



JIPE Journal of Issues and Practice in Education

*Special Issue: International Conference for Educational
Assessment: 50th Years Anniversary of the National
Examinations Council, held at State University of
Zanzibar (The Institute of Tourism),
Zanzibar (27th to 28th of Nov. 2023)*

Host: National Examination Council of Tanzania

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Editorial

On behalf of the editorial and production team of the *Journal of Issues and Practice in Education (JIPE)*, I am humbled to welcome you enjoying reading the papers published in this Special Issue. The publication of this issue emerged as an output of the International Conference for Educational Assessment: 50 Years Anniversary of the National Examinations Council, organized by the National Examinations Council of Tanzania. The conference was convened at State University of Zanzibar (The Institute of Tourism) – Zanzibar, between 27th and 28th of November 2023.

This issue contains the following 16 papers:

1. A national e-assessment implementation framework: Assessing readiness in secondary schools and teacher education in Tanzania.
2. Barriers hindering Effective Engagement in Online Assessment for Teacher Education in Tanzania: Perspectives from two Teachers' colleges.
3. Inclusive Assessment in Tanzania: A Myth or Reality?
4. Mathematics Teachers' Use of National Assessment Feedback Reports in Improving Pedagogical Practices in Secondary Schools.
5. Investigating the Effect of Assessment Feedback on Students' Learning and Performance in Tanzania: Lessons from Secondary Education Mathematics.
6. Differentiated Assessments for Learners with Neurodevelopmental Disabilities in Inclusive Elementary Schools in Tanzania.
7. Formative Assessment Practices and its Influence on Students' Learning and Achievement in Biology: Lessons from a Selected Community Secondary School in Moshi, Tanzania.
8. Applauding or Criticising the Announcement of the Best School and Student in the National Examination: Which Way to Go?
9. Transforming Biology Assessment through Written Feedback in Tanzania Secondary Education: Insights from Action Research.
10. Competence-Based Assessment in Tanzanian Teacher Education in the Fourth Industrial Revolution: A Comprehensive Analysis.
11. Formative Assessment Practices and its Effect on Employability Skills to Vocational Students in Tanzania.
12. Proposal for Aligning the National Examinations Council of Tanzania's Roles with Principles of Education for Self-Reliance.

13. The Assessment Literacy for Secondary School Teachers in Tanzania.
14. Integrating Learning Management System and Digital library for Students' Assessment.
15. Examiners' Feedback Reports and their Effects on Mathematics Performance in Tanzanian Secondary Schools.
16. Utilisation of Information and Communication Technology in Teaching and Assessment of Secondary School Students in Tanzania.

On behalf of the Editorial Board, I extend our heartfelt appreciation first and foremost, to the Executive Secretary of NECTA and the Conference Organizing Committee for selecting JIPE as an avenue to publish the manuscripts came out from the conference. I also acknowledge the Publication Committee and anonymous peer reviewers who tirelessly dedicated their time to improve the manuscripts. Additionally, acknowledgments are due to all authors for the hard work they put on this special issue.

Dr Mohamed Msoroka
CHIEF EDITOR

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 on issues and practice related to 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. Sharing information related to education is important not only for academic, professional and career development but also for informed policy makers and community activity in matters pertaining to the field of education.

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A National E-assessment Implementation Framework: Assessing Readiness in Secondary Schools and Teacher Education in Tanzania

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ABSTRACT

Nearly every aspect of teaching and learning in the education sector has undergone a technological and pedagogical shift globally. The outburst of the COVID-19 pandemic and the digital advancements in recent years are two major factors that have geared and transformed the sector practically. Due to the rapid population growth and the fee-free education policy, candidate enrollment is constantly expanding, so it is crucial to devise an efficient, cost-effective, and secured approach for conducting educational assessments. This paper explores the possibilities of implementing a national e-assessment system for teacher education and secondary schools in Tanzania. Considering that the e-assessment philosophy is diverse, interdisciplinary, and multidimensional, a holistic research approach focused on library search, document review, and international benchmarking was applied. The e-assessment adoption framework and its design are based on expert opinion. The data used for theoretical and qualitative analysis was captured from the candidate and school registration portals. The study suggests that e-assessment in Tanzania is an inevitable part, especially in the educational system of the 21st century. More importantly, the findings show that e-assessment for teacher education appears to be more pressing as it can be deployed quickly given the computing status and educator readiness in teacher training colleges. For secondary education, e-assessment seems possible in about 6.4% of all schools that currently offer computer science as a subject. To facilitate a seamless adoption process and secure registration of examination centers, a national e-assessment framework is proposed. The framework is tailored to the local context as it applies adaptive staging, on-demand, and ready-to-go approaches to ensure the adopted solution is feasible and

sustainable. Through this framework, you can tell whether certain schools are prepared to switch from conventional pen-and-paper exams to e-assessments.

Keywords: E-assessment, digital learning, teacher education, online examination, secondary school

INTRODUCTION

The use of ICT has revolutionized practically all socioeconomic sectors. While technology is reshaping every aspect of our lives (Redmarker, 2023), e-learning is becoming a common pedagogical and dominant approach in the education sector. The field is undergoing a paradigm shift in aspects related to teaching, learning, and assessment processes (Doğan et al., 2020). This is supported by the increased number of virtual classes where learners and educators interact through e-learning (Chun, Kern, and Smith, 2016) using smart gadgets such as iPads, tablets, laptop computers, and cellphones. Due to its convenience, accessibility, and flexibility in time and space (Nambiar, 2020) and the fact that e-learning is both the present and the future (Ivanova, 2021), its role in the educational sphere remains undeniable. Globally, e-learning is growing at an exponential rate (Yelenevych, 2022), with major impacts expected between 2025 and 2030. However, the applicability of e-assessment remains uncertain, despite the fact that the global outbreak of the COVID-19 pandemic has given momentum to e-learning efforts since 2020.

As an international concern, educational continuity was seriously interrupted by the pandemic (Selvaraj et al., 2021), with over 1.07 billion students affected (Mukhtar et al., 2020). The global landscape of education has changed (Abduh, 2021), bringing with it the new phenomenon of learning from home (Rahardjo & Pertiwi, 2020), where the traditional brick-and-mortar schools were forced to transform into mandatory full-time virtual schools (Van Lancker & Parolin, 2020). Although ICT use cannot replace teachers (Turnage & Goodboy, 2016), the post-pandemic era saw a full realization of e-learning (Yan et al., 2021; Vergonia & Mombas, 2022) with a plethora of digital learning resources at different levels. While the face-to-face classroom remains

the most popular teaching approach, the lessons learned from the pandemic indicate that digital learning processes can be optimized to facilitate the shift towards online education, which will pave the way for the implementation of e-assessment systems. Since online learning varies greatly between schools and academic years (Yan et al., 2021), e-assessment systems can be deployed gradually for a seamless experience. The deployment of e-assessment is notably linked to several technological, pedagogical, financial, and operational issues, rendering its implementation and practicality in real-world scenarios a challenging and complex matter. Some of the major challenges in the electronification of assessment processes include high initial cost of investment (Ghouali et al., 2020), Internet quota, access, and poor signal coverage (Agung et al., 2020; Basuony et al., 2020), and computing infrastructure constraints (Niemi & Kousa, 2020; Wahab & Iskandar, 2020; Bączek et al., 2021). Other challenges include software issues (Abduh, 2021), cheating and security threats on academic integrity (Mukhtar et al., 2020), content design (Doğan et al., 2020), teachers' lack of trust (Mostafa, 2023), unpreparedness and educator readiness (Efriana, 2021; Vergonia & Mombas, 2022), and students' digital illiteracy (Windram et al., 2022). The combination of all these issues signifies that going for online assessment is a process that requires careful planning, preparation, and execution to ensure a smooth adoption.

Adoption of e-assessment is probably an intelligent decision as it helps schools minimize disruption to teaching and learning processes as well as cut down on a vast amount of time, energy, and financial resources wasted in managing an array of examination-related activities. With continued digital advancement and a large userbase of enrolled students in secondary and teacher education, e-assessment remains a strategic choice for the seamless administration of national examinations. While e-assessment appears like a futuristic idea (Redmarker, 2023), it is of the utmost importance to determine whether we are ready for its implementation, given the current computing state. Thus, this paper presents e-assessment readiness for teacher education and secondary schools. The e-assessment adoption framework that

ensures the quality, security, and confidentiality of examination processes is also proposed. The framework is confined to e-assessments carried out in a physically controlled environment.

Review of e-Assessment Systems

Assessment Process

Assessment is a broad procedure that covers a wide range of activities (Ghouali et al., 2020), aiming at assessing the learner's competence and understanding of the learning outcomes. Being the umbrella that lies at the heart of the teaching process (Abduh, 2021; Margiene & Ramanauskaite, 2022), it is critical that both teachers and students understand the assessment cycle (Astin & Antonio, 2012) as depicted in Figure 1.

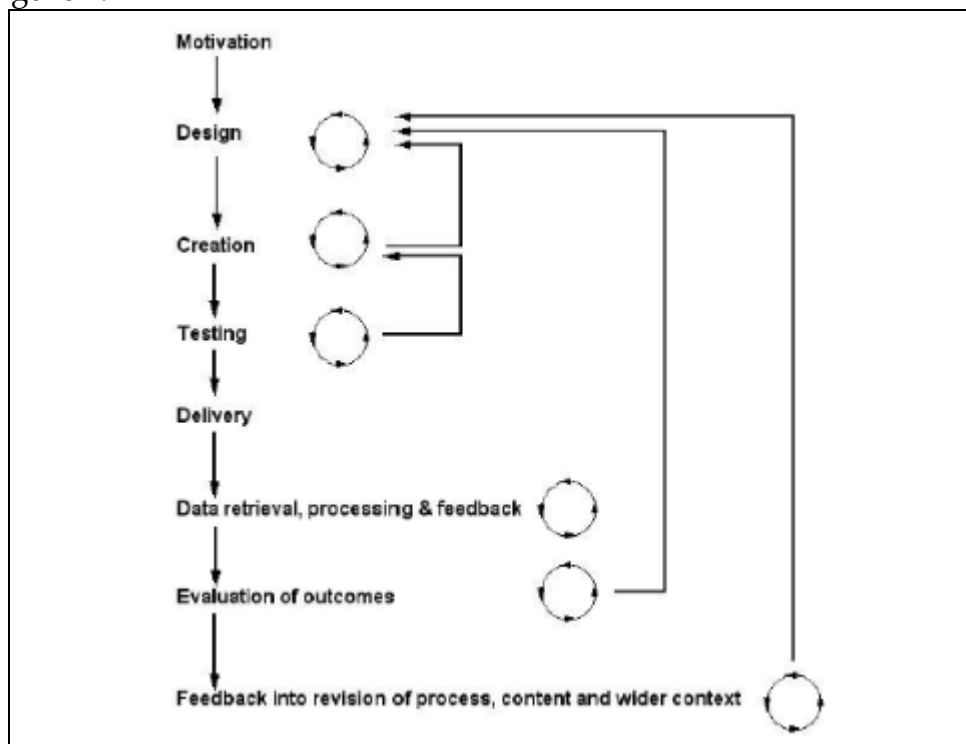


Figure 1. Assessment Cycle

Source: Yan et al. (2021)

Regardless of the differences between formative and summative (Woolfolk et al., 2007), the assessment cycle follows the same

procedure for the *pre-actual-post-exam* activities, including question bank creation, candidates' registration, invigilation, result processing, and award. To get the most out of the assessment process, regardless of whether the assessment is done via ICT or a traditional pen and paper technique, observing pedagogy is essential (Hartell & Strimel, 2019).

e-Assessment Concept

Basically, e-assessment is conducted remotely through the Internet. The e-assessment software automates all examination-related tasks, and it is pedagogically designed (Ashton et al., 2004) to evaluate all learning competencies, including knowledge, comprehension, application, analysis, synthesis, and evaluation. One good example of e-assessment software is the Quiz Module of Moodle LMS (Ally, 2022), a famous e-learning platform (Margiene & Ramanauskaite, 2022). Although the notion of e-assessment has not yet taken shape in secondary schools (Yates et al., 2020; Niemi & Kousa, 2020), its worldwide adoption level is quite promising (Selvaraj et al., 2021), especially in higher education (Margiene & Ramanauskaite, 2022). However, the adoption is highly noticeable in the post-pandemic era (Vergonia & Mombas, 2022).

