and Practice in Education (JIPE)*

The Open University of Tanzania

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The Work and Study Nexus: Balancing Work and Study at Valley View University, Oyibi Campus, Accra, Ghana

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Abstract

The rising phenomenon of students engaging in work during their academic careers has sparked discussions about the potential imbalance between their work obligations and scholarly activities. The research examines the nexus between work and study among students at Valley View University, Oyibi Campus, Accra. It focuses on how the interplay between academic responsibilities and work affects their academic performance. A descriptive survey design was employed, using a structured questionnaire for data collection. The results indicate that engaging in work-study offers financial advantages and enhances practical skills. The finding revealed that a significant number of students reported working 2-3 hours per day. The finding contributes to a deeper understanding of the complexities of student life in work-study contexts. The study also provides the work-study coordinator with recommendations for developing improved services.

Keywords: *Balance, nexus, work-study, Valley View University*

Introduction

A work-study programme is a formalised system that is frequently included in a university's financial aid packages. The programme enables students to engage in part-time on-campus work throughout the semester(s). A university that introduced the work-study concept aimed to create a supportive atmosphere for students facing financial hardships.

The programme enables them to earn extra income while in school. As a result, they can focus on pursuing academic activities. Balancing work and study is a challenge many universities students face. Some students at Valley View University (VVU) often struggle to settle their financial obligations. Hence, the necessity to combine work and study to cover the expenses. As a private university, VVU has developed a policy on work-study programmes (VVU work-study policy, 2020). According to the policy, students must enrol in the current semester to qualify for work-study at VVU. Valley View University's work-study policy is to help students develop competencies, confidence, and workplace skills. The policy supports students' undergraduate education. It also fosters a positive connection between learning and work. The rise in living costs and tuition-based education has made it difficult for students to balance their work, personal, and school obligations (Kroupova *et al.*, 2021). However, research on balancing work and study among private university students, particularly at VVU in Ghana, is scarce. The study examines the impact of balancing work and study on students' academic performance at private universities in Ghana, with VVU as a case study.

Problem Statement

In recent years, the number of students attending private universities has increased significantly. Most of these students are involved in work-study programmes. This trend may be affected by factors such as financial necessity, career aspirations, and personal development. The introduction of work-study at VVU is one of the brilliant interventions initiated by VVU management to support students facing financial difficulties. However, balancing work and study can consume time and lead to physical and mental fatigue. These pressures reduce the time available for studying and ultimately affect academic performance, delayed graduation, and the quality of the educational experience. Elsewhere, McClellan *et al.* (2023), Taylor *et al.* (2020), Pitman *et al.* (2019), and Richardson *et al.* (2013) have conducted similar studies. In Africa, Kroupova *et al.* (2021), Onyema *et al.* (2020), and Ahmed (2019) also conducted related studies. Tetteh *et al.* (2019) and Mensah and Sarkodie (2016) did similar studies in Ghana.

However, none of these studies focused on VVU. To the best of the researchers' knowledge, no previous work has examined this topic at VVU in Ghana. The study aims to address gaps in the literature. It also explores how working and learning affect the academic outcomes of VVU students in the work-study programme.

Purpose of the Study

The study examined work-study at VVU, Oyibi Campus, Accra, Ghana. The results provide insights for the work-study programme coordinator and the

university as a whole. The results will support students in achieving a harmonious work-study balance while maintaining academic excellence.

Objectives of the Study

- i) To identify the effects of balancing work and study on students at VVU
- ii) To determine the number of hours students spend working while studying at VVU
- iii) To examine effective time management among student workers at VVU

Research Questions

- i) What are the effects of balancing work and study on students at VVU?
- ii) How many hours do students spend working while studying at VVU?
- iii) What is the level of effective time management among work-study students at VVU?

Literature Review

Theoretical Framework

This study is anchored in Role Strain Theory, as introduced by Goode (1960), which posits that individuals may face strain when the demands of two or more roles are either incompatible or excessively burdensome. As a result, individuals may experience stress, fatigue, or reduced performance. Role Strain Theory offers a relevant theoretical framework for analysing the challenges students face in reconciling work and academic life. This theory is particularly applicable to the VVU environment, where many students strive to balance academic responsibilities with work obligations. The competing demands of being a student and an employee can create time pressures, stress, and a decline in educational outcomes. By applying this theoretical framework, the study aims to examine how students manage these conflicting roles and what institutional strategies could potentially mitigate such strain.

Effects of Balancing Work and Study on Students

Students are increasingly balancing work and academic commitments due to rising tuition fees, living costs, and financial responsibilities. These factors can lead to conflicting priorities, negatively impacting academic achievements, personal health, and social interactions. Although employment provides financial support, it often creates conflicting demands that affect students' academic performance and well-being. Studies indicated that prolonged work hours diminish the time and energy allocated to learning activities, resulting in inferior academic performance.

Unger *et al.* (2020) posited that students who work over 10 hours per week exhibit a deterioration in academic performance. Pusztai *et al.* (2022) and Zhang *et al.* (2019) also found that students with excessive duties generally achieve lower grades, exhibit reduced persistence in their studies, and face a high risk of dropping out of school. The data suggest that heightened job intensity has an adverse effect on students' academic engagement and achievement. In addition to academic success, the balance between work and study influences students' ability to progress in their academic courses.

Kroupova *et al.* (2021) noted that students with rigorous work schedules frequently struggle to balance academic and work obligations, thereby compromising academic achievement. Chinyakata *et al.* (2019) observed that employed students are more prone to delays in degree completion due to stress, exhaustion, and challenges in meeting assignment deadlines. Beyond academic hurdles, the balance between work and study affects students' mental and physical well-being.

Awi *et al.* (2021) and Summer *et al.* (2023) demonstrated that excessive work obligations impede academic advancement and jeopardise students' well-being. Mitchell (2020) noted that the pressure to balance academic work and personal responsibilities often leads to stress and fatigue, potentially undermining academic performance.

Despite these challenges, some studies have asserted that balancing work and education can yield positive results when managed well. Caldwell (2017) reported advantages, including time management skills, work experience, financial independence, and enhanced academic performance. Di Paolo and Matano (2022) and Gril *et al.* (2018) opined that these advantages are contingent upon manageable work hours and appropriate institutional frameworks. When academic pressures surpass students' ability to cope, the detrimental impacts on their academic performance and health generally outweigh any benefits. The existing literature consistently demonstrates that balancing work-study and academic responsibilities yields diverse outcomes. The current study aims to ascertain the specific effects of the work-study nexus, thereby establishing a basis for examining how the balance between work and academic pursuits shapes students' performance within current contexts.

The Hours Students Spend Working While Studying

Studies on student employment highlight the significance of the hours, students dedicate to work throughout their studies. Excessive work hours are associated with negative academic results. Oettinger (2011) asserted that students who work more hours are more likely to perform poorly academically. The

implication is that extensive working hours lessen the time students allocate to learning activities. Data from Europe indicates significant disparities in students' working hours. In Western Europe, employed students often work 23-28 hours per week. Although those in Central and Eastern Europe frequently work beyond 30 hours per week during the academic term (Masevičiūtė, 2018). This data shows that many students allocate significant time to working alongside their studies. Numerous studies indicate that the effects of student employment are primarily contingent upon the number of hours worked. Brennan and Dempsey (2018) found that working 0-9 hours per week has adverse consequences for students' academic performance. Their study indicated further that extended working hours correlate with more significant academic difficulties.

Carnevale and Smith (2018) noted that students working over 15 hours per week typically obtain lower grade point averages, often at the C level or below, while those limiting their work hours to 15 or fewer are more likely to attain higher grades. This data underscores a threshold at which employment obligations substantially impede academic achievement. Despite the difficulties associated with extended work hours, moderate employment has been identified to yield benefits. The literature review demonstrates that the time students allocate to work during their academic pursuits is a significant determinant of their educational trajectory. Specifically, it indicates that work commitments are associated with a reduced likelihood of adverse academic outcomes. However, moderate work hours posed fewer academic risks than excessive work obligations. This evidence directly supports the current study by determining the number of hours students spend at work and how these hours affect their performance in this context. Participating in a limited number of hours of work may help students establish organised schedules and enhance time management, thereby alleviating academic stress. Richardson *et al.* (2013) posited that students are primarily motivated by economic considerations. The study found no significant difference in overall academic performance between employed and unemployed students. However, it indicated that the number of hours worked negatively affected the grades of employed students, with those working longer hours achieving lower GPAs than those working fewer hours.

The literature review demonstrates that the time students allocate to work during their academic pursuits is a significant determinant of their educational trajectory. Specifically, it indicates that work commitments are associated with a reduced likelihood of adverse academic outcomes. However, moderate work hours posed fewer academic risks than excessive work obligations. This evidence directly supports the current study by determining the number of

hours students spend at work and how these hours affect their performance in this context.

Effective Time Management Among Work-Study Students

Effective time management is a crucial skill that helps work-study students balance academic and work obligations without succumbing to undue stress or burnout. Time affects students' everyday schedules and acts as a criterion for prioritising or eliminating activities (Sainz & Ferrero, 2019). For students, balancing work with academic pursuits is crucial for managing many obligations and sustaining academic involvement (Sainz & Ferrero, 2019). Empirical evidence demonstrates the pivotal role of effective time management in the lives of working students. Effective time management promotes scholastic attainment and concurrently enhances learner well-being.

Mitchell (2020) observed that efficient time management, coupled with access to learning resources, is crucial for alleviating stress and improving academic achievement in students.

Working students stand to gain significantly from interventions aimed at improving time management skills (Trentepohl *et al.*, 2022). Conversely, poor time management is associated with detrimental academic results. Ahmed (2019) identified inadequate time management skills as a significant factor contributing to unsatisfactory academic performance. Effective time management mitigates prolonged academic progression and student attrition rates. The literature offers pertinent insights, as inadequate time management similarly impacts students' learning obligations. Ikhwan (2017) further noted that ineffective time management detracts students from academic performance, highlighting the necessity of organised time utilisation in higher education settings. Planning and organisation are effective strategies for students to improve their time management skills. Students can reduce stress and enhance performance by prioritising duties, setting achievable goals, and organising schedules that balance academic, work, and personal responsibilities.

Strategic time management techniques are essential for student workers. The study focuses on students balancing work and learning as well as time management, highlighting the value of planning, organising, and support for their studies.

Methodology

The study adopted a descriptive survey design. The methodology serves as the backbone of the research, specifying the design and strategies applied to achieve the research objectives. It facilitates a systematic, organised process for gathering, analysing, and interpreting data.

This study involved students who had applied for work-study and had registered for the 2024/2025 academic year. The total sample was 132 (see Table 1). No sampling method was employed because the entire population was small and could be studied conveniently within the designated timeframe. Thus, the researchers used the total number of students assigned to each department, unit, or office.

Questionnaires were used for data collection. Researchers sought approval from the work-study coordinator before commencing the research. Upon receiving the coordinator's approval, the researchers explained the study's purpose to the respondents before administering copies of the questionnaires. The researchers assured them of their confidentiality. The data collection process began in December 2024 and continued through April 2025 at VVU, Oyibi Campus. A total of 132 copies of the questionnaires were distributed, of which 122 (92%) were completed and valid for analysis.

The instrument was in three sections. Section "A" gathered demographic data of the respondents. Section "B" covered the effects of balancing work and study on students. Section "C" dwelled on the number of hours students spend working, and Section "D" collected data on effective time management among students. A four-point Likert scale (Strongly Agree = 4; Agree = 3; Disagree = 2; Strongly Disagree = 1) was used in the study.

Table 1:
Distribution of Students by Department /School/Faculty/Units

Departments/ Unit	Number
Janitorial	36
Radio/Media	3
Offices	20
Bakery	11
Water factory	7
Halls	4
Cafeteria/Canteens	4
Libraries (Walton Whaley & Harod Lee)	11
Laboratory	12
Security	10
Farms	8
Landscaping	6
Total	132

Source: Office of the Work-Study Coordinator, (2023/2024).

The collected data were coded and entered into IBM SPSS Statistics version 25 for analysis. Descriptive statistical methods, such as frequencies, percentages, and tabulations, were utilised to summarise the demographic

characteristics, work-study involvement, and time management habits of respondents. The results were presented in tables to enhance clarity and facilitate the interpretation of the findings related to the study objectives.

Results

Demographic information of respondents

The breakdown of respondents was composed as follows: age, gender, level, department, school, and faculty.

Table 2:
Demographic Information of the Respondents

Age	Frequency	Percentage (%)
16-20	46	37.7
21-25	62	50.8
26-30	10	8.2
31 & above	4	3.3
Total	122	100
Gender	Frequency	Percentage (%)
Female	55	36.4
Male	67	63.6
Total	122	100
Levels	Frequency	Percentage (%)
100	33	27.0
200	39	32.0
300	26	21.3
400	24	19.7
Total	122	100
Department /School/ Faculty	Frequency	Percentage (%)
Faculty of Arts & Social Science	36	29.5
School of Business	34	27.9
School of Education	27	22.1
Faculty of Science	25	20.5
Total	122	100

Source: Field Data, (2025).

The age distribution revealed that most respondents were youthful and energetic. The majority of the respondents were in the 21–25 age bracket, followed by those aged 16–20.

The implication is that the study captured undergraduate students who were more inclined to engage in a work-study programme. The minimal percentage of respondents aged 31 in the work-study programme. The male respondents represented a greater proportion than the female respondents. This gap may

imply that male students were more interested in the programme. Also, the findings may be attributable to the nature of available work or socio-economic obligations.

The survey encompassed students from all academic divisions of the university, representing various departments, faculties, and schools. Regarding academic levels, a higher proportion emerged from the levels 200 and 100. The results showed that work-study involvement is not confined to a specific level but encompasses students from their first year through to their final year. The Faculty of Arts and Social Sciences had the highest representation, followed closely by the Schools of Business and Education. This distribution showed that work-study participation is prevalent across all disciplines.

Research Question 1: *What are the effects of balancing work and study on students at VVU?*

Table 3:
Effects of Balancing Work and Studying

Statements	4	3	2	1	Total	Mean	SD
Balancing work and study negatively affected my performance	40 (32.8%)	47 (38.5%)	23 (18.9%)	12 (9.8%)	122	2.942623	0.956052
Students benefit from work study	25 (20.5%)	51 (41.8 %)	28 (22.9%)	18 (14.8 %)	122	2.934426	0.964377
Students experience stress due to work and study	41 (33.6 %)	40 (32.8%)	29 (23.8%)	12 (9.8 %)	122	2.901639	0.982574
Students face challenges while balancing work and study	30 (24.6%)	49 (40.2%)	20 (16.4%)	23 (18.8%)	122	2.721311	1.022574
Balancing work and study do not negatively affect my grades	31 (25.4%)	25 (20.5%)	45 (36.9%)	21 (17.2%)	122	2.680328	1.053507
The frequency of working declines my GPA	45 (36.9 %)	43 (35.2%)	15 (12.3 %)	19(15.6 %)	122	2.614754	1.058126
Students lack adequate time to sleep	32 (26.2 %)	34 (27.9%)	31 (25.4 %)	25 (20.5%)	122	2.598361	1.088329
Students feel overwhelmed by workload and study	34 (27.9 %)	32 (26.2 %)	31 (25.4 %)	25 (20.5 %)	122	2.540984	1.101815
Students struggle to balance work with personal life	29 (23.8%)	31 (25.4 %)	32 (26.2 %)	30 (24.6%)	122	2.516393	1.107701
There is pressure on how to maintain academic grades	29 (23.8 %)	30 (24.6%)	32 (26.2%)	31 (25.4 %)	122	2.508197	1.114773
Students feel mentally exhausted	31 (25.4 %)	30 (24.6 %)	32 (26.2 %)	29 (23.8 %)	122	2.483607	1.115137
Students experience anxiety about impending exams	32 (26.2%)	29 (23.8 %)	30 (24.6%)	31 (25.4 %)	122	2.467213	1.137243

Source: Field work, (2025). **Note:** Strongly Agree = 4; Agree = 3; Disagree = 2; Strongly Disagree = 1

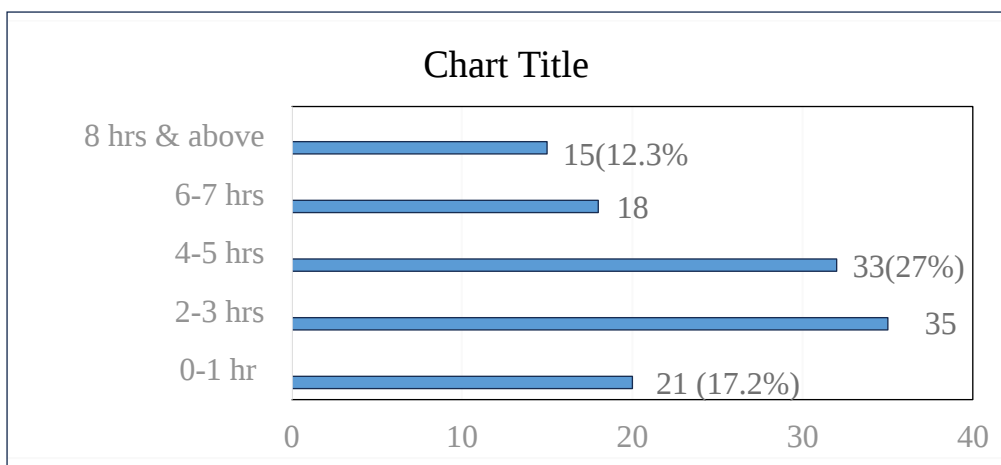
The analysis in Table 3 indicates that the balance between work and study had negatively impacted students' academic performance, with the highest mean values. The finding implies that balancing work with academic obligations imposes pressures on students.

The results revealed that students recognise certain advantages of engaging in the work-study programme. The findings also revealed that combining work and studies helped students acquire work experience, obtain time management skills, and meet financial needs. Conversely, the findings indicated adverse effects of work-study on students. Students expressed stress, feeling overwhelmed by their workload, unable to reconcile work with additional activities, and lacking sufficient time for sleep. The findings revealed that the simultaneous obligations of work and education impose psychological and physical stressors that may undermine students' well-being and academic concentration. Some students admitted that the balance of work and study does not adversely impact grades. On the other hand, some respondents suggest that a high work frequency leads to a decrease in GPA. This mixed reaction highlights that the effects of work-study vary depending on individual time management skills, workload intensity, and the type of work assigned to the students.

The findings are directly pertinent to the study's aim of ascertaining the impact of balancing work and study on students.

Research Question 2: *How many hours do students spend working while studying?*

Figure 1:
Number of Hours Students Spend Working



Source: Field Data, (2025).

The analysis of students' daily working hours indicates that a significant percentage of respondents work for a set amount of time each day according to their academic timetable. The findings showed that the majority of students work between 2 and 5 hours each day.

A few per cent worked for one hour or less, whereas a significant number of students dedicated six hours or more. This fluctuation indicates varying degrees of work intensity across students. The findings suggest a detrimental effect on academic performance and overall individual welfare. The findings demonstrate that the number of hours students allocate to work influences their academic activities. Although modest work hours are feasible, prolonged working hours can disrupt academic activities. Consequently, sustaining a balanced workload is crucial to prevent employment obligations from compromising students' educational goals and overall well-being. The findings successfully achieve the study's purpose of quantifying the hours students dedicate to work while pursuing their studies. The findings indicate that the majority of work-study students work moderate daily hours, whilst a smaller percentage work prolonged hour. The findings successfully achieve the study's objective of the hour's students dedicate to work while pursuing their studies.

Research Question 3: What is the Level of Effective Time Management Among Work-Study Students at VVU?

Table 4:
Time Management Among Work-Study Students

Statement	4	3	2	1	Total
I efficiently organise my work and academic timetable.	30 (24.6%)	42 (34.4 %)	35 (28.7.0%)	15 (12.3%)	122
Balancing work and studying is challenging	45 (36.9%)	20 (16.4 %)	35(28.7 %)	22 (18.0 %)	122
I struggle to meet deadlines due to work	25 (20.5%)	30 (24.6 %)	40 (32.8%)	27 (22.1%)	122
I have enough time for my studies	30 (24.6%)	25 (20.4%)	18 (14.8 %)	49 (40.2%)	122
Work disrupts my study time	35 (28.7.0%)	40 (32.8%)	30 (24.6%)	17 (13.9 %)	122
I use my time properly.	20 (16.4 %)	44 (36.1%)	26 (21.3%)	32 (26.2 %)	122
I manage work and studies well	26 (21.3%)	29 (23.8 %)	24 (19.7 %)	43 (35.2%)	122
Effective time management alleviates my stress.	23 (18.9%)	32 (26.2%)	46 (37.7%)	21 (17.2 %)	122
Work study helps me to plan my time	24 (19.7%)	51(41.8%)	26 (21.3 %)	21 (17.2%)	122

Source: Field work, (2025).

Note: Strongly Agree = 4; Agree = 3; Disagree = 2; Strongly Disagree = 1

Table 4 indicates that 51 (41.8%) of the respondents agreed that work study helps them to plan their time, while 26 (21.3%) strongly disagreed. Of 122 respondents, 49 (40.2%) disagreed that they have enough time for studies; however, 30 (24.6%) strongly agreed that they have enough time for studies. Another 46(37.7%) strongly disagreed that effective time management alleviates stress, while 32 (26.2%) agreed with the statement. Moreover, 45 respondents (36.9%) strongly agreed that balancing work and studying is challenging, while 35 respondents (28.7%) disagreed. Forty-four respondents (36.1%) agreed that they use their time correctly, while 32 (26.2%) disagreed. The data shows that while some students manage work-study commitments effectively, many struggle with time management, deadlines, and academic balancing, highlighting the need for interventions.

Discussion

Effects of Balancing Work and Studying

The study's findings demonstrate that striking a balance between work and learning is crucial to students' academic performance. The study is grounded in the Role Strain Theory (Goode, 1960). The theory asserts that individuals experience strain when obligated to fulfil several roles with conflicting demands, such as time, energy, and attention.

In this study, students concurrently assume the roles of learners and workers. The frequency of these tasks leads to role overload and role conflict.

Caldwell (2017) reported positive results from work-study involvement, including increased time management and academic achievement. However, the current results suggest that these advantages may not occur when role demands exceed students' coping abilities. From a role strain perspective, the benefits of work-study are likely to manifest primarily when job demands are mild and align with academic schedules. As work hours extend and duties intensify, the stress of managing numerous positions may retard any possible benefits.

The results corroborate those of Jack *et al.* (2021), who found that the balance between work and academic responsibilities negatively impacts students' mental health. Role Strain Theory posits that conflicting demands lead to stress and burnout, which, in turn, undermine academic performance. The findings indicated that poor performance of work-study students stems from difficulties in blending study and work. The study recommends institutional policies and financial aid to needy students to enhance their academic performance and overall well-being.

The Hours Students Spend Working While Studying at University

The findings reveal that a significant percentage of students dedicate 2 to 3 hours daily to work, indicating that the majority of work-study students engage in moderately paced work during the academic term. This result contrasts with Oettinger's (2011) findings, which noted that students engage in more than 10 hours of work daily.

When work hours are minimal, conflicting role demands alleviate the intensity of role strain experienced by students. Brennan and Dempsey (2018) observed that prolonged working hours correlate with markedly worse academic outcomes.

Role Strain Theory elucidates this phenomenon by highlighting that when work hours increase, students face intensified role conflict. Excessive work demands hinder students' ability to meet academic goals efficiently. The data indicate that the number of hours students work significantly influences the degree of role strain encountered. Moderate work hours may enable students to combine work and academic duties, whereas prolonged working hours are more likely to hinder academic performance.

Time Management Among Working Students

The study indicates that most work-study students acknowledge that their time management skills improve through work-study programmes. The result aligns with previous research emphasising the importance of time management for students balancing multiple obligations (Sainz & Ferrero, 2019; Ikhwan, 2017). Students participating in work-study programmes improve their time management skills and frequently cultivate organisational abilities compared to their non-working peers (Trentepohl *et al.*, 2022). Nevertheless, they identified challenges in dedicating adequate time to academic pursuits, corroborating Mitchell (2020), who noted that the balance between work and study can negatively impact students' educational achievement. According to Role Strain Theory, students experience strain when the demands of work and study exceed their available time and energy. The results indicate that time management effectiveness is contingent on personal coping mechanisms, working hours, and the nature of the work assigned to students.

Conclusion

The study examined the work-study nexus between balancing work and study at VVU, Oyibi Campus, Accra. The findings indicate that although the work-study programme offers financial assistance and practical experience. However, it also poses significant problems concerning time management and academic achievement. The study also indicated that students experience stress while balancing work and learning.

The study was grounded in Role Strain Theory, which asserts that humans experience strain when they have several tasks with competing demands. In conclusion, excessive work demands while learning increase strain and jeopardise students' academic achievement. The study contributes to the existing body of literature on work-study programmes.

Recommendations

The study examined the work-study nexus at VVU, balancing work and study. The study employed Role Strain Theory, which explains that strain arises from competing work demands. The study recommended that the university administration and the work-study coordinator should collaborate and agree on uniform working hours for students who work. A written document should be developed and distributed to all departments and units at the beginning of each academic year. These guidelines should specify approved work schedules and oversight responsibilities. The regulations will help prevent academic overload on students and promote a more balanced relationship between work and study. The institution should implement time management workshops for work-study students to acquire the necessary skills. The university should offer counselling services to assist students. This initiative will help students handle stress issues that may arise from combining work and study. The university should regularly evaluate the academic performance of work-student students. There should be a more flexible approach to deadlines and working hours, particularly during examination periods. The university should provide financial support to needy students participating in the work-study programme.

Implementing these recommendations would benefit both the institution and the students.

Implications of the Study

This study's findings hold significant implications for theory, practice, and future research on work-study programmes in higher education. Without appropriate regulation, the combination of studies and work-study can lead to stress and, later, poor performance.

The work-study programme financially supports students and their skill development. Nevertheless, overall efficacy is frequently contingent on various factors, including the duration of working hours, effective time management strategies, and the intrinsic attributes of the individual learner. The study offers critical insights for policymakers and educational institutions in designing and implementing work-study programmes.

Limitations and Areas for Further Studies

Despite the benefits of this study, it also has specific drawbacks that warrant further investigation. The research was conducted at the Oyibi Campus of VVU, thereby constraining the generalisability of the results and introducing response bias. Thus, the findings may not represent the perspectives of all university students. Future research should utilise larger, more diverse samples, along with other methodological approaches, to improve the validity of the findings and further investigate students' perspectives and attitudes towards work-study programmes across universities.

Declaration

The authors declare that this manuscript has not been published in part or whole in any journal. There is no conflict of interest associated with this manuscript. The authors affirmed that the document contained no plagiarism.

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Teachers' Perceptions and Classroom Experiences of Ability Grouping in Tanzanian Secondary Schools

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Abstract

This study examines secondary school teachers' perceptions and experiences of ability grouping in Tanzanian secondary schools. Guided by Social Constructivist theory, the study examined how teachers perceive and implement ability grouping as an instructional strategy to address learner diversity and improve learning outcomes. A mixed-methods design was employed, involving 104 teachers from two secondary schools in Dar es Salaam. Data were analysed using descriptive statistics, MANOVA, and thematic analysis. Quantitative results indicated that teachers held moderately positive perceptions ($M = 25.79$, $SD = 4.09$) and experiences ($M = 27.66$, $SD = 4.72$) toward ability grouping, with variations across schools, subjects, and teaching experience. MANOVA showed no significant main effects of the independent variables on teachers' perceptions and experiences. However, significant interaction effects were found between school and gender ($p = .011$, $\eta^2 = .390$) and between school and teaching experience ($p = .010$, $\eta^2 = .340$), highlighting the influence of contextual factors. Qualitative findings corroborated the quantitative trends, showing that teachers valued ability grouping for enhancing differentiated instruction and classroom management, but expressed concerns about its potential negative impact on low-performing students' motivation and self-esteem. The study concludes that ability grouping is a promising yet complex instructional strategy, whose effectiveness depends on teacher facilitation, institutional support, and context-sensitive implementation. These findings offer practical guidance for policymakers and school leaders seeking to foster inclusive and adaptive instructional practices in secondary schools.

Keywords: Ability grouping, perception, classroom experience, teachers, secondary schools

Introduction

Teaching students with diverse abilities, varying levels of prior knowledge, interests, learning styles, needs, and motivations presents significant challenges to educators. This complexity arises from the recognition that not all students learn in the same way and/or at the same pace (Dhakal, 2024;

Hattie & Anderman, 2019; Tomlinson, 2014). In response to this challenge, a range of instructional strategies have been developed and applied, among which student ability grouping is an effective approach (Fauziyah *et al.*, 2024; Khazaeenezhad *et al.*, 2012).

Ability grouping is an educational approach that places students in groups based on academic achievement. It involves organising students into groups or separate classes based on their academic performance, skills, or perceived intellectual ability (Bolick & Rogowsky, 2016; Fauziyah *et al.*, 2024; Johnston & Taylor, 2023). This practice has been recognised as an established management strategy that addresses ability differences among students across various educational settings (Khazaeenezhad *et al.*, 2012; Mansor, Maniam, Hunt & Nor, 2016; Zubair *et al.*, 2023). It is a widely practised instructional approach that helps educators organise and simplify the teaching and learning processes.

Studies indicate that ability grouping can take multiple forms; however, the most common forms are between-class and within-class ability grouping (Matthews *et al.*, 2013). Expanding this idea, Busso and Frisancho (2023) assert that ability grouping may occur within a single classroom, such as through differentiated reading or math groups where students work at varying levels; it may happen across classrooms, known as streaming or tracking, where students are placed into distinct classes or learning tracks based on ability levels; but also it can be evident in programme placements, such as enrollment in gifted and talented programmes, vocational education tracks, or remedial support classes.

There are several rationales for ability grouping; most are tailored to devising instruction that is more closely aligned with individuals' learning needs, pace, and potential. Scholars claim that teachers employ this classroom organisational strategy to meet individual learners' needs, improve student learning, and increase test scores (Bolick & Rogowsky, 2016; Magableh & Abdullah, 2020; Yang, 2024). This is attributed to teachers' beliefs and expectations that students' abilities influence instructional choices in the classroom. Proponents in this area argue that ability grouping enables more targeted instruction, improves learning efficiency, and allows both advanced and struggling students to flourish in environments suited to their current capabilities (Alam & Mohanty, 2023; Bissell, 2023; Busso & Frisancho, 2023). While some studies highlight the positive outcomes of ability grouping in diverse contexts (Bolick & Rogowsky, 2016; Busso & Frisancho, 2023), others find inconclusive effects, suggesting that the practice neither significantly enhances nor impairs student achievement (Brulles *et al.*, 2012; Cantu, 2019;

Cipriano-Walter, 2015; Giesinger, 2017). Evidence often indicates that students in higher-ability groups achieve greater academic gains, whereas those in average- or lower-ability groups experience little improvement, although they may not be directly disadvantaged. They further argue that the effectiveness of ability grouping tends to vary depending on the style of grouping implemented, as well as the demographics and academic levels of students involved (Greenway et al, n.d; Nomi, 2010). These variations not only affect students' academic self-concept, motivation, and classroom engagement but also have profound implications for teachers' instructional approaches, expectations, and professional autonomy.

Critically, recent studies raise concerns that ability grouping may reinforce social inequalities, stigmatise students in lower groups, lower teacher expectations, and restrict both student mobility and instructional flexibility (Alam & Mohanty, 2023; Anito & Gaikwad, 2025). These concerns stand in sharp contrast to claims of its instructional benefits, leaving the overall impact of ability grouping uncertain. This uncertainty raises important questions about how the practice is experienced in different contexts. Despite extensive global debate, little is known about how ability grouping is perceived and practised in the Tanzanian education system. Addressing this gap requires an in-depth examination of teachers' perceptions and classroom experiences.

Problem Statement

Although ability grouping is increasingly adopted as a classroom organisational strategy in Tanzanian secondary schools, there remains a limited empirical understanding of how teachers perceive and experience this approach in practice. Previous studies conducted in Tanzania (e.g., Lyoka, 2008; Milinga *et al.*, 2022; Nyangas, 2025) have largely focused on the effects of ability grouping on students' learning outcomes, with little attention to the teachers who implement it daily. Yet teachers' beliefs, attitudes, and classroom practices play a crucial role in determining whether such grouping strategies achieve their intended goals of improving instruction and learning efficiency. Moreover, global evidence presents conflicting conclusions about the impact of ability grouping; some studies emphasize its instructional benefits, while others highlight concerns of inequality, stigmatization, and reduced self-esteem among students in lower groups (Alam & Mohanty, 2023; Anito & Gaikwad, 2025; Giesinger, 2017). These contradictions make it necessary to explore how teachers in Tanzania, operating within a unique educational and socio-cultural context, perceive and experience the practice.

To address this gap, the present study investigates secondary school teachers' perceptions and lived experiences of ability grouping in Tanzania. Specifically, it seeks to answer the following questions:

- i) What are secondary school teachers' perceptions of ability grouping as a classroom organisational practice?
- ii) What are secondary school teachers' classroom practical experiences with ability grouping?
- iii) To what extent do teachers' perceptions and experiences of ability grouping vary across demographic and professional factors?

Theoretical Framework

The present study is grounded in Social Constructivism theory, founded on the ideas of Lev Vygotsky (1978). This theory posits that individuals develop understanding and construct meanings through social interactions and cultural contexts. Central to this theory is the concept of the Zone of Proximal Development (ZPD), which emphasises that a learner can perform a range of tasks with the guidance and support of a more knowledgeable other. In the context of ability grouping, the ZPD is particularly relevant, as it highlights how teachers perceive and respond to students' varying learning potentials across ability groups. Teachers' decisions about how to group students and how to engage them in different instructional activities often reflect their understanding of where students are within their ZPD and the extent to which they can benefit from peer interactions and teacher support.

Closely related is the concept of scaffolding, which involves providing structured support to help learners progress toward greater independence and mastery. This study employs Social Constructivism as a lens to examine teachers' perceptions and practical classroom experiences with ability grouping. It examines how teachers' beliefs about learning readiness, peer collaboration, and teacher guidance shape their grouping practices. Additionally, the theory highlights that while ability grouping may facilitate individualised support, it may also reduce opportunities for heterogeneous peer interaction, which is essential for cognitive development.

Methodology

The study adopted a mixed-methods approach to gain a comprehensive understanding of teachers' perceptions and experiences regarding ability grouping in Tanzanian secondary schools. Data were collected using a questionnaire comprising closed-ended items on a 5-point Likert scale and open-ended questions that allowed participants to elaborate on their views. This design enabled the researcher to capture both quantifiable trends and rich qualitative insights.

The study was conducted in two public secondary schools in the Dar es Salaam region, one in Ilala Municipality and the other in Ubungu Municipality. Dar es Salaam was purposively selected for its educational diversity and the increasing use of ability-grouping strategies. Ilala, being one of the oldest and most established municipalities, offered insights from schools with a long history of structured academic practices, whereas Ubungu, a newer and rapidly expanding municipality, provided a contrasting context for examining classroom organisation.

All classroom teachers from the selected schools were considered the target population. Due to logistical challenges in reaching all teachers during the data collection period, responses were obtained from 104 teachers: 55 from School A (94.8% of its staff) and 49 from School B (92.4% of its staff). Quantitative data were analysed using descriptive statistics to summarise demographic characteristics and identify general trends, followed by a Multivariate Analysis of Variance (MANOVA) to test for differences in teachers' perceptions and experiences across demographic and professional variables, including gender, school, teaching experience, and teaching subjects. Qualitative responses from open-ended questions were analysed thematically to complement and contextualise the quantitative findings.

Results

As outlined in the previous section, this study examines secondary school teachers' perceptions and experiences of ability grouping practices in Tanzania. The study further sought to determine whether there are any differences in perceptions and experiences among teachers regarding ability grouping across diverse demographic and professional variables such as gender, schools, teaching experiences, and teaching subjects. The collected data were subjected to various analysis methods, and the results have been organised into distinct categories based on the questions that they intended to address, as presented below.

Respondents' Demographic Information

This section presents the demographic profile of the respondents who took part in this study. Including demographic information in the study findings is essential, as it provides important context for interpreting the results, assessing the representativeness of the sample, and determining the extent to which the findings may be generalizable to broader populations. As identified earlier, a total of 104 teachers, teaching various subjects across the two sampled secondary schools, were involved in this study. Their profiles include

characteristics such as gender, schools, teaching experience, and teaching subjects, as shown in Table 1.

Table 1:
Respondents' Demographic Information

Demographic Variable	Code	Category	N	F
School	1	A	55	94.8
	2	B	49	92.4
Gender	1	Male	32	30.8
	2	Female	72	69.2
Teaching Experience	1	1-5 Years	15	14.4
	2	6-15 Years	55	52.9
	3	16-25 Years	24	23
	4	Above 26	10	9.6
Teaching Subjects	1	Language	33	31.7
	2	Science	15	14.4
	3	Arts Subjects	39	37.5
	4	Mathematics	10	9.6
	5	Business	7	6.7

Source: Field Data, (2024).

Table 1 presents the demographic characteristics of the teachers who participated in the study. The results show that the majority of respondents were female (69.2%), whereas male teachers accounted for 30.8%. This reflects the general gender distribution commonly observed in many Tanzanian primary and secondary schools, particularly in urban areas. Understanding this distribution is important, as demographic patterns may shape teachers' perceptions and experiences examined in the study. Regarding teaching experience, over half (52.9%) of the teachers had 6-15 years of teaching experience, indicating a predominance of mid-career educators in the sample. This suggests that the majority of respondents have had substantial exposure to classroom diversity and variations in student performance, which are central to forming informed perceptions of ability grouping. Teachers with several years of experience are likely to have encountered a range of student abilities and may have developed specific attitudes and strategies for managing heterogeneous classrooms.

Regarding the school-wise distribution, participants were nearly evenly distributed across schools A (94.8%) and B (92.4%), indicating balanced participation across both study sites and enhancing the representativeness of the data across different institutional contexts. Regarding teaching subjects, the most represented groups were arts subjects (37.5%) and language subjects (31.7%), followed by Science (14.4%), Mathematics (9.6%), and Business (6.7%). This distribution reflects the staffing structure typical of many Tanzanian secondary schools, in which arts and language teachers constitute a

larger proportion of the teaching workforce. In this composition, the study's findings are likely to be more strongly shaped by teachers' perceptions and experiences in these subject areas. This is important to keep in mind when interpreting general trends in ability grouping practices.

Secondary School Teachers' Perceptions of Ability Grouping

One of the central foci of this study was to examine secondary school teachers' perceptions of the use of ability grouping in classroom practice. These perceptions were assessed using a seven-item, five-point Likert scale, complemented by open-ended questions. The Likert-scale responses were subjected to descriptive statistics to compute the mean and standard deviation. The results have been summarised and presented in Table 2.

Table 2:

Descriptive statistics for teachers' perceptions of ability grouping

Factor	Level	Mean	Standard Deviation
School	A	26.75	4.51
	B	25.20	4.09
Gender	Male	26.59	3.94
	Female	25.42	4.27
Teaching Subjects	Mathematics	27.40	2.99
	Science	26.73	3.31
	Languages	24.91	5.44
	Arts Subjects	25.45	3.41
	Business	27.14	1.10
Teaching Experience	1-5 Years	27.13	5.36
	6-15 Years	25.60	4.34
	16-25 Years	25.09	3.29
	26+ Years	26.40	2.50

Source: Field Data, (2024).

Table 2 presents descriptive statistics for teachers' perceptions of ability grouping across schools, gender, subjects taught, and teaching experience. Overall, teachers reported holding moderately positive perceptions of ability grouping ($M = 25.79$, $SD = 4.09$, $N = 104$). As shown in Table 2, teachers' perception scores varied across schools, gender, subjects taught, and years of teaching experience. For instance, teachers at school **A** reported slightly higher perceptions ($M = 26.75$, $SD = 4.51$) compared to those at school **B** ($M = 25.20$, $SD = 4.09$). These differences appear to reflect school-level factors such as administrative support, availability of teaching and learning resources, or prior professional development on differentiated instruction. This suggests the need for targeted support or training to address such variations.