Benefits and Challenges of e-Assessment

The use of e-assessments can save precious financial and time resources, improve efficiency, and reduce energy spent on administrative processes (Alruwais et al., 2018; Margiene & Ramanauskaite, 2022). Cost items related to printing, transportation, invigilation, marking, and result processing are less expensive for e-assessment adopters. Additionally, less printing means the procedure is more environmentally friendly. From an administration point of view, being web-based, the solution offers convenience, accessibility, and flexibility benefits. The system reduces the likelihood of cheating as it provides high security assurance at the network, browser, and software levels through embedded artificial intelligence (AI) tools. Other notable benefits that adopters gain include reputation, fast evaluation, and instant feedback. Pedagogically, the system supports a variety of question types, such as multiple-choice questions (MCQ), short answer questions (SAQ), long answer questions (LAQ), matching

items (MIQ), and true/false questions (TFQ). Despite all these benefits that adopters' gain, the adoption of e-assessment is still uncertain as technology is considered a challenging and complex matter in real-world scenarios. The use of e-assessments is associated with technological, pedagogical, financial, and operational issues (Biantoro & Arfianti, 2019). The prominent challenges in the electronification of the assessment process include:

- Lack of trust in teachers (Mostafa, 2023)
- Unpreparedness and educator readiness (Efriana, 2021; Vergonia & Mombas, 2022)
- Student digital literacy (Windram et al., 2022)
- Lack of expertise (Peytcheva-Forsyth & Aleksieva, 2021)
- High initial cost of investment (Ghouali et al., 2020)
- Internet quotas, access, and poor signal coverage (Agung et al., 2020; Basuony et al., 2020)
- Constraints of the computing infrastructure, including frequent power outages (Niemi & Kousa, 2020; Wahab & Iskandar, 2020; Bączek et al., 2021)
- Software issues (Abduh, 2021)
- Cheating and security threats to academic integrity (Mukhtar et al., 2020)
- Content design (Doğan et al., 2020)

All these challenges signify that going online successfully is a process that needs to be carefully planned, prepared, and executed.

Research Methodology

The e-assessment philosophy is diverse and interdisciplinary. A holistic approach was applied because e-assessment studies are multidimensional in nature (Ouma et al., 2013; Rachman, 2015), as learners in teacher education and secondary schools have distinct assessment structures tailored to their needs (Margiene & Ramanauskaite, 2022). For that reason, a combination of document review, library search, and international benchmarking was used to conduct the study, which is confined to e-assessment in a physically controlled room.

Document Review

To align the concept with national development goals, a total of five documents were reviewed. These consist of Tanzania's Development Vision 2025, national ICT and education policies, and a rolling strategic plan for the National Examination Council of Tanzania (NECTA, 2020). For theoretical and qualitative analysis, secondary data regarding the computing status of the examination centre was captured from the registration portal. This involved all teacher training colleges (TTC) and secondary schools. On average, a typical examination centre should consist of local servers to support client computers, cable Internet access, a local network, and a power supply for servers and computers. In each centre, parameters for assessment focused on computing infrastructure, in-house expertise, and digital literacy for all key system actors, including candidates, proctors (operators), administrators (invigilators), and technicians (ICT officers).

Library Search and International Benchmarking

A library search and international benchmarking for e-assessment practices were conducted by referring to thirteen examination councils from countries that have taken the lead and taken the necessary initiatives. The referred countries implementing e-assessment for secondary education include Indonesia (2015), Malaysia (2014), Singapore (2014), the Philippines (2018), Australia (2019), England (2019), New Zealand (2020), Israel (2020), Norway (2020), Finland (2020), Scotland (2020), and Pakistan (2020). The e-assessment for teacher education was benchmarked in Kenya from August 21st to August 26th, 2023. The e-assessment data for each examination council was gathered from respective websites through advanced search techniques. For security aspects, the information recorded in the vulnerability database (NVD, 2023) was matched with the three selected e-assessment terminologies for content analysis. The keywords used for data filtration include "online examination," "online testing," "e-assessment," "e-testing," and "e-examination." The NVD source was found to have a total of 29 software vulnerabilities related to e-assessment between 2005 and 2023, as shown in Table 1:

Table 1: E-assessment Security Vulnerabilities

SN	Keyword	Severity Level			Total
		Critical	High	Moderate	
1	Online examination	2	4	11	17
2	Online testing	2	7	3	12
3	E-assessment	0	0	0	0
4	E-testing	0	0	0	0
5	E-examination	0	0	0	0
	Total	4	11	14	29

Source: NVD (2023)

Findings and Discussion

Predictive Factors for e-Assessment Adoption in Tanzania

There are several predictive factors that encourage the development of e-assessments in Tanzania. Four key factors found in the study include *candidate enrollment, digital advancement, the outburst of the COVID-19 pandemic, alignment with the national, regional, and global agenda, and alignment with national policies, standards, and guidelines.*

- (i) **Candidate Enrollment:** The number of candidates enrolled in basic education has increased significantly in the past few years. As Table 2 illustrates, candidates' enrollment is recorded as a constant and an ever-growing entity in Tanzania for Standard Four National Assessment (SFNA), Primary School-Leaving Examination (PSLE), Form Two National Assessment (FTNA), Certificate of Secondary Education Examination (CSEE), and Advanced Certificate for Secondary Education Examination (ACSEE).

Table 2: Candidates Registration Status 2018-2023

SN	Exam Type	No. of Registered Candidates					
		2018	2019	2020	2021	2022	2023
1	SFNA	1,362,642	1,787,045	1,828,268	1,681,791	1,718,896	1,692,797
2	PSLE	957,904	947,077	1,023,950	1,132,084	1,384,186	1,397,370
3	FTNA	545,077	609,381	646,200	652,611	690,341	759,649
4	CSEE	368,037	432,885	448,220	501,039	534,753	543,417
5	ACSEE	77,155	80,216	74,753	81,143	85,414	96,858
	Total	3,310,815	3,856,604	4,021,391	4,048,668	4,413,590	4,490,091

Source: NECTA (2023)

The total number of candidates for national examinations has increased by 1,179,276 between 2018 and 2023. The main driving factors behind the large enrollment of candidates are population growth, the implementation of a fee-free education policy, and increased public and community awareness on education matters. The trend shows that population growth has been continuously increasing over the last six censuses, and its increment has never fallen below 25%, as depicted in Table 3.

Table 3: Population Growth in Tanzania, 1967-2022

SN	Year	Total	Increment	
			N	%
1	2022	61,741,120	16,812,197	37.4
2	2012	44,928,923	10,485,320	30.4
3	2002	34,443,603	11,909,845	52.9
4	1988	22,533,758	5,021,148	28.7
5	1978	17,512,610	5,199,141	42.2
6	1967	12,313,469		

Source: NBS (2023)

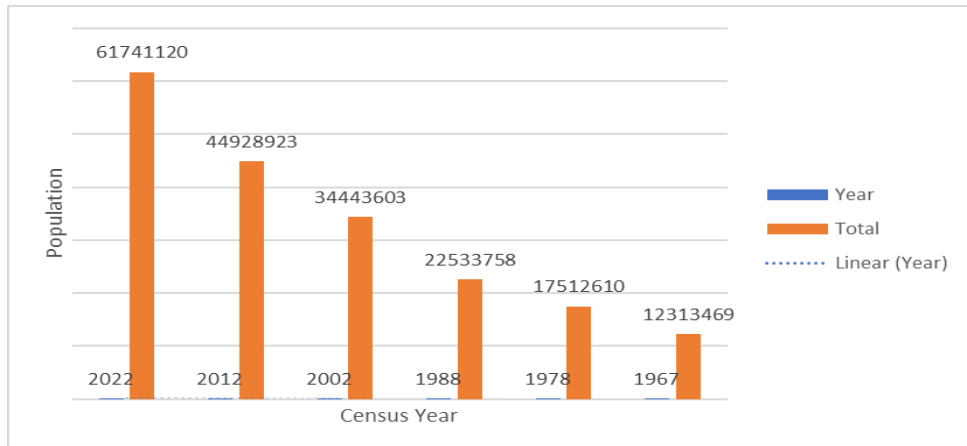


Figure 2: Population Growth in Tanzania

Source: NBS (2023)

As shown in Figure 2, it is predicted that a country's population will reach 100 million by 2042, with an increase of 20 million every ten years. This conforms to the projection by the National Bureau of Statistics (NBS), which estimates a population size of 89,204,781 by 2035 with a growth rate of 2.8% (URT, 2018).

- (ii) **Digital Advancement and Outburst of the COVID-19 Pandemic:** The use of ICT in teaching and learning processes has become a standard practice in the education sector and has proved to be a key factor in e-assessment adoption. Furthermore, the outbreak of the COVID-19 pandemic, which primarily disrupted the continuity of the education system (Selvaraj et al., 2021), has exposed the need for an alternative assessment system (Rahardjo & Pertiwi, 2020). After it has created havoc in a global education system, the lesson learned from the pandemic has principally laid down a future landscape for the adoption and use of e-assessment in Tanzania.
- (iii) **Alignment with the National, Regional and Global Agenda:** Since no country can realistically achieve its national development plans without international cooperation, domestic plans should be aligned with regional and

international agendas. This reveals that integrating ICT into the education sector is in line with the Sustainable Development Goals, the United Nations (UN) Agenda 2030, the Africa Union (AU) Agenda 2063 and the East African Community (EAC) Vision 2050. All these together call for well-educated citizens and skills revolution underpinned by science, technology, and innovation (Ndizera & Muzee, 2018; Carbone, 2018; Walsh et al., 2020; Cilliers, 2021).

(iv) Alignment with National Policies, Standards, and Guidelines:

The use of e-assessments is well aligned with national policies for ICT and education. Furthermore, the idea is well articulated in the TCU Standards and Guidelines for Universities 2019, 3rd Edition, Chapter 7: Blended Learning, which provides e-learning and e-assessment guidelines for higher education (TCU, 2019).

Center Readiness on Computing Infrastructure and Digital Literacy

Critical analysis of center readiness shows that teacher training colleges (TTC) have the necessary facilities to kick-start the e-assessment implementation process. All TTC centers were found to have:

- A well-established computer lab with a server room, reliable Internet access, electricity, and a power backup generator to meet the needs of computing infrastructure.
- Adequate physical space for further expansion.
- Required digital literacy level of both staff and students.
- ICT is taught as a general skill subject. The subject is taught in both GATCE and DSEE curricula in at least 48 colleges.
- Computer science is taught as a teaching subject in eight colleges for the DSEE curriculum and TEHAMA in 57 colleges for the GATCE curriculum.