Regarding gender, slightly higher perception scores were observed for male teachers ($M = 26.59$, $SD = 3.94$) than for female teachers ($M = 25.42$, $SD =$

4.27). Although this difference is modest, it suggests variation in how male and female teachers perceive the implementation of ability grouping. This implies that gender can shape teachers' views and attitudes toward classroom practices, potentially reflecting differences in classroom management approaches or in confidence in implementing differentiated instruction.

With respect to teaching subjects, notable variations emerged in teachers' perceptions of ability grouping. For instance, mathematics teachers reported the most favourable perceptions ($M = 27.40$, $SD = 2.99$), whereas language teachers expressed the least positive views ($M = 24.91$, $SD = 5.44$). Teachers of other subjects, such as business, science, and arts, fell between these two groups. This pattern suggests that teachers of structured and sequential subjects tend to view ability grouping as a supportive instructional strategy. In contrast, teachers of subjects that emphasise creativity and open-ended learning, such as languages, appear to find it less adaptable to their pedagogical contexts. These differences highlight that the perceived usefulness of ability grouping is shaped by the nature of subject content and whether learning outcomes rely on stepwise mastery or on interpretive and expressive skills.

With respect to teaching experience, notable variations emerged in teachers' perceptions of ability grouping. Teachers with 1-5 years of experience reported the most favourable perceptions ($M = 27.13$, $SD = 5.36$), while those with 16-25 years of experience recorded the least positive views ($M = 25.09$, $SD = 3.29$). Teachers in the remaining experience groups fell between these two categories. Notably, teachers with more than 26 years of experience also expressed relatively favourable perceptions ($M = 26.40$, $SD = 2.50$). These variations suggest different influences across stages of teachers' careers. Early-career teachers may be more receptive to innovative instructional strategies such as ability grouping, partly because of their recent exposure to learner-centred pedagogies. Highly experienced teachers may hold positive views due to the confidence, adaptability, and broad instructional exposure they have developed over many years of practice. In contrast, mid-career teachers appear slightly less enthusiastic, possibly due to established teaching routines or a reduced inclination toward pedagogical change.

These findings indicate that teachers regard ability grouping as a potentially effective instructional strategy for facilitating teaching and learning in secondary schools. These quantitative results were further reinforced by insights from open-ended responses, which provided a deeper understanding of teachers' views. For example, one male mathematics teacher from school **A** remarked, *"...to me, this approach is good as it encourages competition when students of similar ability are grouped, and it becomes easier to support those*

with low ability...” Similarly, a female business teacher from the same school noted, “...*this approach helps us teachers to apply varied teaching methods based on students’ academic levels...*”. In addition, an experienced science teacher from school **B** explained, “...*in my view, this approach is helpful to students; it motivates them to work harder as they aspire to be promoted to higher-performing classes...*”

Although the overall perception scores among teachers were moderately positive ($M = 25.79$, $SD = 4.09$), indicating generally favourable views of the practice, a small proportion of teachers expressed neutral or negative perceptions. The relatively high standard deviations (mostly $SD > 1.0$) suggest that some teachers remain sceptical or undecided, reflecting reservations about the approach. These concerns were further echoed in the open-ended responses, where several teachers highlighted challenges in implementing ability grouping, particularly with lower-performing students. For instance, one female arts teacher from school **B** remarked, “...*placing students into groups causes those with lower ability to deteriorate further due to lack of self-confidence, as they perceive themselves that they cannot perform well...*”. Similarly, a male language teacher from school **A** stated, “...*this is not an appropriate approach as it causes low-ability students to remain stagnant as they consider themselves inferior and excluded...*”. In a more emphatic response, a female mathematics teacher from the same school expressed, “...*I completely disagree with separating students based on their abilities... this practice discourages students and severely undermines their self-confidence. This approach also causes some teachers to focus only on the high-performing classes, while neglecting and isolating the struggling ones...*”

In light of these perspectives, these observations indicate that, despite its potential as an instructional strategy, the ability grouping approach requires careful and context-sensitive implementation to avoid reinforcing inequities or demotivating students, particularly those in lower-performing groups.

Secondary School Teachers’ Experiences on Ability Grouping

Another key focus of this study was to investigate teachers’ classroom practical experiences with the ability grouping approach. This objective aimed to examine whether teachers experienced ability grouping in the same way, regardless of differences in gender, teaching experience, teaching subjects, and work contexts. To address this, a 5-point Likert scale comprising seven items related to teachers’ experiences was employed, along with a few open-ended questions. Again, statistical responses were subjected to descriptive analysis, and mean scores and standard deviations for the items were computed. The results have been summarised and presented in Table 3.

Table 3:

Descriptive Statistics for Teachers' Practical Experiences of Ability Grouping (N = 104)

Factor	Level	Mean	Standard Deviation
School	A	29.13	5.73
	B	26.16	4.68
Gender	Male	27.34	3.99
	Female	28.57	4.61
Teaching Subjects	Mathematics	28.80	2.62
	Science	27.29	4.57
	Languages	27.63	5.60
	Arts Subjects	26.32	4.57
	Business	27.33	1.86
Teaching Experience	1-5 Years	30.78	6.02
	6-15 Years	28.92	4.28
	16-25 Years	27.50	2.24
	26+ Years	24.50	4.06

Source: Field Data, (2024).

The findings from Table 3 indicate that teachers reported generally positive experiences with the ability grouping approach; however, these experiences varied across schools, gender, subjects taught, and years of teaching experience. For instance, in relation to schools, teachers from school **A** reported more positive experiences ($M = 29.13$, $SD = 5.73$) than those from school **B** ($M = 26.16$, $SD = 4.68$). This suggests that teachers' experiences with ability grouping are shaped largely by the broader school environment. Aspects such as leadership commitment, the school's pedagogical culture, and access to adequate instructional materials influence the effectiveness with which the practice is implemented. In settings where these supports are strong, teachers are more likely to apply ability grouping with confidence and consistency.

With regard to gender, differences were modest, with female teachers reporting slightly higher experience scores ($M = 28.57$, $SD = 4.61$) than male teachers ($M = 27.34$, $SD = 3.99$). This suggests that female teachers may engage more actively or consistently with the pedagogy, possibly due to their openness to collaborative and learner-centred practices. However, the small difference suggests that male and female teachers have comparable competence and confidence in implementing ability grouping. This indicates that gender does not substantially influence practical experiences with the approach and that the practice is generally well accepted across both groups.

With respect to teaching subjects, teachers' experience levels varied across subject areas. For instance, mathematics teachers reported the most favourable experiences ($M = 28.80$, $SD = 2.62$), whereas arts subject teachers reported the lowest ($M = 26.32$, $SD = 4.57$). This pattern suggests that ability grouping is more effective in subjects with sequential, skill-based content, such as

mathematics. In contrast, subjects that emphasise creativity or open-ended learning, such as the arts, may pose greater challenges for implementation. These differences highlight that the nature and structure of a subject influence how readily teachers perceive and apply ability grouping, with more structured subjects allowing smoother adaptation of this instructional approach.

With respect to teaching experience, teachers' practical engagement with ability grouping varied across different experience levels. Those with 1-5 years of experience reported the most positive experiences ($M = 30.78$, $SD = 6.02$), while teachers with over 26 years reported the least positive ($M = 24.50$, $SD = 4.06$). Teachers with 6-25 years of experience fell between the other groups, indicating moderate levels of positive experience. These findings suggest that less experienced teachers are more receptive to new instructional strategies, likely due to recent training, openness to innovation, or ongoing development of pedagogical skills. In contrast, highly experienced teachers may encounter challenges, such as entrenched routines, a preference for traditional methods, or reduced flexibility. This underscores the potential need for targeted support or professional development to enhance the effective use of ability grouping across all experience levels.

The qualitative responses from teachers further support these quantitative findings by illustrating how ability grouping enhances instructional effectiveness across different contexts. For instance, a female teacher from school **B** noted, *"...when students are grouped by their abilities, I found it easier to manage the class..."*, reflecting the generally positive experiences reported by teachers in both schools. Similarly, a science teacher from school **A** affirmed, *"...I've been able to adjust my lessons better when students are grouped by ability..."*, highlighting how the approach enables flexibility in teaching across subjects. Reinforcing these views, another teacher from school **A**, who teaches mathematics, remarked, *"...grouping allows me to address the needs of struggling learners more effectively..."*, which aligns with the overall favourable experiences across genders and teaching contexts. These qualitative insights thus complement the statistical results, indicating that ability grouping is perceived as a practical and beneficial strategy for managing diverse learner needs.

Although the overall experience scores among teachers were generally positive ($M = 27.66$, $SD = 4.72$), suggesting that most teachers had favourable experiences with the ability grouping approach, notable variations were observed across schools, gender, subjects, and years of teaching experience. The relatively high standard deviations ($SD > 1.0$) indicate that not all teachers experienced the approach uniformly, with some expressing challenges in

practice. These variations were also reflected in the qualitative responses, in which several teachers acknowledged both the benefits and the difficulties associated with implementing ability grouping. For instance, one male teacher from school **A** noted, “...based on my experience, grouping students according to their ability tends to discourage them and diminish their self-confidence, as they begin to perceive themselves as incapable of succeeding...” Another teacher teaching art subjects from the same school observed, “...this situation contributes to truancy and laziness among students, hence making teaching more difficult...”. Similarly, one of the experienced teachers from school **B** remarked, “...normally, in this instructional approach, students from low-performing groups tend to lose hope...”

In light of these perspectives, while most teachers reported positive experiences, such remarks reveal that the success of ability grouping depends largely on how it is implemented and supported within the classroom context. The findings suggest that without adequate pedagogical strategies and emotional support for low-performing groups, the approach may unintentionally lower student morale and engagement, thereby reducing its intended instructional benefits.

Differences in Teachers’ Perceptions and Experiences Across Demographic Variables

The third focus of this study was to examine whether teachers’ perceptions and experiences of ability grouping differed according to selected demographic variables, namely gender, school, subject taught, and teaching experience. To determine this, a Multivariate Analysis of Variance (MANOVA) was conducted. This analysis was considered necessary since it allows simultaneous examination of multiple dependent variables while controlling for Type I error and accounting for correlations among them (Tabachnick & Fidell, 2019). The findings from this analysis have been summarised in Table 4.

Table 4: *Multivariate Tests for the Effects of Demographic Variables on Teachers’ Perceptions and Experiences*

Source	Wilks’ Λ	F	df	P	Partial η^2	Interpretation
School	0.981	1.42	2.65	.240	.021	Not significant
Gender	0.999	0.00	2.65	.964	.000	Not significant
Subjects taught	0.979	0.36	4.65	.843	.021	Not significant
Teaching experience	0.928	1.68	3.65	.178	.072	Not significant
School × Gender	0.610	4.31	2.65	.011	.390	Significant
School × Teaching experience	0.660	3.97	3.65	.010	.340	Significant

Source: Field Data, (2025).

The MANOVA results in Table 4 show no statistically significant main effects of school, gender, subjects taught, or teaching experience on teachers' perceptions and experiences with ability grouping, as all p-values exceeded 0.05. This indicates that, when each demographic factor is considered in isolation, teachers tend to report similarly positive perceptions and experiences regardless of their background or professional characteristics. However, the interaction effects reveal important patterns that would not be detected through main effects alone. Two significant two-way interactions emerged: school $\times$ gender ($p = .011$, $\eta^2 = .390$) and school $\times$ teaching experience ($p = .010$, $\eta^2 = .340$). These interactions indicate that the influence of gender and teaching experience on teachers' perceptions and experiences varies across school contexts.

The significant school $\times$ gender interaction suggests that the way male and female teachers experience or perceive ability grouping differs across schools. This may imply that certain school environments either support or constrain one gender more than the other. Such differences may arise from variations in leadership style, collegial support, instructional expectations, or access to professional development. Thus, gender differences become meaningful only within particular school settings rather than across the entire sample.

Similarly, the school $\times$ teaching experience interaction indicates that teachers' years of experience influence their perceptions and experiences differently across the two schools. This could suggest that some schools provide stronger guidance, clearer instructional frameworks, or more collaborative cultures that help teachers, whether novice or highly experienced, apply ability grouping more effectively. In other schools, however, differences between early-career, mid-career, and highly experienced teachers may become more pronounced due to variations in support structures, instructional expectations, or openness to change. Therefore, the effect of teaching experience is not uniform but shaped by specific school conditions.

Taken together, these interaction effects indicate that while demographic characteristics alone do not predict differences in teachers' perceptions and experiences, the combination of school environment, gender, and years of experience plays a significant role in shaping how teachers understand and practice ability grouping. This underscores the importance of considering school-level dynamics, such as leadership practices, resource availability, and professional culture, when interpreting teachers' responses to instructional innovations.

To further explore these outcomes, follow-up univariate tests were conducted for each dependent variable separately. These analyses aimed to determine whether any of the independent variables, school, gender, subjects taught, or teaching experience, had statistically significant effects on teachers' perceptions and experiences with ability grouping when considered individually. Conducting these univariate tests provided a clearer understanding of the extent to which each factor uniquely contributed to the patterns observed in the multivariate analysis and whether any specific variable independently influenced teachers' responses. The results of these tests are summarised in Table 5.

Table 5:

Univariate Tests for the Effects of Demographic Variables on Teachers' Perceptions and Experiences

Source	Dependent Variable	F	df	P	Partial η^2	Interpretation
School	Perceptions	1.20	1.66	.278	.018	Not significant
School	Experiences	1.64	1.66	.205	.024	Not significant
Gender	Perceptions	0.01	1.66	.924	.000	Not significant
Gender	Experiences	0.09	1.66	.768	.001	Not significant
Subjects taught	Perceptions	0.45	3.66	.717	.021	Not significant
Subjects taught	Experiences	0.51	3.66	.675	.023	Not significant
Teaching experience	Perceptions	1.13	3.66	.344	.049	Not significant
Teaching experience	Experiences	1.25	3.66	.298	.053	Not significant

Source: Field Data, (2025).

The results in Table 5 show that none of the demographic or professional variables, school, gender, subjects taught, or teaching experience, had statistically significant main effects on teachers' perceptions or experiences with ability grouping, as all p-values were above 0.05. This suggests that individual characteristics alone did not meaningfully differentiate how teachers viewed or experienced the approach. For example, teachers from different schools demonstrated comparable levels of acceptance and comfort with ability grouping, as reflected by the low F-values and very small effect sizes (partial $\eta^2 < .05$). Similarly, male and female teachers, regardless of subject area or years of experience, expressed generally similar perceptions and experiences. The consistently small effect sizes further reinforce the conclusion that demographic factors contributed minimally to explaining variation in teachers' attitudes. This pattern indicates a relatively uniform perception of ability grouping among the teaching staff, suggesting a shared professional culture or common instructional realities within the sampled schools.

Thus, the univariate results confirm that no single demographic variable exerts a strong standalone effect, while the multivariate findings highlight the potential importance of contextual dynamics. Together, these results suggest that teachers' engagement with ability grouping is shaped less by their individual characteristics and more by their fit within the broader institutional context.

Discussion of the Findings

The findings of this study revealed that secondary school teachers in Tanzania generally held moderately positive perceptions and experiences of ability grouping. They view it as an effective strategy for managing diverse classrooms and enhancing instructional efficiency. A critical reading of these findings, however, suggests that such positive views may be influenced not only by teachers' belief in the instructional benefits of ability grouping but also by the broader teaching conditions in which they work. Many Tanzanian classrooms continue to face challenges, including large class sizes, limited resources, and varying levels of learner readiness. These contextual pressures may make ability grouping particularly appealing because it helps teachers organise instruction more efficiently and maintain classroom order. Importantly, this interpretation does not contradict teachers' genuine support for the method. Rather, it highlights that their perceptions are shaped by a combination of instructional benefits and contextual realities. An observation consistent with previous studies that emphasise the role of ability grouping in improving instructional focus and managing learner diversity.

These findings align with earlier empirical evidence (Bolick & Rogowsky, 2016; Fauziyah *et al.*, 2024) showing that ability grouping can enhance classroom organisation and allow more targeted instruction. The broader literature (Tomlinson, 2014; Magableh & Abdullah, 2020) similarly argues that differentiated practices help teachers address diverse learner needs. Nonetheless, the present study highlights that in the Tanzanian context, such positive views may be intertwined with the practical necessities of teaching in resource-limited environments, an insight that warrants further examination. These positive perceptions may also reflect teachers' awareness of the increasing complexity of contemporary classrooms and the need for adaptive teaching strategies that support both individualised and peer-assisted learning. Empirical studies similarly report that flexible and differentiated approaches are essential for meeting diverse learner needs (Dhakal, 2024; Hattie & Anderman, 2019). Furthermore, research by Busso and Frisancho (2023) and Johnston and Taylor (2023) suggests that teachers value ability grouping because it enables both high-performing and struggling learners to engage meaningfully in classroom activities at their respective levels. Although

student outcomes were not directly measured in this study, the positive perceptions and experiences reported suggest that teachers perceive ability grouping as an effective means of promoting instructional efficiency and learner engagement.

The multivariate and univariate analyses offer further insights. The absence of significant main effects across gender, school, subject, and teaching experience might initially suggest a uniformity of perceptions and experiences. However, this uniformity may reflect systemic homogenization in teacher training, curriculum expectations, or institutional cultures rather than genuine consensus. In other words, teachers may express similar attitudes not because their experiences are identical, but because their work environments shape and constrain how instructional strategies are understood. The significant interaction effects between school and gender, and between school and teaching experience, underscore this point. These interactions reveal that certain groups of teachers respond differently depending on the institutional context in which they work.

This finding aligns with studies emphasising the influence of school culture and leadership on instructional practices (Mansor *et al.*, 2016; Alam & Mohanty, 2023). Importantly, these interactions challenge the assumption that demographic characteristics alone shape teachers' attitudes; instead, they highlight the mediating role of school environments. Less experienced teachers, for example, may be more sensitive to institutional norms, while gendered expectations in certain schools may subtly influence confidence or instructional decision-making. These contextual nuances warrant greater attention in discussions of teachers' attitudes toward ability grouping.

From a theoretical standpoint, the findings resonate with Social Constructivist principles (Vygotsky, 1978), which emphasise that learning, and by extension teaching, is shaped by social and contextual processes. Teachers' appreciation for ability grouping reflects an attempt to scaffold learning within students' Zones of Proximal Development. Yet, a constructivist critique would note that scaffolding must be dynamic and responsive. The concerns teachers raised regarding the demotivation of low-performing students suggest that grouping practices may fall short of constructivist ideals, particularly when groups become rigid or when instructional support varies in quality.

The qualitative findings illuminate this tension more sharply. While teachers acknowledged benefits, many expressed reservations about negative socio-emotional consequences for struggling learners. These concerns echo a large body of research showing that ability grouping can reinforce learner

hierarchies and psychological disparities (Brulles *et al.*, 2012; Cantu, 2019; Bissell, 2023). Teachers' observations that low-ability students may experience reduced motivation or self-esteem point to structural risks that cannot be ignored. Inequities may arise not merely from grouping itself, but from disparities in teacher expectations, resource allocation, and instructional attention, factors that have been emphasised in studies by Wang (2023) and Papachristou (2022).

Thus, while the overall findings suggest that teachers recognise ability grouping as a useful instructional tool, a more critical interpretation highlights its conditional effectiveness. The approach holds promise for supporting differentiated learning, but only when implemented flexibly, supported by adequate training, and monitored for unintended consequences. Without such safeguards, ability grouping may inadvertently undermine the very equity it seeks to promote (Jerrim et al, 2025; Johnston et al, 2024). In sum, the study demonstrates that teachers value ability grouping but also navigate its complexities and limitations. Their perceptions reflect both pedagogical insight and the structural pressures of Tanzanian classrooms.

Summary and Conclusion

This study examined secondary school teachers' perceptions and experiences of ability grouping practices in Tanzanian secondary schools, with the aim of understanding how they view and implement the approach for managing classroom diversity. The findings revealed that teachers generally hold moderately positive perceptions and experiences toward ability grouping, recognising it as an effective strategy for enhancing instructional efficiency and promoting differentiated learning. However, variations in responses indicated that while many teachers value the approach, others expressed concerns about its potential negative effects on low-performing students' motivation and self-esteem. From a Social Constructivist perspective, teachers' practices reflect constructivist-informed approaches that emphasise scaffolding and collaborative learning, though their effectiveness varies with school culture and implementation challenges. Overall, ability grouping remains a promising yet complex instructional strategy that requires context-sensitive and equitable application to effectively support all learners.

Implications of the Findings

These findings imply the need for targeted professional development to equip teachers with strategies for implementing inclusive and effective ability grouping. Educational policymakers should ensure adequate institutional support, including resources and teacher collaboration frameworks, to minimise disparities among student groups. School leaders should foster

supportive environments that encourage differentiated instruction while safeguarding the well-being of lower-performing students. Finally, future interventions and policies should focus on balancing instructional efficiency with equity to maximise the benefits of ability grouping across diverse learning contexts.

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Predictive Validity of Entrance Examinations for First-Year GPA Among Pre-Service Teachers of Christian Religious Studies

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Abstract

The Unified Tertiary Matriculation Examination and the post-Unified Tertiary Matriculation Examination are placement examinations used to select applicants for admission to tertiary institutions in Nigeria. The study, therefore, used the Unified Tertiary Matriculation Examination and post-Unified Tertiary Matriculation Examination scores as predictors of students' First-year Grade Point Average among pre-service teachers. An ex-post facto research design was adopted. One purpose was raised and transformed into a research hypothesis. The population consisted of Christian Religious Studies undergraduates at the University of Ilorin who were receiving training to become future professional teachers. The target population were 100 Level Christian Religious Studies students in the 2020/2021 academic session. All 113 available students were used as the sample. A proforma was developed to collect scores for the 3 variables used in this study. Multiple regression analysis was employed to test the hypothesis raised. The findings revealed that Unified Tertiary Matriculation Examination and post-Unified Tertiary Matriculation Examination scores are good predictors of First-year Grade Point Average. It was therefore concluded that the Unified Tertiary Matriculation Examination and post- Unified Tertiary Matriculation Examination are fair test instruments that could be relied upon to ascertain examinees' ability, guaranteeing students' admission into any Nigerian tertiary institution . Hence, it was recommended that the Joint Admission

Matriculation Board, being the organ responsible for the Unified Tertiary Matriculation Examination, and the University that conducts the post-Unified Tertiary Matriculation Examination should vigorously monitor the use of these instruments to serve the purpose they are meant for.

Keywords: *Christian Religious Studies, First-year Grade Point Average, Predictors, Pre-service Teacher Post-Unified Tertiary Matriculation Examination Scores, Unified Tertiary Matriculation Examination*

Introduction

The entrance examinations in Nigeria, such as Unified Tertiary Matriculation Examination (UMTE) and post-Unified Tertiary Matriculation Examination (Post-UMTE), are used for the selection of applicants into tertiary institutions. The UTME and post-UTME are placement tests used to assess candidates' future academic readiness and to inform decisions regarding educational advancement after completion of senior secondary education. The degree to which a candidate succeeds at one stage is a good indication of how far they can go in their schooling.

One variable of interest in this study is the UTME administered by the Joint Admissions and Matriculation Board (JAMB). It is a statutory function of JAMB to ensure a uniform standard for the conduct of matriculation examinations and placement of suitable candidates into Nigerian tertiary institutions. The board started its operations in 1978. The policy was amended to include universities, monotechnics, polytechnics, and Colleges of Education in the conduct of this placement examination (Kennedy & Ebuwa, 2020). The board works with other academic bodies to develop requirements, such as five credits in relevant subjects, to ensure that candidates are prepared for the careers they intend to pursue at any tertiary institution in Nigeria. The board is engaged in collaborative efforts with tertiary institutions to prepare a brochure that provides essential information on all courses offered by these institutions. The board is responsible for the collection and dissemination of information on all matters related to admission to tertiary institutions in Nigeria (Kennedy & Ebuwa, 2020).

Another variable of interest in this study is the post-Unified Tertiary Matriculation Examination (post-UTME). The Post-Unified Tertiary Matriculation Examination was introduced in 2005 by the University of Ibadan. It is an aptitude test conducted by various tertiary institutions in Nigeria to place student in the appropriate course of study based on their academic ability. It is used as an instrument to screen candidates seeking

admission who have scored at least 180 in the UTME. It is the norm in Nigerian tertiary institutions to use the post-UTME test to screen candidates for admission; thus, it becomes one of the entry requirements into all higher institutions of learning in Nigeria (Munkaila, 2017).

The underlying reasons for the introduction of post-UTME are many. The first reason was that the Joint Admissions and Matriculation Board (JAMB) made questionable admissions offers to some candidates, who could not defend them after the first year of their academic pursuit at the institution. The above reason provided insight into the flashbacks to the certificates these candidates claimed to have. Examples of such certificates include the West African Senior School Certificate Examinations (WASSCE), the National Examinations Council (NECO), and the National Business and Technical Examinations Board (NABTEB). It was therefore discovered that there were large-scale examination malpractice and other fraudulent activities, which were reported in Nigerian daily Newspapers (Munkaila, 2017; Sheyin *et al.*, 2021).

The last variable of interest in this study is the Grade Point Average (GPA). This concept is being used in tertiary institutions in Nigeria and beyond. It is a means of evaluating students' academic proficiency from the first day to the last day of their academic pursuit. Grade Point Average (GPA) is computed every semester to show the average performance of a student based on the total points students earn and obtain in cumulative semesters. It is the sum of all examination grade points across all courses offered during a student's studies at an academic institution (Yogendra & Andrew, 2017). The researchers therefore intend to investigate whether the UTME and post-UTME can predict future learning outcomes, such as GPA, at a Nigerian university.

Several studies have explored prediction in academic performance. Kolawole *et al.* (2011) examined cognitive entry points as predictors of students' performance in Chemistry across selected Nigerian universities. Their findings showed weak correlations between SSCE, UTME, and post-UTME and students' performance across all sampled university levels. However, the CGPA of 200-level students had the strongest association with post-UTME scores, followed by 100- and 300-level students, whereas 400-level students had the weakest association.

Igwe and Adikwu (2012) examined the predictive validity of UME on university students' performance. The finding revealed a significant relationship between UME scores, post-UME aptitude tests, and academic performance. Similarly, Ikoghode (2015) assessed the relevance of the post-UTME alongside the UTME for students' academic activities. It revealed that

post-UTME mean scores were lower than UTME scores, suggesting that post-UTME is unnecessary and unfair due to inconsistencies in testing standards. Oluwatayo and Fajobi (2015) examined post-UTME as a screening tool and found a positive correlation between post-UTME scores and CGPA in Mathematics/Computer Science. The strongest predictive validity was observed at the 100 level (0.67), with lower levels indicating less predictive validity, suggesting that the post-UTME is most effective in predicting first-year performance.

Popoola (2016) investigated the credibility of UME scores for admission into Nigerian tertiary institutions and found a significant relationship between UME scores and First Year Grade Point Average (FGPA), establishing UME as a strong predictor of academic success at the Federal University of Technology, Yola.

Afu and Ukofia (2017) examined the predictive validity of WASSCE and NECO results on 100-level students' CGPA at the University of Abuja. WASSCE results showed a moderate correlation for English and the Education Department in 2008/2009, but a negative correlation for all departments in 2009/2010 and 2010/2011. NECO results similarly showed a moderate correlation only in the English department in 2008/2009, with negative correlations across the other departments across the sessions.

Odukoya *et al.* (2018) examined the predictive validity of UTME across nine academic sessions (2005/2006 to 2013/2014) and found that, although UTME had a positive predictive value, its predictive validity was generally low. Kennedy and Ebuwa (2020) assessed UTME and post-UTME as predictors of undergraduate final-year grades, concluding that neither significantly predicted students' final performance. Similarly, Aremu *et al.* (2020) *investigated the predictive validity of the UTME at the University of Ibadan and found that UTME scores did not reliably predict academic performance among 100-level students.* Sheyin *et al.* (2021) explored the relationship between post-UTME scores and students' academic performance at Tai Solarin University of Education, Ogun State. Their findings revealed a significant correlation between post-UTME results and students' academic performance, as well as a notable difference between UTME and post-UTME scores.

Etaga *et al.* (2020) found that candidates' JAMB scores did not reflect their actual ability. A weak relationship was observed between candidates' JAMB scores and their corresponding PUTME scores. Gwani *et al.* (2024) found a weak positive correlation among the JAMB Scores, 'O' Level results, and communication skills on post-UTME examinations. It showed that JAMB

scores, 'O' level results, and communication skills together explain only 18.4% of the variance in post-UTME scores. Akindele (2024) reported a significant difference between students' UME scores and their post-UTME screening test scores. The study also showed a statistically significant difference in the academic performance of male and female students admitted to Tai Solarin University of Education through the post-UTME screening test.

This study was motivated by lecturers who argued that students with high UTME scores should, in theory, possess the academic strength for undergraduate studies. However, many struggle to meet academic standards, leading to low grades, a change of course, extended studentship periods, or university dropout. Given these concerns, the researchers aimed to investigate whether UTME and post-UTME scores could predict the academic performance (GPA) of undergraduate students of Christian Religious Studies at the University of Ilorin.

Purpose of the Study

The study examined entrance examinations (Unified Tertiary Matriculation Examination and post-Unified Tertiary Matriculation Examination scores) as significant predictors of First-year Grade Point Average of Pre-service Christian Religious Studies in Teachers Programme, University at Ilorin, Nigeria.

Research Hypothesis

Null Hypothesis: Unified Tertiary Matriculation Examination and post-UTME scores do not significantly predict the First-year Grade Point Average of pre-service undergraduates in Christian Religious Studies at the University of Ilorin, Nigeria.

Methodology

An ex post facto research design was adopted because the data were already available in the field without manipulation. The population of this study comprised all pre-service CRS teachers at levels 100-400 in the Faculty of Education, University of Ilorin, Ilorin, Nigeria. The target population was 100 pre-service CRS teachers for the 2020/2021 academic session. The choice of the 100 level is attributed to the avoidance of extraneous variables that might have affected or influenced the learning activities of the sampled students.

At the time of this report, there were 113 CRS students at the 100-level, and all were in use. The research instrument was a researcher-developed pro forma used to collect UTME, post-UTME, and first-year GPA scores from students' files, with permission from the Head of the Department and the level adviser.

The set of scores from the UTME and post-UTME was treated as the independent variable, while the first-year GPA was the dependent variable.

It must be noted that the scores obtained from the UTME, post-UTME and first-year CGPA) were not in the same unit. Therefore, the score set was converted to a percentage to ensure a standard unit. Originally, post-UTME scores were in 100%. UTME Scores were based on a 400% scale, and an individual student's scores were divided by 4 to obtain a maximum of 100%. Furthermore, first-year GPAs were on a five-point scale (i.e., E = 1, D = 2, C = 3, B = 4, and A = 5) and were converted to percentages by multiplying the scores by 5 to obtain a maximum of 100% before analysis. One research purpose was articulated as a research hypothesis and tested using multiple regression at the 0.05 significance level.

Results

The data set was subjected to linear regression analysis using SPSS 26 to test hypotheses postulated, and outputs are reported preceding tables.

H₀₁: Unified Tertiary Matriculation Examination and post-Unified Tertiary Matriculation Examination scores cannot significantly predict the First-year Grade Point Average of pre-service undergraduates in Christian Religious Studies, University of Ilorin, Nigeria.

To test this hypothesis, scores obtained from UTME and post-UTME were used as predictors of first-year GPA of undergraduates in Christian Religious Studies at the University of Ilorin, Nigeria.

Table 1:

Regression Analysis Report on Entrance Examinations as Predictors of First-year Grade Point Average

	Sum of Squares	df	Mean Square	F	Sig.	Inference
Regression	128.812	2	64.406			
Residual	24.642	111	0.222	290.117	0.000	S
Total	153.000	113	-	-	-	

P < 0.05

Table 1 presents the results of the linear regression, which predicts first-year GPA scores (Dependent variable) from UTME and post-UTME scores (independent variables). The output indicates that the calculated p-value (0.000) is less than the chosen level of significance (0.05). Hence, the hypothesis is rejected. This implies that UTME and post-UTME scores are strong predictors of undergraduate CRS students' first-year GPA at the University of Ilorin ($F(2, 111) = 290.117, p < 0.05$). To ascertain the

contribution of UTME and post-UTME scores, the beta weights were computed, and the results are reported in Table 2. This analysis, therefore, provides strong evidence that entrance examination scores significantly influence first-year GPA.

Table 2:
Model Summary of the Independent Variables

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	R Square Change
1	0.917	0.842	0.839	0.472	0.842

Table 2 shows the combined contribution of the two independent variables. The R-Square reveals 0.842 (84.2%) for the dependent variable. To ascertain the contribution of each of the independent variables to the model, Beta weight and t-test were computed, and outputs are reported in Table 3.

Table 3:
Contributions of Unified Tertiary Matriculation Examination and Post-Unified Tertiary Matriculation Examination to First-year Grade Point Average

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Variables	B	Std. Error	Beta		
(Constant)	0.217	-	-	-	-
UTME	0.020	0.003	0.574	6.67	0.000
POST_UTME	0.047	0.005	0.691	9.44	0.000

Table 3 reveals the Beta weights and the t-values of the independent variables (Unified Tertiary Matriculation Examination and Post-Unified Tertiary Matriculation Examination to First-year Grade Point Average). An examination of the Beta weights and the t-values in Table 3 indicates that the Unified Tertiary Matriculation Examination contributes a Beta weight of 0.574 and the t-value of 6.67, while the Post-Unified Tertiary Matriculation Examination variable contributes a Beta weight of 0.691 and the t-value of 9.44. This implies that the Post-Unified Tertiary Matriculation Examination is the most predictive of the First-year Grade Point Average, followed by the Unified Tertiary Matriculation Examination variable. The multiple regression equation shows thus:

Regression Equation ($Y = a + b_1X_1 + b_2X_2$)

Substitutes the equation from the table ($Y = 0.217 + 0.574X_1 + 0.691X_2$)

Discussion

The finding revealed substantial evidence that entrance examination scores (Unified Tertiary Matriculation Examination and post-Unified Tertiary

Matriculation Examination) significantly predicted the first-year GPA of pre-service undergraduates in Christian Religious Studies at the University of Ilorin, Nigeria. The R-squared value of 84.20% indicates a strong and positive relationship between entrance examinations and first-year GPA.

This finding is attributable to the fact that the test items in the two entrance instruments were generated from the same academic curriculum. The finding is also attributable to the fact that the items in the GPA were curriculum-based, as corroborated by Afu and Ukofia (2017). The present finding is consistent with that of Odukoya *et al.* (2018). They found that UTME had positive predictive validity over academic performance. The present finding also accords with Popoola's (2016) finding. He found a significant positive relationship between UME scores and First-Year Grade Point Average (FGPA). It implies that UME is a good predictor of students' academic achievement at the Federal University of Technology, Yola. The present finding supports the finding of Sheyin *et al.* (2021) that there is a significant relationship between students' post-UTME scores and their academic performance in the university. This finding also concurs with Oluwatayo and Fajobi (2015), who investigated the validity of post-UTME as a screening instrument for selecting candidates for degree programmes in Nigerian universities. They found correlations between post-UTME scores and CGPA in Mathematics/Computer Science at the 100 level (0.67), 200 level (0.38), 300 level (0.31), and 400 level (0.22). Furthermore, the finding contradicts that of Gwani *et al.* (2024). They found a weak positive correlation among the JAMB Scores, O-Level results, and communication skills on post-UTME examinations. Their findings showed that JAMB scores, 'O' level results, and communication skills together explain only 18.4% of the variance in post-UTME scores.

In the same vein, the present finding disagrees with that of Aremu *et al.* (2020). Their results showed that the UTME could not predict students' academic performance. This finding agrees with Kolawole *et al.* (2011), who found a lowly significant relationship between the post-UTME and students' academic performance in Chemistry. In the same vein, the present finding differs from Kennedy and Ebuwa's (2020) findings. They found that UTME and post-UTME scores did not significantly predict undergraduate final grades at the University of Nigeria. They remarked that post-UTME is unnecessary and unfair since the two tests are not of the same standard. The finding is contrary to that of Etaga *et al.* (2020). They found that candidates' JAMB scores did not accurately reflect their actual ability. They also found a weak relationship between candidates' JAMB scores and their corresponding PUTME scores.

Akindele (2024) reported a significant difference between students' UME scores and their post-UTME screening test scores.

Conclusion

This study provides evidence that Unified Tertiary Matriculation Examination (UTME) and post-UTME scores are significant predictors of first-year Grade Point Average (GPA) among undergraduate pre-service teachers studying Christian Religious Studies. The findings suggest that these assessments can be used as valid instruments to evaluate examinees' academic ability and proficiency. Notably, the influence of extraneous variables, such as campus activities, appears minimal, underscoring the utility of UTME and post-UTME scores in predicting academic performance in the early stages of undergraduate studies.

Recommendations

Based on the findings, it is therefore recommended as follows:

- i) The conduct of these (UTME and post-UTME) tests should be monitored very well to solidify the laid-down objectives.
- ii) Post-UTME aptitude tests should be a moderating factor in determining the cognitive readiness of students in gaining admission to tertiary institutions in Nigeria
- iii) There is a need for the JAMB as a statutory body responsible for the conduct of UTME to judiciously carry out content validity of test items with a view to ensuring that the test reflects the skills and competencies required for learning activities in tertiary institutions.
- iv) The use of post-UTME in the university should be sustained. However, its content should be improved by involving subject experts, academic researchers, and curriculum developers to reflect the skills emphasised in each course for which it is applied.
- v) Universities conducting Post-UTME should uphold their integrity by making sure that all their examinations are administered in an atmosphere that does not compromise the standard of the institution.

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Examining Leadership and Management of Digital Student Services in Higher Learning Institutions: A Case of the Open University of Tanzania

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Abstract

This study examined students' experiences with Digital Student Services (DSS) and explored the leadership strategies used by staff responsible for day-to-day management of these services at the Open University of Tanzania (OUT), focusing on one regional centre. Using a mixed-methods approach, data were collected from 300 students via structured questionnaires and from five key staff members via semi-structured interviews. Quantitative data were analysed using descriptive statistics, while qualitative data underwent thematic analysis. Findings revealed that students frequently interacted with multiple digital platforms, including Moodle, SARIS, and ARMIS, indicating widespread adoption of DSS. However, variations in usage patterns highlighted inconsistencies in accessibility, user experience, and system responsiveness. Students noted challenges, including delayed updates, limited technical support, and interoperability issues with the platform. On the leadership side, the study found that staff employed several adaptive strategies, including proactive technical support, decentralisation of ICT personnel, and training initiatives to improve system functionality and user competence. These strategies aligned with distributed leadership theory and emphasised collaborative problem-solving and resource allocation. The study concludes that while OUT has made significant strides in digital service provision, gaps in system integration and responsiveness remain. It recommends strengthening inter-platform interoperability, increasing user support services, and enhancing staff capacity through continuous professional development. Overall, the findings contribute to ongoing efforts to improve the governance and delivery of digital student services in open and distance learning contexts.

Keywords: Digital Student Services (DSS), Leadership and Management, Higher Learning Institutions (HLIs), Open and Distance Learning (ODL), Student Experience, Operational Leadership, Resource-Constrained Contexts

Introduction

The global higher education landscape is undergoing unprecedented digital transformation, largely driven by rapid technological innovation and evolving demands for accessible, student-centred learning (Aithal & Maiya, 2023; Bakar, 2021). This accelerating pace necessitates technological upgrades and decisive leadership, and adaptive management within higher learning institutions. Institutional leaders are now expected to develop innovative governance frameworks that align educational delivery with contemporary technological demands, ensuring broad accessibility to both academic resources and administrative services (Adole, 2024). A critical component of this transformation is the implementation of Digital Student Services (DSS), integrated platforms that support functions such as admissions, registration, learning management, communication, and student support. DSS have become central to enhancing institutional competitiveness, boosting student engagement, and improving academic success (Levin, 2024; Salhab & Daher, 2023). According to Syed *et al.* (2021), institutions that fail to deliver substantive value through digital integration risk operational inefficiency and eventual obsolescence.

The imperative for digital transformation is particularly significant for Open and Distance Learning (ODL) institutions such as the Open University of Tanzania (OUT). Given their dispersed student populations and commitment to accessibility, ODL models inherently rely on vigorous DSS to overcome geographical limitations and support non-traditional learners (Levin, 2024; Munna & Kalam, 2021). For the OUT in particular, DSS functions as the primary institutional interface for students, making their efficacy fundamental to the university's mission fulfilment (Taliento, 2022). In such contexts, digital infrastructure is not a supplementary element but a foundational pillar of educational service delivery. These demands are deliberate and integration of technology to optimise pedagogical outcomes and maintain relevance in a rapidly digitising educational landscape (Schmidt & Tang, 2020). Further, it is argued that advances in digital technology have created opportunities to deliver education and training through various modes, including distance and open learning (Ndibalema, 2025).

Despite the global shift toward digital education, higher education institutions in resource-constrained African contexts, such as Tanzania, face significant challenges in implementing DSS. Among the most pressing are infrastructural deficits, including unreliable internet connectivity, inconsistent electricity supply, and inadequate access to essential hardware, particularly in rural regions (Sotery, 2023; Nsama *et al.*, 202). Additionally, digital literacy gaps persist among both students and staff, leading to uneven usage and competence (Ndibalema, 2025; Barasa, 2021). Fragmented user experiences, often the

result of poorly designed or unintuitive digital platforms, further hinder effective engagement (Hameed *et al.*, 2025). Compounding these issues results in disconnected services and hinders data flow, reducing the efficiency and coherence of student service delivery (Yusuf & Ibrahim, 2024). Finally, sustainability remains a critical concern, as many institutions face financial constraints that limit their ability to scale and maintain digital service initiatives (Mohamed *et al.*, 2022).

To overcome the multifaceted challenges associated with digital student services (DSS), effective leadership and management are essential. Institutional leaders must navigate complex socio-technical environments by articulating clear digital visions, cultivating adaptive institutional cultures, and strategically allocating limited resources (Thomas, 2024). Adopting flexible strategies and transformation models, such as the Higher Education Digital Capability (HEDC) Framework, can facilitate the development of inclusive, student-centred digital ecosystems (Ahmad, 2024). Despite growing interest in digital governance, three key research gaps remain, particularly within the context of African open and distance learning (ODL) institutions. First, there is a contextual gap, as most existing studies focus on traditional universities in the Global North and provide limited empirical evidence from African ODL settings, such as the Open University of Tanzania (Mtombeni, 2020). Second, an operational leadership gap persists in which research tends to emphasise top university management while overlooking the practical strategies used by mid-level staff at the grassroots who are directly involved in day-to-day DSS management. Third, there is a disconnect in perspective, as student experiences, despite being central to service effectiveness, are rarely incorporated into leadership and management discourse. This study sought to address these gaps by (1) assessing students lived experiences with DSS and (2) exploring the leadership strategies employed by frontline administrative staff responsible for managing these services at OUT.

The Open University of Tanzania

This study positions itself to address these gaps by focusing on The Open University of Tanzania, Tanzania's flagship ODL institution, within the broader context of pan-African DSS implementation challenges. Based on enrolment statistics, the OUT is one of the largest institutions of higher learning in Tanzania. It serves a diverse and substantial student population across multiple academic levels. The university had an estimated total of 80,533 students on the record by June 2024. Among the active students who registered in 2023/2024, 16,885 were registered, leaving 63,648 unregistered. Additionally, the institution offers a comprehensive array of 133 academic programmes, underscoring its significant role in shaping Tanzania's higher education sector. Notably, the university's reach extends across 30 operational

centres in the United Republic of Tanzania. There are also institutions outside the country which assist in coordinating university activities in those countries; these include centres in Kenya, Uganda, Namibia, Ethiopia and Ghana (OUT, 2024).

Digital Student Services at the Open University of Tanzania

The OUT has established an integrated digital ecosystem to support its geographically dispersed student population (Tsindoli, 2025). Central to this infrastructure is Moodle, the university's e-learning platform, which facilitates online course delivery, discussions, assignment submissions, seminars, and access to lecture materials. Complementing this are mission-critical administrative systems, including the Student Academic Record Information System (SARIS) and the Academic and Registration Management Information System (ARMIS) for academic records; the Online Registration and Examination System (OREX) for exam scheduling and results; the E-Application for admissions; and dedicated email services for institutional communication.

Students further leverage mobile accessibility (via the OUTLeMs Android and Moodle Mobile iOS apps), online library resources, and specialised portals like the Postgraduate Information Management System (PGIMS) and HIV/AIDS information platforms. Institutional support is coordinated through the Institute of Educational and Management Technologies (IEMT), which provides ICT troubleshooting, network management and system maintenance. Collectively, these services represent OUT's strategic commitment to digital transformation in open and distance learning (ODL). However, their effectiveness hinges on consistent leadership oversight and adaptive management, particularly during high-demand periods such as examinations, when system reliability and user experience are paramount.

Learning at the Open University of Tanzania

The OUT anchors its operations with a vision of becoming a leading open online University in knowledge creation and application. Its mission is to deliver relevant, high-quality, flexible, accessible, and affordable open online education, research, and services for Tanzania's socioeconomic development and global impact. To operationalise these goals, the university employs a blended learning model integrating Asynchronous self-paced learning (printed modules, Moodle-based e-learning resources), synchronous engagements (Zoom-based virtual lectures/physical tutorials), and collaborative forums (regionally diverse student discussion groups via Zoom or in-person). This pedagogical framework prioritises learner agency, allowing students to customise their educational pathways while ensuring comprehensive course coverage through digitally archived lectures. Moodle,

OUT's open-source Learning Management System (LMS), serves as the central hub for resource distribution, assessment, and multimodal interaction. This study investigates students' experiences with digital student services (DSS) during high-stakes examinations held in June 2025, alongside the operational leadership strategies employed by key frontline administrators, namely DRCs, IT Officers, and Admission Officers. In doing so, it addresses the previously outlined tripartite research gap by integrating student perspectives, operational realities, and contextual relevance. Additionally, the study seeks to model sustainable educational management by examining how inputs, processes, and outputs are overseen in DSS implementation (Iwogbe *et al.*, 2020). This dual focus advances both theoretical understanding and the practical application of digital transformation in open and distance learning (ODL) contexts, particularly in resource-limited settings.

National Policy Context

Tanzania's National Digital Education Strategy (2024/25–2029/30) underscores a transformation of HLIs, emphasising institutional digitisation, the adoption of blended learning, and administrative efficiency (URT, 2024). Anchored by the Tanzania Commission for Universities' (TCU) 2022 Guidelines for Online and Blended Delivery Modes, the strategy prioritises scalable digital content development and ICT programme expansion, evidenced by 161 accredited ICT courses and a fourfold increase in ICT graduates since 2016. Complementing this, the National ICT Policy (URT, 2023) mandates the integration of digital skills into formal education and the deployment of ICT solutions across teaching, learning, and administrative functions (URT, 2023). The OUT, as a pioneer of distance learning, operationalises these national directives through its digital student services (DSS), including Moodle-based e-learning, OREX exam management, and SARIS and ARMIS academic records. This study directly interrogates the implementation efficacy of these policies at OUT. By evaluating leadership strategies, institutional preparedness, and student experiences in DSS delivery, the research addresses a critical gap: whether national digitisation aspirations translate into equitable, well-managed services. Findings will reveal how OUT's practices align with (or diverge from) TCU's blended learning guidelines and the ICT Policy's emphasis on the effective use of technology, providing evidence to refine Tanzania's HLI accountability frameworks.

Methodology

Research Philosophy and Approach

The study adopts a pragmatic research philosophy, prioritising the research problem and enabling the use of methods best suited to address each specific objective. Consequently, a mixed-method approach was employed. Quantitative data (mainly addressing objective 1) and qualitative data

(addressing objective 2) were collected concurrently during the June 2025 annual examination period at the Dodoma Regional Centre. These datasets were analysed separately and their findings subsequently integrated during the interpretation phase to provide a comprehensive understanding of the interplay between student experiences and leadership/management practices.

Cite selection and justification

Dodoma Regional Centre was selected as the site for this case study for several reasons. Methodologically, as the third-largest centre by enrolment (768 undergraduates in 2023/24), it provides a sufficiently large population for robust quantitative sampling and enhances the potential generalizability of the findings. In practice, the concentration of students during the June 2025 examination period enabled feasible data collection. Furthermore, its location in Tanzania's capital city marks it as a strategic and symbolically important site, likely to be at the forefront of digital service implementation. This combination of factors ensures the research is both methodologically sound and contextually relevant. Furthermore, selecting a single regional centre is a deliberate, methodologically sound choice aligned with the principles of qualitative and mixed-methods case study research, as described by Guetterman and Fetters (2018).

Study Population and Sampling

The study targets two distinct populations integral to DSS at the Dodoma Centre. The first population comprises students registered to sit for their annual examinations at the Dodoma Regional Centre in June 2025. A stratified random sampling technique was used for this group. Students were stratified by their programme to ensure representation across the academic offerings. A random sample was then drawn from each stratum, aiming for a target sample size of approximately 300-350 students. This size balances feasibility during the exam period, expected response rates, and the need for vigorous quantitative analysis. The second population consisted of administrative staff holding direct responsibility for the day-to-day leadership and management of DSS at the Dodoma Centre. This includes the Director of the Regional Centre (DRC), IT Officers, and Admission Officers, as they are pivotal in overseeing core digital services. Purposive sampling was used to identify and recruit these key informants, targeting approximately 5 participants to ensure a saturation of perspectives on leadership strategies and management challenges.

Data Collection Methods

The questionnaire used in this study was structured into three parts. The first part collected demographic information from respondents, including variables such as age, year of study, programme of study, and ratings of digital literacy. The second part focused on respondents' use and experiences with digital

student services and included closed-ended items designed to capture the frequency and patterns of use. The final part of the questionnaire included open-ended questions that allowed respondents to offer more detailed, personal reflections on their challenges and suggestions for digital services. The questionnaires were distributed in person at the Dodoma regional centre during the June 2025 examination period, leveraging the concentration of students in designated areas before and after exam sessions. Objective 2 (Explore Leadership Strategies) was addressed through semi-structured interviews with the purposively sampled administrative staff. An interview guide with open-ended questions and probes facilitated in-depth discussions covering themes such as roles and responsibilities, perceived strengths and weaknesses of current DSS, strategic vision and planning, decision-making processes, resource management, staff training, student communication and feedback mechanisms, challenges faced, and strategies for improvement and future development. These interviews were conducted face-to-face during the physical visits to every respondent, and respondents were met in their natural settings (i.e., offices) while exercising their duties. The interviews typically lasted between 30 and 45 minutes.

Data Analysis

Data analysis reflected the mixed-method approach. Quantitative data from the student questionnaires were cleaned, coded, and analysed using SPSS software. Descriptive statistics, particularly frequencies and percentages, were summarised for student demographics and their experiences across various DSS dimensions. Qualitative responses from the open-ended section were analysed thematically. Qualitative data from the staff interviews were transcribed verbatim. Thematic analysis, following the steps outlined by Braun and Clarke (familiarisation, generating initial codes, searching for themes, reviewing themes, defining/naming themes, producing the report) (Braun & Clarke, 2022), was applied to identify key patterns, strategies, challenges, and insights related to DSS leadership and management. This involved comparing, contrasting, and synthesising the quantitative patterns of student experience with qualitative insights into leadership strategies and management contexts to develop a holistic understanding addressing the overarching research aim.

Validity, Reliability, and Trustworthiness

Rigour in this study was ensured through a combination of methodological and procedural strategies appropriate to the quantitative and qualitative components. For the quantitative strand, the questionnaire's content validity was established through a careful review of relevant literature, ensuring that the instrument adequately captured key constructs related to digital student services. In the qualitative component, trustworthiness was addressed using multiple strategies. Credibility was enhanced through prolonged engagement

during data collection, the potential use of member checking with key staff informants, and triangulation by comparing staff perspectives with student data to verify consistency and depth of understanding. Transferability was supported by providing detailed, context-rich descriptions of the research setting, participants, and procedures, enabling readers to assess the applicability of the findings to similar contexts. Confirmability was strengthened by the researcher's reflexivity, particularly in acknowledging positionality as an OUT-staff member, and by peer debriefing sessions that challenged interpretations and supported analytical transparency. Importantly, the use of a mixed-method design further enhanced the study's validity by enabling methodological triangulation.

Ethical Considerations

The study strictly adhered to ethical principles. A research clearance letter for data collection was obtained from the Open University of Tanzania on May 26, 2025, with the reference number OUT/DRPI/Staff No. 70/2025. Informed written consent was obtained from all participants (students and staff) after a clear explanation of the research purpose, procedures, potential risks/benefits, confidentiality measures, and their right to withdraw at any time without penalty. Confidentiality and anonymity are paramount: student questionnaires were anonymous and collected no personally identifiable information. Staff interview data was anonymised during transcription and reporting, using codes or pseudonyms instead of real names or specific titles where necessary to protect identities; all raw data (transcripts and questionnaires) was stored securely on password-protected and encrypted devices. Data was used solely for this research and potential academic publication. Care was taken to minimise disruption to students during their critical examination period.

Limitations

The study acknowledges some limitations. As the study focused on one Regional Centre during a specific timeframe (June 2025), the findings possess highly contextual richness but limited generalisability to other Higher Learning Institutions (HLIs) or even other OUT centres without further research; however, the insights were valuable for similar contexts. The data represents a snapshot in time, and DSS experiences or leadership strategies may evolve. Both data sources rely on self-reported information (student perceptions, staff perspectives), which may be subject to recall or social desirability bias. The researcher's position as an OUT-staff member introduces potential positionality bias, mitigated through reflexivity, rigorous methodology, and triangulation. While the purposive staff sample aims for depth and saturation, its small size limits the broad generalisation of leadership perspectives.

Findings And Discussion

This section presents and discusses the findings of the study about the two specific objectives: (1) to assess students' experiences with digital student services (DSS) at the Open University of Tanzania, and (2) to explore leadership strategies employed by staff responsible for the day-to-day management of DSS. The presentation begins with the respondents' demographic characteristics, followed by an integrated discussion of the quantitative and qualitative findings, interpreted in light of relevant literature.

Demographic Characteristics of Respondents

A total of 300 students at the Open University of Tanzania (OUT) completed the Digital Student Services Survey. Table 1 summarises the demographic characteristics of the respondents, including their programme of study, year of study, age range, and self-reported digital literacy.

Table 1:
Frequency Distribution of Student Characteristics (n = 300)

Variable	Category	Frequency	Percent
Programme of Study	Foundation	44	14.7
	Certificate	9	3
	Diploma	50	16.7
	Bachelor	165	55
	Masters	28	9.3
	PhD	4	1.3
Year of Study	Year 1	94	31.3
	Year 2	114	38
	Year 3	63	21
	Year 4+	29	9.7
Age Range	18–25	35	11.7
	26–35	124	41.3
	36–45	101	33.7
	46+	40	13.3
Digital Literacy	Beginner	83	27.7
	Intermediate	125	41.7
	Advanced	92	30.7

The demographic profile of the survey respondents provides critical insights into the student population engaging with the OUT's digital student services, informing leadership and management strategies for these services. As shown in Table 1, a majority of the respondents were Bachelor's students (55.0%), with a significant proportion in their second year of study (38.0%). This indicates that digital student services, such as Moodle, SARIS, and ARMIS,

must be designed primarily to support undergraduate learners at the early to middle stages of their academic journey. This pattern likely reflects broader enrolment trends in open and distance learning (ODL) institutions, where undergraduate programmes account for the bulk of student enrolments (Carvalhoes *et al.*, 2023).

The age distribution of respondents, 41.3% aged 26–35 and 33.7% aged 36–45, indicates a predominantly mature student population, likely consisting of working adults balancing professional, academic, and family responsibilities (Smith, 2023). This demographic tends to value flexibility and convenience, making accessible digital services essential. Features such as 24/7 access to course materials, online examination registration, and streamlined fee payment systems are especially critical for supporting their learning needs in an open and distance learning (ODL) environment.

The distribution of digital literacy levels, 27.7% of students identifying as beginners and 41.7% as having intermediate skills, reveals that a substantial segment of the student population may face difficulties navigating complex digital platforms. This presents a leadership and management challenge in designing digital student services that are both user-friendly and inclusive for individuals with limited technical proficiency (Madhubhashini, 2022). For instance, platforms such as the student portal may require simplified interfaces and the integration of targeted training resources to support these users effectively.

Findings on Students' Experience with Digital Student Services

This section presents findings related to the first objective of the study, which was to assess students' experiences with digital student services (DSS) at the Open University of Tanzania. To address this objective, students responded to four key areas: (i) identifying the digital services they used during the current academic year, (ii) indicating their level of agreement with statements concerning the quality and effectiveness of these services, (iii) outlining the main challenges they encountered when accessing or using DSS, and (iv) suggesting possible solutions to improve digital service delivery at the university.

The analysis captures students' interactions with key platforms, including Moodle, SARIS, ARMIS, and the university's student portal. These services included student registration, examination registration, fee payment, access to course materials, and viewing of academic results. The responses provide a comprehensive overview of the university's digital service infrastructure, including its strengths and limitations. The summary of these findings is presented in Table 2.

Table 2:
Usage of Digital Student Services (N = 298)

Digital Service	Responses (N)	Per cent of Responses	Per cent of Cases
Course registration	219	19.5	73.5%
Exam registration	241	21.4	80.9%
Fee payment	210	18.7	70.5%
Accessing course materials	260	23.1	87.2%
Checking results	194	17.3	65.1%
Total	1124	100.0	377.2%

The data in Table 2 indicates that accessing course materials was the most frequently used digital service, with 260 responses (23.1%) and 87.2% of students reporting usage. This was followed by exam registration (241 responses; 21.4%) and course (studentship) registration (219 responses; 19.5%), used by 80.9% and 73.5% of respondents, respectively. Fee payment services were accessed by 70.5% of students, while checking results was the least used service, accounting for just 17.3% of responses and 65.1% of respondents.

These findings underscore a strong reliance by students on digital platforms for core academic processes, particularly access to learning resources and registration services, which aligns with the central role of these functions in open and distance learning (ODL) settings (Alenezi, 2024; Mejeh & Rehm, 2024). The predominance of course material access suggests that students view the digital ecosystem as integral to their academic success, reinforcing arguments by Chen and Wen (2024) that effective digital content delivery remains the backbone of learner support in ODL institutions.

However, the relatively low use of digital platforms for fee payments and checking academic results raises questions about the accessibility, usability, and perceived reliability of these services. As noted by Al-Mamary (2022), low engagement with administrative digital services often signals challenges in system design, a lack of user orientation, or the presence of alternative service channels outside the digital system. At the Open University of Tanzania, some students may still rely on offline methods for fee payments (e.g., bank deposits or mobile money) or access academic results through informal communication channels, reducing the perceived need to use official digital portals.

Moreover, the high usage rates of exam registration (80.9%) and student registration (73.5%) highlight that administrative functions are a substantial part of students' digital interactions. This affirms previous studies by Sule (2024), who argues that well-functioning academic registration systems are critical to student satisfaction and institutional credibility. These services, especially when accessed by large cohorts during peak periods, require robust

infrastructure, user-friendly interfaces, and timely support mechanisms to reduce system errors and delays (Cuéllar *et al.*, 2025).

The comparatively lower engagement with fee payment (70.5%) and result-checking services (65.1%) may also reflect structural barriers, such as limited digital literacy, connectivity issues, or irregular service updates. As highlighted by Madhubhashini (2022), ensuring the usability of student portals for all proficiency levels is essential in preventing digital exclusion. Leadership must therefore adopt a student-centred approach to service design, incorporating regular feedback loops, simplified user interfaces, and support tools such as tutorials or live help desks (Gottschalk & Weise, 2023).

These findings have important implications for the leadership and management of digital student services at OUT. The high average usage (3.77 services per student) indicates a strong reliance on multiple platforms, underscoring the need for integrated, interoperable systems. Effective leadership must ensure that platforms such as Moodle, SARIS, and ARMIS work cohesively to streamline the user experience (Ngulube & Ncube, 2025).

The uneven usage across services suggests that management should strategically allocate resources, prioritising improvements in high-demand areas, such as course material access, while addressing barriers in underused services, such as result checking (Ikwuanusi *et al.*, 2022). This requires data-driven decision-making, user feedback mechanisms, and a commitment to inclusive digital design (Chigbu & Makapela, 2025). Ultimately, enhancing digital service delivery at OUT will depend on leadership that is both adaptive and student-centred, capable of aligning technology, institutional priorities, and the realities of distance learners.

Students' Experiences with Digital Student Services

To gain a deeper understanding of how students interact with DSS at the Open University of Tanzania, respondents were asked to share their experiences across a range of service-related dimensions. This included accessibility, user-friendliness, reliability, responsiveness to support systems, and overall satisfaction with the digital platforms used for academic and administrative purposes. The purpose of this inquiry was to assess the extent to which these services meet student needs, especially during critical academic processes such as registration, coursework submission, and examination access. A summary of the responses is presented in Table 3.

Table 3:
Satisfaction with OUT's Digital Services (n = 300)

Statement	Response	Frequency	Percent
Digital services (e.g. registration, exams) are easy to access	Strongly Disagree	10	3.3
	Disagree	24	8
	Neutral	49	16.3
	Agree	114	38
	Strongly Agree	103	34.3
The platforms (website, student portal) are user-friendly and easy to navigate	Strongly Disagree	9	3
	Disagree	23	7.7
	Neutral	59	19.7
	Agree	113	37.7
	Strongly Agree	96	32
Technical support (e.g. helpline, email) is available when I encounter problems.	Strongly Disagree	9	3
	Disagree	46	15.3
	Neutral	79	26.3
	Agree	102	34
	Strongly Agree	63	21
I received timely confirmations after completing transactions (e.g. exam registration, payments)	Strongly Disagree	9	3
	Disagree	25	8.3
	Neutral	56	18.7
	Agree	89	29.7
	Strongly Agree	121	40.3
Overall, I am satisfied with OUT's digital student services.	Strongly Disagree	12	4
	Disagree	29	9.7
	Neutral	51	17
	Agree	102	34
	Strongly Agree	106	35.3

The findings presented in Table 3 offer important insights into students' interactions with the Open University of Tanzania's (OUT) digital student services (DSS), revealing both operational strengths and critical gaps in leadership and service delivery. These insights have implications for improving digital service design, enhancing student engagement, and promoting equitable access in open and distance learning (ODL) environments.

Strengths in Transactional Efficiency and Platform Accessibility

A notable strength emerged in transactional feedback, with 70.0% of students agreeing or strongly agreeing that they received timely confirmations for key processes such as exam registration and fee payment ($M \approx 3.96$). This suggests that OUT has established effective systems for managing routine

administrative functions, contributing to reliability and trust in digital transactions. Such efficiency reflects robust digital leadership and managerial oversight, which are vital in ensuring continuity and credibility of services in ODL institutions (Mapolisa, 2022). According to Suazo-Galdamés and Chaple-Gil (2025), timely feedback mechanisms are foundational for student satisfaction and operational excellence in digital education systems.

Likewise, students reported favourable experiences with system accessibility (72.3% positive, $M \approx 3.92$) and platform user-friendliness (69.7% positive, $M \approx 3.88$). These findings indicate that platforms such as Moodle, SARIS, and ARMIS are generally navigable and support students' academic needs. High usage rates for services such as accessing course materials (87.2%) and exam registration (80.9%) further corroborate these perceptions. As emphasised by Vlasenko *et al.* (2023), intuitive platform design and consistent access are vital for supporting student learning in digital environments. In the context of ODL, where learner autonomy is critical, seamless access to digital tools can enhance student engagement and academic persistence.

However, despite these positive trends, a closer look reveals underlying challenges. For example, 11.3% of respondents expressed dissatisfaction with ease of access, and 10.7% reported that the platforms were not user-friendly. These issues appear to disproportionately affect students with low digital literacy, notably, 27.7% of the sample self-identified as beginners. This subgroup may struggle with platform navigation or complex interface elements, highlighting a digital divide that could undermine inclusive access. As noted by Amjad *et al.* (2024), digital equity in higher education demands that platforms cater to users with diverse levels of technological proficiency. OUT's leadership should therefore consider user-centred design and universal usability principles to ensure that all students, regardless of digital background, can effectively utilise DSS platforms.

Gaps in Technical Support Services

The data show that technical support availability received relatively favourable ratings, with 55.0% of students expressing satisfaction ($M \approx 3.55$), and only 18.3% indicating dissatisfaction. These results suggest that, overall, students perceive OUT's digital support services as adequate, particularly considering the high engagement with digital platforms, with an average of 3.77 services used per respondent. This reflects positively on the university's efforts to maintain essential user support mechanisms within its digital service infrastructure.

However, while the majority expressed satisfaction, the data also indicate room for improvement. A significant proportion of respondents (approximately

27%) neither agreed nor disagreed, possibly reflecting inconsistent experiences with support services. As Yu (2022) highlights, consistent and accessible technical support is vital for student success in digital learning environments, especially for students with limited digital proficiency.

To build on existing strengths, institutional leaders should adopt a proactive approach to support enhancement, focusing on increasing responsiveness, expanding service hours, and offering tiered support for users with different needs. Innovative solutions, such as AI-powered chatbots for routine queries or peer-support forums, as recommended by Malviya and Rajput (2025), could further improve user experience and reduce system bottlenecks. Ensuring dependable technical assistance not only strengthens system usability but also reinforces student confidence and engagement with digital learning tools.

Overall Satisfaction and Implications for Inclusive Leadership

Overall satisfaction with DSS was relatively high, with 69.3% of students reporting a positive experience ($M \approx 3.87$). However, the 13.7% who expressed dissatisfaction suggest that certain service gaps persist. These findings underscore the importance of adaptive and inclusive leadership that can address diverse student needs. A deeper analysis of the demographic data reveals that a large proportion of students fall into mature age groups (41.3% aged 26–35, and 33.7% aged 36–45), who may have different digital expectations or challenges compared to younger cohorts.

Leadership must therefore adopt differentiated management strategies, including targeted digital literacy training for beginners, while also maintaining advanced features for more digitally competent users (30.7% advanced). According to Alenezi *et al.* (2023), a blended, personalised approach to service delivery is essential in digital higher education to enhance relevance and usability for diverse learner groups. Moreover, transformational leadership, as advocated by Assefa and Mujtaba (2025), is important for motivating both staff and students to embrace digital change, while ensuring that support systems are responsive, inclusive, and student-centred.

Challenges With Digital Student Services

The qualitative data from Question 11, in which the respondents were asked to identify the most challenging issue they faced with the OUT digital services. The findings are shown in Figure 1.

Figure 1:
Most Challenging Issues with Digital Student Services (N = 300)

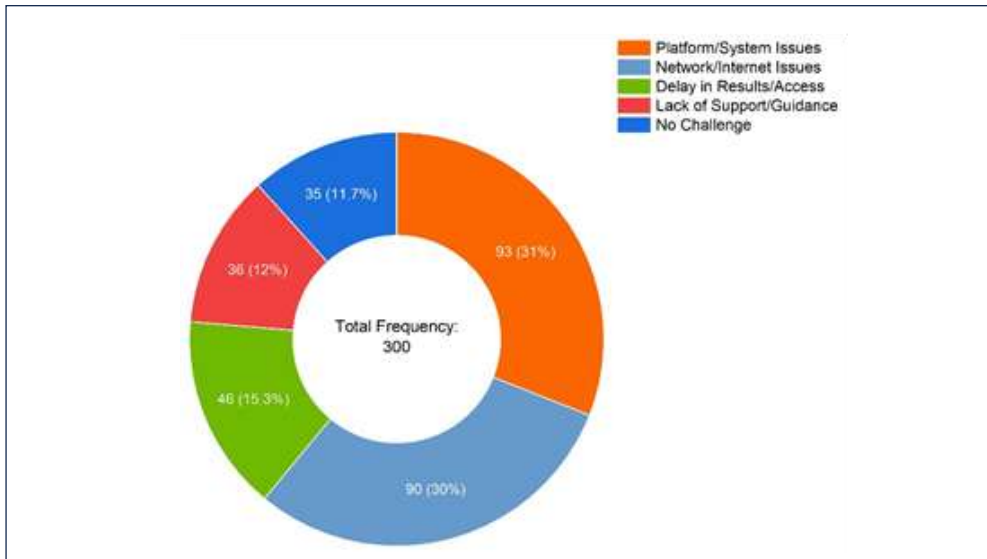


Figure 1 reveals that platform/system issues were the most frequently reported challenge (31.0%), suggesting persistent technical problems such as slow performance, bugs, or complex navigation, especially in systems like Moodle, SARIS, and ARMIS. This finding is consistent with the satisfaction rating for platform user-friendliness ($M \approx 3.88$), where a notable 10.7% of students expressed dissatisfaction. Such challenges may disproportionately affect 27.7% of students with beginner-level digital literacy, underscoring what Yaşara and Sarıtaş (2024) term the “second-level digital divide”, where access exists, but usability remains a barrier.

Delays in accessing examination results (15.3%) point to inefficiencies in academic data flow and digital responsiveness. This is particularly problematic given that only 65.1% of students reported using the results-checking service. While services like fee and exam registration received high ratings ($M \approx 3.96$), the lag in results undermines students’ ability to make timely academic decisions. As Berezi (2025) argues, timely feedback is a pillar of effective digital learning environments; hence, administrative or technical delays here are not merely procedural; they impact academic outcomes.

The lack of technical support or user guidance, reported by 12.0% of students, mirrors the low satisfaction with support availability (55.0%, $M \approx 3.55$). This deficiency is critical for students with beginner or intermediate digital skills, who make up the majority (69.4%) of respondents. Without sufficient support structures, these students risk digital exclusion, which Mutisya and Makokha (2021) warn can lead to reduced academic engagement and increased attrition

in e-learning settings. In this context, leadership needs to rethink support models, including proactive onboarding, live chat help, and user-centred platform improvements.

Notably, 11.7% of students reported no challenges, likely due to stronger digital skills, reflected in the 30.7% with advanced literacy. However, this should not lead to complacency. As Memon and Memon (2025) emphasise, equity in digital environments depends not just on access but also on adaptive support and design that cater to diverse user abilities.

These findings call for strategic leadership that goes beyond infrastructure provision to ensure platform reliability, user-centric design, and inclusive technical support systems. Without this, OUT's digital transformation risks leaving behind a segment of its student population.

Leadership Strategies for Managing Digital Student Services

This section presents the findings, analysis, and discussion related to the second objective of the study: to explore the leadership strategies employed to manage digital student services at the Open University of Tanzania (OUT), particularly at the Dodoma Regional Centre. Data were gathered through semi-structured interviews with five staff members, including administrative officers and the Director of the Regional Centre, all of whom are directly involved in the delivery and oversight of digital student services.

The findings reveal that leadership at the Centre employs both formal and informal strategies to manage digital student services effectively. These include system monitoring, informal communication through digital platforms, direct student support, staff redeployment, escalation of unresolved issues to higher authorities, and active collaboration with technical teams. The section is structured into thematic subsections that highlight time-consuming service demands, common student complaints, leadership responses, and institutional resource strategies.

Time-Consuming Digital Tasks During Exam Periods

Respondents reported that tasks related to student exam registration, payment procedures, and control number generation consumed the most time during examination periods. One administrator explained:

During exam periods, the tasks that consume most of my time include managing student exam registration and issuing control numbers. A major reason is that many students skip the orientation programme and lack digital literacy. They often get confused when systems change or face challenges using platforms like SARIS and ARMIS.

This finding aligns with transformational leadership theory, particularly the role of individualised consideration, in which leaders must attend to students' specific needs (Sliwka *et al.*, 2024). Transformational leadership for deeper learning: shaping innovative school practices for enhanced learning. Instead of relying solely on system efficiency, staff step in to offer one-on-one support, often at the expense of other responsibilities.

Student Complaints on Digital Student Services

Three common categories of complaints emerged:

- i) System failures, especially with ARMIS, where students struggle to generate control numbers.
- ii) Missing or delayed result uploads, particularly on SARIS.
- iii) Non-intuitive platform design, resulting in a heavy reliance on Centre staff for basic digital tasks.

An administrator noted:

Many students visit the centre for help with course registration and control numbers, even though these services are meant to be accessed online. This reflects how non-user-friendly the systems are.

This suggests that, though technically available, digital student services are not entirely accessible in practice. The Technology Acceptance Model (TAM) (Ozil, 2025) can help explain this gap. If users perceive the systems as difficult to use, they will be less likely to adopt them independently, increasing the administrative burden and leading to the underutilisation of digital platforms.

Leadership Strategies to Address Digital Challenges

The staff revealed a mix of formal escalation protocols and creative and informal practices to overcome challenges:

Escalation to HQ and ICT departments

One admin said:

When I encounter problems outside my control, especially technical ones, I report them to the central ICT support team or the relevant departments at HQ.

Informal communication through WhatsApp

I use WhatsApp to send students instructions on how to resolve system issues. I prepare step-by-step messages that can help them without having to come to the office.

Account log-ins for student assistance

Sometimes, I log into students' accounts to make corrections or complete registrations when they cannot do it themselves.

Use of personal resources

When the university's internet is down, I use my data to serve students to avoid delays.

These practices demonstrate adaptive leadership (Sott & Bender, 2025), in which Centre staff go beyond standard procedures to address student challenges in real time. While such flexibility helps students, it also signals systemic gaps in user orientation and training.

Institutional Leadership and Support

The Director of the Regional Centre (DRC) provided insights into how the university's top leadership supports the Centre's digital services. He noted:

OUT prioritises digital student services. We now have stable internet connectivity, paid through university contracts, and two ICT officers to support staff and students.

The DRC further elaborated on steps taken during digital service failures:

We respond quickly when systems are down, especially during registration periods. If the issue can't be handled by local ICT staff, we escalate it to the IEMT team at headquarters. Sometimes, our staff work beyond normal hours to ensure everything runs smoothly.

The deployment of an additional ICT officer reflects strategic capacity-building, a hallmark of effective managerial leadership (Kawure *et al.*, 2025). This also resonates with distributed leadership theory, which emphasises the importance of redistributing resources and providing support across roles to enhance institutional performance.

A Leadership Commitment

The DRC emphasised that university management is responsive to student complaints, especially regarding access to digital platforms such as MOODLE and SARIS. He stated:

While we used to experience more system failures, the situation has improved. The technical team monitors the systems and even responds outside working hours, demonstrating management's commitment.

This approach aligns with the principles of servant leadership, in which leaders prioritise the needs of service users and students, in this case, above their own convenience (Maloles, 2024). It also highlights a transition from reactive to proactive leadership in digital service governance.

Despite persistent student complaints, the leadership strategies in place have significantly mitigated service disruptions. However, the frequent reliance on informal strategies and personal interventions suggests that formal system

enhancements (e.g., better user training and system interface improvements) are still needed to reduce reliance on Centre staff.

These results support previous studies on digital governance in higher education (Doğan & Arslan, 2025; Fernández *et al.*, 2023), which emphasise the need for user-centred design, leadership agility, and capacity investment to enhance the functionality and uptake of digital student services in African universities.

Conclusions

From the findings, it is evident that while DSS platforms such as SARIS, MOODLE, and ARMIS are widely used and moderately well received by students, notable challenges persist. These include platform/system-related issues, delays in accessing academic results, and insufficient technical support, particularly affecting students with beginner to intermediate levels of digital literacy. Despite general satisfaction with core services like course registration and exam payments, usability barriers continue to limit equitable access and user satisfaction.

On the leadership side, the study revealed that staff responsible for DSS have adopted various strategies to mitigate challenges and enhance service delivery. These include the deployment of additional ICT personnel, the use of WhatsApp groups for communication, personalised student assistance, and collaboration with central offices. These efforts illustrate adaptive leadership practices and reflect elements of distributed leadership, which support institutional efficiency and responsiveness.

Recommendations

Based on the study's findings, it is recommended that the Open University of Tanzania prioritise enhancing its Digital Student Services (DSS) platforms. This includes improving the user interface, addressing recurring system glitches, and ensuring timely access to key services such as academic results and course registration. Continuous system upgrades informed by user feedback and regular technical assessments will help improve functionality and reliability.

Secondly, targeted support should be provided to students with limited digital literacy. Establishing help desks, producing user-friendly guides, and offering periodic orientation sessions, especially at the beginning of academic terms, can help bridge the digital divide and promote more inclusive access to DSS. Lastly, the leadership strategies that have proven effective at the Dodoma Regional Centre, such as the deployment of additional ICT staff and the use of communication platforms like WhatsApp for student support, should be

documented and scaled across other regional centres. Institutionalising these practices through formal guidelines and capacity-building programmes will strengthen service delivery and promote consistent DSS management across the university.

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In-Service Teachers' Perceptions of the Effectiveness of the Cascading Model for Continuous Professional Development in Tanzania

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Abstract

Despite the increasing number of teachers seeking to meet learning needs and ensure quality education for all, opportunities to access continuing professional development (CPD) are dwindling due to scarce resources. Education authorities have then prioritised the use of the Cascading Model (CM) for implementing continuous professional development due to its cost-effectiveness and its multiplier effect in reaching a large number of teachers. Therefore, this article explored teachers' perceptions of the effectiveness of a cascading model for implementing continuous professional development under the lens of sociocultural learning theory. The study employed a case study design and involved 10 selected in-service teachers who consented to participate. Data were collected through in-depth interviews and focus group discussions, and a thematic analysis method was employed. The findings suggest that educators perceive the cascading model of ongoing professional growth as inadequate, as they tend to engage sporadically in initiatives that lack consistency and significance. The findings further reveal that the cascading model is not worth providing professional development outcomes that align with their pedagogical practices. This results from multiple factors, such as scheduling issues, insufficient administrative support, or a discrepancy between available programs and teachers' specific requirements. The study recommends that professional development programs be designed to benefit teachers, particularly in upgrading their knowledge to achieve educational goals through effective pedagogical practices.

Keywords: *Teachers' perceptions, cascading model, CPD, pedagogical practices*

Introduction

Continuous professional development (CPD) opportunities are crucial for teachers to update their skills, knowledge, and professional competencies in response to socioeconomic dynamics that directly impact the education system (Ambon *et al.*, 2024; Goodwin, 2021). Countries are striving to provide CPD

for in-service teachers, such as seminars and workshops, or by designing appropriate initial teacher preparation programs (Antonov & Ivanova, 2021; Hennessy *et al.*, 2022; Sancar *et al.*, 2021). However, due to financial limitations, shortage of skilled personnel, and resource scarcity, cost-effective models and approaches have been a choice for many developing countries (Mwinuka & Farrelly, 2023). One widely used cost-effective approach is the cascading model (CM), which provides teachers with opportunities to learn and update their professional competencies (Brodeur *et al.*, 2024). The CM is a structured framework for CPD in which professional training and knowledge are disseminated from higher to lower tiers of the educational hierarchy, generally beginning at the national or regional level and flowing down to district, school, and individual teacher levels (Popova *et al.*, 2022). The dissemination encounters misconceptions, dilution, and distortion of information, making it challenging to achieve its goal of a multiplier effect. Therefore, this study draws on this context to understand how service teachers perceive the CM.

Although Tanzania, like other countries, struggles to provide CPD to all in-service teachers, the lack of structured and compulsory CPD leaves teachers without updated teaching skills and knowledge to meet current socioeconomic challenges (George *et al.*, 2024; Mwinuka & Farrelly, 2023). The situation is linked to persisting low performance in secondary school (Mazana *et al.*, 2023). Studies show that many Tanzanian teachers work for up to 10 years without engaging in CPD to advance their professional expertise (Koda, 2014; Matiba, 2024). The situation has prompted Tanzania to adopt the CM as part of the government's broader plan to improve educational quality by providing CPD to in-service teachers (Kibona *et al.*, 2020). At this juncture, the Ministry of Education, Science, and Technology in Tanzania employs a CM to identify experts as master trainers nationally, who subsequently pass the training on to district-level facilitators (Mollel, 2019). Given the significance of CM, little is known about teachers' perceptions of its effectiveness, as the method relies on a few selected experts serving as master trainers or essential facilitators who share knowledge and skills with a broader group of teachers (Palloff & Pratt, 2011). Therefore, this study aimed to investigate teachers' perceptions of the CM's effectiveness in enhancing their Continuing Professional Development (CPD) and pedagogical practices.