For secondary education, necessary computing facilities were found in about 380 schools; all 380 schools teach information technology and computer science-related subjects. For Ordinary Level secondary schools, the subject is named *Information and Computer Studies* and is taught in 371 secondary schools. For Advanced Level secondary

schools, the subject is named *Computer Science* and is taught in 14 schools. This data represents 6.4% of the 5,913 secondary schools in Tanzania. Computer science is taught in three subject combinations, which include 7 schools with PMC (Physics, Mathematics, and Computer Science), 6 schools with MCE (Mathematics, Computer Science, and Education), and 1 school with PCE (Physics, Computer Science, and Education).

User Readiness based on Web Experience

User readiness based on web experience was determined through the application of an e-marking system (e-MAS). For the last three years, from 2021 to 2023, the software has been used for the marking of examinations for PSLE and teacher education. The e-MAS platform is regarded as the ideal test for assessing users' readiness since it functions in real-time and concurrent mode, similar to an e-assessment. The fact that all computer science and information technology courses offered in secondary and teacher education have demonstrated a highly promising performance rate, as indicated in Table 4, also justifies user preparedness.

Table 4: Examination Results for IT/CS Subjects 2018-2023

Exam Type	Subject	Pass Rate					
		2018	2019	2020	2021	2022	2023
CSEE	<i>Information & Computer Studies</i>	2,368 (86.11%)	2,393 (85.83%)	2,404 (88.97%)	2,525 (93.69%)	2,805 (91.52%)	-
ACSEE	<i>Computer Science</i>	26 (92.86%)	33 (94.29%)	32 (82.05%)	187 (60.52%)	66 (22.15%)	146 (92.41%)
GATCE	<i>Information & Comm. Tech. (ICT)</i>	349 (97.21%)	628 (98.28%)	773 (98.35%)	774 (98.60%)	826 (97.06%)	1,365 (88.46%)
	TEHAMA	4,851 (99.67%)	4,353 (100%)	3,487 (99.97%)	3,076 (100%)	3,390 (100%)	4,580 (99.98%)
DSEE	<i>Information & Comm. Tech. (ICT)</i>	904 (99.78%)	3,065 (99.84%)	2,718 (99.38%)	2,038 (98.74%)	4,085 (99.68%)	1,699 (99.71%)
	<i>Computer Science</i>	308 (100%)	528 (99.62%)	-	8 (100%)	257 (98.85%)	160 (100%)

Source: NECTA (2023)

Country Readiness

Being a very sensitive web system that requires intensive resources, e-assessment readiness at the country level is crucial to proceeding smoothly and acquiring the desired benefits. As found in this study, the landscape of ICT readiness at the country level was determined using the following indicators:

- (i) **Increase of Internet Users and Mobile Subscribers:** The rapid increase in Internet users and mobile subscribers indicates that the country is doing well in enhancing its digital culture. As of September 2023, the number of Internet users in Tanzania had hit 34,047,407. In the same period, a total of 67,117,449 mobile subscribers were registered. This represents 99.9% of all subscriptions in Tanzania (TCRA, 2023). Table 5 shows the telecom market shares by subscriptions per operator.

Table 5: Operators' Subscriptions Market Shares

Telecom	Jun-Sept 2023			
	Jun	Jul	Aug	Sep
AIRTEL	17,505,139	17,924,973	18,426,704	18,485,232
TIGO	17,484,387	17,505,562	17,756,672	18,181,259
TTCL	1,559,090	1,585,879	1,606,925	1,621,049
SMILE	13,840	13,724	13,404	7,826
HALOTEL	8,410,029	8,332,702	8,436,839	8,266,320
VODACOM	19,116,166	19,732,390	20,165,204	20,555,763
TOTAL	64,088,651	65,095,230	66,405,748	67,117,449

Source: TCRA (2023)

In a period of three months, from June to September 2023, statistics show that the number of telecom subscriptions has increased by over 3 million, representing a quarterly increase of 4.73%. Other (fixed) subscriptions count 83,111 in total, including wired and wireless connections. TCRA (2023) reports that Internet subscribers grew at an average growth rate of 7.8% annually, from 23.8 million in 2018 to 34.5 million in September 2023. The population covered by a mobile broadband network signal for 4G and higher has reached 74%, with

geographical coverage being 55%. The network quality represents average download speeds of 10.81 Mbit/s and 24.29 Mbit/s for mobile and fixed broadband, respectively.

- (ii) **Data Center Investment:** Tanzania has made significant investments in the data center infrastructure for the finance and telecom sectors in both public and private-owned entities. Currently, the National Internet Data Center (NIDC, 2023) and the e-Government Agency Data Center (e-GA, 2023) are the two publicly owned data centers that have been in operation for years. These data centers can provide substantial computing support for the conduct of country-wide e-assessments.
- (iii) **Legal Framework:** Going online necessitates a precise legal and regulatory framework appropriate to the ICT sector. Tanzania's Cybercrimes Act (Magalla, 2018), which was approved in 2015, considers electronic transactions susceptible to criminality. Through this Act, e-content, including e-assessment, has a legal shield from Internet dangers.
- (iv) **Formation of the National TZ-CERT:** Due to its sensitivity, e-assessment requires stringent security for system and data protection at all levels. Currently, the country has a national Computer Emergency Response Team (TZ-CERT), which has been formed within the TCRA structure under Section 124 of the Electronic and Postal Act (EPOCA) Number 3/2010 (TCRA, 2024). At institutional levels, sector-specific CERTs in charge of coordinating the response to cybersecurity incidents were established. This lays the foundation for security threats related to e-assessment systems and ensures a high and effective level of network and information security across the nation.
- (v) **New National ICT Policy (NICTP 2023):** Adoption of e-assessment is well aligned with a newly developed national

ICT policy (2023) that focuses on the ever-evolving landscape of ICT innovation and usage (URT, 2023a). This policy plays a crucial role for the emerging digital economy as well as the national GDP to conform to the Digital Economy Strategic Framework 2023-2033, which aims at transforming Tanzania into a digital-driven economic powerhouse (URT, 2024).

- (vi) **Education and Training Policy of 2014 (Edition of 2023):** Adoption of e-assessment is in line with the national education and training policy (2023 edition), which places special emphasis on enhancing technology-enabled education. The policy is mainly focused on the use of ICT in teaching, learning, and assessment (URT, 2023b).
- (vii) **e-Learning Culture:** Adoption of e-assessment depends heavily on the success and transition to e-learning. In Tanzania, several education stakeholders have launched e-learning projects. In higher education, for instance, the Open University of Tanzania, with over 18 years of e-learning experience, has managed to use asynchronous online content in ATutor LMS in 2004, recorded lectures in Moodle LMS in 2016, and online live sessions through audiovisual conferencing tools in 2021. In basic education, there are several other local initiatives related to e-learning apps, including Shule Direct, SomaApp, Elimu, KLB eLearning, Eneza Education, Ubongo Kids, KiuFunza, Darasa, Classmate, and SmartDarasa. These apps offer a range of learning options, including live online classes, practice tests, video tutorials, and interactive digital textbooks.
- (viii) **e-Assessment Initiative:** The idea of e-assessment is not new in Tanzania. The Open University of Tanzania used Moodle LMS to implement the concept in higher education (Ally, 2022; Ally & Oreku, 2022). In basic education, NECTA created an e-assess prototype to help students self-test their understanding of the learning outcomes through online access. The system

was able to facilitate online item development, item banking, testing, and auto-marking (NECTA, 2018).

The Proposed e-Assessment Adoption Framework

A framework for e-assessment adoption based on ready-to-go, adaptive staging, and on-demand approaches is proposed. The framework is structured with four key enablers, seven prerequisite rules, three management-focused dimensions, four security-focused implementation stages, five adoption levels, and four e-innovation-related aspects. Figure 3 depicts the structural design of the proposed framework.

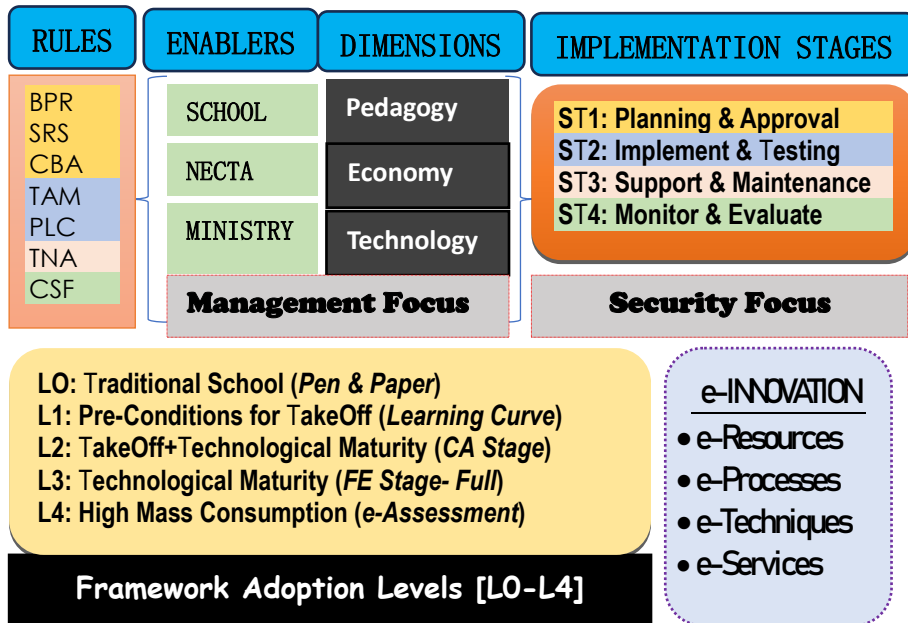


Figure 3: e-Assessment Adoption Framework

The main characteristics of the framework are:

- **On-demand:** the framework offers on-demand services that let the school sign up for the scheme whenever it suits their pedagogical, financial, and technological requirements. This technique conforms to the study by (Zeng et al., 2001; Lindner et al., 2010; Fahland et al., 2011; Küçükaltan, 2020).

- **Ready-to-go:** The framework is based on the ready-to-go approach to enable schools to join the scheme based on their level of readiness, especially in terms of digital literacy and available computing facilities. This study conforms to the study by (Lee et al., 2020; Vergonia & Mombas, 2022).
- **Adaptive Staging:** The framework provides for an adaptive staging approach as it allows for a learn-as-you-go process. This allows the framework to continuously reevaluate and adjust the e-assessment project accordingly based on the existing computing demands, resources, and emerging technologies. This technique conforms well to the study by (Treu, 1985).

The process is guided by the school registration guidelines used by the Ministry responsible for education.

Framework Implementation Stages

For smooth implementation of e-assessment, the framework is designed with four key stages: *planning and approval (st1)*, *implement and testing (st2)*, *support and maintenance (st3)*, and *monitor and evaluate (st4)*. In each stage, the management focus is on the pedagogy, economy, and technology dimensions. Additionally, seven prerequisite rules form the basis for the framework implementation stages. These are the project life cycle (PLC), business process review (BPR), system requirement specification (SRS), cost benefit analysis (CBA), training needs analysis (TNA), critical success factors (CSF), and technology acceptance model (TAM).