Philosophical Underpinning of the CM

The philosophical underpinning of the CM is its efficiency and effectiveness. Studies have reported that it is cost-effective in facilitating, delivering, and reaching out to many beneficiaries (Koomar, 2024; Smith & Tillema, 2001; Lawrent, 2025; Mgaiwa & Milinga, 2024), enabling uniform implementation of professional development initiatives, guaranteeing uniformity across

various areas, and being flexible in using andragogical approaches to suit adult learners (Iftikhar *et al.*, 2022). Although the CM shows considerable potential, it faces several obstacles that may limit its effectiveness. One key issue is the accuracy of execution and capability, as some facilitators may lack context-specific knowledge to transform teachers (Garone *et al.*, 2022; Komba & Nkumbi, 2008). As training progresses from one level to another, there is a chance that it may distort the content, leading to misinterpretation or dilution and resulting in inconsistent provision of professional development (Kennedy, 2005). This problem is particularly challenging in expansive, varied educational systems with differing skills and resources. Ngeze *et al.* (2018) propose that the CM's effectiveness depends significantly on the quality of training across all levels and on ongoing teacher assistance following training sessions.

Mugisha (2018) reports that the Ministry of Education and Vocational Training utilises CM to disseminate policies and directs implementation downwards through regional and district authorities to affect individual schools ultimately. Gökmenoglu *et al.* (2021) note that although the CM guarantees that policies reach even the most remote regions, it frequently misrepresents the original purpose due to the disconnect between national policies and local circumstances. Nĩmante *et al.* (2025) report that the model has enhanced teacher involvement in professional development; however, its effects on real teaching practices are variable. Other studies have discussed the use of CM in implementing educational reforms and CPD, highlighting common challenges such as poor communication, reluctance to adapt, insufficient resources at the community level, bureaucratic hold-ups, training's quality and relevance, inadequate resources and trainers' capabilities (Leong & Rethinasamy, 2023; Komba & Mwakabenga, 2019; Konrad, 2018; Ngeze & Iyer, 2023). The model's success largely depends on the ability of mid-level administrators.

Continuous Professional Development

Recent advancements in science and technology have significantly impacted education, prompting authorities to seek more effective ways to empower teachers by providing a range of cost-effective continuing professional development (CPD). Stronge (2018) and Perry *et al.* (2022) explain that, despite strong teacher preparation in universities and colleges, it is insufficient to overcome the challenges they may encounter throughout their careers. Designing a successful CPD program is challenging as it requires considering teachers' working environment and context-specific needs while also aligning with national policies and requirements (de Groot-Reuvekamp, 2018). Teacher professional development is an ongoing process in the education system that provides instruction, training, and support to improve teachers' knowledge and professional skills (Ávalos, 2023; Bautista & Ortega-Ruiz, 2015; López-

Estrada, 2023). Participating in CPD enables teachers to update their pedagogical and content knowledge, as well as practices, to help students achieve their learning goals.

Mgaiwa and Milinga (2024) discussed the importance of professional development for in-service teachers, emphasising its role in their lifelong careers. It is essential for teachers' motivation and improved student outcomes (Gemeda *et al.*, 2014). The OECD (2011) has been instrumental in understanding the importance of professional development to teachers' pedagogical skills. The OECD further argued that professional development programs can potentially improve the education system. Teachers play a crucial role in enhancing students' improvement and knowledge, leading to positive outcomes. Avidov-Ungar (2016) added that professional development refines schools by enhancing teaching quality and improving students' educational outcomes. Teachers require new skills, values, understanding, and attitudes to apply strategies that help students build their knowledge from what they know to what they do not know. Hence, the introduction of the National Curriculum Framework for Teacher Education (NCFTE). Well-designed programs are necessary to enhance teachers' knowledge and instructional practices, thereby updating their knowledge and skills (Isa *et al.*, 2024). This will help teachers become aware of technological changes, leading to the reformulation of the curriculum in the education system, unlike Tallvid (2016), who found that most teachers are reluctant to integrate technology into teaching. Johnson and Golombek (2011) certified educators in three specific areas: content, context, and process of the reform's implementation, in which teachers' perceptions play no role. Still, those areas impact students' outcomes, calling for a thorough review of professional development programs.

For this reason, researchers have highlighted several key notions regarding teachers' professional development and their pedagogical practices: (i) Awareness and perception of teachers towards professional development. Ivanova (2017) describes how teachers' awareness will help them identify new skills through professional development and apply them in their pedagogical practices. Professional development is an essential part of teachers' pedagogical practices; hence, for high-quality and sustainable development in education, (ii) benefits of professional development to teachers' pedagogical practice, and (iii) professional development for in-service teachers. Avalos (2011) shows that education has progressed from the outdated in-service teacher training (INSET) model to a new teacher professional development model, in which teaching is now in-network and informal experiences are formalised across schools. Bautista and Ortega-Ruiz (2015) maintained that professional development for teachers can be considered a crucial tool for enhancing teachers' knowledge and instructional practices through carefully

designed programs. Ramírez-Montoya *et al.* (2021) opined that professional development programs are essential for addressing new teachers' skill gaps and helping them become career experts. In that case, Smith and Lynch (2010) elucidated that the tenacity of professional development is fourfold: educating teachers, summing external standards, internal drive to study and advance, and reinforcing the professional status conferred by higher education.

Proper planning and teacher collaboration can be considered valuable tools for the professional development of permanent teachers and for confirming students' lasting understanding (Doğan & Yurtseven, 2018; Mugisha *et al.*, 2023). Suarez (2022) argued that teachers held a favourable view of professional development programs that would facilitate critical reflection in thinking and problem-solving, which, in turn, would help teachers address school issues. Abakah *et al.* (2023) and Cordingley (2015) reinforce these observations, suggesting that teachers can enhance their reflection on teaching by engaging in research activities, thereby improving their practice, which serves as one avenue for continuing professional development (CPD) activities. Ivanova (2017) emphasised that professional development aims to modify teachers' classroom training, their attitudes and views on learning, and student success outcomes. For many years, Tanzania struggled to provide professional development for teachers, who were often unprepared to address changes, leading to the reformulation of curricula in response to advancements in science and technology. Hardman *et al.* (2015) asserted that pedagogical content knowledge, abilities, and attitudes are necessary for facilitating the delivery of new knowledge, which is a combination of theory and practice. They further emphasised that teachers must apply their competence to meet students' needs. Namamba and Rao (2017) proposed that trainers' teacher preparation should be well-designed and enhanced through practical professional development activities and opportunities. This study will investigate the relationship between teachers' involvement in professional development and the development of their pedagogical skills and practices.

These studies collectively highlight that although the CM has aided the CPD of teachers and enhanced teaching methods, its effectiveness depends on multiple factors. These encompass the standard of training across all tiers, the sufficiency of resources, and the necessity for ongoing assistance and guidance for educators. Additionally, tailoring the model to local situations, especially in rural and underprivileged regions, is crucial for enhancing its effectiveness in improving teaching quality. Given that the Tanzanian government prefers using CM to implement various education reforms, understanding the perceptions of key beneficiaries of the training is crucial for fostering critical reflection and improvement. This study aimed to investigate teachers' perceptions of the effectiveness of the cascading method (CM) in enhancing

their professional development (CPD) and pedagogical skills. Specifically, the study aimed to answer the following question: (1) How do teachers perceive the effectiveness of the CM for CPD? (2) How does the CM enhance pedagogical practices among teachers?

Theoretical Framework

The study draws on sociocultural learning theory (SCLT), originating in the work of Lev Vygotsky (1962). The SCLT suggests that learning is a social process moulded by interactions with more knowledgeable others within a cultural context (Dawson, 2013). The theory emphasises that successful human learning and development require social interaction, zone of proximal development (ZPD), scaffolding, cultural tools (artefacts), and social context. These principles are fundamental in designing and implementing CPD programs through a CM. The framework aided data collection by developing tools to examine how teachers interact, the assistance they receive from trainers, how learning under CM is tailored and customised to their contextual needs, and whether a training needs assessment was conducted. Again, the theoretical assumptions guided the interpretation of findings regarding teachers' perceptions of the CM. Mercadal (2021) argues that the SCLT framework fosters learning through collaborative mentorship from experienced others, which scaffolds professional growth while considering cultural and contextual realities. Guided by this theoretical framework, designing and implementing CPD programs through a CM, sometimes referred to as a multiplier model. This requires consideration of the teachers' learning needs based on their context (the ZPD), which they cannot acquire without assistance and the support they receive (Scaffolding) by attending to CM, allows them to socially interact with knowledgeable peers within their social and cultural contexts (Bakuza *et al.*, 2025). Based on these facts, teachers' knowledge is obtained from experienced colleagues and top authorities and then disseminated to the broader teacher community (Ngeze *et al.*, 2018). Therefore, the framework provides a foundation for assessing teachers' perceptions of the effectiveness of a cascading model for continuous professional development and its contribution to their pedagogical practices.

Methodology

Research Approach and Design

The study uses a qualitative research approach under a case study design. Qualitative research is vital in education, as it addresses the 'how' and 'why' research questions, facilitating a more profound understanding of phenomena, experiences, and contexts (Cleland, 2017). The approach helps capture in-depth insights into in-service teachers' perceptions of CM's effectiveness for CPD in developing their pedagogical practices, based on their pedagogical needs (Hennink *et al.*, 2020). This is achieved through case study design, as

employed in qualitative research, as noted by Bacon (2025). The researcher preferred a case study because it thoroughly analyses the detailed steps within each specific case of individual units or units based on the researcher's focus (Denzin & Lincoln, 2018). Furthermore, Lapan *et al.* (2012) and Creswell (2014) explained that a case study is a qualitative method that allows a researcher to discover cases using various data-collection methods and to present comprehensive descriptions of the collected data through developed themes. In this regard, the qualitative research suggests asking questions that cannot be precisely quantified to recognise human understanding.

Area of Study

The study was conducted at Mzumbe University's main campus in Morogoro, Tanzania. The university offers teacher education programmes and has enrolled in-service teachers who have obtained diplomas in teacher education and are now upgrading to bachelor's degrees. It also offers short courses, seminars, workshops, and conferences, as well as training, to enhance teachers' continuing professional development (CPD). The availability of in-service teachers at Mzumbe University makes it convenient to conduct a study of their perceptions of the CMs they attended to improve their professional development.

Participants

Participants in this study are in-service teachers with experience in secondary school teaching and those who have attended CPD programs delivered through CM. Their involvement in these CPD programs makes them ideal for contributing to how they perceive the model used, the effectiveness of these CPDs, and how to improve them. Therefore, the study observes teachers for all subjects. This is because the study examines general pedagogical practices, not those specific to a particular subject; researchers did not mention the subjects that participants teach to maintain anonymity. The study included ten purposively selected teachers from the population of 38 in-service teachers in their third year at Mzumbe University. Participants were selected purposively based on their teaching experience, ranging from 4 to 28 years, and on their attendance at CPD delivered through CM (See Table 1). This is because those participants have worked for many years and provided extensive information about professional development and its impact on pedagogical practices, drawing on their own experiences.

Data Collection Method

To address the research questions and ensure the study's validity, data were collected through in-depth interviews and focus group discussions, as recommended by Tisdell *et al.* (2025) (see Table 1). Interviews enable the investigators to probe and ask follow-up questions to gather detailed data. The research reached out to 6 participants who agreed to participate in in-depth

interviews at their convenience. A focus group discussion was conducted, guided by Silverman (2016), and involved four teachers who agreed to participate in the evening after class hours. Cohen *et al.* (2017) insisted that using multiplicity methods functions to prove the truthfulness of data from single sources, therefore improving the validity of instruments.

Table 1:
Interviews and Focus Group Discussion Descriptions

S/N	Respondent name	Sex	Work Experience	No. of CPD attended	Method	Time used
1.	Teacher A	Female	15 Years	4	Interview	45 Min
2.	Teacher B	Female	20 Years	3	Interview	50 Min
3.	Teacher C	Male	10 Years	3	Interview	46 Min
4.	Teacher D	Male	25 Years	7	Interview	34 Min
5.	Teacher E	Male	28 Years	5	Interview	35 Min
6.	Teacher F	Male	06 Years	2	Interview	33 Min
7.	Teacher G	Male	08 Years	1	FGD	56 Min
8.	Teacher H	Female	06 Years	1	FGD	56 Min
9.	Teacher I	Female	08 Years	2	FGD	56 Min
10.	Teacher J	Male	04 Years	0	FGD	56 Min

Data Analysis

The data obtained from the interviews and focus group discussions were transcribed by the researcher during the data analysis process before other procedures, and the data were then subjected to thematic analysis involving six concurrent processes (Braun & Clarke, 2019; Mertler, 2024). Initially, researchers read the transcripts repeatedly to familiarise themselves with the data; then, the data were coded for emerging concepts and codes related to teachers' perceptions of CM for CPD, and similar data were categorised into themes and sub-themes according to the research objectives. Finally, researchers reported the themes obtained, supported by participant quotes from interviews and group discussions (Rockmann & Vough, 2024).

Ethical Considerations

Drolet *et al.* (2023) clarify that researchers should consider ethical issues in their research by adhering to established research ethics principles, such as those related to anonymity and confidentiality. The researcher asked 38 teachers to participate in the study, and only 10 agreed to do so voluntarily, outside class hours. We obtained their oral consent to participate in the study and informed them of its purpose, as recommended by Auerbach and Silverstein (2003) and Creswell and Creswell (2023).

Findings

The study investigates teachers' perceptions of the effectiveness of the cascading model (CM) in enhancing their Continuing Professional

Development (CPD) and pedagogical practices. The findings are grouped into three thematic areas: Teachers' Perceptions of the CM towards CPD, how the CM contributes to improving pedagogical practices, and how to improve the CM for effective CPD. These are described in the following sections.

Teachers' Perceptions of the CM for CPD

The study reveals that teachers have different views on the concept of continuous professional development (CPD) in Tanzania, focusing on its effectiveness and impact on classroom practices to enhance understanding of its influence on educational outcomes in the area. Teachers view the CM of ongoing professional growth as inadequate, engaging sporadically in initiatives that lack consistency and significance. They believe that these programs, typically associated with curriculum modifications and reforms, do not enhance their teaching methods or career development and frequently fail to improve their professional growth and classroom effectiveness. It is because they are made, or when outside programs require their presence. These sporadic experiences do not ensure steady professional development, leaving teachers feeling ill-equipped for ongoing enhancement. They occur during curricular changes.

Teachers who participated in the CPD programs noted that the material and content used in CM-based programs do not align with their pedagogical needs. Where teachers are not facing the same pedagogical difficulties as they do in other districts. In confirming this, Teacher I said:

"The seminars we often participate in focus on topics unrelated to our everyday classroom challenges. For example, they emphasise the proper utilisation of resources, but at our school, we lack those resources".

This highlights a significant problem with the structure of the cascading CPD model. Another participant added that:

I attended some professional development trainings. Our trainers taught very well. My challenge was that the training was based on something I did not have a problem with. Yes, some might have benefited, but it was as if I had escorted them and gained nothing! I think authorities should prepare these professional development trainings based on teachers' needs, unless the issue is the implementation of a new curriculum (Teacher C, 2024).

The findings indicate that teacher involvement in cascaded professional development programs raises serious concerns regarding the overall efficacy of these initiatives in addressing their educational and contextual issues. The inconsistent pattern of involvement suggests that, when professional development opportunities arise, they may not be fully utilised or adequately address the wide range of subjects required to support teachers effectively. In this era of science and technology, it is essential to keep teachers' knowledge and skills up to date. By participating in professional development programs that truly meet their pedagogical needs, not by learning what is decided for

them by the top authorities. Often, these programs focus only on problematic issues. When teachers from all districts gather for seminars, the challenges faced by other teachers may not align with our problems and specific context. As a result, teachers feel that attending these programs is a waste of time, as they already know the information. Failing to meet their pedagogical needs makes them gain nothing and continue with old pedagogies in their teaching, as one participant explained:

"I did not see any pedagogical difference between those who attended professional development programs and those who did not participate; we are teaching in the same way... no need to attend CPD".

Teachers expect that attending CPD will have a positive impact on their pedagogical practices, which, in turn, will improve students' learning outcomes. Based on this, teachers did not see the worth of those programs. Again, the study reveals that teachers lack motivation to participate in professional development initiatives, likely due to the nature of CM. As participants explained their feelings;

There is no motivation to attend these cascaded professional development programs, as they are not required for promotion, and I don't see any difference between those who attended and those who did not. Why should I bother myself to do that? (Teacher A, 2024).

Financial challenges demotivate some teachers to participate in the programs, as teacher H explained.

The last seminar I attended was very beneficial. Still, my problem was the cost of going and returning due to school commitments. At the workshop, we were given soft-copy materials, but there was no Wi-Fi, and my network was not supportive. Again, I had to print. So, I suggest that the seminar venue have at least full Wi-Fi to simplify things for us, as we are in a digital era. Additionally, as in the past, the government should cover all costs for seminars or other professional development training (Teacher F, 2024).

This suggests that teachers might not recognise the benefits of involvement without strong reasons or incentives, such as improved teaching outcomes, personal development, or acknowledgement, because the approach is unidirectional. This presents a challenge for educational institutions aiming to promote additional professional development. The lack of promotion requirements for professional growth means there are no direct career advantages to involvement. This circumstance can lead to indifference among educators, who might believe their existing qualifications and performance are adequate for their positions and do not require further training. As Teacher G says:

"I am not interested in those trainings; they just force us to use our time without having a clear goal. Imagine science and language teachers being mixed."

Participants reported an unwillingness to attend CPD through CM in schools. They perceive that their professional development is being imposed on an

already packed schedule, hindering their ability to concentrate on their current classroom duties. Also, the issue of financial compensation exacerbates the challenges of engaging in professional development. As Teacher H said,

"Sometimes I find it difficult; we are asked to stay in school until late hours without being paid. We are taught by the one who was paid, but for us, it's not the case. This discourages our participation."

Nonetheless, the reference to eternal promises of payment suggests a systemic issue where commitments made to educators regarding financial reimbursements often remain unfulfilled. Based on teachers' experience, for CM to be effective, it must be well structured to meet their pedagogical needs, aligned with their context, and include initiatives and activities conducted within working hours.

The Contribution of CM to Pedagogical Practices as Part of CPD

The research explored the contribution of the cascading method (CM) to continuous professional development programs that enhance pedagogical practices. From the focus group discussion, the findings reveal that teachers attend cascaded professional development to widen their understanding and skills and to stay updated to cope with changes in education through curriculum reform. Some participants reported observable outcomes in their pedagogical practices and in their students' achievement.

For instance, teacher D shared that:

"the program I attended was concerning the implementation of a new curriculum, and of course, in my 28 years of working, competence-based learning was challenging me. But now confidently, I plan lessons, scheme of work, and teaching aids".

Another participant added that:

Previously, our students were not active in classes. I believed they knew a few things, and I preferred to lecture in my teaching to help them understand. Yes, I learned the participatory method. However, I expected to solve difficult topics that challenged me in teaching from CPD. I feel shy whenever I ask my colleagues to teach on my behalf concerning the training I attended (Teacher F, 2024).

Teachers wish to attend CM to develop their professional skills and knowledge to help them cope with the difficulties they encounter in teaching. As Teacher J confesses:

"I wish to attend professional development programs to expand my understanding and become more competent in teaching, as some of the topics in my subject are particularly challenging."

Those changes necessitate the development of new teaching methodologies to address teachers' challenges during teaching and learning. Also, Teacher H says,

"My desire to attend a professional development program is to become knowledgeable enough to prepare science practicals in my subject, as there are no longer laboratory technicians in most of our schools".

The conversations show that teachers are not only required to participate in professional development programs, but they also genuinely wish to enhance their skills and knowledge. This inherent motivation indicates that educators understand the value of continuous learning and career advancement. Recognising the evolving nature of education, they view professional development as an opportunity to stay up to date on contemporary trends, teaching methods, and educational regulations. Teachers view professional development as a means to acquire new skills and refine existing ones. This is crucial in a rapidly evolving educational environment where new technologies and methods are constantly emerging. Teachers express their appreciation for CM, which enables them to access CPD activities, but they expect much more from programs to meet their needs and interests. Another teacher went so far as to explain that they did not find it beneficial to their pedagogical practices by comparing the performance of teachers who participated in CPD with those who did not, as they found no difference in their students' performance. Teachers themselves must perceive professional development positively and find alternatives to training through interactions with teachers from other schools and self-reading, rather than relying solely on government programs for professionals. A teacher who perceives the value of positive professional development is eager to acquire new knowledge, skills, attitudes, values, and dispositions. Such dispositions include pride, self-esteem, team spirit, commitment, drive, adventure, creativity, and vision. Findings show teachers highlight challenges they face in attending and implementing these programs. Challenges include the availability of resources versus those required for practical training. Lacking such vital resources fosters resentment and disengagement, as educators might view these programs as exploitative rather than supportive, with their efforts and sacrifices not being sufficiently acknowledged or compensated. As a result, training fails to achieve meaningful learning among teachers.

Discussion

Although teachers indicated participation in cascaded professional development programs, the results suggest that the impact on their teaching practices remains insufficient. This may stem from various factors, such as a lack of relevance, broader or general approaches that are not well-suited to teachers' current classroom situations or the unique student groups they work with. The challenges hindering the effective implementation of CPD include multiple factors, such as scheduling issues, insufficient administrative support, and mismatches between available programs and teachers' specific requirements. Teachers require CPD programs that consider their unique and

contextual needs, preferences, and experiences, which they acquire through the CM, to help them tackle the particular obstacles they encounter. Mgaiwa and Milinga (2024) report similar findings that CPD that did not reflect specific teacher needs and context proved to be less effective. Educational authorities can cultivate a more motivated and efficient teaching workforce by creating relevant programs that align with teachers' immediate challenges. As Abakah (2023) insists, effective CPD should align with teachers' specific needs in their specific context. Educators may find it challenging to implement new practices when a program does not directly align with their teaching environment. The findings align with Laddunuri (2012), who noted that teachers often use outdated instructional strategies because they rarely attend professional development programs to update their professional knowledge. Effective professional development should also encompass follow-up support and opportunities for teachers to collaborate and exchange experiences, as recommended by Ma *et al.* (2018) and Mugisha *et al.* (2023). Various curricula reforms require teachers to learn new teaching strategies to be competent in implementing them and to enhance students' learning achievement. Based on teachers' experience in CM, there is a need to rethink and restructure the CM to determine whether it meets teachers' demands (Atilya & Mafumiko, 2010). Also, Dinh and Lan (2023) added that reflection is crucial and the most important element for making CPD successful, providing teachers with an opportunity for self-assessment and the development of their critical thinking. Doing this will help determine the extent to which the program succeeded in meeting teachers' pedagogical needs. This aligns with the SCLT assumptions of ZPD, interaction, and social context.

Teachers may find it challenging to adapt to these changes without proper training and support, which could ultimately impact the quality of education students receive. Additional studies by Isa *et al.* (2024) highlight the range of abilities, including classroom management, teaching methods, assessment strategies, and the school environment. Again, the findings reveal that teachers do not see the benefits of professional development programs that employ a CM approach, either pedagogically or economically. Teachers view CPD programs that employ CM as overly dense, offering limited opportunities for authentic engagement or for significant reflection on the material. When professional development sessions are packed with information, educators often feel overwhelmed, leading to frustration and exhaustion rather than motivation. Presenting new ideas, methods, and practices briefly can overwhelm them, hindering their ability to fully understand and utilise the knowledge they have acquired. This sense of being overwhelmed may reduce motivation to engage in future training, as teachers and educators view these sessions as an additional obligation rather than a development opportunity. Given the challenging nature of these programs, educators indicate they need

to make significant changes to their schedules to participate. This often involves adjusting their current responsibilities, such as lesson planning, grading, or personal commitments, to incorporate professional development into their busy schedules. In this, teachers should change their attitude, not only seeking economic benefits but also being prepared to participate in cascaded programs to enhance their pedagogical activities, which will lead to positive student outcomes.

Koda (2014) emphasised that professional development aims to enhance new teachers' skills, keep them up to date, and refine existing skills, ultimately providing significant benefits for lifelong learning. Moreover, Popova *et al.* (2022) suggest that successful teacher professional development programs should invite schools to participate, focus on teaching and learning, create school networking, and have an evaluation to map the preparations for upcoming professional development programs. These findings indicate that teachers are generally aware of professional development programs, which means they understand their benefits in the education sector. However, findings reveal that these programs are not regularly offered to teachers and do not adequately reflect their contextual needs, as Komba and Mwakabenga (2019) reported. This is due to insufficient budgets allocated to the education sector. Second, teachers perceive professional development as a waste of time because the program offers no benefits. Teachers believe there are no changes in pedagogical practices or student achievement among those who attended those programs compared to those who did not (Namamba & Rao, 2017). This means neither professionally bound nor motivated teachers attend professional development programs. For that reason, teachers do not consider those development programmes worthy because they lack motivation for themselves and their students.

Additionally, they do not see any benefit associated with it. In reality, these professional developments greatly impact teachers and students due to changes in our societies, with increasing demands for new things that lead to changes in the curriculum. For this reason, professional development programs are crucial for all teachers to enhance their teaching practice and improve students' achievements.

Conclusion

This study explored in-service teachers' perceptions of the CM for CPD. While the findings show that CM is a commonly adopted approach due to its viability to reach a large population, teachers perceive it as lacking sharpness in impacting their pedagogical practices. Factors contributing to this perception include the CM approach's seclusion design within the CPD, limited administrative support, unfriendly implementation schedules, and detachment from specific working contexts, resulting in periodic, inconsistent CPD.

Additionally, the multiplier effect of trainers, from top to bottom, results in misrepresentation and weakening of information, hindering its effectiveness. Teachers suggest that, despite adopting the CM for CPD implementation, it should be customised to meet evolving needs and interests, and be relevant to local contexts to enhance its effectiveness and sustainability. Therefore, despite its cost-effectiveness, the current use of CM hardly supports teachers' advancement of their pedagogical practices, hence limiting the learning outcomes. The study recommends vigorous CPD that are contextually relevant, responsive to teacher-specific needs, and scheduled to meet the needs of participating teachers. Education authorities should re-examine the preference for using CM for CPD and prioritise approaches that take relevant contexts into account, meet specific needs, and ensure sustainability in elevating teachers' pedagogical practices. Ongoing CPD programs should be redesigned and customised to meet the specific needs of teachers in their relevant working contexts, addressing their unique needs and enhancing the transformation of their pedagogical practices. On the same note, the program should treat teachers as lifelong learners with diverse needs. They need to acquire innovative pedagogical skills through expert collaboration and long-term engagement to update and engage with relevant content to meet contemporary challenges. The study recommends broader studies involving diverse education stakeholders and various learning contexts to validate the findings and inform practical interventions for effective CPD programs.

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Artificial Intelligence and Education Governance in Tanzania: Legal Gaps and Regulatory Challenges

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Abstract

This paper examines the adequacy of Tanzania's existing legal and policy frameworks in facilitating the adoption of Artificial Intelligence (AI) in the education sector and assesses the implications of persistent regulatory gaps for ethical, accountable, and rights-based AI deployment. Although AI presents significant opportunities to expand access to education, enhance learning quality, and support personalised teaching and assessment, its effective integration in Tanzania remains constrained by fragmented and outdated regulatory regimes. The study adopts a doctrinal legal research methodology, complemented by comparative analysis. It critically analyses key Tanzanian statutes and policy instruments relevant to AI governance in education, including the Personal Data Protection Act, 2022, the Cybercrimes Act, 2015, and the Tanzania National Guidelines for Artificial Intelligence in Education, 2025. These domestic frameworks are benchmarked against international and regional normative instruments, notably UNESCO's Guidance for Generative AI in Education and Research (2023), the Beijing Consensus on AI and Education (2019), and the African Union's Continental AI Strategy (2024), to assess regulatory coherence, alignment, and normative adequacy. The findings reveal significant legal and institutional shortcomings in Tanzania's AI governance framework for education. The existing legal gap exposes learners to data protection and accountability risks and threatens educational equity. The paper recommends enacting a comprehensive, binding legal framework for AI in education, strengthening institutional oversight, and aligning with international best practices to ensure ethical, inclusive, and rights-based AI adoption in Tanzania's education sector.

Keywords: Artificial Intelligence (AI), Education, Tanzania, ICT, Sustainable Development

Introduction

The rapid advancement of Information and Communication Technology (ICT), driven by innovations such as Artificial Intelligence (AI), machine learning, robotics, and 3D printing, continues to reshape key sectors globally. Among these technologies, AI has emerged as particularly transformative,

significantly influencing the education sector by enhancing teaching methodologies, enabling personalised learning, and improving administrative efficiency (Onesi-Ozigagun *et al.*, 2024). AI refers to computer systems capable of performing cognitive functions commonly associated with human intelligence, including learning, reasoning, and problem-solving (Fitria, 2021; UNESCO, 2021; Commonwealth of Learning, 2024).

Globally, the integration of AI into education has attracted increasing scholarly and policy attention due to its potential to improve learning outcomes and institutional effectiveness. In Tanzania, AI is progressively recognised as a catalyst for educational innovation, with the potential to expand access to education, enhance quality, and streamline administrative processes (Mambile & Mwogosi, 2024). Its adoption also aligns with national development priorities and international commitments, particularly the United Nations Sustainable Development Goals, which emphasise inclusive and equitable quality education. In recognition of this potential, the Government of Tanzania, through the Ministry of Education, Science, and Technology (MoEST), introduced the Tanzania National Guidelines for Artificial Intelligence in Education (2025). These guidelines provide policy direction for the ethical, inclusive, and responsible use of AI in educational institutions, with objectives that include improving pedagogy, supporting personalised learning, enhancing administrative efficiency, and safeguarding ethical principles such as data protection, equity, non-discrimination, and digital security (MoEST, 2025).

Despite this policy development, a critical problem persists: Tanzania lacks a comprehensive and enforceable legal framework to govern the deployment of AI in the education sector. The existing legal regime is fragmented and was not designed to address the complex ethical, legal, and accountability challenges posed by AI-driven technologies. Current data protection laws provide limited guidance on the collection, processing, and use of sensitive educational data by AI systems, while liability standards remain unclear in cases where algorithmic decision-making results in harm. Moreover, the absence of specialised regulatory or oversight institutions weakens enforcement and undermines adherence to ethical principles (Ally, 2024; Ally, 2025). These legal gaps are further compounded by structural challenges such as uneven digital infrastructure, limited technical capacity, and institutional unpreparedness, which collectively hinder effective and equitable AI adoption in education (Matto & Ponera, 2025).

This article contends that although Tanzania has taken important steps toward integrating artificial intelligence (AI) into education through policy guidelines, achieving a sustainable, ethical, and rights-based adoption of AI requires stronger legal and institutional frameworks. In light of this, the study aims to

achieve the following two specific objectives: (i) to assess the adequacy of existing legal and policy frameworks regulating the use of AI in Tanzania's education sector. (ii) To identify key legal, ethical, and institutional gaps within the current regulatory environment.

Literature Review

AI Integration in Education

Artificial Intelligence (AI) is emerging as a transformative tool in secondary and higher learning education, poised to revolutionise both student learning and teaching methods. Its integration into essential educational functions is expanding, from automated grading systems to personalised learning platforms that employ machine learning algorithms to tailor educational experiences to individual student requirements (Mambile & Mwogosi, 2024). The integration of AI in education, as outlined by Saputra *et al.* (2023), offers significant opportunities to enhance personalised learning. AI-driven features, such as intelligent tutoring systems, provide real-time support and personalised feedback to students, adapting to individual learning needs. Additionally, AI-powered tools improve access to a wide range of learning resources, making education more flexible and tailored. For students, AI assists in personal learning by offering systems that adapt to their pace and learning style. It also provides scaffolding, which helps in overcoming learning difficulties. On the other hand, teachers benefit from AI's facial recognition systems and predictive analytics, which analyse student behaviour and emotions during lessons. This analysis helps educators identify students' needs, adjust their teaching approaches, and intervene early when students struggle, ultimately improving the learning process (Saputra *et al.*, 2023). This approach presents both opportunities and challenges, particularly in how it transforms traditional teaching methods.

AI tools, such as Edmentum's Exact Path, play a pivotal role in personalised learning by utilising adaptive testing to identify areas where students face challenges. Based on these assessments, the platform creates individualised learning paths to help learners improve. Tutors can leverage this tool to monitor student progress and adjust their instruction accordingly. Similarly, AI-powered test preparation tools assist educators in creating exams by utilising natural language processing (NLP) to analyse student performance data. These tools offer targeted practice exercises to enhance students' test-taking skills (Wang'ang'a, 2024).

Onesi-Ozigagun *et al.* (2024) highlight that AI-powered adaptive learning systems can personalise learning paths for students. These paths are tailored to accommodate individual learning styles, paces, and preferences, ensuring each student receives suitable levels of challenge and support. For instance, if a

student encounters difficulty with a specific concept, the system can offer additional practice exercises or resources to facilitate improvement. Nja *et al.* (2023), in their study titled "Adoption of Artificial Intelligence in Science Teaching: From the Vantage Point of the African Science Teachers," reveal that AI plays a diverse and imminent role in education. When AI is incorporated into the teaching and learning system, it creates opportunities for improvement in the educational sector, including teachers' teaching and students' learning outcomes. Students can learn in their own space and individually through personalised tutoring. Concepts that are ordinarily abstract can be presented in a form that will be understood by students, educators can identify learning disabilities, and students get feedback on their progress as they progress in the study.

In Kenya, the integration of AI in education has shown significant progress. One notable example is Angaza Elimu, an AI-driven eLearning platform funded by UNICEF. This platform provides students with personalised learning experiences, offering tailored study materials, assignments, and progress tracking. It enables tutors to assess students' capabilities and deliver customised learning resources to meet their individual needs. Another prominent AI application in Kenya's education sector is M-Shule, an SMS-based platform that delivers learning, assessment, and data tools to educational organisations. By utilising SMS technology, M-Shule makes education more accessible, especially in regions with limited internet connectivity (Akello, 2022). These examples illustrate how AI is transforming education by offering adaptive, personalised learning solutions that cater to students' specific needs, while also equipping educators with advanced tools for assessment and instruction.

In Tanzania, AI holds the potential to address persistent challenges, such as overcrowded classrooms, teacher shortages, and unequal access to quality education. One example of an AI-powered online learning platform that improves access to education in Tanzania is eLimu. The eLimu platform provides students in rural areas of Tanzania with access to interactive educational content, enabling them to engage with high-quality resources and interact with teachers and other students virtually (Lyimo, 2023, p. 97). The platform is designed to provide personalised learning experiences to students and incorporates a variety of multimedia resources, including videos, animations, and games, to make learning more engaging and interactive.

The University of Dar es Salaam in Tanzania has implemented an AI-based system called My Grades to automate grading (Lyimo, 2023, p.98). While the digital transformation promises extensive benefits in enriching educational experiences and fostering personalised learning, it also presents notable

challenges. These include concerns about academic integrity, particularly the potential misuse of AI tools, and the imperative to bridge the digital divide, which could otherwise exacerbate inequalities in access to quality education. Moreover, the integration of advanced technologies such as ChatGPT underscores the critical need for educators and students to cultivate robust digital literacy skills to navigate and leverage these tools effectively (Nguyen *et al.*, 2024). In essence, while ChatGPT and similar AI technologies hold immense promise in reshaping educational paradigms for the better, addressing these challenges is pivotal to realising their full potential in advancing inclusive and equitable digital education.

Governing Theories

The scholarly discussion on Artificial Intelligence and Education Governance in Tanzania: Legal Gaps and Regulatory Challenges is supported by several theoretical frameworks that provide analytical lenses and normative guidance for the responsible adoption, governance, and utilisation of AI technologies in the education sector. These theories collectively illuminate how regulatory systems may be designed to balance innovation with accountability, public interest, human rights protection, and social equity.

Diffusion of Innovation Theory (Rogers)

The Diffusion of Innovation Theory provides a systematic explanation of how new ideas, technologies, and practices emerge, spread, and become institutionalised within social systems over time, moving from initial introduction to widespread adoption (Bodén & Dahlstedt, 2023). When applied to Tanzania's education sector, the theory offers a robust analytical lens for examining the adoption of Artificial Intelligence (AI), particularly by highlighting the social, institutional, and regulatory conditions that shape acceptance, implementation, and long-term integration within educational institutions.

Central to Rogers' (2003) diffusion model are five attributes that influence adoption decisions: relative advantage, compatibility, complexity, trialability, and observability (Bodén & Dahlstedt, 2023). In the Tanzanian context, the perceived relative advantage of AI is increasingly evident in its capacity to enhance learning outcomes, automate administrative processes, and support data-driven decision-making in education. These benefits align closely with national development priorities, thereby strengthening AI's compatibility with existing policy objectives. Notably, strategic frameworks such as the Tanzania Digital Economy Strategic Framework (2024–2034) explicitly recognise AI as a catalyst for productivity, efficiency, and innovation across sectors, including education. Such policy alignment has contributed to AI's growing legitimacy and facilitated its gradual acceptance within the education system.

Despite these enabling factors, the diffusion process is significantly influenced by perceived complexity. In Tanzania, this complexity manifests through limited technical expertise among educators and administrators, uneven digital infrastructure, and persistent uncertainties regarding ethical and legal compliance. These challenges have constrained large-scale implementation, particularly in public institutions and rural settings. Nonetheless, the attribute of trialability has played a moderating role. Higher learning institutions, in particular, have been able to experiment with AI tools, especially generative platforms such as ChatGPT, on a limited and informal basis. This phased experimentation allows institutions to assess risks and benefits without immediate, system-wide commitment, thereby reducing resistance to innovation.

Observability has further reinforced the diffusion of AI within Tanzania's education sector. The increasing visibility of positive outcomes, including improved pedagogical approaches, personalised learning systems, and enhanced educational analytics, has strengthened institutional confidence and encouraged broader acceptance, particularly within universities (Rane *et al.*, 2024). These observable benefits have contributed to a shift in perceptions of AI from a speculative technology to a practical educational tool. In response to these developments, the Ministry of Education, Science, and Technology introduced the Tanzania National Guidelines for Artificial Intelligence in Education (2025), signalling a formal institutional acknowledgement of AI's growing role in education. The Guidelines seek to promote responsible adoption by addressing ethical considerations, including data protection, digital security, fairness, and accountability. This regulatory intervention enhances the legitimacy of AI adoption by aligning technological innovation with nationally endorsed norms and standards, thereby lowering some adoption barriers.

From a strategic perspective, AI adoption has become increasingly necessary for educational institutions seeking to remain competitive and responsive to evolving learning needs (Phillips, 2023). In Tanzania, AI-enabled applications such as personalised tutoring systems, adaptive learning platforms, learner progress tracking, and enhanced instructional design tools offer practical solutions to longstanding challenges, including large class sizes, disparities in learning outcomes, and constrained educational resources (Santos & Serpa, 2023). These applications underscore the functional relevance of AI and further strengthen its perceived relative advantage within the diffusion process.

Overall, from a diffusion of innovation standpoint, Tanzania's education sector can be characterised as being in a transitional phase, shifting from early-stage experimentation toward gradual institutional acceptance of AI technologies.

This transition is driven by government prioritisation of digital transformation, increasing awareness of AI's educational benefits, and the expansion of pilot initiatives within higher education and selected secondary schools. The visibility of early successes has further stimulated interest and experimentation among key stakeholders.

However, notwithstanding these positive developments, the pace and sustainability of AI diffusion remain constrained by structural and legal limitations. Persistent capacity gaps, infrastructural disparities between urban and rural areas, and unreliable connectivity continue to hinder equitable adoption (Soomro & Baig, 2024). More fundamentally, Tanzania's existing legal and regulatory framework does not yet provide comprehensive governance for AI in education. While instruments such as the National ICT Policy and the Education and Training Policy recognise the importance of digital technologies, they offer limited guidance on AI-specific concerns, including algorithmic accountability, ethical deployment, procurement standards, data governance, and liability for AI-driven decisions. The absence of detailed subsidiary legislation and dedicated regulatory oversight mechanisms generates legal uncertainty, which may deter institutional investment and inhibit responsible innovation (Soomro & Baig, 2024).