St1: Planning and Approval

The procedure for the *planning and approval* stage is regulated by three rules: BPR, SRS, and CBA. The BPR rule helps in the review of pedagogical needs, with major focus areas being continuous assessment, formative and summative assessment, curriculum mapping, a question bank, and lower and higher-order subjective and objective questions. All these are essential for maintaining uniformity, fairness, and quality assessment criteria. The SRS rule places special emphasis on software quality attributes such as accessibility,

compatibility, flexibility, and scalability to accommodate emerging needs. The software is modelled to generate student progress, real-time feedback, auto-marking, auto-grading, ranking reports, a dry run, and a preview of a question paper based on acceptable blueprints and pre-designed templates. Furthermore, the system supports specific requirements such as screen reader compatibility, adjustable font sizes, question formats for science subjects, chemical reactions, mathematical equations, special symbols, graphs, images, statistics, and drawing tools. For the CBA rule, the focus is on an economic feasibility study for the entire e-assessment life cycle. The iceberg model is used to uncover the hidden costs related to software licensing, hardware resources, staffing, electricity, connection, security, usability, and interoperability.

St2: Implement and Testing

In stage 2, the TAM and PLC rules are used. The PLC rule is tailored to *pre-actual* and *post-exam* activities. The pre-exam activities include examiner allocation, planning and budgeting, exam timetable, candidate registration and identification, and question paper generation. The post-exam activities include on-screen marking, APIs for data export, audit records, use of artificial intelligence and machine learning for analysis, certificate layout, and e-certificates. The TAM rule is mainly applicable to user acceptance tests, where ease of use and usability are key aspects to ensure the framework provides a solution with an easy learning curve.

St3: Support and Maintenance

For the *support and maintenance* stage, the PLC and TNA rules apply. The PLC rule is mainly applied to system performance, exam completion rates, system uptime, support network, and technical assistance through a *user-centric help desk* and a *business-centric service desk*. On the other hand, the TNA rule places special emphasis on achieving the necessary digital literacy through training programmes, orientation sessions, pre-exam demos, user manuals, and video tutorials for all main actors involved in the e-assessment process. The framework is focused on recurrent system evaluation, maintenance,

updates, and continuous improvement to optimize system performance for full-scale implementation and long-term success.

St4: Monitor and Evaluate

For *monitor and evaluate stage*, the PLC and CSF rules apply. The focus areas of the PLC rule are integrity policies and academic misconduct, time management, exam-taking strategies, user feedback, emerging needs, system effectiveness, usability and security, and communication strategy. For the CSF rule, the major focus area is the ability to run parallel systems in order to assess usability trends, patterns, learning gaps, and areas for improvement. Some of the set criteria for the CSF rule are:

- The advancements in assessment technology.
- Technology adoption, acquisition, and transition process.
- Effective collaboration with local, regional, and international partners.
- Teamwork, effort level, stakeholder engagement, and benchmarking.
- Budget and cost implications for the hardware, software, and network resources.
- Required expertise with respect to emerging 21st century skills.
- Compliance with the Data Privacy Act and protection regulations
- Data-driven decisions to enhance teaching and learning outcomes.
- Effective communication, transparency, and user trust.

Security Focus

In this framework, security is a focus in all implementation stages, specifically at the question bank, user, software, browsers, network, infrastructure, and invigilation levels from both the server and client sides. The question bank is hosted and protected as on-premises software within the exam domain, where question items and answers are encrypted. The framework enhances auto-authorization through strict access controls and role-based permissions, secure login procedures, and authentication for identity verification using

fingerprints and facial biometric features. At the software level, questions are randomized to alter the order and sequence so that each student is given a different but equivalent exam set. Shuffling is applied to distractors for multiple-choice and numerical questions. The Safe Exam Browser is used as a locker to disable multiple attempts, copy-paste options, keyboard shortcuts, page navigation and switching, browsing activity, backtracking, taking screenshots, time restrictions, instant feedback, and enforcing auto-submit when the allotted time expires. At the network level, the framework emphasizes authentication based on controlled IP addresses, trusted network layers, and the SSL protocol for data encryption between client and server. During the transmission process, stringent security, anti-cheating technology, and confidentiality measures are used for fake feed detection, automated critical security alerts, and notifications on hacking attempts and suspicious activities through warning messages and alerts. Apart from extraneous factors that may lead to the crashing of exam websites, a LAN-based offline exam link is offered as a restore plan in the event of an Internet outage. At the invigilation level, security is enhanced through real-time monitoring and feedback, audio and video streaming, and remote proctoring using AI-powered tools and algorithms. The seating plan is randomized to prevent candidates from synchronous collusion and content sharing, since the framework is confined to a controlled physical classroom.

Roles of Enablers

- **School:** The school is in charge of all infrastructure needs for conducting e-assessments. Among the must-have e-assessment resources at the school level are adequate electricity supply with a power backup facility, a computer lab with a sufficient number of computers, iPads, and tablets, a local server with a LAN connection, and Internet access. Client-side software (operating systems and antivirus programs), auto-surveillance tools for activity logs (web camera, CCTV footage), and biometric attendance registers are also necessary.



Figure 3: e-Exam Room

Source: CC (2023)

- **NECTA:** The responsibility for the server-side services is left to NECTA. The Council oversees the performance of the data center infrastructure in computing, storage, network, and security services based on the registered e-assessment centers, the number of candidates, and the computing workloads. The Council is also in charge of the administration of front- and back-end software, including the design, development, and maintenance of e-assessment software. In the event that a candidate is unable to complete the e-assessment due to issues related to the client or server, the Council will ascertain and determine the cause and make a decision based on the existing examination rules and regulations.
- **Ministry:** The e-assessment philosophy should be adopted when the school is registered in its early stages. The ministry responsible for education is in charge of overseeing all quality attributes required to register a school as a hybrid. The hybrid school should teach and assess via an e-learning platform and must demonstrate teacher-student preparedness, digital literacy, and reliable computing infrastructure. Additionally, the ministry responsible for ICT development will oversee the implementation of the national ICT policy in the education sector as an important step towards e-assessment development.

Adoption Levels

For secure implementation of an e-assessment, the framework presents five adoption levels. These levels are crucial to ensuring a smooth school transition and a gentle adoption process from traditional to online assessment. The adoption levels are:

- Level0→Traditional Schools
- Level1→Pre-conditions for TakeOff (*Preparations*)
- Level2→TakeOff + Technological Maturity Stage (*Continuous Assessment*)
- Level3→Technological Maturity (*Final Examination*)
- Level4→High Mass Consumption

Before using e-assessment, all schools are considered traditional schools at level 0. Schools are registered based on educational delivery between traditional face-to-face and hybrid modes. Since both types have brick-and-mortar classrooms, the shift from conventional pen and paper to hybrid schools follows the same approval procedures used to register Swahili and English-medium schools based on the medium of instruction. In this framework, the adoption of e-assessment is not mandatory; schools join the scheme through on-demand and ready-to-go methods. For level 1, schools aiming to adopt e-assessment must fulfil all the pedagogical pre-conditions as part of preparations for takeoff. The Ministry is in charge of conducting the fieldwork for stage 1 verification to determine readiness for the transition to hybrid mode.

The level 1 pre-conditions that a school must fulfil are the e-learning culture, having computer science as a teaching subject, and reaching an acceptable level of digital literacy. For Level 2, the school must reach technological maturity by having all the necessary facilities required for computing infrastructure together with ICT officers. The salient feature of level 2 is the ability of hybrid schools to conduct school-based e-assessment (SBeA) as well as continuous assessment (CA). 4NECTA determines and approves the field conduct for stage 2 verification. Adoption Level 3 ensures the school is well-equipped with modern and state-of-the-art computing infrastructure. At this level, the

school must have a power backup system, a reliable Internet, and sufficient high-spec computers. Adoption Level 4 is aimed at high mass consumption, in which the school is guided to operate in accordance with *policies, processes, security, infrastructure, skills, and competences* guiding the e-assessment. This is possible through the framework technique of adaptive staging, which allows hybrid schools to practice a *learn-as-you-go* approach throughout all adoption levels.

Discussion

Without a reliable, secure, and seamless e-assessment, examination management is highly challenging. The adoption of e-assessments is considered an intelligent decision and a game-changer in the education industry, where adopters can accrue multiple economic, management, and pedagogical benefits. Considering the current computing status and educator readiness, e-assessment in Tanzania is possible for teacher education. For secondary education, e-assessment is practical in only 6.4% of schools. Pedagogically, e-assessment is a product of e-learning. While e-learning accelerates at an annual growth rate of 16.3% (ExamOnline, 2023), e-assessment implementation is becoming imperative. Since assessment and learning are two sides of the same coin, e-learning ensures that assessment conforms to the teaching and learning methods. The framework also allows for on-demand services (Clero, 2023) where hybrid schools are flexible enough to join the e-assessment scheme. This makes the framework customer-centric and dynamic for integrating and streamlining complex business processes (Zeng et al., 2001). The ready-to-go approach intends to fast-track the adoption process by schools that are fully equipped with e-assessment facilities. The framework is useful for national-level examinations. With a learn-as-you-go technique, the framework provides room to continuously reevaluate the execution process at each decision point to determine the project viability in terms of management, economy, and technology dimensions. At each decision point, the issues of security, cost-effectiveness, and societal acceptance are handled instantly, making it systematic, iterative, flexible, scalable, and structured to accommodate educational levels, a large user base, and emerging functional requirements.

Conclusion and Recommendations

As technology advances and its use in Tanzania becomes evident in teaching and learning, e-assessment initiatives are nowhere to be found. In this study, the e-assessment readiness in teacher education and secondary schools was conducted based on evidence of the current computing infrastructure and digital literacy among key actors. The study reveals that e-assessment is possible in teacher education considering the current computing state. The study also suggests that e-assessment is not possible in all secondary schools, but it can be implemented on demand and stage-wise using a ready-to-go approach. As part of the study, an e-assessment adoption framework is proposed. Since the IT provision varies with the heterogeneity of the schools, the framework ensures a smooth transition process in terms of efficiency, flexibility, and security. The framework is holistic and multidimensional and can be the best reference for countries aiming to adopt e-assessments for national-level examinations. For the country to benefit from using e-assessment, the following are recommended:

- The e-assessment implementation begins with teacher education before secondary school, strategically to instill confidence among key stakeholders.
- The e-assessment comes after e-learning implementation strategically to instill a pedagogical web experience and digital culture.
- The e-assessment implementation involves hybrid schools strategically to instill a sense of maintaining and evaluating the capacity of the computing infrastructure.

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Barriers hindering Effective Engagement in Online Assessment for Teacher Education in Tanzania: Perspectives from two Teachers' Colleges

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ABSTRACT

The recent shift to online distance learning in education institutions has prompted the implementation of online assessment. However, the effectiveness of online assessment in most countries, particularly sub-Saharan Teacher Colleges, remains in a critical dilemma as their adoption of technology is still at an infancy stage. Evidence about tutors and student-teachers from sub-Saharan Africa using available virtual platforms such as Learning Management System (LMS) to conduct effective online assessment is scarcely available. This paper addresses how tutors and student-teachers face challenges of integrating online assessment into their teaching through LMS as well as how they benefit from it. The paper is based on a study that employed a qualitative approach where the phenomenological design was adopted to gain lived experiences from participants on the use of LMS for online assessment. 15 tutors from two colleges were interviewed with the expectation that they would have rich information about the implementation of online assessment through LMS. Findings indicated that both tutors and student-teachers faced multiple barriers which compromised their ability to engage in online assessment. Such barriers are categorized into policy issues, resource-related challenges, online teaching and learning services and instructor-related challenges. Despite the challenges, participants perceived online assessment to have significant impact towards learning. Participants also expressed that online assessment is essential for learning in the digital age and thus, suggested the need to strengthen their capacity to improve their engagement. This study recommends that Teacher Colleges should invest in technological systems that enhance online assessment. To accelerate learning transformation in Teacher Colleges, awareness in online learning is vital. To

increase student-teachers' engagement in online assessment through LMS, it is necessary to make curriculum reforms to ensure effective e-learning. Future research may focus on generating evidence about practices in different contexts.