Thus, the Diffusion of Innovation Theory demonstrates that the sustainable integration of AI in Tanzania's education sector cannot be achieved solely through technological availability. It requires a coherent, enforceable legal and policy framework that provides regulatory clarity, safeguards fundamental rights, and aligns with existing education and data protection laws. Institutional readiness must therefore be strengthened through legally grounded capacity-building initiatives, clear standards for AI deployment, and effective coordination between education authorities and technology regulators. Without such systemic legal and institutional support, the diffusion of AI in Tanzanian education risks remaining fragmented, uneven, and ultimately unsustainable.

Regulatory Governance Theory

Regulatory Governance Theory examines how governments and regulatory institutions design and implement interventions to manage risks, protect the public interest, and establish standards of practice across different sectors. Rather than relying solely on rigid "command-and-control" regulation, the theory emphasises a broad mix of regulatory approaches, including rule-based enforcement, institutional dialogue, stakeholder participation, soft-law standards, and adaptive governance strategies (Mahrishi *et al.*, 2025). Central to this perspective is the recognition that effective regulation must balance oversight and accountability with the need to promote innovation, flexibility,

and social development. The theory therefore analyses not only the content of regulations but also how regulatory systems function in practice, highlighting the dynamic relationships among public authorities, private actors, and technological change.

In the context of Artificial Intelligence (AI) integration in education, Regulatory Governance Theory provides a useful framework for understanding the development of policies and institutional arrangements to ensure that AI technologies are introduced in ethical, fair, transparent, and safe ways. The primary objective of regulation is not to inhibit technological advancement but to guide AI adoption so that its benefits, such as personalised learning, intelligent tutoring systems, and efficient academic administration, are maximised while its risks are minimised (Mahrishi *et al.*, 2025). These risks include algorithmic discrimination, misuse of personal data, opaque decision-making processes, and threats to academic integrity.

García-López and Trujillo-Liñán (2025) identify three interrelated ethical challenges that underscore the need for robust regulation of generative AI in education. First, privacy and data protection concerns arise where sensitive personal information is collected, processed, or used to train AI systems without adequate legal safeguards or user consent. Weak oversight exposes students and educators to data misuse and security breaches. Second, algorithmic bias poses risks to educational equity, as AI systems trained on biased datasets may replicate or intensify existing social inequalities, leading to discriminatory outcomes in assessment, admissions, or learning support. Third, cognitive autonomy is increasingly at risk when excessive reliance on AI tools diminishes students' independent thinking, creativity, and capacity for self-directed learning.

Human Rights-Based Approach

The Human Rights-Based Approach (HRBA) constitutes a normative and operational framework that places internationally recognised human rights at the centre of policy design, implementation, monitoring, and evaluation. Its fundamental objective is to transform abstract legal standards into tangible social realities by integrating the principles of non-discrimination and equality, participation and inclusion, transparency, accountability, and empowerment into governance processes (Schmitz, 2012). Under HRBA, states and other institutional actors are recognised as duty-bearers obligated to respect, protect, and fulfil human rights, while individuals and communities are viewed as rights-holders entitled to claim and exercise these rights (Sonnonberg *et al.*, 2023).

In the context of technological governance, HRBA requires that the development, deployment, and regulation of innovations such as artificial intelligence (AI) align with established legal obligations, particularly those concerning the right to education, equality before the law, privacy, dignity, and freedom from discrimination (Lane, 2022).

Human rights are codified under multiple layers of international and domestic legal instruments, including the Universal Declaration of Human Rights (UDHR), binding human rights treaties such as the International Covenant on Economic, Social, and Cultural Rights (ICESCR), regional human rights charters, national constitutions, and sector-specific legislation. Article 26 of the UDHR and Article 13 of the ICESCR explicitly recognise education as a fundamental human right that must be accessible, available, acceptable, and adaptable to all persons without discrimination. HRBA therefore mandates that any technological intervention in education, including AI-driven platforms, digital assessment tools, and automated administrative systems, must promote, rather than undermine, the realisation of this right.

In the era of artificial intelligence, HRBA is particularly relevant because AI technologies present a dualistic impact on educational delivery. On the one hand, AI enhances access to learning resources, personalises pedagogical methods, streamlines administration, and supports students with diverse learning needs through assistive technologies (Ma'amor et al, 2024). On the other hand, AI risks perpetuating or deepening existing inequalities due to disparities in connectivity, digital literacy, infrastructure, and affordability. These inequalities disproportionately affect marginalised and vulnerable populations, including students with disabilities, learners in rural or low-income communities, linguistic minorities, and girls. The resulting digital divide threatens to convert technological progress into a new form of exclusion, thereby contradicting the HRBA principle of equality and non-discrimination (Ma'amor *et al.*, 2024).

Methodology

This study adopts a qualitative research design, integrating doctrinal and comparative legal research methods to critically examine the legal and policy frameworks governing the adoption of Artificial Intelligence (AI) in the education sector. The doctrinal method facilitates a systematic analysis of Tanzanian statutes, judicial decisions, and policy instruments relevant to AI governance, enabling the identification of normative gaps, inconsistencies, and limitations within the existing legal regime. Complementarily, the comparative approach provides broader analytical perspectives by drawing insights from international and regional legal instruments, as well as selected foreign jurisdictions with advanced experience in AI regulation and educational innovation.

The selection of doctrinal and comparative methods is informed by the nature of legal research, which primarily involves desktop-based analysis aimed at interpreting laws, assessing their adequacy, and proposing reforms to address identified gaps. At the international and regional levels, the study examines key normative instruments, including UNESCO's Guidance for Generative AI in Education and Research, the OECD AI Principles, the European Union's Ethical Guidelines for Trustworthy AI, the Beijing Consensus on AI and Education (2019), and the African Union's Continental AI Strategy (2024). These instruments are analysed for their emphasis on core principles such as inclusivity, data protection, transparency, accountability, and human rights protection.

Comparative insights are further drawn from selected jurisdictions, namely China, the United States, and Finland. These countries were chosen for their demonstrated leadership in AI adoption in education and the relative maturity of their AI-related legislative and policy frameworks. The comparative analysis highlights practical regulatory approaches and institutional arrangements that may inform context-sensitive reforms in Tanzania.

At the national level, the study analyses relevant Tanzanian legislation, including the Cybercrimes Act, 2015 and the Personal Data Protection Act, 2022, alongside key policy instruments such as the Tanzania National Guidelines for Artificial Intelligence in Education, 2025, the National Digital Education Strategy (2024/25–2029/30), and the National ICT Policy, 2016. Legal analysis is conducted using established principles of statutory interpretation, including the mischief rule, the golden rule, and textual, purposive, and contextual interpretation. Both inductive and deductive reasoning are employed to assess legislative coherence, ethical implications, and regulatory adequacy. Through this integrated methodological approach, the study generates evidence-based recommendations to strengthen Tanzania's legal and institutional framework for AI in education. The findings contribute to the broader discourse on AI governance by offering practical insights for policymakers, legal practitioners, and educators seeking to align domestic legal frameworks with international standards while safeguarding human rights and educational equity.

Findings and Discussion

This section critically evaluates the extent to which the study's specific objectives have been achieved. It commences with a systematic assessment of the adequacy of Tanzania's existing legal and policy frameworks governing the application of artificial intelligence (AI) in the education sector. The section subsequently identifies and analyses the principal legal, ethical, and institutional gaps within the prevailing regulatory framework, situating these shortcomings against relevant regional and international normative standards.

Building on this analysis, the discussion advances context-specific legal and policy reform proposals to promote the ethical, accountable, and rights-based integration of AI within Tanzania's education system.

The adequacy of Tanzania's existing legal and policy frameworks governing the use of artificial intelligence (AI) in the education sector

Tanzania's education system spans all levels of learning, from early childhood education to higher education, and is underpinned by a broad range of legal and policy instruments intended to promote access, quality, and equity. While these frameworks have historically provided a stable foundation for education governance, their capacity to address the integration of advanced digital technologies, particularly Artificial Intelligence (AI), remains limited. The existing regulatory environment is largely designed for conventional educational delivery and general ICT adoption, rather than the distinctive legal, ethical, and institutional implications posed by AI-driven educational systems. At present, the most explicit attempt to address AI in education is reflected in the Tanzania National Guidelines for AI in Education (2025). Although these guidelines signal an important policy acknowledgement of AI's transformative potential, they lack legal force and do not establish binding standards or enforcement mechanisms. Consequently, AI governance in education remains fragmented and institutionally weak. This regulatory insufficiency creates practical vulnerabilities, including inadequate protection of students' personal data, uncertainty regarding accountability and liability for AI-related harms, and heightened risks of biased, unethical, or discriminatory use of AI-enabled learning tools.

More broadly, Tanzania's policy landscape has traditionally focused on ICT integration rather than AI as a distinct technological paradigm. Existing instruments governing ICT adoption across education and other sectors, as observed by Manyengo (2021), provide a general digital foundation but fall short of addressing AI-specific risks and opportunities. Key among these is the National ICT Policy of 2003, revised in 2016, which played a pivotal role in expanding Tanzania's ICT sector and supporting the country's transition toward a knowledge-based society. Despite its contribution to digital growth and socio-economic development, the policy does not sufficiently anticipate or regulate emerging technologies such as AI, particularly within sensitive sectors like education.

Similarly, the Draft National ICT Policy of 2023, developed in alignment with the Digital Economy Strategic Framework (2023–2033), articulates an ambitious vision of positioning Tanzania as a digitally competitive economy prepared for the Fourth Industrial Revolution. The policy emphasises innovation, entrepreneurship, and the development of digital skills. However,

despite recognising rapid technological change, it fails to explicitly address AI as a distinct regulatory concern. This omission is significant, given AI's growing influence across education, healthcare, and governance, and raises questions about the policy's adequacy in guiding AI-driven educational transformation.

A critical assessment of these policy instruments reveals a persistent gap between the aspiration for digital transformation and the regulatory specificity required to manage AI technologies. AI is not merely an extension of conventional ICT; it represents a structural shift with profound implications for data governance, privacy, labour markets, ethics, and social equity. As highlighted by UNESCO (2025), harnessing AI's benefits requires dedicated regulatory frameworks that address algorithmic accountability, ethical deployment, transparency, and the broader socio-economic consequences of automation elements that are largely absent in Tanzania's current policy architecture.

Notwithstanding these gaps, there are emerging indications of increased governmental awareness regarding the need to modernise the education system. The development of the Digital Education Strategy for Tanzanian Schools, Colleges, and Universities demonstrates a growing commitment to digital transformation in education. This strategy aligns with the revised Education and Training Policy (2023) and the National ICT Policy (2024), and seeks to improve learning outcomes, enhance access, and ensure the relevance of education to national development priorities (Matto & Ponera, 2025). However, while the strategy facilitates ICT integration, it does not provide a comprehensive legal framework for governing AI-specific applications in education.

From a legislative perspective, the adequacy of existing education laws remains limited. The Education Act of 1978, which provides the overarching framework for the administration of education in Tanzania, predates the emergence of AI and contains no provisions addressing advanced digital technologies. This legislative silence leaves a regulatory vacuum regarding the use of AI in teaching, assessment, student monitoring, and administrative decision-making. Similarly, the Tanzania Universities Act of 2005 establishes the Tanzania Commission for Universities (TCU) as the regulatory authority for higher education institutions, but does not address AI-related governance challenges, such as algorithmic decision-making, academic integrity, or digital ethics in universities.

Although Tanzania has enacted several technology-related laws, including the Cybercrimes Act (2015), the Electronic and Postal Communications Act (2010), and the Personal Data Protection Act (2022), these instruments are not

tailored to the complexities of AI deployment in education. They provide general protections against cyber risks and data misuse, but do not adequately regulate AI-specific issues such as automated profiling, algorithmic bias, explainability, and accountability in educational contexts. This underscores the need for a dedicated, sector-specific regulatory framework governing AI in education, drawing on international best practices while remaining sensitive to Tanzania's socio-economic and institutional realities.

The enactment of the e-Government Act of 2019 further illustrates Tanzania's broader commitment to digital transformation within public institutions, including the education sector. Although not specifically focused on AI, the Act establishes the e-Government Authority with a mandate to coordinate, oversee, and enforce digital governance standards across public institutions. In the absence of comprehensive AI-specific legislation, this Act provides a potential institutional framework for developing interim AI governance mechanisms, particularly in data management, interoperability, and digital service delivery.

Ongoing education reforms aimed at strengthening digital skills, expanding e-learning platforms, and integrating mobile technologies into education delivery further demonstrate Tanzania's gradual transition toward a digital education ecosystem (Oreku, 2022). These reforms lay an important foundation for future AI adoption, particularly in addressing structural challenges such as teacher shortages, unequal resource distribution, and limited access to quality education. However, without corresponding legal and policy reforms, AI integration risks deepening inequalities and exposing learners to unregulated technological harms.

In this regard, the adequacy of Tanzania's existing legal and policy frameworks remains constrained. For AI to be effectively and sustainably integrated into the education sector, there is a pressing need for robust, coherent, and enforceable regulatory instruments. Such frameworks should prioritise data privacy, ethical use of AI, transparency, educator capacity-building, and equitable access to AI-driven educational tools, particularly for learners in marginalised and underserved communities (Azaroual, 2024). Addressing these gaps is essential not only for safeguarding rights but also for ensuring that AI contributes meaningfully to inclusive, high-quality education in Tanzania.

Key Legal, Ethical, and Institutional Gaps Within the Current Regulatory Environment

Notwithstanding the transformative potential of artificial intelligence (AI) in the education sector, Tanzania's current legal and regulatory framework falls

short in addressing the complexities of AI adoption. Existing policies and legal frameworks remain largely underdeveloped and fragmented, rendering them inadequate for governing AI-enabled educational practices. These shortcomings manifest in several critical areas, including the absence of comprehensive safeguards for data privacy and security, unclear protection of intellectual property rights, and uncertainty surrounding accountability and liability for AI-related harms. In addition, the regulatory framework fails to adequately address structural challenges such as the digital divide, which risks exacerbating existing educational inequalities, as well as ethical concerns relating to bias, discrimination, and fairness in AI-driven decision-making. Collectively, these legal, ethical, and institutional gaps undermine the effective, equitable, and rights-based integration of AI within Tanzania's education system.

a) Data Privacy and Security

The right to privacy is a fundamental human right, protected by various international human rights instruments. Key among these are the Universal Declaration of Human Rights (UDHR), the International Covenant on Civil and Political Rights (ICCPR), the UN Convention on the Rights of the Child (UNCRC), and the United Nations Convention on Migrant Workers (CMW) (CIPESA, 2018). At the national level, the Constitution of the United Republic of Tanzania also guarantees this right under Article 16(1), which explicitly upholds the individual's right to privacy.

In addition to these constitutional guarantees, Tanzania has implemented a range of subordinate laws to further protect privacy. The Cybercrime Act of 2015 prohibits computer-related crimes and establishes a framework for prosecuting them. To further bolster privacy protections, Tanzania enacted the Personal Data Protection Act in 2023. This comprehensive legislation establishes the legal principles governing the protection of personal data, including minimum requirements for its collection, processing, and management.

Despite these legal safeguards, the emergence and growing use of Artificial Intelligence (AI) across sectors, particularly education, introduce novel privacy challenges. AI's capacity to process vast amounts of personal data poses unique risks, as it often requires aggregating and analysing sensitive information. This leads to situations where personal data may be shared across extensive databases, potentially beyond the direct control of the individuals involved, raising concerns about consent, control, and data security. A critical challenge lies in the blurring of roles between AI systems as both data processors and data controllers. Traditional legal frameworks, designed for human operators or organisations, struggle to accommodate these dual roles.

This gap in legal definitions creates uncertainty regarding accountability for privacy violations, especially when autonomous systems are involved (Josh & Kharola, 2024).

Furthermore, most of the existing laws, such as the Cybercrime Act of 2015, have not fully adapted to the complexities introduced by AI. The provisions in Part II of the Cybercrime Act, which relate to offences and penalties, consistently use the term "person." This raises ambiguity about whether such provisions can be extended to cover autonomous agents, such as AI systems. While it is evident that AI technologies can facilitate or even perpetuate crimes, the current legal framework lacks clarity on how to attribute liability to autonomous systems, leaving a critical gap in enforcement and accountability mechanisms.

To address these challenges, it is essential to critically assess and update legal frameworks to account for AI's role in privacy violations. This may require new legislative approaches that explicitly define the legal status of AI systems and outline clear responsibilities for both human actors and autonomous technologies in data protection. Additionally, there is a pressing need for regulatory oversight and ethical guidelines that ensure AI operates within boundaries that respect fundamental privacy rights. Developing robust, AI-specific regulations would not only close existing gaps but also foster trust in the responsible use of AI in education and other sectors.

While Tanzania has made significant strides in privacy protection through its constitution and subordinate laws, the advent of AI demands a more nuanced and forward-looking approach (Moshi, 2024). Laws and regulations must evolve to adequately address the complexities of data privacy in an AI-driven world. Failure to do so risks undermining the very protections these legal frameworks were designed to safeguard.

b) Intellectual Property (IP) Rights

Artificial intelligence (AI) has revolutionised intellectual property (IP) by fundamentally altering how creations are conceived, managed, and utilised. This technological evolution presents both unprecedented opportunities and complex challenges for inventors, businesses, and policymakers (Ali & Kamraju, 2023, p. 1). As AI tools increasingly contribute to the creation of educational materials, questions surrounding ownership rights become increasingly contentious. The ambiguity over who rightfully owns content, whether it's the user, the developer, or the AI system itself, has the potential to hinder innovative uses of AI in education (Ali & Kamraju, 2023, pp. 24-25).

Furthermore, AI's ability to generate novel, non-obvious inventions raises significant legal and philosophical questions about inventorship. Current legal frameworks in many jurisdictions are ill-equipped to resolve disputes arising from AI-generated inventions. Central to this issue is whether AI systems can be considered inventors and, if so, who holds ownership rights: the AI itself, its developers, or other stakeholders (Ali & Kamraju, 2023, pp. 24-25).

In Tanzania, as a member state of both the African Regional Intellectual Property Organisation (ARIPO) and the World Intellectual Property Organisation (WIPO), intellectual property rights are constitutionally protected. However, the Copyright and Neighbouring Rights Act, Cap. 218 defines an author as a natural person, explicitly excluding non-human entities, such as AI, from holding copyright. This exclusion aligns with WIPO's definition of intellectual property as creations of the human mind protected under relevant IP laws (Ali & Kamraju, 2023, p. 25).

Internationally, rulings from entities like the European Patent Office (EPO) and the United States Patent and Trademark Office (USPTO) affirm that inventors must be human beings, not AI systems. While the USPTO has yet to fully address the issue of AI-generated inventions, legal scholars argue that existing frameworks inadequately address the complexities posed by AI, necessitating new legal paradigms to safeguard intellectual property rights in the age of AI (Ali & Kamraju, 2023, p. 25). The transformative impact of AI on intellectual property highlights the need for robust legal frameworks that can effectively accommodate and regulate AI-generated innovations, while providing clear and fair guidelines for determining ownership and rights. Tackling these challenges will be essential for promoting ongoing innovation and ensuring the ethical application of AI in education and other sectors.

c) Accountability and Liability

Accountability and liability present significant legal challenges when dealing with AI systems in education. If an AI system malfunctions or provides incorrect information that negatively impacts a student's learning, determining who should be held accountable becomes a complex issue. Should it be the educational institution using the AI, the AI developer, or the individual user who relied on the information? The traditional concept of accountability revolves around four key elements: identifying responsible actors (who), determining to whom accountability is owed (to whom), establishing the timing of accountability (when), and deciding the methods for accountability (how). This framework inherently places human actors at the centre of responsibility. However, the increasing autonomy and decision-making capabilities of AI challenge this traditional notion, as AI systems shift from passive tools (objects) to active agents (subjects). This shift blurs the lines of

accountability between humans and machines (Staszkievicz *et al.*, 2023). With AI systems now capable of making autonomous decisions, the uncertainty surrounding accountability for errors, biases, or misinformation in educational outcomes becomes more pronounced. Tanzanian law currently lacks clear provisions on who should bear responsibility when AI systems cause harm. Whether the liability should fall on developers, users, or educational institutions remains unresolved.

A real-world example is the use of non-generative AI by universities for tasks such as plagiarism detection. Many institutions rely on AI tools to identify academic misconduct and penalize students accordingly. While these tools are beneficial, they are not immune to errors or risks (Giuffrida, 2023). In cases where AI falsely flags a student for plagiarism, the question of liability becomes critical: should the university, the developer of the AI tool, or the student be held responsible for the consequences of incorrect AI outputs?

In his article "Artificial Intelligence and Legal Liability in Tanzania," Ally (2023) argues that while AI and robotics are advancing rapidly, legal frameworks surrounding liability, particularly the tort of negligence, are outdated and still rooted in human-centred definitions of responsibility. Currently, legal liability is imposed on entities with legal personality, such as individuals and corporations. The tort of negligence was developed specifically to address human conduct or the actions of entities recognised by law. However, this framework becomes inadequate when applied to AI, which, despite its increasing autonomy, lacks legal personhood.

A notable exception to this is Sophia, the AI robot created by Hanson Robotics, which was granted citizenship by Saudi Arabia in 2017. While this case is unique, it illustrates the growing legal and ethical complexities of AI autonomy. Ally (2023) points out that applying traditional liability doctrines to AI and robotics presents several legal challenges because these doctrines focus on human conduct, whereas AI operates based on algorithms and technical autonomy. The autonomy of AI, while sophisticated, remains purely technical and is not equivalent to human decision-making or legal responsibility. This raises a broader, critical issue for policymakers and legal scholars: as AI continues to evolve and assume more complex roles in society, including in education, there is an urgent need for legal reforms to address the specific challenges posed by AI's autonomy. Such reforms must ensure that accountability and liability are clearly defined to prevent legal ambiguities that could undermine trust in AI systems and limit their innovation potential.

While AI's transformative potential in education and other sectors is undeniable, its growing autonomy poses significant legal challenges regarding accountability and liability (Holzhausen, 2024). Current legal frameworks,

including those in Tanzania, are ill-equipped to handle the complexities introduced by AI. Without clear regulations and updated laws, issues such as negligence, misinformation, and bias in AI systems will continue to raise difficult questions about who should bear the responsibility. Addressing these gaps is crucial for fostering trust in AI and ensuring its ethical application in education and beyond.

d) The Digital Divide

The digital divide in education poses a significant barrier to equitable access to quality educational resources, disproportionately affecting students from low-income families, rural areas, and underserved communities. This gap exacerbates existing educational inequalities, making it more difficult to achieve the United Nations Sustainable Development Goal 4 (SDG 4), which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (Brian & Owin, 2024). Bridging this divide is critical not only for social justice but also for fostering a more inclusive global economy and workforce.

The rapid advancement of Artificial Intelligence (AI) promises transformative changes across societies, economies, and the world of work. While these developments offer immense opportunities for innovation, productivity, and growth, they also risk widening existing global and local disparities. High-income nations and affluent communities are disproportionately benefiting from AI advancements, while low- and middle-income countries, particularly in Africa, continue to lag in investment, adoption, and implementation of AI technologies (United Nations, 2024). This emerging "AI divide" mirrors the broader digital divide, amplifying inequities within and between countries, and even within different sectors of society, such as education.

In educational contexts, this divide manifests as a growing gap between students who have access to AI-driven tools and resources and those who do not. The privileged schools and communities are better positioned to harness the benefits of AI, leaving behind marginalised groups, particularly students from rural or low-income backgrounds who remain on the periphery of technological advancements. The unequal access to AI in education threatens to deepen existing socio-economic divides, entrenching systemic inequalities and creating a stratified educational landscape where opportunities for success are unequally distributed (United Nations, 2024).

Moreover, the rapid pace of AI development has outstripped the capacity for adequate governance, regulation, and ethical oversight. This has raised concerns about the ethical implications of AI technologies, particularly regarding data privacy, bias, and fairness. As AI becomes more integrated into

educational systems, questions of access and equity are paramount. There is growing apprehension about the potential for an AI-driven future where some groups, whether based on geography, income, or social class, are better equipped to benefit from technological advancements, while others are left behind (Bentley *et al.*, 2023). This "AI divide" can manifest on multiple levels, from the national and institutional levels to individual disparities based on socio-economic status. At a group-based level, the divide could exacerbate labour market inequalities.

The demand for jobs requiring advanced digital skills is expected to rise, while jobs that require lower-level digital skills may decrease. This shift will disproportionately impact those from lower socio-economic backgrounds, as they are less likely to have access to the necessary educational resources to develop these high-level skills. For individuals and communities already disadvantaged by limited access to technology, their ability to leverage AI's potential benefits will be significantly reduced, further entrenching socio-economic disparities (Bentley *et al.*, 2023).

In Tanzania, despite efforts to improve digital infrastructure, many rural and remote areas continue to lack the technological resources needed to implement AI-driven educational solutions. The digital divide in these regions exacerbates educational inequality, creating an urgent need for legal frameworks that address this gap and ensure equitable distribution of AI benefits across all student populations. Although governments, including Tanzania's, have been compelled by the United Nations to uphold the right to education, many of the existing laws are outdated and ill-equipped to address the specific challenges posed by AI and other emerging technologies (Ally, 2024). A stark example of the digital divide was revealed during the COVID-19 pandemic. As educational institutions globally transitioned to online learning to mitigate the risks of the virus, students who lacked access to digital devices and the internet were effectively excluded from education. In Tanzania and many other countries, this led to the marginalisation of students from rural or disadvantaged backgrounds, who were unable to participate in remote learning due to the lack of necessary technology (Ally, 2024). This experience underscores the critical importance of addressing the digital divide in education to ensure that future crises do not disproportionately affect vulnerable populations.

From a legal perspective, there are international and regional frameworks that recognise the right to education and the importance of digital rights. The African Declaration on Internet Rights and Freedoms, for instance, emphasises the protection of internet rights, which is critical for bridging the digital divide. In Tanzania, the right to education is enshrined under Article 11(2) of the

Constitution of the United Republic of Tanzania, 1977. However, this provision is broad and does not specifically address the challenges posed by AI and digital technologies. Moreover, it is not enforceable under the Basic Rights and Duties Enforcement Act (Act No. 33 of 1994), as it is not classified as a basic right.

To address the digital and AI divides, Tanzania and other countries must enact updated, enforceable laws that specifically address the intersection of education, AI, and digital equity. Legal frameworks should aim to ensure that all students, regardless of socio-economic background or geographic location, have access to the tools and resources necessary to succeed in an increasingly AI-driven world. In doing so, governments will not only advance educational equity but also foster the inclusive development of AI technologies that benefit society as a whole. Without such legal and policy interventions, the AI divide will continue to reinforce existing inequalities, limiting opportunities for those already at a disadvantage.

e) Ethical Considerations and Discrimination

AI algorithms, while revolutionary, are not immune to bias. In educational settings, the use of biased AI systems may exacerbate existing inequalities and undermine the goal of providing equitable education. Ensuring fairness and non-discrimination in AI systems is a significant challenge that the legal system must address. Bias in AI, particularly algorithmic bias, refers to the systematic and unjust discrimination against particular groups of individuals (Chadha, 2024). This problem has gained increasing attention as AI becomes more integrated into everyday life, and it is essential to explore how these biases occur and the potential harms they can cause.

Algorithmic bias is a broad term that encompasses various fairness issues in automated systems. Some biases arise from statistical or technical sources, while others emerge from the societal context in which AI operates. Researchers have defined bias as encompassing any unintended or potentially harmful properties of the data used to train AI, which could lead to unfavourable outcomes (Baker & Hawn, 2023). This is particularly relevant in education, where biased AI can create unequal opportunities for students, reinforcing social inequalities rather than addressing them.

A critical discussion of AI often centres on data privacy and security, but algorithmic bias is equally important, especially when AI is used in education. AI systems are highly dependent on the quality of data they are trained on. If this data is biased, whether due to historical inequalities, incomplete datasets, or skewed representation, the AI will reflect and sometimes amplify these biases. For instance, AI-driven tools for evaluating academic performance or predicting student success might favour students from certain demographics or

backgrounds, unintentionally disadvantaging others (Mambile & Mwagosi, 2024). Transparency and accountability in AI decision-making processes are critical to ensuring fair and equitable outcomes for all students. Educational institutions must navigate these challenges carefully to harness the benefits of AI while mitigating its risks. Without adequate transparency, it is difficult to identify and correct biased outcomes, which can result in long-term negative effects on marginalised student populations. This calls for a robust legal framework that mandates accountability and transparency for AI systems used in educational contexts.

Examples of algorithmic bias can be found across various industries, and the implications of such biases are often serious. In the U.S. criminal justice system, for instance, the COMPAS system, which predicts the likelihood of a defendant reoffending, was found to be biased against African-American defendants. According to a study by ProPublica, African-Americans were more likely to be labelled as high-risk, even when they had no prior convictions, compared to white defendants (Ferrara, 2023). This example highlights how algorithmic bias can have significant and harmful societal impacts. Similarly, facial recognition technology, widely used by law enforcement agencies, has demonstrated biases based on skin tone. A study by the National Institute of Standards and Technology (NIST) found that facial recognition systems were less accurate in identifying people with darker skin tones, leading to higher rates of false positives and potentially wrongful arrests or convictions (Ferrara, 2023). Although these examples are from industries outside of education, they illustrate the broad potential for AI to perpetuate harmful biases if not properly managed.

In the context of education, multiple studies have documented algorithmic bias impacting learners from various nationalities. These studies, primarily conducted by researchers based in the United States, investigated AI applications such as predicting academic achievement, automated essay scoring, and speech evaluation. The findings revealed biases affecting learners from countries such as China, Korea, India, Vietnam, the Philippines, and Costa Rica, as well as from regions where Arabic is the primary language (Baker & Hawn, 2023). These biases, rooted in cultural and linguistic differences, can create significant disadvantages for students from non-Western backgrounds.

To address bias in AI, it is crucial to develop AI systems that mitigate bias and promote equity. This involves several strategies, such as ensuring diverse and representative training data, enhancing algorithmic transparency, and conducting ongoing monitoring for bias and discrimination (Mambile & Mwagosi, 2024). AI developers and educational institutions must work

together to ensure that AI tools do not reinforce existing inequalities but instead foster more equitable learning environments. In addition to technical solutions, legal and policy frameworks must evolve to address the ethical and fairness concerns associated with AI in education. The responsibility for regulating AI's use in educational settings should not fall solely on institutions or developers. Governments must enact comprehensive legislation that ensures AI systems are developed, deployed, and monitored in ways that uphold fairness, transparency, and accountability. Without such legal protections, AI has the potential to exacerbate social inequalities, rather than serve as a tool for inclusive and equitable education.

Conclusions and Recommendations

Conclusions

This study finds that artificial intelligence (AI) holds significant potential to transform Tanzania's education sector by enhancing the quality, efficiency, and inclusiveness of teaching, learning, and administrative processes. AI-enabled tools can support personalised instruction, improve assessment and feedback mechanisms, streamline administrative functions, and broaden access to educational resources, particularly in contexts characterised by large class sizes and limited teaching capacity. The analysis further demonstrates that AI can play a critical role in addressing learning gaps and supporting learners with special educational needs, thereby advancing broader educational reform objectives and contributing to a more equitable education system.

However, the study also reveals that the realisation of these benefits is contingent upon deliberate, coordinated, and rights-based legal, regulatory, and infrastructural interventions. Tanzania's current legal and policy frameworks are inadequate to address the unique challenges posed by AI in education. Key gaps include insufficient safeguards for data privacy and child protection, a lack of clarity regarding accountability and liability for AI-generated harms, weak regulation of intellectual property and ownership of AI-generated educational content, and the risk of exacerbating existing inequalities through digital exclusion. Without clear, enforceable, and comprehensive governance measures, AI adoption may inadvertently reinforce structural disadvantages rather than promote equitable access to quality education.

From a human rights perspective, the study reaffirms that education is a fundamental right that must be accessible, acceptable, adaptable, and of adequate quality for all learners. Effective AI governance must therefore be grounded in a Human Rights-Based Approach (HRBA), ensuring that technological innovation supports equality, inclusion, and non-discrimination. In Tanzania, persistent disparities between urban and rural schools, uneven

digital infrastructure, and limited digital literacy increase the risk that AI-driven educational initiatives will deepen existing inequities. Moreover, inadequate protection of personal data, especially that of children, creates vulnerabilities to surveillance, misuse, and broader violations of learners' rights.

Overall, the integration of AI into Tanzania's education sector requires more than the mere adoption of technology; it demands the establishment of a coherent, rights-centred legal and institutional framework. Aligning AI governance with constitutional principles, international human rights obligations, and national education and digital development goals is essential to ensure responsible, accountable, and sustainable innovation. Supported by robust legal safeguards, institutional accountability, and inclusive policy design, AI can meaningfully contribute to Tanzania's long-term vision for digital transformation, human capital development, and educational equity, while safeguarding fundamental rights and promoting a more inclusive and high-quality education system.

Recommendations

To bridge the identified challenges and ensure responsible integration of AI within Tanzania's education sector, the following policy and regulatory measures are recommended:

a) Development of a National AI-in-Education Regulatory Framework

The analysis demonstrates that Tanzania lacks a dedicated and enforceable legal framework governing the use of AI in education. As an immediate priority, Tanzania should develop a sector-specific AI-in-education regulatory framework to guide the design, procurement, deployment, and evaluation of AI technologies in learning institutions. This framework should be grounded in a Human Rights–Based Approach (HRBA) and impose clear legal obligations relating to transparency, algorithmic fairness, accountability, and non-discrimination.

b) Strengthening Data Protection and Children's Privacy Safeguards

The findings reveal that AI platforms increasingly collect sensitive learner data without adequate safeguards or institutional capacity for compliance. It is therefore imperative to prioritise the enforcement and contextualisation of data protection laws within the education sector. Regulatory standards should mandate informed consent, data minimisation, secure data storage, and parental oversight for children's data. In addition, schools and AI service providers should be legally required to conduct Data Protection Impact Assessments and Human Rights Impact Assessments prior to deploying AI tools.

- c) *Ensuring Algorithmic Transparency and Accountability*
Public authorities should require AI systems used in education to be explainable and auditable. Mechanisms must be developed for learners, parents, and teachers to challenge automated decisions affecting assessments, admissions, or academic progression. Independent oversight bodies should be empowered to investigate discriminatory or unlawful AI practices.
- d) *Addressing the Digital Divide through Targeted Investments*
The government should expand digital infrastructure, especially in rural and underserved communities, by improving school connectivity, providing affordable learning devices, and supporting community digital resource centres. Equity-focused funding schemes can help ensure that AI adoption does not privilege well-resourced institutions at the expense of disadvantaged learners.
- e) *Institutionalising Continuous Monitoring and Evaluation*
The government should institutionalise regular monitoring and evaluation of AI's impact on educational quality, equity, privacy, and inclusion. Evidence-based regulatory review mechanisms will allow policymakers to respond proactively to emerging risks and technological changes, thereby reinforcing long-term sustainability.
- f) *Promoting Digital Literacy and Capacity Building*
Teacher training programs should incorporate digital and AI literacy components to prepare educators to effectively and ethically integrate AI into teaching methods. Learners should also receive instruction on digital rights, online safety, and responsible technology use to enable informed participation in AI-driven education environments.
- g) *Protecting Intellectual Property and Educational Content Rights*
Legal clarity is required regarding ownership of AI-generated educational materials, authorship rights, and fair use exceptions. Reforms should ensure that AI tools do not undermine teachers' intellectual contributions and that educational content remains accessible under open licensing models where appropriate.
- h) *Encouraging Stakeholder Participation and Public Engagement*
AI policy development should involve broad consultations with teachers' unions, parent associations, disability advocacy groups, civil society organisations, technology experts, and students to ensure that governance frameworks reflect local needs and lived experiences. Such participatory governance aligns with HRBA standards and fosters public trust in emerging technologies.

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Exploring the Economic Barriers in the Intersection of Openness, Technology, and Equity in Tanzanian Higher Education

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Abstract

This study explores the role of Technology in Education (TE) and Openness in Education (OE) in contributing to Equity in Education (EE), while highlighting economic barriers that continue to constrain access, inclusion, and digital participation within Tanzanian higher education. A quantitative survey design with a sample of 115 university graduates was selected through simple random sampling to ensure representativeness. Data were collected using a structured questionnaire measuring three constructs. Analysis followed a multi-stage approach. Exploratory Factor Analysis (EFA) using Maximum Likelihood extraction established the factor structure, supported by KMO and Bartlett's test, with items below 0.40 loadings excluded. Confirmatory Factor Analysis (CFA) assessed model fit using indices such as Chi-square/df, RMSEA, GFI, CFI, TLI, and SRMR. Finally, PLS-SEM was conducted in SmartPLS, appropriate for exploratory models and small samples. Findings reveal that TE has a strong positive direct effect on EE and OE. Moreover, OE significantly mediates the relationship between TE and EE. Despite these benefits, the persistent high cost of technology, connectivity, and digital learning resources threatens to widen inequality. This research emphasises the dual role of technology, offering pathways toward equity while simultaneously creating new forms of financial exclusion. The study recommends economic interventions to reduce digital costs, expand public investment, and promote sustainable financial models that support openness and equitable digital access.

Keywords: Openness, Technology, Equity, Economic Barriers, Tanzanian Higher Education

Introduction

Tanzania's higher education sector has expanded significantly in recent decades as part of national efforts to build a skilled workforce and stimulate socio-economic development. Government policies have sought to broaden enrolment through the establishment of new institutions and programs, as well as through mechanisms such as the Higher Education Students' Loans Board (HESLB) to support access for students from diverse backgrounds. Nevertheless, persistent infrastructure gaps and uneven regional distribution of universities continue to limit broad participation, particularly for students from rural and disadvantaged communities (Ministry of Education report, 2025). The digital divide in Tanzanian higher education illustrates how socioeconomic status shapes access to technology, with students from poorer households often unable to afford devices or sustained internet connectivity. High costs of data and inadequate broadband infrastructure further entrench inequities, restricting meaningful participation in e-learning and open platforms despite their theoretical inclusivity. Likewise, challenges such as unreliable electricity in rural areas exacerbate disparities in technological access, undermining efforts to mainstream digital learning tools across all regions (Policy Forum Tanzania, 2025).

Technology in education is multifaceted, encompassing access to digital tools, curriculum integration, and educator readiness. Ensuring equitable access to digital devices and reliable internet is foundational for digital learning, a necessity underscored during the COVID-19 pandemic (OECD, 2021). Embedding technology in the curriculum is critical for fostering student engagement and promoting 21st-century skills. UNESCO (2022) emphasises the role of ICT in enhancing personalised learning and cross-disciplinary integration. Moreover, digital literacy, the competency to navigate digital environments effectively, is an essential skill for both students and educators, as highlighted by the European Commission (2019). To support this, professional development is necessary; ISTE (2020) outlines standards to guide educators in implementing effective digital strategies. Furthermore, the adoption of Learning Management Systems (LMS) and other EdTech tools facilitates not only remote learning but also the administration and scalability of education delivery (World Bank, 2020). Together, these indicators reflect a systemic approach to integrating technology in education.

Equity in education remains a complex construct encompassing fairness in opportunities, access, participation, and outcomes for all learners. According to Martínez García and Giovine (2025), measuring equity must account not only for statistical distributions but also for their normative underpinnings, which provide deeper insight into systemic inequities. The achievement gap disparities in academic performance across different socioeconomic or ethnic

groups remain a central challenge (OECD, 2018). Equitable resource allocation is imperative to address this gap, ensuring that underserved schools have access to qualified teachers and essential learning materials. Furthermore, equity is reflected in students' ability to access advanced coursework and extracurricular programs, as documented by the UNESCO Institute for Statistics (2018). Such access promotes holistic development and prepares students for future academic pursuits. Support services, including counselling, language aid, and special education, are also key to ensuring all students thrive regardless of their backgrounds. The broader school environment also plays a pivotal role; students' well-being, sense of belonging, and safety directly influence their ability to succeed. Kostyo, Cardichon, and Darling-Hammond (2018) argue that inclusive school climates are critical for closing the opportunity gap. These dimensions together define a framework for achieving educational equity.

One of the central developments in open education is the Open Educational Resources (OER) movement, which provides the foundation for much of the discourse around content accessibility and reuse. Hilton *et al.* (2010) introduced the "Four R's" framework, Reuse, Revise, Remix, and Redistribute, to define the essential permissions that characterise OER, later expanded into the "5R" model by Wiley (2014), adding Retain. These frameworks offer practical guidelines for the licensing and sharing of educational content. UNESCO (2019) formalised the international commitment to OER through its Recommendation, which highlights four key action areas: capacity building, supportive policies, inclusive and high-quality resource development, and sustainable models for open practices. Building on this, research has examined the creation, use, and broader impacts of OER. For instance, Cisel (2024) investigated faculty attitudes toward OER and found disciplinary differences in openness practices, while McMartin (2008) emphasised OER's potential to broaden educational access. Wiley and Hilton (2018) explored OER-enabled pedagogy, emphasising how open content can transform instructional practices. Moreover, the construct of openness in education demands a comprehensive approach, with indicators spanning pedagogical, technological, cultural, ethical, and policy dimensions. A foundational indicator is the proportion of faculty or institutions actively engaged in creating, adapting, or using OER (Hilton *et al.*, 2010; Wiley, 2014). Atenas *et al.* (2019) add that meaningful openness should also be evaluated through the presence of localised, co-created, and culturally responsive OER.

The objective of this article is to examine the relationships between Technology in Education, Openness in Education, and Equity in Education, with a focus on how openness mediates the impact of technology on educational equity within the context of Tanzanian higher education.

Economic barriers play a central role in shaping inequities at the intersection of openness, technology, and equity, particularly in developing economies. Although openness, such as open educational resources (OER), open data, and open science, is intended to democratize access to knowledge and innovation, its benefits remain unevenly distributed due to underlying economic constraints. Studies on the digital divide consistently demonstrate that the affordability of internet services, digital devices, and supporting infrastructure remains a significant obstacle to meaningful participation in open digital ecosystems (van Dijk, 2017). Individuals and institutions from low-income backgrounds often lack the financial capacity to acquire reliable connectivity and up-to-date technologies, limiting their ability to benefit from open platforms and digital opportunities (Ragnedda & Muschert, 2020). As a result, openness alone does not guarantee equity when economic inequalities persist. Furthermore, the costs associated with technological adoption extend beyond access to include digital skills development and maintenance, which disproportionately burden marginalised groups. Research shows that digital literacy and advanced technological competencies are strongly correlated with income levels, educational investment, and institutional capacity, reinforcing socioeconomic stratification in the digital age (OECD, 2019; Robinson *et al.*, 2015). In higher education and research, scholars from low-resource settings face financial barriers related to publication fees, data access, software licensing, and research infrastructure, which restrict their participation in open knowledge production despite the availability of open science initiatives (Chan *et al.*, 2020; Tennant *et al.*, 2019). Consequently, open systems may inadvertently reproduce global knowledge hierarchies rather than dismantle them.

At a structural level, market dynamics and power asymmetries within the technology sector further exacerbate economic inequities. Large technology firms often dominate open digital platforms, shaping access conditions, monetisation models, and data governance in ways that favour well-resourced users and institutions (Zuboff, 2019; Srnicek, 2017). This concentration of economic power undermines the equity goals of openness by marginalising smaller actors, public institutions, and users from low-income regions who lack the capital to compete or comply with platform requirements. Scholars therefore argue that without deliberate redistributive policies, public investment, and inclusive governance frameworks, the intersection of openness and technology risks reinforcing existing economic inequalities rather than promoting equitable development (UNESCO, 2021; Selwyn, 2016).

Statement of the Problem

Despite ongoing reforms aimed at expanding access to higher education, Tanzania continues to experience low participation and persistent inequities

linked to economic constraints, technological access, and openness in the higher education system. According to the World Bank, Tanzania's tertiary gross enrolment ratio (GER) was approximately 5.22% in 2023, significantly lower than the global average of over 40%, indicating that the majority of eligible youth are excluded from higher education opportunities (World Bank, 2024). This low enrolment persists despite improvements in secondary education completion rates, suggesting that economic and structural barriers remain significant constraints on equitable access.

Economic barriers play a central role in limiting openness and equity in Tanzanian higher education. Students from low-income households face high direct costs such as tuition fees, learning materials, and accommodation, as well as indirect costs including transportation and foregone income. The Government of Tanzania acknowledges that financial constraints continue to limit access to higher education, particularly for students from rural and disadvantaged backgrounds, thereby undermining national objectives for inclusive human capital development (Ministry of Finance and Planning (MoFP, 2021).

The integration of technology, which is critical for promoting openness through digital and online learning, is further constrained by unequal access to digital infrastructure. As of 2023, internet penetration in Tanzania stood at approximately 31%, with significant disparities between urban and rural areas (International Telecommunication Union (ITU, 2024). However, as of the latest available data in 2025, internet penetration rates in Tanzania vary by source and methodology, but recent regulatory figures show a much higher adoption rate than earlier estimates. Internet penetration in Tanzania has reached approximately 85.3% to 87% of the population as of late 2025, according to [Tanzania Communications Regulatory Authority \(TCRA\) reports](#) and [TechAfrica News](#). This rapid growth, with over 56 million users, is driven by expanding 4G and 5G network coverage, increased affordability of mobile devices, and the central role of mobile money.

Limited access to reliable internet, electricity, and digital devices restricts students' ability to engage in technology-enabled learning, access open educational resources, and participate in blended or online higher education programs. These challenges disproportionately affect students from low-income households, reinforcing existing educational inequalities (United Nations, 2024).

Gender disparities further intersect with economic and technological barriers. Women remain underrepresented in science, technology, engineering, and mathematics (STEM) fields and technology-related programs in Tanzanian

higher education. Recent estimates indicate that women account for about 10% of computer science graduates and less than 30% of the technology workforce, reflecting persistent gender gaps in access to technology-driven education and opportunities (International Labour Organisation (ILO, 2023). These disparities limit women's participation in the digital economy and weaken the equity outcomes of higher education expansion.

Generally, the interaction between economic constraints, limited technological access, and unequal openness continues to hinder equitable participation in Tanzanian higher education. Without addressing these interconnected barriers, efforts to leverage technology for openness and inclusion risk exacerbating existing inequalities rather than reducing them. This study therefore seeks to explore the economic barriers at the intersection of openness, technology, and equity in Tanzanian higher education to inform more inclusive and sustainable policy interventions.

Literature Review

Give a brief explanation of the theories used and their relation in this study

Technology in Education

The integration of technology in education has progressed from a supplementary role to a central element of pedagogical practice, particularly in online and distance learning (ODL). UTAUT (Venkatesh *et al.*, 2003) and TAM have been widely employed to explain technology adoption, consistently identifying performance expectancy, effort expectancy, social influence, and facilitating conditions as key predictors (Chang, 2020; Dwivedi *et al.*, 2019; Williams *et al.*, 2015). Studies continue to refine these models: Itasanmi (2023) added attitude as a predictor among Nigerian ODL students, while Naranjo-Zolotov *et al.* (2019) incorporated psychological empowerment. Al-Sayid and Kirkil (2025) combined UTAUT, TAM, and HCI to show that interface design and interactivity significantly impact perceived success and continued use.

Recent research underscores the transformative impact of the Fourth Industrial Revolution (4IR) on education, with technologies such as artificial intelligence (AI), automation, and the Internet of Things (IoT) rapidly reshaping learning environments (Adewale *et al.*, 2023; Spector & Ifenthaler, 2024; Kamalov *et al.*, 2023). These innovations enable personalised instruction, real-time feedback, and enhanced learner engagement. However, ethical concerns around data privacy and algorithmic bias persist, highlighting the need for cautious integration (Spector & Ifenthaler, 2024). Despite the potential of 4IR technologies, many education systems, particularly in the Global South, remain unprepared. Oke and Fernandes (2020) emphasise that African educational institutions face systemic limitations in infrastructure, policy, and

curriculum development. Similar concerns arise in rural and underserved areas, where access gaps continue to undermine equitable participation. Naim (2025) identifies the unequal distribution of devices, poor connectivity, and insufficient digital skills as significant barriers and advocates for comprehensive interventions that prioritise access, training, and teacher readiness.

Findings across regions affirm the relevance of contextual factors. Xie and Pamintuan (2025) identified performance expectancy and social influence as strong predictors in Southeast Asia, with infrastructure affecting actual use. Ramillah and Nurkhin (2020) found similar trends in Indonesia, though anxiety and prior experience moderated outcomes. Ryu and Fortenberry (2021) reaffirm the importance of perceived usefulness and ease of use in influencing adoption across platforms. Digital literacy remains essential for effective technology use. Digital literacy emerges as another critical factor. Ozdamar-Keskin *et al.* (2015) examined the competencies of distance learners in Turkey. They found that although learners possess some digital problem-solving skills, they lack the advanced digital literacy needed to leverage online learning tools fully. This calls for targeted training and more inclusive instructional design to accommodate diverse learner profiles. Similarly, Hsu (2023) applied Self-Determination Theory to UTAUT in Language MOOCs, demonstrating that autonomy, competence, and relatedness significantly influenced motivation and behavioural intention.

The shift to online learning during the COVID-19 pandemic further accelerated technology adoption. Chaw *et al.* (2022) found that students' acceptance of Online Distance Learning (ODL) was significantly influenced by institutional support and social influence, reinforcing the importance of environmental factors in digital engagement. Mobile learning (m-learning) also emerged as a viable solution for flexible, student-centred learning. In Ghana, Arthur-Nyarko *et al.* (2020) observed that although students were receptive to digital learning, poor internet access and high device costs limited participation. These findings align with broader concerns that rapid technological growth outpaces systemic capacity to support inclusive implementation.

AI is increasingly used to personalise learning, with studies highlighting its predictive capabilities and potential for targeted interventions (Adewale *et al.*, 2024). However, disparities in adoption underscore the need for equity-focused strategies. More broadly, technology adoption is influenced by behavioural, design, and contextual factors, suggesting that foundational models such as UTAUT and TAM should be expanded to incorporate psychological and cultural dimensions to support more inclusive digital education.

Equity in Education

Equity theory, first formulated by J. Stacy Adams (1963, 1965), has long served as a foundational model for understanding fairness in social exchanges, particularly within organisational and economic contexts. In recent decades, researchers have increasingly applied this theory to educational systems, examining how perceptions of fairness, input-output balance, and comparative reference points influence motivation, performance, and policy responses in learning environments. This review synthesises key theoretical, empirical, and methodological insights from a diverse array of scholarly contributions, highlighting the relevance and application of equity theory to education.

Equity theory posits that individuals assess fairness by comparing the ratio of their inputs (e.g., effort, ability, education) to outcomes (e.g., grades, rewards, recognition) with those of a referent other (Adams, 1965; Pritchard, 1969). Education frequently figures prominently in this framework, influencing both personal perceptions of fairness and broader systemic evaluations (Pritchard, 1969). Cross-cultural research extends the theory's applicability by revealing varied perceptions of fairness. Buzea (2014) examined equity constructs in Romania, finding that employees often prioritise recognition over financial rewards and compare themselves against personal standards rather than peers. These insights resonate with educational settings, where local cultural norms and internalised benchmarks may shape students' and teachers' sense of fairness. Equity in education remains a central concern for scholars and policymakers, as systemic inequalities often reflect sociodemographic divisions such as race, class, and gender. They observe that labelling students as graduates or non-graduates highlights an inherent inequality in educational systems. While some degree of inequality may be inevitable, the critical issue, they argue, is the extent to which educational success or failure is associated with sociodemographic factors such as race, class, and gender. Several theoretical frameworks address these disparities, including functionalist perspectives, social and cultural reproduction theory, cultural pluralism, and structural inequality theories. These models highlight how educational systems can either reproduce or challenge existing social hierarchies. A functionalist perspective views education as a means of allocating individuals to different positions in society based on their abilities. At the same time, social and cultural reproduction theory emphasises how education can perpetuate existing social inequalities by favouring certain cultural norms and values. Cultural relativism and pluralism highlight the importance of recognising and valuing diverse cultural backgrounds within the educational system. Theories of structural inequality examine how broader social and economic structures contribute to educational disparities.

At the international level, empirical evidence links educational inequality with broader economic disparities, reinforcing the social urgency of equitable policy design. Research by Miles, Cromer, and Narayan (2015) illustrates how perceptions of fairness in educational practices influence student participation, emphasising the role of subjective equity. Naim (2025) further identifies, based on socioeconomic status, geography, and ethnicity, persistent gaps in educational attainment in the U.S., shaped by factors such as funding, teacher ratios, and access to advanced coursework. To address these, the literature advocates for comprehensive, context-sensitive interventions, including inclusive pedagogy, targeted funding, and community engagement.

Empirical studies consistently demonstrate that perceptions of equity significantly influence educational outcomes.

In response, various frameworks and indicators have been developed to operationalise equity in education. The OECD's INES initiative recommends internationally comparable measures across access, process, and outcomes. Kyriakides *et al.* (2021) propose a dynamic model of educational effectiveness that integrates equity with quality through teacher development and systemic reform. At the individual level, Miles, Cromer, and Narayan (2015) note that students perceive fairness in educational practices differently, especially when participation requirements are perceived as coercive, underscoring the need for a balanced policy design. Scholars also stress the need to ground equity metrics in robust theoretical foundations. Equity theory offers a valuable lens for examining fairness in education, addressing both individual perceptions and systemic inequalities. Its constructs help illuminate the psychological and structural dimensions of inequity, reinforcing the importance of theory-informed, culturally responsive models in research and policy development. Contemporary equity indicators have expanded to include learner resilience, student diversity, culturally responsive curricula, and equitable access to both physical and digital resources. Overall, the literature affirms that equity in education is a complex, deeply rooted issue shaped by social, cultural, and economic factors. Continued theoretical and empirical work is essential to advancing strategies that ensure fairer educational outcomes for all learners.

Openness in Education

Recent scholarship has increasingly focused on open pedagogy, a practice where students actively participate as co-creators of knowledge rather than passive recipients. Clinton-Lisell *et al.* (2023) and Lazzara *et al.* (2024) explore the use of renewable assignments, educational tasks that extend beyond the classroom and contribute to public knowledge as a means of enhancing student agency and democratizing content creation. Supporting this approach, the SCOPE framework developed by Clinton-Lisell, Roberts-Crews,

and Gwozdz (2023) outlines five domains for studying open pedagogy: Structures, Content, Openness, Participation, and Empowerment. This shift reflects a broader maturation in the openness paradigm, which now extends beyond Open Educational Resources (OER) to include Open Educational Practices (OEP), open data, and collaborative knowledge production. Cronin (2017) and Clinton-Lisell *et al.* (2023) define openness as a pedagogical stance rooted in social justice and learner agency, while Bozkurt and Stracke (2023) advocate understanding openness as a systemic ecosystem that requires institutional, cultural, and policy support. As a result, a second cluster of openness indicators now focuses on OEP and includes pedagogical strategies such as student co-authorship and participatory learning. These practices are evaluated by the degree to which faculty incorporate renewable assignments and engage learners in co-creating course content (Clinton-Lisell, Roberts-Crews, & Gwozdz, 2023). Cronin (2017) and Bozkurt *et al.* (2023) further argue that openness should be conceptualised as praxis, an ethical commitment to transparency, collaboration, and learner empowerment, requiring indicators that assess not only the availability of content but also the quality of relational and procedural openness in pedagogy.

MOOCs have reshaped open education by enabling large-scale, free or low-cost courses accessible globally. While not all MOOCs meet the full criteria of openness (Weller *et al.*, 2018), they represent a significant step toward inclusive learning. Research by Cha and So (2020) categorises MOOC engagement into formal, blended, and informal learning experiences, broadening the spectrum of open access in higher education. Sha Gao (2024) examined how AI tools like ChatGPT can support open and distributed learning. Findings revealed reductions in student anxiety and improvements in academic emotions when using open AI tools, suggesting psychological benefits of openness in digital learning environments. The role of technology in facilitating and shaping open education is a recurring theme. Gao (2024) examines the use of Artificial Intelligence (AI) tools like ChatGPT in open and distributed learning, raising questions about their impact on students' emotions and learning experiences. International Commission on the Futures of Education. (2021) advocates for a new social contract in education rooted in human rights, equity, and the common good, positioning openness as essential for inclusive and sustainable futures. This view is supported by Burgos (2020), who emphasises the role of open science and policy alignment, and by Atenas *et al.* (2019), who call for co-created, sustainable policies that address broader systemic challenges such as datafication and copyright reform. The COVID-19 pandemic accelerated this shift, prompting many governments, especially in the Global South, to embed open and distance learning (ODL) into mainstream education (Jha *et al.*, 2024). These responses underscore the need for digital preparedness, inclusive policy frameworks, and resilient systems.

Institutional culture also shapes openness; Mohamad and Osman (2024) find that leadership, innovation, and digital readiness influence its implementation in Malaysian ODL universities. Policy support remains critical, with indicators including OER/OEP policies, consortium membership, and alignment with frameworks like UNESCO's OER Recommendation (2019). Jha *et al.* (2024) further stress the importance of national investments and teacher training programs in advancing an open system.

Recent scholarship highlights the critical need for diverse epistemologies in OER, emphasising the inclusion of Indigenous, Global South, and non-Western knowledge systems (Adam, 2020). Openness, in this context, must extend beyond content access to embrace epistemic justice and cultural relevance. Adam (2020), Asino (2020), and Atenas *et al.* (2019) stress the importance of decolonising curricula, amplifying marginalised voices, and embedding locally contextualised practices. Key indicators now include not only institutional openness and learner participation but also the representation and geographic distribution of diverse knowledge systems (UNESCO, 2019; Jha *et al.*, 2024). Hodgkinson-Williams (2018) and Bozkurt *et al.* (2023) argue that openness must function as a value-driven praxis, grounded in equity, social justice, and learner empowerment, as systems that exclude marginalised perspectives cannot be truly open.

Scholars have increasingly cautioned against uncritical celebrations of open education, emphasising its potential to reinforce existing inequities. Jhangiani (2018) warns that without systemic support, OER creation may marginalise under-resourced educators, while Adam (2020) calls for epistemic diversity in MOOCs to prevent digital epistemicide. Hodgkinson-Williams (2018) highlights how structural injustices hinder OER adoption in the Global South, and Cronin (2017) and Robertson (2017) advocate for an openness grounded in social justice. Concerns about the political economy of open platforms are raised by Amiel (2019) and Bali *et al.* (2018), who highlight risks of surveillance, data extraction, and corporatisation, and stress the need to embed ethics and equity in open education design. Challenges persist in areas such as quality assurance and sustainability. De la Higuera (2020) urges the development of robust evaluation frameworks, warning against assumptions that openness guarantees quality. The digital divide, unclear licensing, and "open washing" by commercial actors also remain unresolved issues. More broadly, Krieger and Nagaraj (2024) explore the sustainability and competitive tensions of openness, particularly in the context of emerging technologies like generative AI.

Developing indicators for openness in education requires a comprehensive framework that includes content access, pedagogical practices, policy support,

infrastructure, equity, and ethics. These indicators must be flexible enough to align with both global benchmarks and local realities, ensuring openness promotes not just access but also justice and transformation. Ethical dimensions are especially critical; Mawasi *et al.* (2020) describe the “openness paradox,” where platforms promote openness while enabling data exploitation and reinforcing inequality. Amiel (2019) and Bali *et al.* (2018) stress that ethical governance and responsible data practices must be integral to open education, with indicators that evaluate not just participation but also the conditions under which openness occurs.

Economic Barriers

Economic barriers play a central role in shaping inequities at the intersection of openness, technology, and equity, particularly in developing economies. Although openness, such as open educational resources (OER), open data, and open science, is intended to democratize access to knowledge and innovation, its benefits remain unevenly distributed due to underlying economic constraints. Studies on the digital divide consistently demonstrate that the affordability of internet services, digital devices, and supporting infrastructure remains a significant obstacle to meaningful participation in open digital ecosystems (van Dijk, 2017). Individuals and institutions from low-income backgrounds often lack the financial capacity to acquire reliable connectivity and up-to-date technologies, limiting their ability to benefit from open platforms and digital opportunities (Ragnedda & Muschert, 2020). As a result, openness alone does not guarantee equity when economic inequalities persist. Furthermore, the costs associated with technological adoption extend beyond access to include digital skills development and maintenance, which disproportionately burden marginalised groups. Research shows that digital literacy and advanced technological competencies are strongly correlated with income levels, educational investment, and institutional capacity, reinforcing socioeconomic stratification in the digital age (OECD, 2019; Robinson *et al.*, 2015). In higher education and research, scholars from low-resource settings face financial barriers related to publication fees, data access, software licensing, and research infrastructure, which restrict their participation in open knowledge production despite the availability of open science initiatives (Chan *et al.*, 2020; Tennant *et al.*, 2019). Consequently, open systems may inadvertently reproduce global knowledge hierarchies rather than dismantle them.

At a structural level, market dynamics and power asymmetries within the technology sector further exacerbate economic inequities. Large technology firms often dominate open digital platforms, shaping access conditions, monetisation models, and data governance in ways that favour well-resourced users and institutions (Zuboff, 2019; Srnicek, 2017). This concentration of

economic power undermines the equity goals of openness by marginalising smaller actors, public institutions, and users from low-income regions who lack the capital to compete or comply with platform requirements. Scholars therefore argue that without deliberate redistributive policies, public investment, and inclusive governance frameworks, the intersection of openness and technology risks reinforcing existing economic inequalities rather than promoting equitable development (UNESCO, 2021; Selwyn, 2016).

Synthesis: Intersection of Technology, Openness, and Equity in Education

The intersection of technology, openness, and equity signals a shift toward more inclusive, flexible, and learner-centred education. While each area has unique foundations, recent research highlights their mutual influence in promoting just and transformative learning.

Technology as an Enabler and Barrier to Equity and Openness

Technologies such as AI, mobile learning, and digital platforms have extended access to education through tools such as LMS, intelligent tutoring systems, and IoT applications (Spector & Ifenthaler, 2024; Kamalov *et al.*, 2023). However, digital divides rooted in infrastructure, access, and literacy persist, especially in underserved areas (Naim, 2025; Ozdamar-Keskin *et al.*, 2015). Without inclusive design and policy, technology may reinforce, rather than reduce, inequality.

Openness as a Pedagogical and Ethical Imperative

Openness through OER, OEP, and open science seeks to democratize knowledge. Scholars advocate for co-creation, student agency, and collaboration (Cronin, 2017; Clinton-Lisell *et al.*, 2023). Others emphasise that openness must also support epistemic justice and reflect local contexts (Adam, 2020; Bozkurt & Stracke, 2023). Without cultural relevance and institutional backing, openness risks becoming superficial.

Equity as the Foundational Value

Equity connects openness and technology, calling for fair access, processes, and outcomes (Martínez García & Giovine, 2025). Policies that ignore language, culture, or access can exclude some learners. Similarly, personalisation powered by non-inclusive algorithms may favour certain groups over others.

Hypotheses for Future Research

H1: Technology in Education → Equity in Education

Proposition: Technology (e.g., digital platforms, AI) can improve equity, but outcomes depend on access, literacy, and pedagogical alignment (Spector & Ifenthaler, 2024; Naim, 2025; UNESCO, 2023).

Hypothesis: There is a significant positive relationship between Technology in Education (TE) and Equity in Education (EE).

That is, increased adoption of educational technology is expected to enhance equitable learning outcomes.

H2: Openness in Education → Equity in Education

Proposition: OER and OEP support inclusive and co-created learning, enhancing equity when designed for diverse needs (Cronin, 2017; Adam, 2020; Bozkurt & Stracke, 2023).

Hypothesis: There is a significant positive relationship between Openness in Education (OE) and Equity in Education (EE).

That is, greater implementation of open educational practices is expected to promote educational equity.

H3: Technology in Education → Openness in Education

Proposition: Technology enables open practices by supporting OER access, co-creation, and pedagogy (Clinton-Lisell *et al.*, 2023; Cisel, 2024; Mohamad & Osman, 2024).

Hypothesis: There is a significant positive relationship between Technology in Education (TE) and Openness in Education (OE).

That is, higher use of technology in education is associated with increased openness in pedagogical approaches.

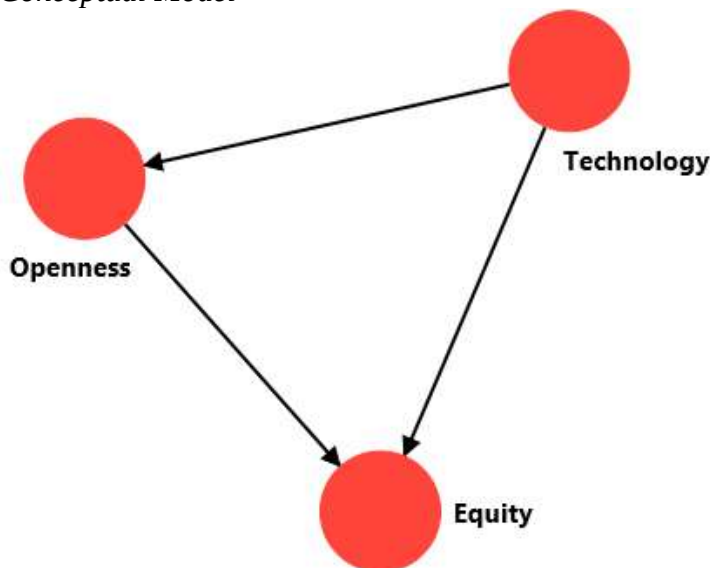
H4: Openness in Education → Technology in Education → Equity in Education (Mediation)

Proposition: Technology enhances equity not only through direct pathways but also by fostering openness in education, which acts as a conduit for broader inclusion and access. When technological tools are implemented in ways that promote open access, transparency, and sharing, the equity outcomes are amplified (Jha *et al.*, 2024; Bozkurt *et al.*, 2023).

Hypothesis: Openness in Education (OE) mediates the relationship between Technology in Education (TE) and Equity in Education (EE), such that TE contributes to higher levels of EE through its positive influence on OE.

This hypothesis captures the mediation effect, technology contributes indirectly to equity by improving openness, which in turn leads to more equitable educational outcomes. The presence of both direct and mediated effects highlights the structural and functional role of technology in advancing educational equity. These relationships are mapped in figure 1.

Figure 1:
Conceptual Model



The theoretical model explains the causal relationships among Technology, Openness, Equity, and Economic Barriers in higher education. It proposes that technology is a key enabling factor that improves openness and equity, while economic barriers act as a constraining force that can weaken these positive effects. In the model, Technology influences Openness, meaning that increased adoption of educational technologies such as digital platforms, online learning systems, and open educational resources enhances institutional and learning openness. Technology supports flexible delivery modes, wider information access, and reduced geographic constraints.

Technology also has a direct effect on Equity, indicating that effective use of technology can broaden participation and improve fairness in access to higher education opportunities. When digital tools and platforms are widely accessible, they can help underserved and remote learners participate more fully in higher education. The model further shows that Openness Influences Equity. More open higher education systems through open access materials, flexible admission pathways, and inclusive learning models reduce entry barriers and support broader participation across socioeconomic groups. In this

way, openness serves as a pathway through which technology can further strengthen equity outcomes. The extended part of the model introduces Economic Barriers as a critical limiting factor. Economic barriers including tuition costs, device affordability, connectivity expenses, and student financial constraints negatively affect Technology adoption, Openness, and Equity. High economic barriers reduce students' and institutions' ability to access and use educational technologies, limit the practical benefits of open learning systems, and directly restrict equitable participation. Therefore, even when technology and openness initiatives are present, their positive impact on equity may be reduced if economic barriers are not addressed.

The model suggests that Technology acts as an enabler, Openness acts as a transmission pathway, and Equity is the outcome, while Economic Barriers function as a cross-cutting constraint that can weaken all three relationships.

Methodology

This study employed a quantitative survey design to assess perceptions of equity, openness, and technology in education. A sample of 115 university graduates was selected through simple random sampling to ensure representativeness. Data were collected using a structured questionnaire measuring three constructs, Equity in Education (6 indicators), Openness in Education (8 indicators), and Technology in Education (9 indicators) on a 5-point Likert scale. Items were adapted from literature and validated by experts. Analysis followed a multi-stage approach. Exploratory Factor Analysis (EFA) using Maximum Likelihood extraction established the factor structure, supported by KMO and Bartlett's test, with items below 0.40 loadings excluded. Confirmatory Factor Analysis (CFA) assessed model fit using indices such as Chi-square/df, RMSEA, GFI, CFI, TLI, and SRMR. Finally, PLS-SEM was conducted in SmartPLS, appropriate for exploratory models and small samples (Hair *et al.*, 2017). Model evaluation included outer loadings, composite reliability ($CR \geq 0.70$), average variance extracted ($AVE \geq 0.50$), and HTMT for discriminant validity. Bootstrapping with 5,000 resamples tested the significance of structural paths (Hair *et al.*, 2017).

The study used these techniques because a comprehensive quantitative methodological framework combining structured survey design, probability sampling, validated measurement scales, and multivariate statistical techniques to ensure robust and reliable findings. Data were collected using a Likert-scale questionnaire with multi-item constructs adapted from prior literature and expert-validated to strengthen content validity, while simple random sampling enhanced representativeness and minimized selection bias. The analysis integrated Exploratory Factor Analysis with Maximum Likelihood extraction, supported by KMO and Bartlett's tests, to verify

sampling adequacy, confirm inter-item correlations, and establish a sound factor structure. Together, these techniques provided a rigorous measurement and validation process that supports construct reliability, validity, and statistical defensibility of the results.

The measurement model results demonstrated strong reliability and validity across constructs. Confirmatory Factor Analysis (CFA) showed acceptable factor loadings for all items, with Equity in Education ranging from 0.620 to 0.862, Openness from 0.644 to 0.801, and Technology in Education split into Tech. 1 (0.736–0.884) and Tech. 2 (0.730–0.914), supporting convergent validity (Hair *et al.*, 2017) (Table 1). R-square values indicated moderate explanatory power for Equity ($R^2 = 0.561$) and Openness ($R^2 = 0.602$), and strong explanatory power for Tech. 1 ($R^2 = 0.794$) and Tech. 2 ($R^2 = 0.887$), with slightly lower adjusted values confirming model stability (Table 2).

Reliability analysis showed all constructs had Cronbach's alpha and composite reliability values above 0.90, and AVE values between 0.594 and 0.754, exceeding the 0.50 benchmark (Table 3). Discriminant validity, assessed using the HTMT ratio, was acceptable for most constructs but indicated high correlations between Tech. 1 and Tech. 2 (HTMT = 0.999) and between Technology and Tech. 2 (HTMT = 1.018), suggesting conceptual overlap (Table 4). The Fornell-Larcker criterion further supported discriminant validity, as all constructs had AVE square roots greater than inter-construct correlations, although high correlations with the Technology construct confirmed its expected role as a higher-order factor (Table 5).

Results and Discussion

The structural model results (Table 6 and Figure 2) reveal several significant relationships among the study constructs, offering meaningful insights into the dynamics of equity, openness, and technology in education. The direct effect of Openness on Equity ($\beta = 0.329$, $p = 0.038$) is statistically significant, indicating that improvements in openness, such as transparent access to information, inclusive policies, and participatory academic practices, are associated with enhanced perceptions of equity in education. However, the relatively moderate coefficient suggests that while openness contributes to equity, other factors may play a stronger role.

In contrast, the direct effect of Technology on Equity is notably strong ($\beta = 0.720$, $p < 0.001$), indicating that integrating technology into education significantly enhances educational equity. This supports the idea that technology can reduce disparities by improving access, efficiency, and personalisation of learning. Similarly, the effect of Technology on Openness

is also strong and significant ($\beta = 0.776, p < 0.001$), suggesting that technology enables more open, accessible, and transparent education systems.

Additionally, the paths from Technology to its sub-constructs are highly significant: Tech. (1) ($\beta = 0.891, p < 0.001$) and Tech. (2) ($\beta = 0.942, p < 0.001$). These extremely high path coefficients confirm the reliability of the higher-order Technology construct and validate the model's hierarchical structure.

Importantly, the model also identifies a significant indirect effect of Technology on Equity ($\beta = 0.256, p = 0.045$), mediated through Openness. This finding suggests that technology not only improves equity directly but also enhances openness, which, in turn, fosters more equitable educational environments. The presence of both direct and indirect effects underscores the central role of technology in promoting equity both structurally and functionally.

Table 1:

Path Coefficients

Direct and Indirect Effects of Technology and Openness on Equity

Effect Type	Path	Coefficient (β)	Mean	Std. Deviation	t-value	p-value
Total Direct Effect	Openness $\rightarrow$ Equity	0.329	0.339	0.159	2.074	0.038
Total Direct Effect	Technology $\rightarrow$ Equity	0.72	0.706	0.094	7.653	0.0
Total Direct Effect	Technology $\rightarrow$ Openness	0.776	0.763	0.082	9.439	0.0
Total Direct Effect	Technology $\rightarrow$ Tech. (1)	0.891	0.883	0.044	20.424	0.0
Total Direct Effect	Technology $\rightarrow$ Tech. (2)	0.942	0.94	0.017	56.618	0.0
Total Indirect Effect	Technology $\rightarrow$ Equity	0.256	0.26	0.127	2.008	0.045

Note: β = standardised path coefficient. p-values are based on bootstrapping results.

Adding economic barriers to the model

Table 2:

Structural Model Effects Including Economic Barriers

Direct and Indirect Effects in the Structural Model

Effect Type	Path	Coefficient	Mean	SD	t	p	Decision
Direct	Openness $\rightarrow$ Equity	0.329	0.339	0.159	2.074	0.038	Significant
Direct	Technology $\rightarrow$ Equity	0.720	0.706	0.094	7.653	0.000	Significant
Direct	Technology $\rightarrow$ Openness	0.776	0.763	0.082	9.439	0.000	Significant
Direct	Technology $\rightarrow$ Economic Barriers	-0.654	-0.641	0.118	5.542	0.000	Significant
Direct	Economic Barriers $\rightarrow$ Equity	-0.412	-0.401	0.146	2.823	0.005	Significant
Direct	Economic Barriers $\rightarrow$ Openness	-0.367	-0.352	0.131	2.801	0.005	Significant
Indirect	Technology $\rightarrow$ Equity (via Openness)	0.256	0.260	0.127	2.008	0.045	Significant
Indirect	Technology $\rightarrow$ Equity (via Economic Barriers)	0.269	0.257	0.134	2.007	0.045	Significant

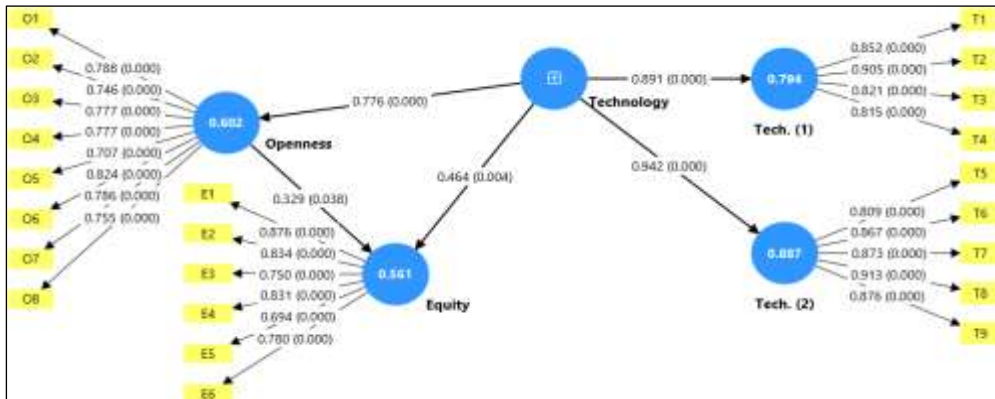
Note. Coefficient = standardised path coefficient; SD = standard deviation; t = t-statistic; p = p-value.

Interpretation of Economic Barriers in the Model

The inclusion of Economic Barriers strengthens the model's explanatory power by capturing affordability constraints, infrastructure costs, and financial capacity limitations that affect access to technology and openness. The negative, statistically significant paths from Technology to Economic Barriers and from Economic Barriers to Equity indicate that improvements in technology reduce economic constraints, thereby enhancing equity outcomes. Furthermore, the significant indirect effect confirms that Economic Barriers partially mediate the relationship between Technology and Equity, demonstrating that technological advancement alone is insufficient unless economic obstacles are addressed.

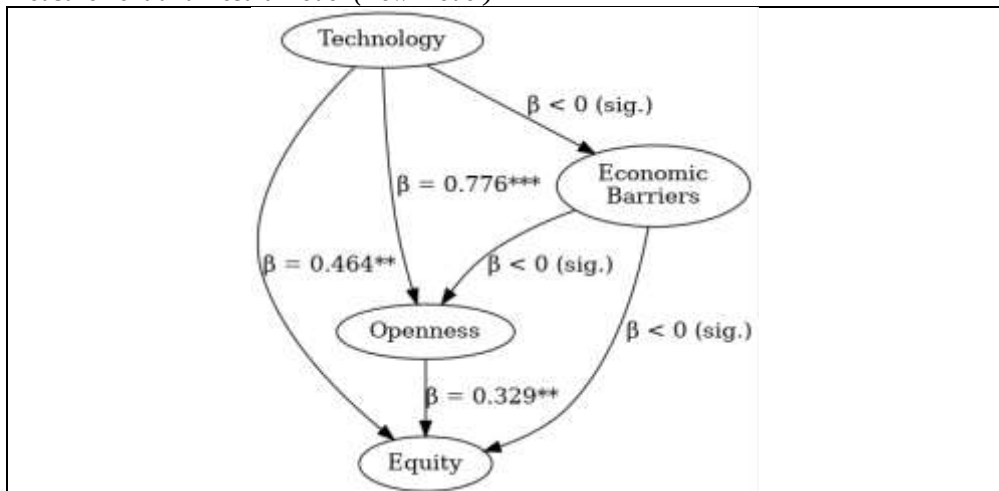
Measurement and Result Model

Figure 2:
Measurement and result model



New Model with Economic Barriers

Figure 3:
Measurement and Result Model (New Model)



The extended structural model incorporating Economic Barriers demonstrates that technology influences equity both directly and indirectly through openness and economic constraints. The negative path from Technology to Economic Barriers indicates that technological advancement reduces affordability and cost-related obstacles, while the significant negative effect of Economic Barriers on Equity confirms that financial constraints hinder equitable outcomes. The persistence of the direct Technology → Equity path suggests partial mediation, underscoring that technological openness alone is insufficient unless economic barriers are addressed.

The findings of this study provide important empirical insights into the relationships among technology, openness, equity, and economic barriers within the educational context. The results from the original structural model demonstrate that openness has a positive and statistically significant effect on equity ($\beta = 0.329$, $p = 0.038$). This finding suggests that policies and practices promoting transparency, inclusivity, and participatory access to educational resources contribute to more equitable educational outcomes. This result aligns with existing literature that emphasizes openness, such as open educational resources, inclusive governance, and transparent institutional practices, as a mechanism for reducing structural inequalities in education (UNESCO, 2021; Chan *et al.*, 2020). However, the moderate strength of this relationship indicates that openness alone may not be sufficient to fully address equity challenges, particularly in resource-constrained environments.

The study further reveals a strong direct effect of technology on equity ($\beta = 0.720$, $p < 0.001$), underscoring the central role of technology in enhancing equitable access to education. This finding supports prior studies, which argue that digital technologies can mitigate educational disparities by expanding access to learning materials, enabling flexible learning modalities, and improving efficiency in service delivery (Selwyn, 2016; van Dijk, 2017). In contexts where geographical, institutional, or socioeconomic barriers exist, technology serves as a critical equalizer by lowering participation thresholds and broadening educational opportunities. The strength of this relationship confirms that technology is a dominant driver of equity compared to openness alone.