Keywords: Online assessment, e-learning, formative feedback, Teacher Colleges

INTRODUCTION

In recent years, the landscape of education has undergone a transformative shift, with technology playing a pivotal role in shaping teaching and learning methodologies. Within this paradigm shift, teacher education programmes have embraced online platforms as powerful tools for imparting knowledge and skills to future educators (Hathaway et al., 2023; Shrestha et al., 2022; Wang et al., 2023). Online learning not only addresses the challenges posed by traditional teaching methods but also aligns education with the demands of the 21st century or digital age. In the face of globalization and technological advancements, the demand for highly skilled and technologically literate teachers is rising. Online assessments serve as a response to such demand, offering a platform that nurtures both pedagogical and technological proficiencies in aspiring teachers.

Moreover, as the digital realm becomes an integral part of pedagogical practices, the assessment of teacher candidates' competency also needs to be transitioned into the online domain. These assessments can be tailored to evaluate a wide array of skills, from content knowledge to critical thinking thus fostering a holistic development approach. However, evidence indicates that the use of online learning and online assessment in teacher education is still a challenge in many countries (Joshi et al., 2020; Kampamba et al., 2023; Sanz et al., 2023). Online learning and assessment challenges range from an individual level to an organizational level. For example, Anastasakis et al., (2023) found that administrative and instructor issues such as course materials not always delivered on time, instructors' lack of knowledge in teaching online, lack of timely feedback from instructors and fear of using new online assessment tools were some of such challenges. Further

evidence by DeCoito and Estaiteyeh (2022) indicates that tutors negatively view the use of online learning to teach students, also teachers view the use of online assessment techniques as unauthentic and ineffective which is an indication that there are some factors that drive the negative attitudes among tutors and student-teachers. One of such factors is inadequate availability of technological solutions in many educational institutions particularly in sub-Saharan Africa. During the outbreak of COVID-19 whereby many educational institutions had rapid transition to online distance learning while online assessment remained a paradox. Although there was rapid transition, yet still, there were some educational institutions which did not manage to utilize fully the technological systems for online assessment due to several factors such as lack of infrastructure and limited skills (Aldiab et al., 2019; Mohammadi et al., 2021; Mtani & Mbelwa, 2022).

Likewise, during COVID-19 outbreak, most instructors in educational colleges were reluctant to implement or adopt technological systems to support online teaching and assessment due to technophobia, lack of competence and skills (Ameri et al., 2023; Chinamasa & Neube, 2023). Despite the rising use of technology to support online learning and assessment in many sub-Saharan nations, there are evidence of poor utilization. In countries such as Tanzania, there is a promising Information Communication Technology (ICT) policy which emphasizes the need for integration of ICT across all levels of education in Tanzania in teaching including online assessment (United Republic of Tanzania, 2014). Despite this, one could still notice some disparities on policy statements and practices. Likewise, there has been an introduction of Teachers' ICT competence standards framework which aims at enhancing the integration of technology for learning in teacher education programmes with emphasis being put on students' learning, assessment and content pedagogy; and use of problem-based teaching methods (United Republic of Tanzania, 2015). In the framework, it is envisioned that there is an urgent need to continually train tutors and student-teachers to make them acquire greater competency in the use of ICT in teaching and learning, and assessment. However, little digital contents exist and the curriculum does not point

to specific use of ICT in accomplishing learning objectives and where instructors use ICT in the classroom to enhance pedagogy, it is limited to the use of presentation packages (United Republic of Tanzania, 2015). While ICTs have been introduced in education system to support among others online assessment, in most African countries including Tanzania, the expansion and its adoption remain slow due to lack of effective ICT guidelines and long-run support to ICT infrastructure (e.g., electricity, Internet, software, and hardware devices), tutor capacity, and financial resources (Barakabitze et al., 2019). In Tanzania, it has been acknowledged that the value and significance of using ICT in education could be realized if tutors are able to design and/or adapt learning activities that link their teaching and online assessment. The existing ICT competency framework for teachers seems to emphasize theoretical knowledge for ICT competencies and how to employ them in teaching and assessment but the practical application remains the discretion of tutors.

In a study by Lubuva et al., (2022), it was found that in Teacher Colleges there seemed to be no strong emphasis and support to help tutors to consistently use their ICT competencies innovatively in teaching and assessment. Limited use of ICT for online assessment in teacher colleges is exacerbated by inadequate ICT facilities and poor internet accessibility. The study carried out in two teacher colleges in Tanzania by (Chirwa, 2018) revealed that the frequency of using internet for academic purposes was not convincing as only 12.5% of the respondents were using it daily while the accessibility of internet for learning was limited. The most recent study in Tanzania also highlights that the majority of pre-service teachers have lower satisfaction with ICT despite having ICT infrastructure due to tutors' limited ICT integration, which also limits their ICT pedagogical competence in assessment (Swai et al., 2022). The demand to engage students in online assessment due to the shift to online distance learning has intensified the need to adopt technological systems such as LMS in teacher education colleges. However, the extent to which teacher education colleges have adopted technological systems to support online assessment and the barriers associated with limited implementation remain unclear. Thus, the current study aimed to explore barriers that

contribute to ineffective utilization of technological systems for online assessment in Teacher education.

Methodological Procedures

This study utilized a qualitative explorative study approach to gather information about the barriers hindering effective engagement in online assessment in Teacher education. The research sample was drawn from two teacher education colleges. To obtain the sample, convenience and purposive sampling methods were utilized and a total of 15 tutors were recruited for participation. In the study, data were collected through the use of a semi-structured interview guide which was developed based on the support of literature and the study objectives. Prior to data collection, participants were informed about the study objectives and provided with an informed consent and confidentiality binding form. Open ended probing questions were also used during the interview process to gather detailed information. The interviews were conducted in Swahili, audio recorded, and lasted between 30 and 60 minutes. Data were collected from the participants within the premises of their respective colleges until no new information emerged. Upon receiving ethical approval from the research and ethics committees of the University of Dodoma (Ref.No.MA.84/261/02/'A'/63/129), data were collected.

The researchers first obtained participants' permission to record them via cell-phone and provided them with information on voluntary participation prior to recording. The study only considered participants who provided signed informed consent forms. To ensure confidentiality and privacy, no personally identifiable information was gathered from the participants. The collected data were subjected to manual processing and analysis using the thematic approach recommended by Braun & Clarke (2012). The data were gathered until thematic saturation was achieved. Before analyzing the data, the researchers familiarized themselves with them and developed themes. Verbatim transcriptions of recorded interviews were read and re-read systematically to identify themes and sub-themes. The participants' direct quotations were used to support the research. Co-coder was used to ensure the credibility of the results. The co-coder analyzed the

raw data, which were then compared with that of the researchers. The themes and sub-themes were presented in a Figure.

Findings

The study involved 15 instructors from two teacher education colleges in Tanzania. The age range of the participants was from 30 to 55 years, whereby 10 were males and 5 were females. All tutors taught more than one class in their respective colleges. Based on the study's objective, Figure 1 presents 13 barriers hindering effective engagement in online assessment which fall under five categories named policy issues, tutors' capacity, infrastructure, students' capacity and institutional capacity.

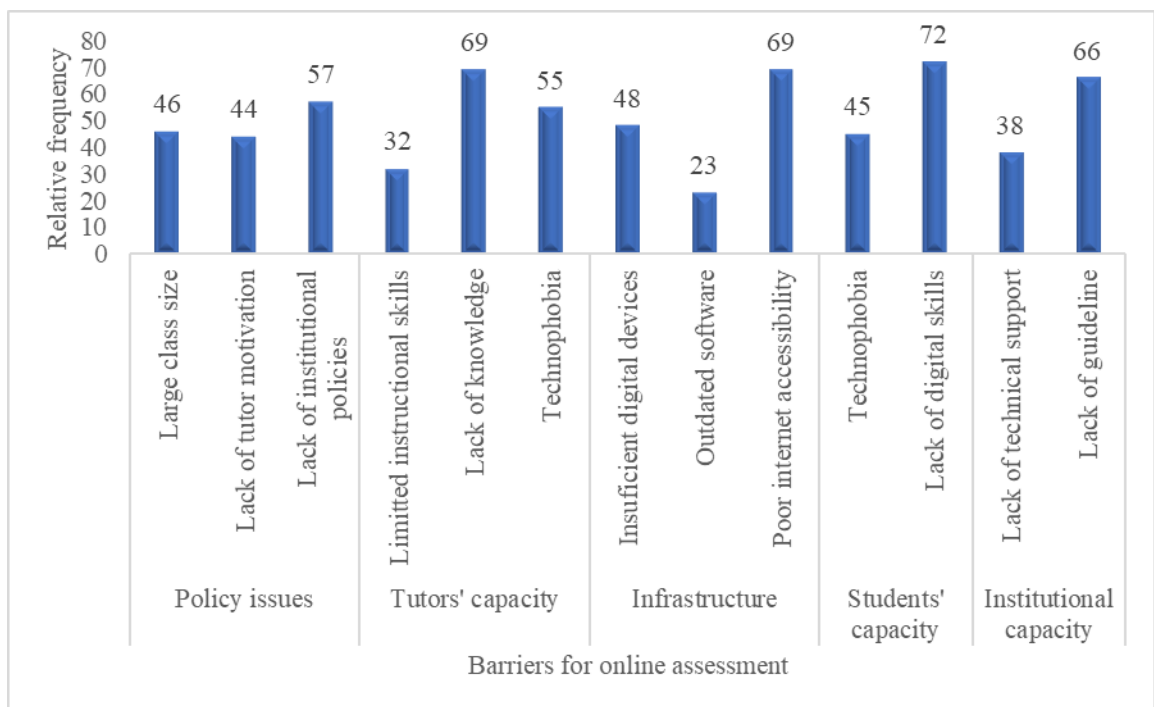


Figure 1: Barriers hindering Effective Engagement in Online Assessment

Policy Issues

This category revealed that tutors from both colleges felt that policy issues such as large class size, lack of tutor motivation to embark on online learning and assessment, and lack of institutional policies that emphasize the use of online assessment in assessing student-teachers in

teacher colleges were hindrances to enhancing the development of 21st century skills. The most prominent barrier mentioned by participants was lack of institutional policies (57). On this, one of the tutors was quoted as saying:

The college itself does not put emphasis on the use of those systems and modern technology in teaching and assessment in academic activities as there is no specific policy in place to carry these out. This makes it difficult to engage learners in online assessment. Those who attempt to engage students in online assessment, they do it at their own discretion and this can bring queries among students and tutors and the college especially if students fail while complaining that the mode of assessment was not as per institutional policies' (Tutor 2 college A).

Again, tutors believed that lack of motivation to use online assessment among tutors was among the barriers hindering effective engagement in online assessment. Regarding this, one of the tutors shared this perspective:

The incentives that are attached to learning are small and sometimes there is no incentive at all. So, people see it as a wastage of time. If there were a motivation factor, people would learn and know it by hooks and crooks. That's why I say there must be reinforcement and motivation such that people would learn. (Tutor 1 college B).

Tutors also mentioned large class-size as one of the policy issues hindering effective implementation of the online assessment. In relation to this, one of the instructors stated

Another thing is the size of the classes. Maybe you find that the class you are teaching has 3-4 thousand students. If you say that you should use those systems, you may be disappointed because with this population and students who are not well-informed on the use of these systems like ours, it may become a challenge whereby many issues and problems will be arising, and some students may fail to attempt the exams (Tutor 3, College B).

Another instructor said:

I think it is a policy issue that we can go through our policies and see areas with high priority in education and invest there. The advice is on the part of government to come up with good policies that will enable access to these facilities for tutors and students by targeting to start with what we have even though a lot of money was needed (Tutor 4, College A).

Reflecting on the participants' quotes, it makes sense to note that policy issues such as large class size, lack of tutor motivation to embark on online learning and assessment, and lack of institutional policies are among the barriers against effective implementation of online assessment among teacher education colleges. This is an indication that policy issues may need to be addressed effectively to motivate the implementation of online assessment in teacher education. The availability of policies and guidelines is considered vital in providing guidance, consistency, accountability, efficiency, and clarity on how an organization operates online assessment.

Tutors' Capacity

During the study, tutors from both colleges mentioned tutors' capacity which included limited instructional skills, lack of knowledge and technophobia as among the barriers hindering effective implementation of the online assessment in teachers' college. One of the tutors mentioned:

I don't know how to upload the materials, even to give a reference, and materials using online system, and I also didn't know if you can do assignments through assessment systems. And I also didn't know if you could chat with the students through the online learning systems. I wish a had come to apply and use those systems to teach as it could have made easier the job or simplified some activities in the academic environment (Tutor 5, College A).

Additionally, another tutor stated:

...but I think the awareness for students and for us tutors are low. It may be there, but the competence is also too low to be able to do that. I do that because I have ideas and ideas about ICT. When I see colleagues, the things they ask me are very trivial. For example, just yesterday, an older person here at the college was telling me to create a WhatsApp group, that is, he wants to do a tracer study like this, but he can't create a WhatsApp group. You see, people lack knowledge and skills on how to use these online learning systems that's why it becomes difficult to use them in assessment of students (Tutor 6, College B)

The lack of technological awareness among college tutors was further revealed by another interviewee who claimed that;

The main thing in colleges here is reluctance and technophobia, you can introduce any system but sometimes people do fear to use it, they like to be at their comfort zone. That is, people oppose it because of their habits, so the system can be good or bad, but people oppose it. But I think it is good and it brings great flexibility in work performance in short, but the problem comes when its flexibility is constrained by the rigidity of people (Tutor 7, College A).

Looking at the participants' explanations it makes sense to note that the tutors' capacity to use online assessments is constrained by limited instructional skills, lack of knowledge and technophobia, which are undermining effective implementation of the online assessment. This is an indication that tutors' capacity should be strengthened so that they acquire and enforce necessary digital literacy skills for online learning and assessment. Capacity strengthening/building is considered vital in helping tutors to acquire the 21st century skills and technological literacy skills such as information and data literacy, collaboration and communication skills, digital content creation skills, problem solving skills and safety measures skills for the implementation and effective use of the online assessment.

Infrastructure

Participants conveyed their discontent with the infrastructure at the colleges such as insufficient digital devices, outdated software, and poor internet accessibility in colleges. This was for instance quoted from one of the tutors:

With regard to infrastructure, I think it is a problem starting with the internet infrastructure. Here in the college, ICT infrastructure is poor and not reliable, internet connectivity is available only at this administration building and, in the library although it is also not reliable. In classes and students' hostels, internet is not available at all. Due to this, implementing online assessment effectively becomes difficult (Tutor 8, College A).

Another tutor stated:

The economic situation for students is hard, even if someone buys a phone, being able to buy a bundle is a challenge unless the college invests in the infrastructure to set up internet access. Likewise, the internet accessibility even for staff is still unreliable (Tutor 9, College B).

One of the tutors gave the following views:

The system is good, but the affordability of these equipment, that is, laptops, cameras and computers and internet cables in classrooms and dormitories is a big challenge. However, if there is a good policy, perhaps to facilitate the availability of these facilities to supply the equipment to students, and electricity and things like that. I think it is better because it will reduce the costs of constructing buildings and large lecture theatres to gather people (Tutor 10, College B).

Despite the good attitude presented by tutors in the use of online solutions in assessment, the quotes above indicate the sense of limited college infrastructures such as insufficient digital devices, outdated software and poor internet accessibility which hinder effective engagement in online assessment in such a way that both student-teachers and tutors lack the necessary tools to implement online

learning and assessment. This indicates that the presence of good and reliable infrastructures may facilitate the use of online assessment effectively.

Students' Capacity

Concerning students' capacity, tutors mentioned technophobia among students' problems related to the use of online learning and assessment system, as well as lack of digital skills among students. A participant argued that:

There is a negative attitude among students towards the use of online learning and assessment due to technophobia and I think it is caused by lack of knowledge and skills on our students on the use of these digital technologies for learning (Tutor 11, College A).

Another tutor said:

What I see is that, not only tutors, but also our students are not well prepared in terms of knowledge and skills on how to use online learning and assessment. This makes them afraid and reluctant to use these systems for learning. Lack of knowledge also makes them psychologically unprepared (Tutor 12, College B).

Based on the statements given by tutors, it was noted that low student capacity which includes technophobia and lack of digital skills served as barriers or hindrances against effective implementation of online assessment in teacher colleges. This is an indication that online learning and assessment is a two-way phenomenon, under which both student-teachers and tutors need to have knowledge and skills on the use of digital solutions for effective its implementation. It should be noted that knowledge and skills on digital solutions may stimulate positive attitude towards the use of online assessment and learning.

Institutional Capacity

Institutional capacity which is affected by lack of technical support and institutional guidelines emerged as one of the areas surrounded by barriers against effective online assessment. One of the tutors who identified problems in institutional capacity, shared the following:

The use of online assessment is low and sometimes not happening at all in our colleges. This is because, firstly, there are few ICT professionals and the awareness of using them is low. To use the online assessments needs to have technical support so that whenever there is a problem with the system being used, there will be immediate assistance. Lack of these ICT professionals to act as a technical assistance, I think is one of the issues hindering the use of online assessments (Tutor 13, College A).

Regarding the same matter, another tutor was quoted as saying:

In our college, we do not have any guidelines as an institution to guide us in the use of online learning and assessment. So, tutors and students just decide to use or not to use it and most of the time people are reluctant to use those online learning systems and assessment. So, this stands against effective implementation of online assessment in teacher college education (Tutor 3, College B).

Reflecting on the above statements, it can be noted that teacher colleges lack adequate preparations for online assessment. Therefore, educational institutions responsible for preparing teachers to work in the digital environment must have adequate capacity strengthening programmes for tutors, in technology. Lack of institutional guidelines to guide online assessment is an indicator that ICT is yet to be adequately prioritised in teacher education.

Discussion

It is evident that tutors have varied experiences on the use of current technological systems such as LMS for online assessment. The findings have indicated that tutors have limited understanding and inadequate skills about online assessment resulting from limited opportunities for training in technology. Tutors have concerns over their low engagement in integrating technology for assessment. This is consistent with the study findings by Anastasakis et al., (2023), who observed that there exist barriers against online learning in colleges. Further, instructors' lack of enough digital devices and poor internet connectivity are some of the main contributors to their limited

understanding and skills related to online assessment. Likewise, there exists instructors' dislike of online assessment because they were linking it with academic dishonesty in the sense that it increases cheating practices among students. Available evidence further indicates that during the outbreak of COVID-19 pandemic whereby many educational institutions such as colleges had to migrate to online distance learning, many students were reported to engage in academic malpractices (Ives & Cazan, 2023). Studies have indicated that the COVID-19 pandemic increased first time cheating, cheating in online classes was higher than that of in-person classes for most types of graded materials due to "feeling pressure," and "pandemic," and students who had cheated reported feeling "relieved" most often (Jenkins et al., 2023). Further, evidence indicates that students at colleges reported that they cheated more frequently in online than in on-site exams (Janke et al., 2021).

Similarly, previous studies have also indicated that most teacher education colleges faced with several problems that contributed to limited adoption of online assessment. Such challenges include inadequate competencies and motivation to engage in online assessment among tutors (Lubuva et al., 2022; Swai et al., 2022). Tutors in teacher colleges seem to rely much on traditional assessment methods such as written test and examinations than online assessment (Mbwile et al., 2023). With such findings, one would argue that other higher education institutions have been facing the same challenges. The study findings by Lee et al., (2022) indicate that majority of students (72.6%) agreed that online assessments were more affected by computer problems and internet connection compared to traditional examination. This is due to the fact that they did not receive feedback on time and they faced many technical challenges. The same concerns were reported in other studies by Semlambo et al. (2022) and Mahai (2022) who revealed that instructors and students were unwilling to adopt online assessment due to technical, academic, poor access to the Internet, prohibitive costs of learning infrastructure, limited technical skills and security concerns. This is an indication that online assessment is likely to be affected by instructors' attitudes which does not provide adequate technical support to students which in turn

compromises students' readiness for online assessment. Studies have also indicated that teacher education colleges lack adequate support to tutors and students on online assessments. This was brought about by a lack of policies and guidelines which stress the responsibility of each actor. Although there is a national framework for ICT integration in Tanzania which emphasizes on online assessment (United Republic of Tanzania, 2015) , the results of the current study suggest that the framework is inadequately translated into practice. This could be an indication that the curriculum does not point to specific online assessment strategies as a result, tutors lack appropriate technological and pedagogical know-how on how to best use the available technological systems to assess students. It is on this basis that one would recommend the need of curriculum reforms to reflect the new technological innovations that support online assessment.

Conclusion and Recommendations

This study investigated barriers hindering effective engagement in online assessment in Teacher education in Tanzania. The findings give worthy awareness for strategic planning of the current and future online assessment in teacher colleges. The implementation of online assessment suffers significantly due to barriers identified such as unreliable internet connectivity, technophobia among tutors and students, lack of digital skills to both tutors and students, lack of motivation, lack of knowledge, insufficient digital devices, and lack of emphasis from both the government and institutional policies. It is therefore recommended that colleges should strengthen their infrastructure such as internet connectivity, develop online assessments guidelines to guide the overall practice of online assessment in colleges and to develop capacity for strengthening programs to both tutors and students to impart knowledge and skills that will facilitate the use of online assessment. The study recommends future research on the strategies for implementing effective online assessment in teacher education colleges. Moreover, future research may focus on generating evidence from the existing empirical articles to examine the trends and practices in different contexts.

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Inclusive Assessment in Tanzania: A Myth or Reality?

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ABSTRACT

The National Examinations Council of Tanzania (NECTA) was established in 1973, following the withdrawal of Tanzania from the East African Examinations Council in 1971. Since then, NECTA has been coordinating and managing national examinations at primary and secondary school levels. It also coordinates and manages teacher college examinations. With such a huge pool of customers, NECTA has been serving learners with diverse learning needs, including learners with disabilities. This requires NECTA to find ways to accommodate those learners. This paper discusses inclusive assessment, an approach to assessment which ensures that assessment policies, procedures, and practices support and enhance the inclusion of all learners, including those with special needs. The paper intends to establish whether inclusive assessment in the Tanzanian context is a myth or a reality. This qualitative study mainly collected data through documentary reviews and individual interviews. The findings suggest mixed feelings; in some areas, NECTA performs well. However, there are a lot of gaps to be filled by the government, NECTA and other stakeholders to ensure inclusive assessment is implemented to the fullest.