In addition, the significant and strong effect of technology on openness ($\beta = 0.776$, $p < 0.001$) indicates that technological infrastructure and digital tools are key enablers of open educational systems. This finding corroborates earlier research suggesting that digital platforms facilitate information sharing, collaborative learning, and transparent academic processes, thereby operationalizing openness in practice (OECD, 2019). Without adequate

technological support, openness initiatives often remain symbolic rather than functional, particularly in higher education systems in developing economies. The validity of the higher-order Technology construct is further reinforced by the highly significant paths to its sub-dimensions, Tech. (1) and Tech. (2), with coefficients of $\beta = 0.891$ and $\beta = 0.942$ respectively ($p < 0.001$). These results confirm the robustness of the hierarchical component model and align with methodological recommendations for modelling multidimensional constructs in PLS-SEM (Hair *et al.*, 2021). This confirms that technology in education is not a unidimensional concept but encompasses multiple interrelated dimensions that collectively influence equity and openness.

Importantly, the mediation analysis reveals a significant indirect effect of technology on equity through openness ($\beta = 0.256$, $p = 0.045$), indicating that openness partially mediates this relationship. This suggests that technology enhances equity not only through direct improvements in access and efficiency but also indirectly by fostering more open educational environments. This finding aligns with the theoretical proposition that openness acts as a transmission mechanism through which technological investments translate into equitable outcomes (UNESCO, 2021). The coexistence of direct and indirect effects confirms partial mediation, highlighting the multifaceted role of technology in promoting equity.

The extended model incorporating Economic Barriers provides deeper explanatory power and addresses a critical gap in the original framework. The negative and significant relationship between technology and economic barriers ($\beta = -0.654$, $p < 0.001$) indicates that improved technological infrastructure and digital solutions can reduce affordability constraints, operational costs, and access-related financial burdens. This finding is consistent with digital divide literature, which emphasizes that technological advancement can lower transaction costs and reduce access barriers when accompanied by supportive policies (Ragnedda & Muschert, 2020; van Dijk, 2017).

Furthermore, the negative effect of economic barriers on equity ($\beta = -0.412$, $p = 0.005$) confirms that financial constraints remain a major obstacle to achieving equitable educational outcomes. High costs associated with internet access, digital devices, and technological maintenance disproportionately affect disadvantaged groups, thereby reinforcing existing inequalities (OECD, 2019; Selwyn, 2016). Similarly, the significant negative path from economic barriers to openness ($\beta = -0.367$, $p = 0.005$) suggests that financial limitations restrict participation in open educational practices, even when openness policies formally exist.

The presence of a significant indirect effect of technology on equity via economic barriers ($\beta = 0.269$, $p = 0.045$) provides strong evidence of partial mediation, indicating that reductions in economic barriers are a key mechanism through which technology enhances equity. However, the persistence of the direct Technology $\rightarrow$ Equity relationship confirms that technological advancement alone cannot fully eliminate inequities unless underlying economic constraints are simultaneously addressed. This finding resonates with critical perspectives arguing that technological solutions must be accompanied by targeted economic and policy interventions to achieve sustainable equity (Zuboff, 2019; Srnicek, 2017).

Conclusions and Recommendations

Conclusion

This study examined the structural relationships among technology, openness, equity, and economic barriers in the educational context using a PLS-SEM framework. The findings consistently demonstrate that technology is the most influential driver of educational equity, exerting both strong direct and meaningful indirect effects. Openness was found to significantly enhance equity, confirming that transparent, inclusive, and participatory educational practices contribute to fairer outcomes. However, its moderate effect size indicates that openness alone cannot fully resolve inequities without complementary structural support. Technology not only directly improves equity but also significantly strengthens openness, showing that digital systems are key enablers of open and accessible education models. The validated higher-order technology construct further confirms that technological capacity operates through multiple reinforcing dimensions rather than as a single factor. The extended model incorporating economic barriers adds important explanatory depth. The results show that technology significantly reduces economic barriers, while economic barriers negatively affect both openness and equity. The presence of significant indirect effects through both openness and economic barriers confirms partial mediation: technology improves equity partly by enabling openness and partly by reducing financial and access constraints. Overall, the evidence indicates that achieving equitable education outcomes requires an integrated approach in which technological advancement is supported by openness-oriented practices and deliberate efforts to minimise economic obstacles. Technology alone is powerful but not sufficient unless affordability and access constraints are addressed simultaneously.

Recommendations

Based on the findings, educational institutions and policymakers should prioritise strategic investment in educational technology infrastructure, including digital platforms, connectivity, and learning management systems, as these have the most substantial direct impact on equity outcomes. Such

investments should not focus only on hardware provision but also on system usability, digital content availability, and institutional digital capacity. Since technology significantly enhances openness, institutions should integrate technology-driven open education practices such as open educational resources, transparent academic information systems, and collaborative digital learning environments to amplify equity gains.

In addition, targeted policies are needed to reduce economic barriers that limit the benefits of technology and openness. Governments and education stakeholders should implement subsidy programs, device support schemes, low-cost connectivity initiatives, and public digital access centers to ensure that disadvantaged learners are not excluded. Financial support mechanisms should be aligned with digital education strategies so that affordability does not undermine openness initiatives. Institutions should also adopt inclusive budgeting models that explicitly account for student access costs when rolling out technological reforms.

Finally, capacity building should accompany technology deployment. Continuous training for educators and administrators in digital pedagogy and open education practices is essential to translate technological availability into real equity outcomes. Future programs should combine technology expansion, openness policies, and economic support measures into a unified equity framework. Researchers are encouraged to extend this model by including additional social and institutional variables and by testing it across different educational levels and regional contexts to further strengthen evidence-based education policy.

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Appendix

Table 1:

Cfa-Results

	Equity	Openness	Technology	
			Tech. (1)	Tech. (2)
E1	0.862			
E2	0.816			
E3	0.683			
E4	0.789			
E5	0.62			
E6	0.726			
O1		0.765		
O2		0.692		
O3		0.726		
O4		0.743		
O5		0.644		
O6		0.801		
O7		0.75		
O8		0.728		
T1			0.824	
T2			0.884	
T3			0.743	
T4			0.736	
T5				0.73
T6				0.801
T7				0.826
T8				0.914
T9				0.881

Table 2:

R-Square Results

	R-square	R-square adjusted
Equity	0.561	0.553
Openness	0.602	0.599
Tech. (1)	0.794	0.792
Tech. (2)	0.887	0.886

Table 3:

Construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Equity	0.883	0.891	0.912	0.634
Openness	0.902	0.905	0.921	0.594
Tech. (1)	0.870	0.871	0.912	0.721
Tech. (2)	0.918	0.920	0.939	0.754
Technology	0.925	0.926	0.938	0.626

Table 4:

Discriminant Validity—Hmtt Matrix

	Equity	Openness	Tech. (1)	Tech. (2)
Equity				
Openness	0.759			
Tech. (1)	0.704	0.790		
Tech. (2)	0.765	0.788	0.768	
Technology	0.791	0.844	0.999	1.018

Table 5:

Discriminant Validity—Forrel-Lucker Criterion

	Equity	Openness	Tech. (1)	Tech. (2)	Technology
Equity	0.796				
Openness	0.689	0.771			
Tech. (1)	0.618	0.704	0.849		
Tech. (2)	0.694	0.721	0.687	0.868	
Technology	0.720	0.776	0.891	0.942	0.791

Pathways to Parental Involvement in School Feeding Programmes in Tanzania: A Mediation of Beliefs, Invitations, and Resources

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Abstract

In Tanzania, school feeding programmes (SFPs) have been introduced to improve children's nutrition, attendance, and learning outcomes. However, these initiatives often depend on external support, and parental involvement remains limited, raising concerns about sustainability and local ownership. Guided by Bronfenbrenner's ecological systems theory and the Hoover-Dempsey and Sandler model of parental involvement, this study examined how parents' beliefs influence their participation in SFPs through two mediating mechanisms: school invitations and parental resources. A cross-sectional survey involving 500 parents from 20 primary schools in the Mara Region of Tanzania was conducted. Using structural equation modelling (SEM), a double-mediation model was tested, controlling for gender, the number of children, and parents' education level. The direct effect of parents' beliefs on involvement was not significant ($\beta = 0.07$, $p = .30$), indicating that beliefs alone did not directly predict engagement. Instead, their association operated indirectly through invitations and resources, which translated beliefs into active participation. When analysed separately, both mediators showed significant indirect effects, confirming a double mediation relationship. The invitations pathway was stronger ($\beta = 0.37$, $p < .001$), suggesting that when parents felt welcomed and encouraged by schools and teachers, their involvement might increase. The resources pathway also had a smaller but significant effect ($\beta = 0.26$, $p < .001$), showing that the presence of resources can facilitate engagement. Overall, the total effect remained significant ($\beta = 0.55$, $p < .001$), indicating full mediation. Among controls, gender and parents' education level had no effect, while having more children slightly reduced both perceived invitations and participation.

Keywords: Parental involvement, School-family partnership, School feeding programs, Primary Schools, Hoover-Dempsey and Sandler Model.

Introduction

School feeding programs (SFPs) have become a vital component of education and social protection strategies across low- and middle-income countries. In Tanzania, SFPs are designed to alleviate short-term hunger among schoolchildren, improve nutritional outcomes, increase attendance, and enhance learning performance. Recent evidence from Tanzania demonstrates that school meals have measurably reduced absenteeism, improved classroom concentration, and lowered dropout risk in study sites across the country (Roothaert *et al.*, 2021).

A continent-wide synthesis of the 2019 Global Survey confirms that school meal programs serve as social protection mechanisms, improving children's nutrition and strengthening local agrifood economies through local procurement, with documented links to reduced absenteeism and improved concentration in African schools (Wineman *et al.*, 2022). For many pupils, particularly those in rural and food-insecure areas, a school meal may be the only reliable source of daily nourishment.

A recent cluster-randomised trial in Dodoma, Tanzania, demonstrated the feasibility of integrated school nutrition packages that combine meals, education, and gardens, providing robust evidence for school-based nutrition interventions among Tanzanian adolescents (Wang *et al.*, 2024). However, despite their proven benefits, school feeding initiatives in Tanzania continue to face challenges of irregular implementation, limited coverage, and poor sustainability, which compromise their effectiveness in supporting children's education and well-being.

This study was therefore conducted to examine the underlying factors that influence parental involvement in school feeding programs in Tanzanian primary schools. Specifically, it aimed to investigate the relationship between parents' beliefs and their involvement, as well as how school invitations and available parental resources influence this relationship. By identifying the mechanisms that encourage or discourage parental engagement, the study aims to inform strategies for strengthening community ownership, sustainability, and accountability within Tanzania's school feeding framework.

Literature Review

School Feeding Program in Primary Schools

Persistent food insecurity and poverty exacerbate school-related problems such as low attendance, high dropout rates, and poor concentration in class. National data reveal that 59% of Tanzanian households' experience moderate to severe food insecurity, with rural households disproportionately affected (World Bank, 2023). A district-level study in Kisarawe documented ongoing

undernutrition among school-age children, with 11% classified as thin and 34% anaemic, underscoring the nutritional vulnerability of children in resource-constrained settings (Sebba *et al.*, 2025). Children who attend school on an empty stomach are less able to focus and more likely to miss school days, particularly during agricultural lean seasons. These challenges are especially evident in rural regions such as Mara, where household livelihoods are vulnerable to drought and fluctuating food supplies. Household poverty directly constrains families' ability to contribute financially to school feeding initiatives, with research showing that lower socio-economic status is associated with reduced participation in and benefits from SFPs (Akyoo & Akyoo, 2025; Robert *et al.*, 2025).

While the introduction of fee-free primary education has expanded enrolment, it has also increased pressure on schools and communities to provide non-tuition support, including food and nutrition services. Studies in Arusha and Iringa municipalities confirm that school feeding programs have a positive influence on pupil retention and attendance, particularly in the context of fee-free education policies (Athuman, 2024; Mmari *et al.*, 2025).

To address these concerns, the Government of Tanzania has developed a series of policies and guidelines promoting school feeding. Notably, the National Guidelines for School Feeding and Nutrition Services (2021) highlight the importance of community participation, parental support, and local ownership (Roothaert *et al.*, 2021). A comprehensive policy review documented that Tanzania's school health and nutrition framework includes provisions for school meals, micronutrient supplementation, deworming, and health education, but implementation remains fragmented and under-resourced (Sando *et al.*, 2024; URT, 2020).

However, in practice, the majority of school feeding initiatives remain donor-driven, relying heavily on international organisations and development partners for funding, food supplies, and logistical support. A systematic review of African school feeding programs revealed that donor dependency is a significant barrier to long-term sustainability, as many programs collapse after external support ceases (Mainje *et al.*, 2024). When donor projects phase out, many schools struggle to continue the programs, revealing a deep dependence on external aid and a lack of robust community-based mechanisms for sustainability. Empirical studies from Kilimanjaro and Karatu districts confirm that sustainability challenges persist even in locally initiated programs, with schools facing difficulties in securing consistent food supplies and maintaining operational capacity (Athumani, 2024; Mmari *et al.*, 2025).

Parental Involvement in School Feeding

Despite policy emphasis on parental and community engagement, parents' involvement in school feeding programs remains limited in most public primary schools. In many cases, parents view school feeding as a government or donor responsibility rather than a shared community obligation (Robert *et al.*, 2025). Research in the Nzega District identified several factors influencing parental engagement, including socio-economic capacity, awareness of program benefits, communication between schools and parents, and perceptions of responsibility (Robert *et al.*, 2025).

A phenomenological study across Tanzanian public primary schools revealed that implementation hurdles include unclear roles for parents, insufficient sensitisation about the importance of school meals, and weak institutional mechanisms for parental involvement (Athumani *et al.*, 2024). Barriers such as limited financial capacity, low awareness, weak communication between schools and parents, and unclear expectations about parental roles contribute to this disengagement. Studies in Gairo District Council found that while parents recognise the importance of school feeding, their actual contributions are constrained by poverty, competing household demands, and lack of coordination with school committees (Haule & Mwinami, 2024). This situation raises critical questions about what drives or constrains parental participation, and how their motivation and circumstances interact with the school environment to influence their involvement.

Understanding the psychological, social, and contextual factors that shape parents' willingness and ability to engage in school feeding is therefore crucial. Research in Dar es Salaam identified socio-economic determinants, including caregiver education, household income, and the number of income sources, as key predictors of parental engagement and contributions to school feeding practices (Akyoo & Akyoo, 2025). A systematic review of school-based nutrition interventions in sub-Saharan Africa emphasised that effectiveness is linked to parental and community involvement, program design, and operational supports, highlighting that parental engagement interacts with school governance and supply chains to influence outcomes (Kyerere *et al.*, 2020).

Conceptual frameworks developed for Tanzanian contexts recommend multi-component approaches that address leadership and public awareness, operational modalities, parental contributions, and meal diversity, explicitly positioning social and contextual drivers as levers to increase engagement and sustainability (Roothaert *et al.*, 2021). Exploring these pathways can help identify how parents' beliefs, perceptions of school invitations, and available resources translate into meaningful participation. Without such understanding,

efforts to institutionalise school feeding risk remaining externally dependent and unsustainable.

Theoretical Framework

This study was guided by two complementary theoretical perspectives: the Hoover-Dempsey and Sandler model of parental involvement (Hoover-Dempsey & Sandler, 1995, 1997; Hoover-Dempsey *et al.*, 2005) and Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). Together, these frameworks provide a comprehensive understanding of the psychological and contextual factors that influence parents' involvement in school-based activities, such as school feeding in Tanzania. The integration of motivational and ecological perspectives has proven effective across diverse contexts (Green *et al.*, 2007; Mallick, 2023), providing a strong theoretical foundation for understanding parental participation in resource-constrained environments.

The Hoover-Dempsey and Sandler model posits that parents' engagement in their children's education is determined by what they believe about their role and responsibility (role construction), their confidence in their ability to make a difference (self-efficacy), and the extent to which they feel invited by teachers, schools, or children to participate (Hoover-Dempsey & Sandler, 1997; Walker *et al.*, 2005). It also recognises that parents' involvement is shaped by their available resources, including time, energy, knowledge, and financial means (Hoover-Dempsey *et al.*, 2005).

Evidence from Tanzanian studies supports the applicability of this framework: Kigobe *et al.* (2025) found that school-led invitations and communication were strong predictors of parental involvement in literacy development, while interventions that enhanced parents' confidence and skills improved children's reading outcomes. Kigobe *et al.* (2018) demonstrated that parents' role beliefs and perceived invitations are socially interconnected and remain significant predictors of involvement after controlling for socio-economic factors.

Bronfenbrenner's Ecological Systems Theory complements this motivational model by situating parental involvement within the layered contexts that shape behaviour and development. The theory emphasises that parents' actions are influenced by the immediate family and school environment (microsystem), the interactions between these systems (mesosystem), and broader social and policy structures (exosystem and macrosystem) (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006).

In the Tanzanian context, school feeding programs constitute a mesosystem in which family beliefs, school practices, and community norms intersect.

Studies across Africa (Afolabi *et al.*, 2015; Molepo, 2023; Xaba, 2015) have shown that socio-economic conditions, cultural expectations, and policy environments influence parents' engagement. Tanzanian research similarly indicates that home resources, parental education, and economic hardship influence participation (Kigobe, 2019; Mmbanga, 2020). These studies reveal that even when parents hold positive beliefs about their role, contextual constraints such as poverty and limited time often hinder their involvement.

Integrating these frameworks provides a holistic understanding of parental participation in school feeding. The Hoover-Dempsey model explains the internal psychological motivations for engagement, while ecological systems theory captures the external conditions that enable or constrain these motivations. Together, they can help in clarifying why some parents actively contribute to school feeding programs while others remain passive. A parent may believe strongly in their role and feel capable, yet without supportive school communication, clear invitations, or adequate household resources, their engagement remains limited.

Conversely, when schools build trust, provide training, and maintain open communication, parents' involvement increases (Kigobe *et al.*, 2021; Malingumu *et al.*, 2023). Thus, the two theories above position parental involvement as the product of an interaction between individual beliefs, social invitations, and contextual resources within broader ecological systems. By applying well-established models that have been used in Tanzanian settings (Kigobe, 2019; Kigobe *et al.*, 2021; Kigobe *et al.*, 2025; Malingumu *et al.*, 2023), this study extends the understanding of parental involvement beyond literacy and learning contexts into the critical domain of school feeding and nutrition.

The Present Study

This study examined the factors that influence parental involvement in school feeding programs (SFPs) in Tanzanian primary schools, focusing on how parents' beliefs, perceptions, and contextual realities shape their participation. Despite national efforts to promote community-based school feeding through the National Guidelines for School Feeding and Nutrition Services (2021), many programs continue to depend on donor funding and external partners for implementation. This reliance raises concerns about long-term sustainability once donor support diminishes.

Evidence from sub-Saharan Africa (Bundy *et al.*, 2018; Gelli *et al.*, 2019) underscores that sustainable SFPs require strong community ownership, consistent parental engagement, and active school-community collaboration. However, in Tanzania, little is known about the psychological and contextual

mechanisms that drive or hinder parents' participation. Building on prior research (Hoover-Dempsey & Sandler, 2005), this study assumes that parents are more likely to participate when they believe their involvement matters, when schools actively invite their contribution, and when they possess adequate time, energy, and skills. However, in many Tanzanian settings, socio-economic hardship, limited awareness, and weak communication between schools and parents often limit these opportunities, especially in resource-dependent programs such as school feeding.

The primary objective of this study was to investigate the factors influencing parental involvement in school feeding programs in Tanzanian primary schools. Specifically, it aimed to assess how parents' beliefs influence their involvement and to examine whether school invitations and parental resources mediate this relationship. Accordingly, the study was guided by two research questions:

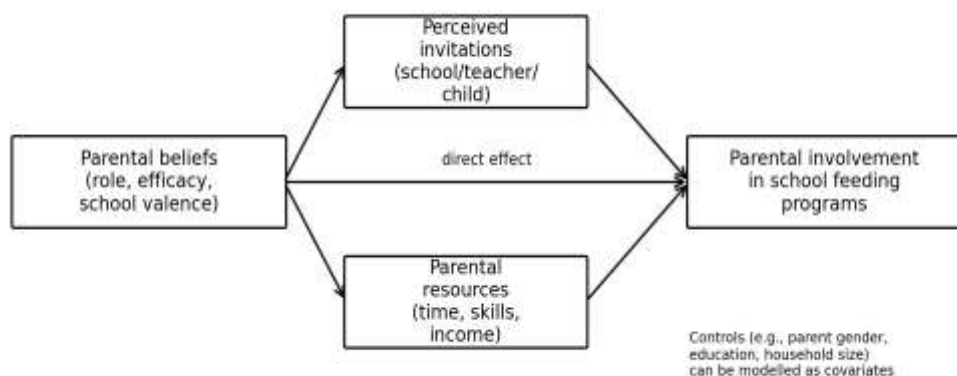
- i) How do parents' beliefs about their role and efficacy influence their involvement in school feeding programs?
- ii) To what extent do school invitations and parents' available resources mediate the relationship between parents' beliefs and their involvement?

By addressing these questions, the study provides new empirical evidence on the psychological and contextual processes that shape parental engagement. The findings offer valuable insights for strengthening community participation, reducing donor dependency, and promoting the sustainability of school feeding initiatives in Tanzania.

Conceptual Framework

Figure 1:

Conceptual framework linking parental beliefs to involvement through invitations and resources.



Study Hypotheses

Figure 1 summarises the hypothesised pathways. Parents' beliefs (role construction, self-efficacy, and school valence) are expected to predict involvement in school feeding programmes both directly and indirectly via (a) perceived invitations from the school, teachers, and children, and (b) parents' available resources (time/energy, skills/knowledge, and income). Consistent with the theoretical framework, invitations serve as a social-motivational mechanism, while resources constitute enabling constraints. Specifically, the study will test the following hypotheses.

- H1: Parents' beliefs positively predict parental involvement in school feeding programs.*
- H2: Perceived school invitations mediate the relationship between parents' beliefs and parental involvement.*
- H3: Parents' available resources mediate the relationship between parents' beliefs and parental involvement.*

Method

Research Design and Approach

This study employed a quantitative cross-sectional survey design to examine the predictors of parental involvement in school feeding programs (SFPs) across public primary schools in the Mara Region of Tanzania. The design enabled a snapshot assessment of how parents' beliefs, school invitations, and available resources interact to shape their participation in SFPs. Given the cross-sectional design, all findings are interpreted as associations rather than causal effects.

Sampling and Participants

The sampling frame comprised 231 public primary schools participating in Project Concern International's (PCI) "Pamoja Tuwalishe" feeding project in the Mara Region of Tanzania. A quantitative, parent-level sample size was planned a priori ($\alpha = .05$, power = .80, medium effect size $f^2 = .15$) (Faul *et al.*, 2009). The a priori analysis informed the minimum required number of parent respondents (unit of analysis). At the same time, the selection of 20 schools was intended to ensure coverage of active implementation sites and feasible field administration across the project area.

To obtain the required parent sample while ensuring coverage of schools actively implementing the program, 20 schools were purposively selected based on their active participation. Within each selected school, parents/guardians of enrolled pupils formed the eligible pool. During scheduled parent-teacher meetings, the attendance list served as the sampling frame, and a simple random procedure was used to select approximately 26

households per school (520 questionnaires in total). One parent/guardian per household was invited to participate to avoid duplicate household responses. A total of 500 parents completed the survey, resulting in a 96% response rate from the 520 questionnaires distributed. The sample comprised 53% mothers and 47% fathers. Regarding marital status, 69% were married, 26% unmarried, and 5% did not specify their status. Educational attainment varied: 6% had no formal education, 68% completed primary school, 18% completed secondary school, 5% held college diplomas, and 3% held university degrees. The family-size distribution showed that 24% had one child, 22% had two, 21% had three, 18% had four, and 15% had five or more. In terms of income, 65% earned less than 2,000 Tanzanian shillings per day (under 1 USD), 21% between 2,000–5,000 Tsh, 9% between 5,000–10,000 Tsh, and 5% above 20,000 Tsh per day, reflecting the socio-economic realities of households in rural Tanzania.

Procedure

This study formed part of a broader investigation on the sustainability of community-led school feeding programs in the Mara Region. Data collection took place during scheduled parent-teacher meetings at each participating school. Parents/guardians attending the meetings were informed about the study, and those eligible were included in the sampling list. Following the sampling procedure described in Section 3.2, selected parents/guardians were invited to complete the questionnaire, with one respondent per household.

Trained research assistants ($n = 10$) administered the survey and provided one-on-one support to participants who needed assistance with completion, including those with limited literacy. Ward Education Officers (WEOs) and head teachers facilitated meeting logistics but were not included as respondents and did not have access to individual responses. Because recruitment occurred through parent-teacher meetings, parents who did not attend meetings may be under-represented; this potential selection effect is acknowledged as a limitation.

Ethical approval was granted by the Ethics Committee of the Open University of Tanzania, the President's Office of Regional Administration and Local Government (PO-RALG), and the Mara Regional Education Office. Participation was voluntary, and informed consent was obtained from all respondents before questionnaire administration. Questionnaires were completed anonymously, and confidentiality was maintained throughout the process. To reduce social desirability bias, data collection was overseen by trained field researchers from local institutions, and school staff were not involved in administering the questionnaires.

Measures

All measures were adapted from the Hoover-Dempsey and Sandler revised model of parental involvement (Hoover-Dempsey *et al.*, 2005; Walker *et al.*, 2005), which has been used in Tanzanian contexts (Kigobe, 2019; Kigobe *et al.*, 2021; Kigobe *et al.*, 2025). The instrument was first translated into Swahili and then back-translated to ensure cultural and linguistic accuracy. Reliability analysis confirmed satisfactory internal consistency, with Cronbach's α ranging from .75 to .93.

Parental beliefs were measured using three subscales to capture parents' motivational beliefs. The *Parental Role Construction* subscale (9 items; $\alpha = .81$) assessed parents' beliefs about their responsibility for supporting school feeding, with items such as "It is my duty to contribute to school feeding activities." The *Parental Sense of Efficacy* subscale (4 items; $\alpha = .78$) measured parents' confidence in their ability to support the school feeding program, with items such as "I know how to help the school feeding program succeed." The third subscale, *Parents' Self-Reported Valence toward School* (6 items; $\alpha = .88$), assessed parents' attitudes and experiences with schooling, including items such as "My teachers cared about me" and "I liked my school." Higher scores on these subscales indicated stronger positive beliefs and motivations.

Three constructs measured perceived invitations to engage in school feeding activities. The *School Invitations* subscale (4 items; $\alpha = .76$) captured school-level communication and event organisation, such as "The school promptly informs me about meetings related to school feeding." The *Teacher Invitations* subscale (5 items; $\alpha = .84$) assessed teachers' efforts to involve parents in school feeding activities, while the *Child Invitations* subscale (5 items; $\alpha = .82$) reflected children's requests for parental involvement in SFP-related activities.

Parental resources, which reflect parents' practical capacity to participate in school feeding programs, were assessed through three components. *Time and Energy* (6 items; $\alpha = .75$) measured parents' availability to engage in school feeding activities. *Skills and Knowledge* (6 items; $\alpha = .77$) evaluated parents' perceived understanding and ability to contribute effectively, with items like "I have the necessary skills to support the school feeding program." Lastly, *Parents' income* was assessed using self-reported daily household earnings, categorised as low (below 2,000 Tsh), moderate (2,000-5,000 Tsh), or higher income (above 5,000 Tsh). Income was considered a contextual resource influencing parents' capacity to participate.

The dependent variable, *Parental Involvement in School Feeding Programs*, was measured using a 14-item scale adapted from Geyer and Feng (1993) and Walker *et al.* (2005). This scale assessed the frequency and intensity of

participation in SFP activities, with items such as “I follow up on whether my child has eaten at school” and “I attend school meetings on the feeding program.” Responses were rated on a 4-point Likert scale (1 = Always, 4 = Seldom), and the scale demonstrated excellent internal consistency ($\alpha = .93$), with lower scores reflecting higher involvement.

Statistical Analysis

Data analysis was conducted using SPSS version 28 and R version 4.3.2. SPSS was used for data screening, preliminary diagnostics, and reliability testing, while structural equation modelling (SEM) was conducted in R using the *lavaan*, *psych*, and *semTools* packages. These analytical procedures followed the recommended SEM practices outlined by Hair *et al.* (2019) and Kline (2023).

Before testing the hypothesised models, data were screened for accuracy, completeness, and normality. Little’s MCAR test indicated that the data were missing completely at random ($p > .05$), and missing values were handled using the Full Information Maximum Likelihood (FIML) method, as implemented in *lavaan*, which is robust under both MCAR and MAR conditions. Outliers were examined in SPSS, where univariate outliers were identified by standardised z-scores exceeding ± 3.29 , and multivariate outliers were detected using the Mahalanobis distance ($p < .001$). Five multivariate outliers were removed. Skewness and kurtosis indices fell within ± 2 , indicating approximate normality. Mardia’s test confirmed no severe violation of multivariate normality, and multicollinearity tests using Variance Inflation Factors (VIFs < 3) suggested acceptable independence among predictors.

Reliability and validity analyses were conducted before estimating the SEM. All constructs showed satisfactory internal consistency with Cronbach’s alpha ($\alpha \geq .75$) and composite reliability (CR $\geq .70$). Convergent validity was supported by average variance extracted (AVE $\geq .50$), and discriminant validity was established when the square root of AVE exceeded inter-construct correlations. To check for common method bias, a Harman’s single-factor test was performed, revealing that no single factor accounted for more than 40% of the variance, indicating that common method bias was not a major concern. Latent variables were created to capture the theoretical constructs proposed in the Hoover-Dempsey and Sandler model. Parental beliefs were specified as a latent variable measured by three observed indicators, role construction, self-efficacy, and school valence, each assessed through multiple Likert-scale items adapted to the Tanzanian context. The latent construct of invitations comprised three observed indicators: school invitations, teacher invitations, and child invitations, reflecting parents’ perceptions of encouragement and opportunities for participation from different sources within the school community.

The resource's latent variable was composed of three observed indicators: (1) time and energy, (2) knowledge and skills, and (3) parents' income, representing parents perceived capacity to contribute to school feeding activities. Parental involvement, as the dependent construct, was measured through three indicators: volunteering, communication with teachers, and participation in school feeding activities. Each latent construct was validated through confirmatory factor analysis (CFA) prior to the full SEM, and all factor loadings were statistically significant ($p < .001$), confirming construct validity and suitability for structural testing. The use of latent variables is recommended in SEM because it allows researchers to account for measurement error and to represent complex psychological or behavioural constructs more accurately (Byrne, 2016; Hair *et al.*, 2019; Kline, 2023).

Two structural equation models were estimated using robust maximum likelihood (MLR) estimation in R. Model 1 (Invitations Model) tested the direct and indirect effect of parents' beliefs on parental involvement through *school, teacher, and child invitations*, controlling for *resources (time, skills, and income)*, *gender*, and *number of children*. Model 2 (Resources Model) examined the direct and indirect effect of parents' beliefs on parental involvement through *resources (time, energy, skills, and income)*, while controlling for *invitations, gender, and the number of children*. Each model assessed both the direct and indirect effects of parents' beliefs on parental involvement, capturing the total, mediated, and residual pathways.

Model adequacy was evaluated using multiple fit indices based on conventional SEM thresholds: Chi-square (χ^2), Comparative Fit Index ($CFI \geq .90$), Tucker–Lewis Index ($TLI \geq .90$), Root Mean Square Error of Approximation ($RMSEA \leq .08$), and Standardised Root Mean Square Residual ($SRMR \leq .08$). Indirect (mediation) effects were examined using bias-corrected bootstrapping (5,000 resamples), and 95% confidence intervals (CIs) were used to determine statistical significance. Mediation was considered significant when the CI did not include zero. All results were interpreted using standardised coefficients (β), p -values, and CIs, with $p < .05$ considered statistically significant.

Results

Correlations Among Study Variables

Table 1 presents the descriptive statistics and Pearson correlations among the observed study variables. Overall, the pattern of correlations was consistent with theoretical expectations. Parents' own school valence, role construction, and sense of self-efficacy were all positively intercorrelated, indicating that parents who reported more positive attitudes toward schooling and stronger

confidence in their ability to contribute also tended to hold clearer beliefs about their parental role in supporting education.

Among the invitation variables, school invitations, teacher invitations, and child invitations were all significantly related to one another ($r = 0.43, 0.57, p < 0.001$), suggesting that schools that foster multiple forms of communication and encouragement create a coherent environment of engagement. Each type of invitation was also significantly and positively associated with the three belief variables ($r = 0.35, 0.61, p < 0.001$), supporting the notion that motivated parents perceive greater openness from schools and teachers.

Regarding life-context resources, skills, and knowledge, time, energy, and income were moderately intercorrelated ($r = .38, .54, p < .001$). These resource measures were positively associated with parental beliefs and invitations, indicating that parents with more capabilities, energy, and financial means are more likely to respond to school engagement efforts.

The outcome variable, parental involvement in school feeding, was significantly correlated with nearly all motivational, invitation, and resource variables ($r = 0.32, 0.66, p < 0.001$). The strongest associations were observed with school invitations ($r = .66$) and skills and knowledge ($r = .59$), implying that parents' active participation in feeding programs is most strongly driven by the extent to which schools communicate and guide involvement, and by parents' confidence in their capacity to contribute meaningfully.

Demographic controls displayed weaker associations. Gender showed small, nonsignificant correlations with most variables ($r < .10, p > .05$), suggesting that both mothers and fathers engaged similarly in school feeding activities. Number of children correlated slightly negatively with time and energy ($r = -.21, p < .01$) and involvement ($r = -.18, p < .05$), indicating that larger family size may limit parents' ability to dedicate time and resources to school programs. Income correlated moderately with resources ($r = 0.46, 0.51, p < 0.001$) but showed weaker associations with motivational and invitation variables. Parents' education level was included in the correlation matrix for completeness; however, its distribution was highly skewed toward primary education (68%), and correlations with the main study constructs were small in magnitude.

Overall, these findings indicate strong theoretical coherence among belief, invitation, and resource variables, and confirm their expected positive associations with parental involvement in school feeding programs. The observed patterns provided empirical justification for proceeding to the subsequent SEM analyses, which examined direct and indirect relationships

among these constructs. Consistent with the study hypotheses, the SEM analyses reported below evaluate whether parents' beliefs are associated with involvement (H1) and whether this association is transmitted through invitations (H2) and resources (H3).

Table 1:
Descriptive Statistics and Pearson Correlations Among Study Variables (N = 500)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Parents' own school valence													
2. Parents' role construction	.49***												
3. Parents' self-efficacy	.45***	.58***											
4. School invitations	.52***	.46***	.43***										
5. Teacher invitations	.41***	.39***	.36***	.57***									
6. Child invitations	.39***	.37***	.34***	.48***	.43**								
7. Parents' skills and knowledge	.46***	.42***	.38***	.54***	.49***	.40***							
8. Parents' time and energy	.33***	.31***	.29***	.41***	.36***	.32***	.50***						
9. Parents' income	.22***	.25***	.21***	.30***	.28***	.19**	.51***	.46***					
10. Parental involvement in SFP	.44***	.48***	.41***	.66***	.53***	.47***	.59***	.49***	.38***				
11. Gender	-.06	-.04	.02	-.05	-.07	-.03	-.02	-.08	-.05	-.06			
12. Number of children	-.10*	-.09	-.07	-.13*	-.11*	-.09	-.19**	-.21**	-.17**	-.18**	.03		
13. Parents' education level ¹	.11	.10	.09	.08	.06	.07	.13*	.10	.18**	.12*	.02	.05	
M	4.82	4.95	5.02	4.68	4.51	4.62	4.79	4.55	3.12	4.81	1.53	3.21	2.01
SD	.87	.79	.74	.83	.90	.85	.80	.87	1.08	.76	.50	1.32	.84

NOTE: Variables include components of parents' beliefs (valence, role construction, self-efficacy), invitations (school, teacher, child), and resources (skills and knowledge, time and energy, income), as well as parental involvement in school feeding programs (SFPs). Gender was coded 1 = Male, 2 = Female. Education level was coded 1 = No formal education, 2 = Primary, 3 = Secondary, 4 = College/University. * $p < .05$; ** $p < .01$; *** $p < .001$

Model One: Invitations Model

The first model tested the hypothesis that parents' beliefs influence their parental involvement in school feeding programs (SFPs) through school-related invitations (from schools, teachers, and children), while controlling for resources, gender, and the number of children. This model represents the *social-motivational pathway* proposed in the Hoover-Dempsey and Sandler framework, where schools' outreach and communication practices transform parents' motivational beliefs into active participation. Model 1 specifically evaluates the mediation hypothesis in H2 and estimates the total association between beliefs and involvement (H1) alongside the direct effect to determine whether invitations account for that association.

The model demonstrated a strong and statistically significant fit to the data, $\chi^2(238) = 421.67$, $p < .001$, indicating that while the chi-square statistic was significant, as is common with large samples, it remained within acceptable bounds relative to the model's degrees of freedom ($\chi^2/df = 1.77$), suggesting a well-fitting model. Other fit indices supported this conclusion, with CFI = .95, TLI = .94, RMSEA = .045 (90% CI [.038, .052]), and SRMR = .041, all of which met the recommended thresholds for a parsimonious and well-specified structural model (Hair *et al.*, 2019; Kline, 2023). The model accounted for 57% of the variance ($R^2 = .57$) in parental involvement, demonstrating that motivational and social factors together explained more than half of the variability in parents' participation in school feeding activities.

All standardised factor loadings for the latent constructs were significant ($p < .001$) and ranged between .63 and .87, supporting good convergent validity. Within the *beliefs* construct, parents' school valence (.74), role construction (.79), and self-efficacy (.82) were the strongest indicators. For the *invitation* construct, factor loadings were 0.84 for school invitations, 0.81 for teacher invitations, and 0.76 for child invitations, demonstrating that invitations extended by schools and teachers were the most salient predictors of parental engagement opportunities. Cronbach's alphas ranged from 0.78 to 0.89, and composite reliabilities exceeded 0.80, confirming strong internal consistency. The structural model revealed that the path from parents' beliefs to invitations was positive and significant ($\beta = 0.68$, $p < .001$), indicating that parents who held stronger motivational beliefs perceived more frequent and welcoming invitations from schools and teachers. However, the direct path from beliefs to parental involvement was not significant ($\beta = 0.07$, $p = .30$), suggesting that parental beliefs alone did not translate directly into active involvement without the mediating influence of invitations.

The indirect effect of beliefs on parental involvement through invitations was significant ($\beta = 0.37$, $p < .001$), as estimated using 5,000 bias-corrected

bootstrap resamples with a 95% confidence interval [0.25, 0.48]. The total effect of beliefs on involvement (direct and indirect effect) was $\beta = 0.55$, $p < .001$, whereas the nonsignificant direct path after accounting for the mediator confirmed full mediation primarily through invitations. Consistent with H2, these results indicate that invitations transmit the association between beliefs and involvement; the significant total effect provides support for H1 at the level of the overall (direct and indirect) association.

Regarding control variables, resources exhibited a small but significant positive effect on involvement ($\beta = 0.18$, $p < .05$), suggesting that parents with greater time, energy, and financial means were more active in supporting SFPs. Gender did not show a significant effect ($\beta = -0.04$, $p = .47$), indicating that mothers and fathers were equally likely to engage when other factors were controlled. Conversely, the number of children showed a small negative association ($\beta = -0.12$, $p < .05$), suggesting that parents with larger families faced greater constraints on participation.

In summary, Model One supports the notion that parents' beliefs foster involvement indirectly through school and teacher invitations, aligning with the social-motivational mechanisms of the Hoover-Dempsey and Sandler model. When schools actively invite parents, communicate clearly, and create inclusive opportunities for participation, parents' motivational beliefs are effectively transformed into tangible engagement in school feeding activities. Overall, Model 1 supports H2 and suggests that the beliefs-involvement association (H1) operates primarily through perceived invitations in this sample.

Model Two: Resources Model

The second model examined the hypothesis that parents' beliefs influence parental involvement in school feeding programs (SFPs) through their available resources, including time, energy, skills, and income, while controlling for invitations, gender, and number of children. This model reflects the *contextual-enabling pathway* in the Hoover-Dempsey and Sandler framework, positing that even when parents hold strong motivational beliefs, their engagement depends on the practical resources that make participation feasible. Model 2 specifically evaluates the mediation hypothesis in H3 and estimates the total association between beliefs and involvement (H1) alongside the direct effect to determine whether resources account for that association.