Keywords: Assessment, inclusive assessment, learners with disabilities, NECTA

INTRODUCTION

The National Examinations Council of Tanzania (NECTA) is a Government Institution established by the Parliamentary Act No. 21 of 1973. NECTA is responsible for the administration of all National Examinations and Assessments in Tanzania. It was established in December 1973 after the government's pull-out from the East African Examinations Council in 1971. At its initial stage, NECTA had a mission "to contribute to national development through fair, efficient and effective national examinations and education assessment systems that provided high-quality stakeholder services through competent and motivated staff." Its vision was "to be the centre of excellence within and beyond Tanzania in Quality Educational Measurement and Assessment" (The National Examinations Council of Tanzania, 2004). With the change in social and technological needs, the Mission and Vision of NECTA have been changed to accommodate the current needs. Currently, NECTA has a Mission "to be the Centre of Excellence in Quality Education Assessment and Certification" and its Vision is "to Provide Fair, Efficient and Effective Educational Assessment"

NECTA has six functions. They include formulating examinations policy, assuming responsibility for examinations within the United Republic of Tanzania, receiving from other persons or bodies of person's reports or other material affecting examinations policy, and cooperating with other persons or bodies of persons in the development of an examination system in the United Republic of Tanzania. Others are to conduct examinations for, and to grant, diplomas, certificates, and other awards of the council and to facilitate, administer, and supervise foreign examinations in Tanzania (see www.necta.go.tz). This paper was presented at the conference to celebrate the 50 years (1973 to 2023) anniversary of NECTA's establishment. It is expected here that the presented papers, including this one, will help the NECTA to reflect on the extent to which its mission and vision have been achieved. In this conference, the following sub-themes were discussed:

- (a) The role of assessment feedback in teaching and learning.
- (b) Assessment for learners with disabilities.

- (c) Competence-based assessment in the 21st century.
- (d) Assessment for life-long learning.
- (e) The role of assessment in enhancing competency-based learning.
- (f) The role of ICT in assessment.

The current paper delved into inclusive assessment (Assessment for learners with disabilities). The paper highlights whether inclusive assessment is a myth or a reality.

Methodology

The objective of this study was to establish whether inclusive assessment in the Tanzanian context is a myth or a reality. This qualitative study mainly collected data through documentary reviews and individual interviews. Qualitative studies do not concentrate on the use of specific sample sizes or cases for representation purposes; it is the specific needs of the study that determine the types of participants and sample size of the study, which is usually small (Msoroka, 2021). The researcher of the current study decided on suitable cases/participants who were resourceful enough to provide relevant information (Creswell, 2007). Therefore, this study did not pick a specific number of documents to review and a specific number of interviewees. Instead, the researcher collected relevant documents and reviewed them thoroughly. Consequently, the documents related to assessment, inclusive assessment, examination reports, and policies related to assessment were also reviewed. The search yielded 25 records. To maintain focus, the author had to develop the inclusion criteria which helped to gauge relevant documents (Moher et al., 2010). Table 1 indicates the inclusion and exclusion criteria employed in this study.

Table 1: Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
1. International documents related to assessment.	Documents related to education but with no connection with assessment
2. Documents related to assessment in Tanzania between 1973 and 2023.	Documents related to assessment connected with Tanzania, but prior 1973
2. Documents related to inclusive assessment	Documents that are not connected with inclusive assessment.
3. National examination reports for people with special needs.	National examination reports for other candidates.
4. National policies related to assessment.	National policies that are not related with assessment.

The author developed a checklist to guarantee accessibility of relevant information. Other necessary information thought to have contributed to this study was also recorded. Eventually, a total of 13 documents were reviewed. Figure 1 below (PRISMA 2020 flow diagram) summarises the review process.

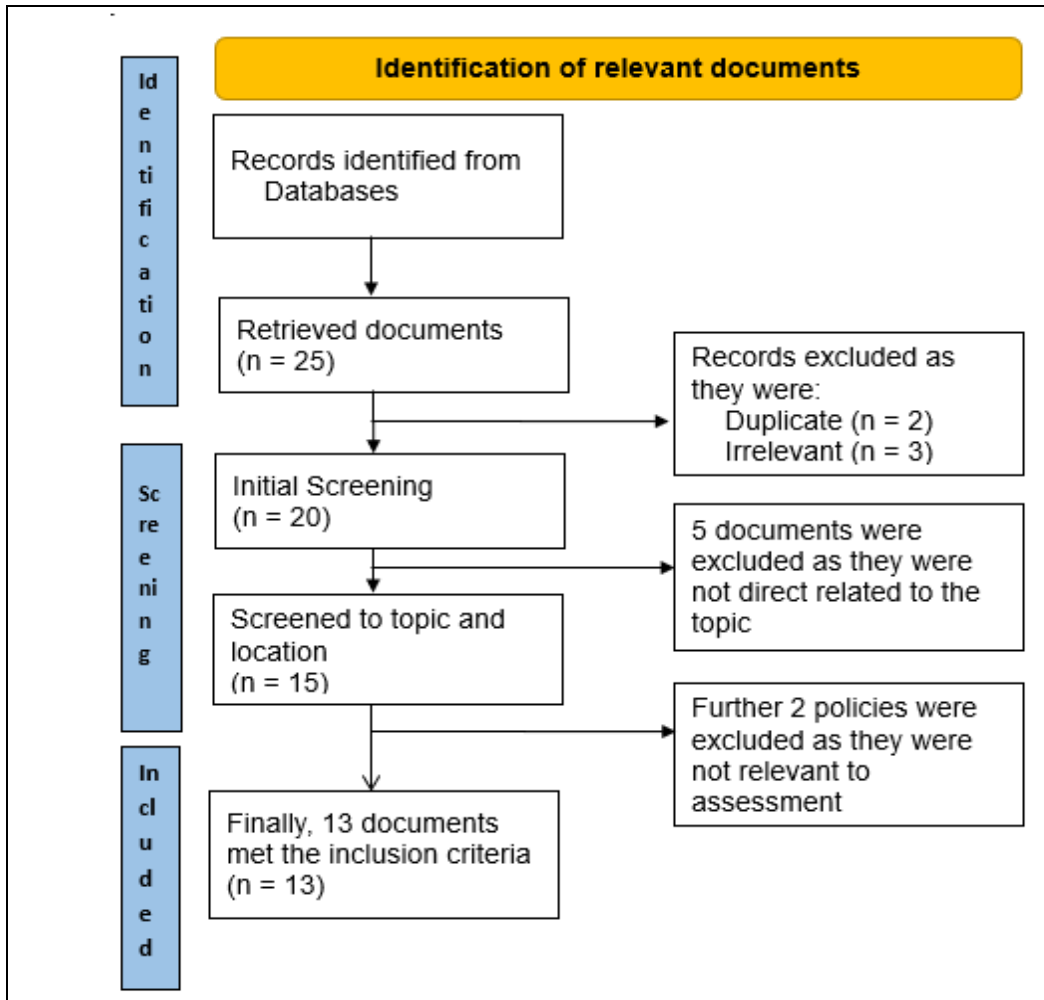


Figure 1: Flow diagram for the systematic review following the PRISMA statement

Source: Adapted from Page MJ, et al. (2021)

Similarly, three (3) resourceful officials from NECTA were interviewed. The data provided a significant contribution to the development of this paper. The data analysis engaged the researcher in writing the transcripts from interviews and documentary analysis. Moreover, the author conducted multiple readings of the raw data from interviews and documentary analysis. The multiple readings were intentionally conducted in order to examine and interpret the texts critically. The analysis process was guided by objectives of the study to allow the researcher to “maintain a critical lens when re-reading and analysing

data related to research phenomena” (Kamenarac, 2019, p. 108). As a consequence, themes and subthemes formed headings and subheadings of this paper emerged from the text organically (Creswell, 2003; McMillan & Schumacher, 1993; Msoroka, 2021).

Findings

Assessment

In the education context, assessment is associated with a series of measures used to understand the learning attributes of an individual or group of individuals. This involves gathering and interpreting information about learning goals and student's levels of attainments. The teacher/facilitator assesses the learning processes through both observation and measurement to understand students' learning in the subject/course. This includes collecting graded and non-graded evidence about students' progress in respective subjects/courses (Tontus, 2020; Watson, n.d; Yambi, 2018). Assessment is categorised into formative and summative assessments.

Formative Assessments/Assessment for Learning

This refers to tasks/activities that provide feedback for students about their learning in the subject (Watson, n.d). This is usually referred to as “assessment for learning.” Sometimes formative assessments do not contribute to the grade in a course (Nordengren, 2021). The focus of formative assessment is on student learning. The formative assessment activities usually give students a chance to check their understanding of the subject matter. Students can use the feedback provided to improve their learning through reflection. The feedback can include written/verbal comments, quiz/question scores and others (Watson, n.d). Commonly, formative assessment enables teachers and students to answer three key questions:

1. What has been learnt?
2. How is learning progressing?
3. What will be learned next?

Formative assessment provides:

1. Feedback to the teacher about how and where to modify the teaching of the programme to meet the needs of one or more of their students;
2. Feedback on what achievement of standards looks like;
3. Diagnostic feedback is incorporated into the design of a learning programme with learning outcomes in mind (The Education State, n.d, p. 2).

As indicated above, the formative assessment is sometimes referred to as “Assessment for Learning” as it provides an opportunity for both a student and a teacher to improve the teaching and learning processes. The main feature of “Assessment for Learning” is effective feedback provided by a teacher to a learner on his/her progress (Jones, 2005). Therefore, based on the argument above, it is argued here that formative assessment cannot be ignored as it has a major impact on students’ learning. Basically, formative assessment is the core objective of teaching.

What does NECTA do in Formative Assessment?

As argued earlier, formative assessment/assessment for learning has a major contribution to student learning. Thus, it is important to weigh it accordingly and make teachers more seriously during teaching and learning processes. This approach is in-line with the 1974 Musoma Directive on the Implementation of Education for Self- reliance, which stated that:

The excessive emphasis now placed on written examinations must be reduced, and the student’s progress in the classroom plus his/her performance of other functions and the work which he will do as part of his education, must all be continually assessed and the combined result is what should constitute his/her success or failure (The National Examinations Council of Tanzania, 2004, p. 45)

It is from this perspective that NECTA's assessment package became 50% for school-based assessment and the other 50% meant for final examinations. Currently, NECTA's assessment package constitutes 30% for school-based assessment and 70% for final examinations. This means that formative assessment contributes 30% of students' final grade, while summative assessment counts 70% of the final grade.

Summative Assessment/Assessment of Learning

Summative assessment is often referred to as "assessment of learning." It refers to any task/activity that results in a score/grade which judges the final student's performance (Watson, n.d). Summative assessments are meant for promotion of students from one level to another or determining whether they have met the required standards for certification. What makes an assessment "summative" is not the design of the test items or assignment, but rather the way it is used. In the context of Tanzanian schools, summative assessments are the final examinations coordinated by NECTA. They are provided at the end of the school cycle to measure how well the learners have attained the learning objectives. NECTA plays a great role in summative assessment. NECTA sets examinations and moderate examination items, organises and coordinates distribution of examination papers, marking arrangements and dissemination of the results. Therefore, the whole processes for summative assessment constitutes 70% of the final grades of students who sit for NECTA examinations.