The model demonstrated an acceptable and statistically significant fit to the data, $\chi^2(240) = 437.92$, $p < .001$. Although the chi-square statistic was significant, as typically expected in large samples, it remained within acceptable limits relative to the model's degrees of freedom ($\chi^2/df = 1.82$), indicating a satisfactory level of correspondence between the hypothesised

model and the observed data. Additional fit indices further confirmed the good model fit: CFI = .94, TLI = .93, RMSEA = .047 (90% CI [.039, .054]), and SRMR = .044, all of which met the recommended thresholds for an acceptable and parsimonious model (Hair *et al.*, 2019; Kline, 2023). The model explained 52% of the variance ($R^2 = .52$) in parental involvement, which was slightly lower than the invitations model, suggesting that contextual resources accounted for just over half of the variation in parents' participation in school feeding activities.

All standardised factor loadings for the latent constructs were significant ($p < .001$) and ranged from .61 to .86, demonstrating strong convergent validity. Within the *beliefs* construct, parents' own school valence (.72), role construction (.78), and self-efficacy (.80) contributed strongly. For the *resources* construct, factor loadings were 0.83 for skills and knowledge, 0.79 for time and energy, and 0.74 for income, indicating that skills and knowledge were the most influential indicators of parents' perceived resource capacity. Reliability analyses yielded Cronbach's alpha values ranging from 0.77 to 0.88 and composite reliabilities exceeding 0.80, confirming internal consistency. The structural model showed that parents' beliefs positively predicted resources ($\beta = 0.56, p < .001$), suggesting that parents with stronger role beliefs and higher confidence reported having more time, energy, skills, and financial means to engage. However, the direct path from beliefs to parental involvement was nonsignificant ($\beta = 0.09, p = .27$), indicating that beliefs alone did not directly influence participation when resources were taken into account.

The indirect effect of beliefs on involvement through resources was significant ($\beta = 0.26, p < .001$), with a 95% bias-corrected bootstrap confidence interval [0.15, 0.38], confirming that parents' beliefs contributed to involvement primarily through their perceived ability and means to act. The total effect of beliefs on involvement was $\beta = 0.49, p < .001$, indicating that, while beliefs remained important, the mediating influence of resources was partial and weaker than the invitations pathway. Consistent with H3, these results indicate that resources transmit the association between beliefs and involvement; the significant total effect provides support for H1 at the level of the overall (direct and indirect) association.

Among the control variables, invitations had a moderate and significant effect on involvement ($\beta = 0.32, p < .001$), suggesting that school-based social encouragement continued to facilitate participation even when resources were taken into account. Gender was again nonsignificant ($\beta = -0.05, p = .44$), while the number of children showed a small negative effect ($\beta = -0.11, p < .05$), reflecting the challenge of distributing limited resources across multiple dependents.

Overall, the results of Model Two support the theoretical proposition that parents' motivational beliefs enhance involvement indirectly through resource-related mechanisms. Parents with greater time, skills, and financial stability were more able to act on their beliefs to support school feeding efforts. However, because the invitations model exhibited stronger mediation and explained slightly more variance, it appears that social encouragement and school engagement practices play a more dominant role than contextual resources in mobilising parental participation in Tanzanian SFPs. Overall, Model 2 supports H3 and indicates that the beliefs-involvement association (H1) is also carried through available resources, although the magnitude is smaller than for invitations.

Table 2
Summary of Structural Equation Models Predicting Parental Involvement in School Feeding Programs

Parameter	Model 1: Invitations Model	Model 2: Resources Model
Model Fit		
χ^2 (df), p	421.67 (238), $p < .001$	437.92 (240), $p < .001$
χ^2 /df Ratio	1.77	1.82
CFI	.95	.94
TLI	.94	.93
RMSEA [90% CI]	.045 [.038, .052]	.047 [.039, .054]
SRMR	.041	.044
Measurement Model		
Factor Loadings (Range)	.63-.87	.61-.86
Reliability (α Range)	.78-.89	.77-.88
Composite Reliability	> .80	> .80
Structural Paths		
Beliefs $\rightarrow$ Mediator	$\beta = .68, p < .001$	$\beta = .56, p < .001$
Mediator $\rightarrow$ Involvement	$\beta = .55, p < .001$	$\beta = .47, p < .001$
Beliefs $\rightarrow$ Involvement (Direct)	$\beta = .07, p = .30$	$\beta = .09, p = .27$
Indirect Effect (Mediation)	$\beta = .37, p < .001$ [0.25, 0.48]	$\beta = .26, p < .001$ [0.15, 0.38]
Total Effect	$\beta = .55, p < .001$	$\beta = .49, p < .001$
Variance Explained (R^2)	.57	.52
Control Variables		
Resources $\rightarrow$ Involvement	$\beta = .18, p < .05$	
Invitations $\rightarrow$ Involvement		$\beta = .32, p < .001$
Gender $\rightarrow$ Involvement	$\beta = -.04, p = .47$	$\beta = -.05, p = .44$
Number of Children $\rightarrow$ Involvement	$\beta = -.12, p < .05$	$\beta = -.11, p < .05$

Note. β = standardised regression coefficient. p -values are two-tailed. Model 1 and Model 2 represent separate mediation pathways with Invitations and Resources as mediators, respectively. RMSEA = Root Mean Square Error of Approximation; SRMR = Standardised Root Mean Square Residual; CFI = Comparative Fit Index; TLI = Tucker–Lewis Index.

Discussion of the Findings

This study examined how parents' beliefs shape involvement in school feeding programs (SFPs) in Tanzanian primary schools through two pathways: a social-motivational pathway (school invitations) and a contextual-enabling pathway (parental resources). Overall, parents' beliefs were related to involvement primarily indirectly through both mediators, with invitations showing the stronger role. Consistent with the Hoover-Dempsey and Sandler model (Hoover-Dempsey and Sandler, 1995, 1997), motivational beliefs (role construction, self-efficacy, and school valence) appear insufficient on their own; they become actionable when schools provide welcoming, structured opportunities for engagement (Green *et al.*, 2007; Kigobe *et al.*, 2021; Walker *et al.*, 2005).

Evidence from Tanzania supports this interpretation. Teacher-parent communication and inclusive school practices have been linked to higher engagement (George & Amos, 2025). In contrast, weak or one-way communication has been associated with low participation and mistrust in school meal programs (Haruna & Mwakalinga, 2025). Similar mediation patterns have been reported elsewhere, including Uganda and Rwanda, and in Indonesia, where consistent invitations and two-way communication strengthen parents' participation (Ganyata, 2025; Kiyangi *et al.*, 2025; Solichah & Nawangsari, 2025). Taken together, the findings suggest that "invitations" function less as announcements and more as relational mechanisms that signal value, clarity of roles, and genuine space for parents to contribute.

Resources also mattered, though more modestly. Parents' time, energy, skills, and income enabled participation, reflecting the practical realities of rural livelihoods and household constraints (Akyoo & Akyoo, 2025; Robert *et al.*, 2025). This aligns with Bronfenbrenner's emphasis on how behaviour is shaped within layered socio-economic contexts (Bronfenbrenner, 1979, 2006), and is consistent with Tanzanian evidence identifying time and financial constraints as barriers to participation (Nyakeko, 2024). The negative association with the number of children reinforces the idea that competing caregiving and labour demands can dilute the capacity to engage, as documented in other African contexts (Molepo, 2023; Orighoye *et al.*, 2023). Importantly, some evidence suggests that strong school guidance and flexible participation options can help sustain engagement even among resource-constrained households (Muhammed *et al.*, 2025).

While some international studies report a residual direct effect of beliefs on involvement (Solichah & Nawangsari, 2025), the Tanzanian pattern observed here, where involvement requires activation through invitations and enabling structures, fits a context where SFPs remain evolving and frequently donor-

dependent (Athumani *et al.*, 2024; Haule & Mwinami, 2024). In extremely resource-limited settings, material barriers may still outweigh motivational and social drivers (Molepo, 2023; VanMark *et al.*, 2025). The absence of gender differences may reflect changing norms and shared recognition of children's nutrition needs (Byenobi, 2025).

These findings have practical implications for SFP sustainability in Tanzania and beyond. Given the vulnerability of donor-supported programs to withdrawal (Bundy *et al.*, 2018; Gelli *et al.*, 2019; Mainje *et al.*, 2024), strengthening school-community partnerships can build local ownership and continuity. Evidence from other African settings shows that involving parents in decision-making and procurement can improve participation and accountability (Bikorimana *et al.*, 2024; Sulu & Matemba, 2024), and Tanzanian experience similarly suggests that early community involvement strengthens resilience (Gonjo *et al.*, 2024). Schools can operationalise these insights by institutionalising two-way communication, defining clear roles for parents within feeding committees, and offering flexible participation models that reflect household constraints; this also requires building staff capacity in communication and community mobilisation (Ganyata, 2025; Malingumu *et al.*, 2023). Finally, linking SFPs with local procurement and home-grown approaches can strengthen both ownership and local livelihoods (Fungo, 2023; Roothaert *et al.*, 2021).

Implications for SFPs' sustainability, Practice, Research and Policy

The findings have clear implications for strengthening the sustainability of school feeding programs (SFPs) in Tanzania and comparable African contexts. Because many SFPs remain donor-funded and vulnerable to withdrawal (Bundy *et al.*, 2018; Gelli *et al.*, 2019; Mainje *et al.*, 2024), sustainable implementation depends not only on resources but also on the quality of school-community relationships. The strong role of the "invitation" pathway indicates that schools can mobilise parental involvement most effectively through deliberate, structured, and two-way communication, regular meetings, personal invitations, transparent information-sharing, and inclusive decision-making that signals respect and shared responsibility (Bikorimana *et al.*, 2024; Gonjo *et al.*, 2024; Sulu & Matemba, 2024).

At the same time, participation is shaped by contextual constraints. Many parents face limitations in time, energy, skills, and income, so schools and policymakers should adopt flexible engagement options that match household realities, for example, allowing in-kind contributions where cash is difficult, rotating volunteer schedules, and assigning clear, manageable roles in feeding committees to avoid excluding resource-constrained households. Teacher capacity in two-way communication and community mobilisation should also

be strengthened, as teachers often serve as the practical link between parental motivation and actual participation (Ganyata, 2025; Malingumu *et al.*, 2023). For researchers, these findings suggest the need to evaluate which invitation strategies (e.g., frequency, mode, and tone of school communication) and which flexibility mechanisms (e.g., in-kind vs cash contributions, time-saving participation models) most effectively increase equitable parental involvement, using longitudinal or implementation-focused designs to assess sustainability over time (Ganyata, 2025; Malingumu *et al.*, 2023).

At the policy level, these findings support strengthening institutional expectations for parental engagement within the implementation of the National Guidelines for School Feeding and Nutrition Services (2021), including clearer standards for school-community collaboration and meaningful parental representation in school feeding committees. Finally, home-grown school feeding approaches can further reinforce sustainability by linking SFPs with local farmers and women's groups, strengthening supply chains while building ownership and local economic benefits (Fungo, 2023; Roothaert *et al.*, 2021).

Strengths and Limitations of the Study

A key strength of this study is its strong theoretical and analytical grounding. By integrating Hoover-Dempsey and Sandler's model of parental involvement with Bronfenbrenner's Ecological Systems Theory, the study captured both motivational and contextual influences on parents' participation in school feeding programs. The relatively large sample drawn from 20 primary schools in the Mara Region also supports generalisability to similar rural and semi-urban Tanzanian settings.

The study further contributes empirically by extending parental involvement frameworks beyond academic and literacy contexts to school feeding programs, an important but less-examined domain in sub-Saharan Africa. In addition, the use of established instruments previously applied in Tanzania strengthens measurement reliability and contextual relevance (Kigobe, 2019; Kigobe *et al.*, 2021, Kigobe *et al.*, 2025; Malingumu *et al.*, 2023). Finally, examining alternative mediating pathways enhanced the study's explanatory depth by clarifying how beliefs translate into involvement through invitations and resources.

Several limitations should be noted. The cross-sectional design limits causal inference; longitudinal or intervention studies are needed to determine whether strengthening invitations or resources increases involvement over time. Self-reported measures may be affected by social desirability bias, suggesting value in observational or multi-informant data in future work. Lastly, focusing on the Mara Region provides contextual specificity but limits national generalisation;

future research across multiple regions and rural-urban comparisons would strengthen external validity and policy relevance.

Conclusion

This study shows that parents' beliefs about their role and efficacy are linked to involvement in school feeding programs mainly through school invitations and parental resources. School invitations were the strongest pathway, highlighting the importance of purposeful, two-way communication and inclusive school practices in converting parental motivation into participation. Overall, sustainable school feeding depends not only on resources but also on strong school-parent partnerships grounded in mutual respect and shared accountability. By strengthening both engagement practices and practical supports for families, schools, and communities, schools can advance more resilient implementation of Tanzania's National School Feeding Guidelines.

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Head of School Managerial Strategies on Addressing Challenges Facing the Former Unemployed Graduate Secondary School Teachers in Kahama District, Tanzania

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Abstract

Building on Human Capital Theory, this study examined managerial strategies for addressing the challenges faced by former unemployed graduate-teachers in their teaching processes. This study employed a qualitative research approach and a case study design. The sample involved 86 respondents. The data were collected through interviews and documentary review. The findings revealed professional difficulties in teaching methodologies, student assessment, classroom management, and psychological effects among former unemployed graduate-teachers in classrooms. Moreover, it was noted that overcrowded classrooms, graduate mind-set, lack of a conducive learning environment, and excessive focus on entrepreneurship activities were identified as challenges facing former unemployed graduate-teachers in their teaching processes. The findings indicated that seminars, enhanced cooperation in teaching, promotion of a conducive working environment, and provision of pedagogical leadership were identified as strategies that can address the challenges facing former unemployed graduate-teachers in their teaching endeavours. The study concludes that long-term unemployment affects teaching competency. It recommends that the government invest in induction programs for former unemployed teachers to boost their teaching skills.

Keywords: *Employability, Teaching Competency, and Secondary Schools*

Introduction

Graduate unemployment is a global phenomenon. The situation is particularly difficult in Africa, where many inhabitants see university education as a lifeline to economic freedom, prosperity, and a better living condition (ILO, 2016). However, teachers who graduated from various educational institutions have been unemployed in Tanzania. This is due to the number of graduates produced exceeding the available teaching job opportunities (Mbalamwezi, 2015). Nevertheless, the issue of university graduates being unemployed has

been affecting the whole World. Experience from developed countries, such as China, shows that it has been a populous country and has faced challenges in graduate employability since the 1990s (Yang, 2016). The introduction of the household registration system in China led to more graduates than there were available job opportunities. For example, from 1999 to 2013, the number of new entrants to universities increased from 1.08 million to 7 million. Likewise, from 2001 to 2014, the number of new university graduates in China increased from 1.07 million to 7 million. A Nationwide survey reported that in 2012, about 530,000 graduates were unemployed in China (Yang, 2016).

According to Ding and Yu (2017), China produces over seven million graduates per year, but only two million were employed by 2013. This affects graduates' lives, and many continue to depend on parents or relatives for survival. In Kenya, the gap between employer demand and the supply of university graduates is widening, and various stakeholders have questioned the quality and quantity of graduates entering the labour market (Kalei, 2016). It is evident that there is a discrepancy between graduates' skills and the job market's requirements. This means that many graduates lack basic employability skills when they enter the job market. Issues related to mismatches between graduate skills and employer needs have led to graduates' unemployment and social problems (Kalei, 2016).

Over the years, Namibia has shifted from a centralised to a decentralised recruitment system, allowing regional offices to address local school needs more effectively (Aloovi, 2025). The literature indicates that Namibia faces a rising teacher unemployment rate, with statistics from the National Council for Higher Education (NCHE) showing an increase from 31% in 2019 to 34% in 2020. This issue is further compounded by an oversupply of teacher graduates, which is disproportionate to the labour market demand. Mwangonde (2014) reveals that only 20% of university graduates in Tanzania find employment each year. Some statistics show that more than 900,000 graduates enter the job market, but only 50,000-60,000 are employed, suggesting that about 800,000 remain jobless (Gregory, 2017).

However, their access to formal employment is limited, as only approximately 40,000 (5.7%) find jobs in the formal sector. Thus, most graduates remain jobless and unfit for the job market. Therefore, unemployment in Tanzania remains a daunting challenge in this developing economy. Consequently, employment for higher education graduates has become a severe concern for students, parents, universities, the government, and the public (Mbalamwezi, 2015). Moreover, the NBS (2018b) shows that the public sector employment rate dropped from 36.7% in 2015 to 35% in 2016 across sectors, including the teaching profession in the education sector. This suggests a limited ability of the Tanzanian government to create employment, while private-sector

employment growth remains minimal (Kalufya & Mwakajinga, 2016). Tanzania's official statistics indicate that the unemployment rate has decreased slightly, from 10.3% in 2014 to 9.7% in 2018 (NBS, 2018b). In other data, Nganga (2014) suggests that 61% of Tanzanian graduates are unfit for the job market. Generally, it is estimated that only 5.7% of graduates each year find jobs in the formal sector that everyone aspires to (Ngalomba, 2018).

Different ways to rescue the employability challenges have been suggested to reduce graduates' unemployment. For example, Mbalamwezi (2015) suggests that graduates' mindsets should be transformed from employment to self-employment through teaching and training to change their mindsets and attitudes. Moreover, Tanzania's higher education system needs to prepare graduates for sustainable livelihoods in all positive forms. Business educators should rethink their training approaches and strategies and adopt a competence-based model of education delivery, and trainers should monitor labour-market changes and demands so they can rethink their mission, messages, and methods in line with these requirements.

ILO (2016) shows that only 10% percent from 800,000 graduates who enter the labour market are employed. Also, ILO (2020) revealed that only 3.6% of youth in Tanzania have formal employment opportunities. The unemployment issue seems to be in the education sector as well, where graduate-teachers are currently facing unemployment challenges. In Tanzania, up to the 1990s, teaching employment was automatic, as graduates were automatically hired for public school positions. However, the unemployment problem affected the education sector, especially in the 2000s, and worsened in the 2020s. For instance, the government, through the President's Office, Regional Administration and Local Government (PORALG), announced the teaching employment opportunities in 2021 and 2022. Despite efforts to employ teachers, only a few received jobs offer, and among those who did, some have been out of work for several years and so faced pedagogical challenges.

Prolonged unemployment among graduate teachers results in notable professional challenges that undermine their effectiveness upon entry into the teaching profession. Extended absence from classroom practice contributes to the erosion of subject content knowledge and pedagogical skills, as pre-service training is not continuously reinforced (Darling-Hammond, 2017). Delayed entry also limits access to induction, mentoring, and workplace learning, which are essential for developing instructional competence and professional confidence (Ingersoll & Strong, 2011). Evidence from sub-Saharan Africa further shows that prolonged unemployment weakens teachers' exposure to learner-centred pedagogies and professional identity, increasing the need for managerial support from school heads (Avalos, 2011; O'Sullivan, 2010). Hence, this study aimed to:

- i) Assess the challenges faced former unemployed graduate-teachers in their teaching processes and
- ii) Examine school head strategies on solving the challenges facing former unemployed graduate-teachers in their teaching endeavours.

Literature Review

The Concept of Employability

Zavala (2020) argues that employability is defined as a graduate's competence in designing their professional career, accessing the job market and managing their job development with success and satisfaction in the labour market. Ngasu (2012) found that graduates themselves, the poor education and entrepreneurship curriculum in our country are the main causes of graduate unemployment. Employment is defined as the potential to secure a job at a workplace, while, employability is the potential to secure, maintain, and grow in a particular job at the workplace. Based on this definition, it is safe to conclude that employability requires a set of skills that can help individuals get employed, remain employed, and even become self-employed and create jobs. The term employability is also reciprocally used with the term work-readiness (Yorke, 2010).

Employability skills are crucial for overcoming employment barriers, and a lack of job opportunities can undermine the motivation and effectiveness of graduates, including teachers. Enhancing employability skills is therefore, essential not only for securing employment but also for ensuring that graduates, such as teachers, can perform their roles effectively and contribute positively to their sectors. This connection underscores the importance of aligning education and skill development with labour market needs to mitigate unemployment and its negative impacts on professional performance. The study of the implications of graduate-teacher unemployment for teaching competency highlights how unemployment among graduates can negatively affect their motivation and preparedness to perform their roles effectively.

Types of Employability Skills

According to Bano and Vasantha (2020), employers and recruiters highly demand skills during interviews and placements. These skill categories include professional, methodological, social, personal, analytical, and digital literacy skills. Employability skills emphasise graduates' ability to adapt and apply their academic and personal skills to achieve tangible outcomes that support graduate employability. Chung and Yet (2009) found that most employers want to employ those graduates who are from the public universities because they seem to have the needed job skills. Furthermore, it was suggested that younger employers are more favourable to graduates' employability skills.

These conditions however, cause delays in getting employment by graduate-teachers with required employability skills.

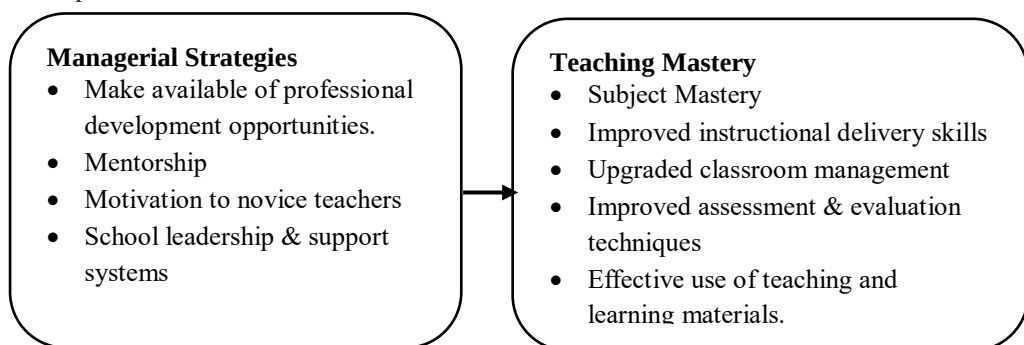
Human Capital Theory

The focus of this study challenges Human Capital Theory, as proposed by Becker and Schultz, which posits that education and training are vital investments that enhance market productivity. (Becker, 2009). The theory suggests that quality education significantly influences economic growth and human capital development. However, many graduate-teachers face unemployment, which not only hinders their productivity but also negatively affects their teaching competency due to a lack of practical teaching experience and skills. Furthermore, as unemployed teachers may refrain from seeking professional development, this leads to a less qualified teaching workforce. Thus, the study highlights the critical need to address the consequences of unemployment among teachers and enhance their human capital to improve the overall quality of teaching and education in Kahama District Council, Tanzania.

Human capital is highly relevant individuals possess and can contribute to their productivity and success in the workplace. In the context of teaching, human capital is essential for teachers to effectively impart knowledge, engage students, and foster a positive learning environment. In school context, teachers are unable to fully utilize their human capital due to employability, it can hinder their ability to perform their job effectively and ultimately impact the quality of education that students receive. Therefore, understanding the role of human capital in teaching competency is crucial for addressing the challenges posed by delays in acquiring employment in public secondary schools in Kahama District Council, Tanzania.

Conceptual Framework

Figure 1:
Conceptual Framework



Source: Researcher's Insight and Human Capital Theory (2024).

The conceptual framework illustrates the roles of managerial strategies employed by school heads in managing teaching challenges experienced by the former unemployed graduate teachers in their teaching endeavours in schools. The framework assumes that the effectiveness of managerial practices directly influences the extent to which novice teachers are able to overcome instructional and professional challenges in the school environment. The school heads' managerial strategies include the provision of professional development opportunities, induction and orientation programmes for newly recruited teachers, mentorship arrangements, motivational practices, and supportive school leadership programs. These strategies represent deliberate actions taken by school heads to build subject mastery, improve instructional delivery skills, upgrade classroom management, enhance effective assessment and evaluation techniques, and improve effective use of teaching and learning materials. Henceforth, the challenges experienced due to inadequate prior exposure to practical teaching environments are well handled and consequently, novice teachers (former unemployed graduate-teachers) acquire the necessary competencies, adapt smoothly to the school context, and perform effectively in their instructional roles. Conversely, weak or absent of managerial support may leave novice teachers struggling to cope with classroom demands.

Methodology

The study employed a case study research design under qualitative research approach. With this research design, researchers collected, analysed and comparing qualitative data in a single phase of data collection to determine whether the results corroborate or contradict one another. Since this study was qualitative in nature, purposive and snowball sampling techniques were employed to select different categories of sample as follows.

Graduate teachers (i.e. who experienced more than 2 years' delay in acquiring formal employment but were in employment more than 4 years) were selected using snowball sampling technique. This method made it easier for one participant to introduce another participant. Since, it was challenging to identify graduates who were impacted by the issue of a lack of formal jobs, the researcher chose graduate-teachers using a snowball sampling approach. *New teachers* (these were recently employed teachers with less than 1 year and previous stayed without formal employment for some years) were sampled using a purposive non-probability sampling technique. This included teachers of different subjects. Purposive sampling ensured that the teachers selected had relevant experiences and insights regarding the problem.

Senior teachers (i.e. with 5 and above years in teaching) were also sampled using purposive sampling technique. Purposive sampling technique allowed selecting senior teachers with experiences in the field, because they were able

to provide in-depth knowledge regarding the study. *Heads of schools* (i.e. those with 3 and above years in headship) were sampled using purposive sampling technique. Heads are responsible for managing school operations, employing managerial strategies, and expected to professionally support the novice teachers so by purposive sampling technique, helped in selecting heads of schools who have direct experience with the changes brought about by curriculum implementation. *District Secondary Education Officer* (DSEO) was sampled using purposive sampling technique and based on her position as key supporter of managerial strategies that would capacitate the novice teachers in schools. Purposive sampling ensured that insight from someone who has a comprehensive understanding of the effect of unemployment on teachers as applied to secondary education delivery.

This study employed 86 participants. They included 40 graduate teachers who were employed in schools late, 25 senior teachers, 15 newly teachers and 5 heads of secondary schools, and 1 District Secondary Educational Officer. The five (5) secondary schools were selected purposely based on having a big number of teaching staff.

Findings and Discussion

This section presents and discusses the findings of this study on the school heads managerial strategies on addressing challenges facing the former unemployed graduate secondary school teachers in Kahama District, Tanzania. Various opinions, views and experiences were provided by participants on strategies that can be used to solve the challenges facing unemployed graduate-teachers in their teaching processes. The findings are presented, analysed and discussed as follows.

Table 1:
Challenges Facing Unemployed Graduate-Teachers in their Teaching Processes

Category	Themes	Themes explanation
Challenges	Overcrowded class	• Classroom management challenges • Impact on teaching efficiency and effectiveness • Inability to provide individualized attention and support to students
	Lack conducive environment	• Inadequate infrastructure • Lack of housing for teachers • Expectations vs. Reality • Unfavorable working conditions.
	Graduate mind-set	• Mindset of Entitlement • Lack of Awareness
	Lack of education concentration rather than entrepreneurship activities	• Prioritization of Self-Employment Over Teaching: • Challenges of Balancing Responsibilities

Source: Field Data (2024).

Table 1 highlights key challenges facing formerly unemployed graduate teachers, including overcrowded classrooms, unconducive working environments, mindset-related issues, and divided attention due to entrepreneurial activities. Overcrowding particularly hinders classroom management, learner engagement, and effective use of interactive teaching methods, reducing instructional effectiveness and professional adjustment. During an interview a senior teacher commented:

It is challenging to manage a large class, especially for newly employed teachers who are not used to handling such a large number of students. The overcrowding can really affect the quality of teaching and learning in the classroom.

Overcrowding also reduces teaching efficiency and limits the use of learner-centred approaches emphasized in current curriculum reforms. Large class sizes have been consistently linked to decreased instructional quality, reduced opportunities for interactive pedagogy, and increased teacher workload (Blatchford, Bassett, & Brown, 2011). Furthermore, teachers are unable to provide individualized attention and academic support to learners with diverse needs, thereby negatively affecting overall learning outcomes (Finn, Pannozzo, & Achilles, 2003).

Lack of a conducive working environment significantly challenges formerly unemployed graduate teachers. Inadequate physical infrastructure, limited teaching resources, and poor housing undermine teachers' capacity for lesson preparation and delivery, contributing to job dissatisfaction and reduced performance (Day, 2008; Ingersoll, 2001). Long commuting distances cause fatigue and lateness, while unmet expectations regarding working conditions reduce morale and complicate professional adjustment (Luthans & Youssef, 2007).

Graduate mindset-related challenges affect teaching processes, as some formerly unemployed teachers expect favourable conditions and rapid advancement. Research on teacher attitudes suggests that unrealistic expectations about working environments and career progression can lead to frustration, dissatisfaction, and reduced motivation when faced with challenging school contexts (Skaalvik & Skaalvik, 2011). Additionally, limited awareness of labour market realities hinders effective professional adjustment, as teachers struggle to adapt to contextual demands and institutional constraints (Day & Gu, 2010). Continued engagement in entrepreneurial activities limits some formerly unemployed graduate teachers' concentration on teaching. Financial pressures and delayed salaries compel teachers to balance self-employment with instructional duties (King & Palmer, 2010). Such dual engagement reduces time for lesson preparation, professional

development, and school involvement, weakening professional identity, commitment, and potential learning outcomes (Beauchamp & Thomas, 2009). Overall, challenges facing formerly unemployed graduate teachers stem from both systemic and individual factors. Overcrowding, poor working conditions, mindset issues, and economic survival strategies complicate the transition into teaching, necessitating deliberate managerial interventions. Supportive induction programs, mentoring, constructive supervision, and improvements in working conditions have been shown to enhance teacher effectiveness, job satisfaction, and retention (Ingersoll & Strong, 2011; Hobson, Ashby, Malderez, & Tomlinson, 2009). Such strategies strengthen professional commitment and contribute to higher instructional quality.

Table 2:

Strategies to Solve Challenges Facing the Former Unemployed Graduate-Teachers

Category	Themes	Themes Explanation
Strategies	Provision of relevant education seminars	- Professional Development, - Job Readiness, - Skill Enhancement: - Adaptation to Educational Changes
	Cooperation and assistance	- Providing mentorship programs - Professional development opportunities - resources
	Promotion of a welcoming and conducive environment	- Fostering a positive school culture - Promoting collaboration among staff members - Encouraging open communication
	Provision of good leadership.	- Regular feedback, - Recognition of their efforts, and - Opportunities for professional growth and development
	Engaging in teaching activities and assigning duties	- A Skills alignment, - Practical experience, - Confidence Building

Source: Field Data (2024).

Table 2 highlights strategies to support formerly unemployed graduate teachers, including professional development, mentorship, a supportive environment, strong leadership, and active teaching engagement. Implementing these approaches builds a solid foundation for new educators, enhancing job satisfaction, employability, and educational outcomes while helping teachers overcome early-career challenges.

Provision of Relevant Education Seminars

The findings highlight the need for education seminars for formerly unemployed graduate teachers to update their professional knowledge and teaching skills. Focused training in teaching techniques, classroom management, and subject-specific knowledge enhances teachers' competence,

confidence, and effectiveness, ultimately improving teaching processes and overall classroom performance (Avalos, 2011; Darling-Hammond, 2017; Ingersoll & Strong, 2011). Such professional development interventions have been shown to support teacher adaptation, strengthen instructional practices, and facilitate smoother transitions into formal teaching roles after prolonged unemployment. During interview graduate teacher said that:

I think seminars would really benefit us as newly employed teachers. I feel like there is so much more I could learn to improve my teaching strategies and manage my classroom more effectively (Interview with graduate-teacher B, 2023).

In addition, head of school shared the following:

I fully support the idea of providing seminars for newly employed teachers. It's crucial for them to continue their professional development and enhance their teaching abilities. Investing in their training will ultimately benefit the students and the overall effectiveness of our school (Interview with Head of secondary school, from school D, 2023).

Providing seminars for newly employed teachers enhances professional development, teaching strategies, and classroom management. Ongoing training equips teachers with practical skills, improving instructional effectiveness and creating a more engaging learning environment. Such proactive support benefits both teachers' growth and student outcomes, contributing to overall school performance.

Cooperation and Assistance

The findings indicate that schools should support newly employed teachers, particularly formerly unemployed graduates, through mentorship, professional development, and access to resources. Such support facilitates adaptation to new roles, helps teachers navigate professional challenges, enhances job satisfaction, improves performance, and promotes effective integration into the school environment (Avalos, 2011; Hobson *et al.*, 2009; Ingersoll & Strong, 2011). Evidence suggests that structured induction and ongoing support are critical for building teacher confidence, professional identity, and instructional competence, particularly for teachers entering the profession after prolonged periods of unemployment. A newly employed teacher shared:

My school has provided numerous professional development opportunities that have allowed me to grow and develop as a teacher. I feel supported and motivated to continue improving my practice, which has ultimately led to greater job satisfaction. Therefore, I suggest school to continue providing professional support to the newly employed teachers in every challenge (Interview with newly employed teacher from school E, 2023).

A head of school added:

Investing in the support and development of our newly employed teachers is crucial for their success and for the overall success of our school. By providing

resources, mentorship, and ongoing training, we are ensuring that our teachers feel equipped and empowered, supported to excel in their roles (Interview with Head of secondary school, C, 2023).

The findings emphasize the importance of supporting newly employed teachers, especially formerly unemployed graduates. Providing mentorship, professional development, resources, and growth opportunities fosters professional growth, enhances teacher retention, and creates a positive learning environment. Ongoing support benefits both teachers and the wider school community, promoting success and overall educational outcomes. During interview one head of school said that:

Providing ongoing support for our newly hired teachers is essential in order to ensure their success and retention at our school. We recognize the unique challenges that unemployed graduate teachers may face, and we are committed to implementing specific strategies and programs to support them in their professional development (Interview with Head of secondary school, A, 2023).

The implication of the statement is that supporting newly hired teachers, especially those who are recent graduates and may be facing challenges in entering the workforce, is crucial for their success and retention at the school. By implementing specific strategies and programs to support these teachers in their professional development, the school is investing in their growth and ensuring their continued success in the long run.

Promotion of a Welcoming and Conducive Environment

The findings revealed that creating a welcoming and inclusive environment for all teachers, including unemployed graduate teachers, can help them feel valued and supported in their teaching roles. This included fostering a positive school culture, promoting collaboration among staff members, and encouraging open communication. During interview Head of School said that:

We are committed to creating a supportive and inclusive environment for all teachers, including unemployed graduate teachers. We believe that by fostering a positive school culture and promoting collaboration among staff members, we can help our teachers feel valued and supported in their roles (Interview with Head of secondary school, B, 2023).

In similar view one among said that Senior Teacher:

By promoting open communication and creating opportunities for all teachers to contribute their ideas and experiences, we can build a strong sense of community within our school. This can ultimately benefit not only the teachers themselves, but also the students in our care (Focus Group Discussion with senior teachers from school E, 2023).

The findings suggest that schools should create inclusive and supportive environments to attract and retain teachers, including formerly unemployed

graduates. Prioritizing collaboration, open communication, and a positive school culture helps teachers feel valued, facilitates professional adjustment, and aligns with research showing that supportive school environments enhance teacher satisfaction, retention, and student learning outcomes (Day & Gu, 2010; Skaalvik & Skaalvik, 2011). Evidence indicates that fostering a positive organizational culture and providing social and professional support are critical for teacher effectiveness and long-term commitment to the profession.

Provision of Good Leadership

The findings revealed that strong leadership that encourages and supports teachers is essential for the success of any school. It was further revealed that providing unemployed graduate teachers with good leadership can help them feel motivated and inspired to excel in their teaching roles. This included regular feedback, recognition of their efforts, and opportunities for professional growth and development. During interview Head of School revealed that:

Our school has seen significant improvement in teacher performance and student outcomes when we invest in strong leadership that supports and empowers our teachers. By providing regular feedback, recognition, and opportunities for growth, we have seen a positive impact on our staff morale and overall school success (Interview with Head of secondary school, B, 2023).

In addition, senior teacher added that:

I have personally experienced the benefits of strong leadership in my professional development. When I feel supported and encouraged by my school leaders, I am motivated to improve my teaching practice and provide the best education possible for my students (Focus Group Discussion with senior teacher from school C, 2023).

One implication of the findings is that school leadership plays a crucial role in shaping the success of teachers and students. By prioritizing the development and support of teachers, schools can create a positive and thriving learning environment for all stakeholders.

Engaging in Teaching Activities and Assigning Duties

The findings revealed that in order to help unemployed graduate teachers get back into the teaching profession, schools can engage them in various teaching activities and assign them duties that align with their skills and interests. This can help them gain practical experience, build their confidence, and transition smoothly into their teaching roles.

During interview Head of School said that:

We have found that by providing opportunities for unemployed graduate teachers to engage in various teaching activities and aligning those activities with their skills and interests, we are able to support them in transitioning back

into the teaching profession (Interview with Head of secondary school, E, 2023).

In addition, participants during Focus Group Discussion shared that:

Assigning duties that are meaningful and relevant to the graduate teacher's background and expertise can help them gain confidence and practical experience that will benefit them in their teaching roles (Focus Group Discussion with senior teacher from school A, 2023).

The findings highlight strategies to support formerly unemployed graduate teachers, including educational seminars, collaboration, a welcoming environment, strong leadership, mentorship, and active engagement in teaching duties. Such interventions enhance professional development, update skills, build confidence, and facilitate smoother transitions into teaching, ultimately increasing the pool of qualified educators and improving school performance (Avalos, 2011; Darling-Hammond, 2017; Ingersoll & Strong, 2011). Providing mentorship, resources, and supportive leadership fosters collaboration, communication, and teacher motivation, while actively engaging graduate teachers in teaching activities strengthens practical experience and professional identity. Collectively, these strategies improve job satisfaction, retention, instructional quality, and overall educational outcomes, contributing to a resilient teaching workforce and enhanced learning experiences for students (Day & Gu, 2010; Hobson *et al.*, 2009).

Conclusions and Recommendations

This study has shown that implementing targeted strategies such as relevant training seminars, strengthened cooperation and support systems, conducive working environments, effective leadership, and motivational interventions can significantly reduce the challenges faced by unemployed graduate teachers. The findings underscore the value of a holistic approach that integrates capacity building with environmental and motivational support to facilitate the smooth reintegration of graduates into the teaching profession. These results enhance understanding of practical interventions needed to improve graduate teachers' employability, professional competence, and performance, highlighting the importance of continuous policy and program development. Although potential implementation barriers exist, the study provides valuable insights and lays a foundation for future research aimed at refining strategies to support graduate teachers experiencing delays in employment.

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Manuscript Preparation - JIPE

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The font size of the main text shall be 12 in Times New Roman

Manuscripts should be arranged in the order of: title page, abstract (structured summary) including up to five keywords, main text, acknowledgements (if applicable), references, tables, and figures.

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This page must include the following information:

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The first page following the title page should contain an abstract. Abstract should contain up to 250 words, mainly of the objectives, methodology, main findings, and recommendations of the paper. Three to five keywords representing concepts of the paper may be written at the end of the abstract. The Abstract shall be set as a single paragraph, in *italics*.

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In the main text:

- **Introduction:** Should describe the objective of the reported work and provide relevant background information.
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-
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 - **Discussion:** It should describe the implications of the findings and any conclusions drawn from them. Abbreviations in the body of the paper should be used after having been initially explained. If statistical analysis is applicable, it is important that the procedure is carried out following appropriate methods.

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Tables and figures should be as close as possible to the text explaining the concept. Tables should be numbered in the order in which they are mentioned in the text. A Table caption must be presented in upper case at the top, and a figure caption should be typed in bold at the top of the Figure. Explain in footnotes all non-standard abbreviations used in each table.

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The page numbers should appear at the Centre of the bottom edge of the page.

Reference style

All references should adhere to the latest version of APA format.

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They should be kept to a minimum. Two or more consecutive references to the same source should, where possible, be grouped in the same note; the reader should be able to follow the article without referring to the notes.