Why Assessment of Students?

Assessment is an integral part of teaching and learning processes. As we assess, we evaluate whether the educational objectives/goals and standards of the subjects are attained. Assessment directs students and instructors' attention on what is important (Boud & Falchikov, 2007). It is also impliedly that "it is only when faced with assessments that students truly engage with the course materials" (Watson, n.d, p. 2). Assessment affects decisions about instructional needs, grades, curriculum, placement, advancement, and in some cases, funding. Assessment inspires us to ask the following hard questions: "Are we teaching what we think we are teaching?" "Are students learning what

they are supposed to be learning?" "Is there a different way to teach the subject very well for promotion of better learning?"

Inclusive Assessment

Educational institutions, including Tanzanian schools, comprised multiple learners with different learning needs. It is for this reason, inclusive education is the cornerstone amongst education initiatives in recent years. Inclusive education refers to an approach to accommodate all learners (despite their learning needs) in mainstream education by addressing learners' diverse learning needs. Inclusive education involves adaptation and adjustment of curriculum content, pedagogy/andragogy, teaching and learning materials, learning environment, and assessment to ensure access and participation of all learners (UN, n.d). Inclusive assessment is an approach to assessment in mainstream settings where policy and practice are designed to promote learning of individual learners. The purpose of inclusive assessment is to ensure that all assessment policies, procedures, and practices support and enhance the successful inclusion and participation of all learners, including those with special needs. It aims at preventing segregation by avoiding all forms of labelling and promoting inclusion. It is argued here that inclusive assessment practices should lead to the general assessment approaches.

Principles of Inclusive Assessment

Scholars such as (Thurlow et al., 2016, pp. 4-22) have identified six core principles of inclusive assessment. These principles are:

Principle Number 1: All students with disabilities must be included in the assessment system

- With this principle, all learners who attend education need to be included in the assessment system.
- Alternative assessments are allowed as long as they are allowed for other students. This is allowed only after the methods are carefully reviewed by stakeholders and policymakers; their use and impact should be carefully studied before their implementation.

- Exemptions/exclusions from assessment are allowed for students with disabilities with the same conditions that are allowed for other students.

Principle Number 2: Decisions about how students with disabilities participate in the assessment system are the result of clearly articulated participation, accommodations, and alternate assessment decision-making processes.

- Decisions about how students participate in the assessment system are based on their ability to show what they know and are able to do in the assessment formats available to all students.
- The National Examination team makes assessment participation, accommodation, and alternate assessment decisions on an individual student basis.

Principle Number 3: All students with disabilities are included when student scores are publicly reported, in the same frequency and format as all other students, whether they participate with or without accommodations, or in an alternate assessment.

- All students who receive educational services are accounted for in the reporting system.
- Students who are not in the assessment system are reported and an explanation is given for their non-participation.
- Reports are provided to policymakers, parents, educators, students, and journalists with a clear explanation of results and implications.

Principle Number 4: The assessment performance of students with disabilities has the same impact on the final accountability index as the performance of other students, regardless of how the students participate in the assessment system (i.e., with or without accommodations, or in an alternate assessment).

- Performance data for all students, regardless of how they participate, have a similar impact as all other student performance data in accountability indices.

Principle Number 5: There is improvement of both the assessment system and the accountability system over time, through the processes of formal monitoring, ongoing evaluation, and systematic training in the context of emerging research and best practices.

- All decisions about student participation, alternate assessment, and accommodations are collected, compiled, and reported. The data are used to improve the quality of the assessment process.
- The consequences of student assessment decisions are identified, compiled, and reported. These data are reviewed by multiple stakeholders and used to improve the quality of the accountability processes at the school, district, regional and national levels.

Principle Number 6: Every policy and practice reflect the belief that all students must be included in the assessment and accountability systems.

- There should be broad support from the government and amongst professional groups for the inclusion of all students in the efforts linked to assessments. This should be demonstrated by sufficient funding and resources to improve the capacity of all schools for every student to succeed.
- All students need to be included in every aspect of assessment and accountability systems, including assessments, determination of accountability measures, data reporting, and data use for school improvement.
- All aspects of assessment and accountability systems are designed and reviewed collaboratively, with inputs from other stakeholders (e.g., related service providers, parents, community members, advocacy groups and others).

What is the Current Status of NECTA to Accommodate Inclusive Assessment?

NECTA has been accommodating learners with disabilities in the same way like schools. NECTA has served five types of learners with disabilities. These learners include:

1. Learners with a Total Blind (TB).
2. Learners with Low Vision (LV).
3. Learners with Hearing Impairment (HI).
4. Learners with Intellectual Impairment (II).
5. Learners with Physical Impairment (PI).

All these groups of learners have been sitting for national examinations coordinated by NECTA from primary school level, secondary school level, and teacher professional examinations. The current practice requires NECTA to identify learners with special needs ahead of any examination session. The earlier identification enables NECTA to find proper mechanisms to assist these learners based on their needs. For instance, NECTA ensures that learners with *Total Blindness (TB)* are served with Braille question papers. This helps the Total Blind learners to attempt their examinations easily and eventually inclusive assessment is realised. For learners with *Low Vision (LV)*, NECTA prepares special examination papers with enlarged font sizes to allow them to read the test items easily. Learners with *Hearing Impairment (HI)* are served with the normal examination papers.

However, their papers are marked with sign language experts since dropping conjunctions are sometimes used when responding to questions. Therefore, assigning a sign language expert is a move to ensure inclusive assessment and fairness in marking. Currently, there are no special examination papers for people with *Intellectual Impairment (II)*; they attempt the normal examination papers. However, all learners with disabilities are given the additional 20 minutes for each hour of sitting mathematics examination and 10 minutes for each hour of attempting other examinations. Thus, for a three-hour mathematics examination paper, they normally spend 3:45 hours and 3:30 hours for the other subjects. This warrants ample time to respond to examination items. Learners with *Physical Impairment (PI)* experiencing writing difficulties are served with objective test items to reduce essay writing load. However, the objective test items are carefully set to strengthen the weight. Subsection 4 of the NECTA guidelines on assessment procedures for secondary schools and

professional levels (The National Examinations Council of Tanzania, 2021, pp. 74-75) insists;

Assessment of learners with special needs should consider the nature of their disabilities. Assessment for learners with physical impairments depends on the type and nature of their disabilities. For example, learners who are unable to write using hands should not be given tests that require them to write, such as essay questions. Learners who are completely unable to write, do examinations orally, and their responses are recorded.

The test for learners with total blindness should be written using Braille Notation. Besides, if the test items contain maps or drawings, they should be transformed into wording. Moreover, tests for learners with low vision should use enlarged font size. Considering the nature of the disability, examiners should give all learners extra 10 minutes for each hour in all subjects, except in Mathematics, whose extra time is 20 minutes for each hour.

With such approaches, one would ask him/herself whether the initiatives taken by NECTA are adequate enough to ensure inclusive assessment in Tanzania? Perhaps the discussion below may help us to reflect on this question.

Performance of Students with Disabilities

The data indicate that most students with special needs (learners with disabilities) fail their final examinations. For instance, in 2017, out of 89 deaf students who sat for the Certificate of Secondary Education Examination in 30 Examination Centres, only 29 passed the examination as Table 1 below summarises. Surprisingly, no one attained Division One. Only four (4) of them attained Division Two, three (3) of them attained Division Three, and the rest (22) attained Division Four. This confirms poor performance amongst deaf students in Tanzania.

Table 2: Performance of Deaf Candidates for 2017 CSEE

Sex	Sat	Passed	%	Division Attained				
				I	II	III	IV	0
F	37	15	40.54	0	2	1	12	22
M	52	14	26.92	0	2	2	10	38
T	89	29	32.58	0	4	3	22	60

Source: National Examination Council of Tanzania [NECTA] (2018)

Studying the data from Njombe Viziwi Secondary School's performance for five years (2013 - 2017) it is also revealed that deaf students do not perform well.

Table 3: Analysis of Performance for Njombe Viziwi for Five Years

Year	Sat	Passed	%	Division Attained				
				I	II	III	IV	0
2013	38	8	21.05	0	0	2	6	30
2014	22	2	9.09	0	1	1	0	20
2015	25	9	36.00	0	0	1	8	16
2016	25	5	20.00	0	0	0	5	20
2017	21	0	0.00	0	0	0	0	21

Source: National Examination Council of Tanzania [NECTA] (2018)

The data from 2013 to 2017 (5 consecutive years) suggests that — Njombe Viziwi performed below average. It is noted that few students passed their examination. It is further recorded that all the candidates in 2017 scored Division '0' (Zero). It is likely to note similar performance across other categories of disabilities when their circumstances are subjected to critical analysis. Such performance triggers questions and concerns whether test items and assessment processes are fairly and inclusive enough to gauge candidates with disabilities.

The Learning and Assessment Environment for Learners with Disabilities in Tanzania

In 2020, the Tanzania Institute of Education (TIE) established a guideline for implementing the curriculum for ordinary-level secondary education for deaf and hard-of-hearing students. In this guideline, TIE recommends the availability of a multidisciplinary team to support deaf and hard-of-hearing students depending on their needs. The guideline mentions experts such as teachers, itinerant teachers, Tanzanian Sign Language (TSL) interpreters, educational audiologists, educational psychologists, social workers, counsellors, and educational speech-language therapists. Others are educational administrators, curriculum developers, health specialists, educational quality assurers, examination specialists, educational researchers, and practitioners (Tanzania Institute of Education, 2020). The mentioned experts are expected to assist the deaf and hard-of-hearing students at the ground level.

All these players are expected to possess practical skills in TSL as relevant tool for supporting deaf and hard-of-hearing students. Examining the real-life situation in many Tanzanian schools, the situation is not favourable as suggested by the guidelines (Mkama & Storbeck, 2023). The majority of experts are not available in most schools. Consequently, the deaf and hard-of-hearing students are not getting the expected assistance. One would argue that such poor performance of the deaf recorded in Tables 1 and 2 reflects the missing assistance from experts during teaching and learning processes. It should be learned that other learners with other types of disabilities also face similar challenges. It is noted that NECTA serves learners with Hearing Impairment (HI) with traditional examination items. However, the papers are marked with sign language experts as sometimes they tend to use dropping conjunctions when responding to questions. This paper holds that such approach is not sufficient to ensure inclusive

assessment. It should be noted that fairness is maintained when such experts are involved from the beginning throughout the development of test items, invigilation and marking. Such efforts could give them a chance to advise the best way to assess these learners inclusively. Currently, there is nowhere these experts are involved from the earliest stages of assessment. It is suggested here that there should be involvement of experts from the beginning of the assessment exercise. As noted previously, there are no special examination papers for people with Intellectual Impairment (II); the candidates with Intellectual Impairment attempt normal examination papers given to other students, with additional time to take examinations. Such approach raises some questions. For instance, one would ask, who determines whether a person is intellectually impaired and not a slow learner?

Currently, Tanzania does not have mechanisms to screen all children before they are admitted to schools (Namirembe, 2019). How have these learners been taught? Through which curriculum have these learners been taught? Who teaches these students? All these questions contribute to how these learners should be taught and assessed. It is recorded that an intellectually impaired child is characterized by low intelligence/mental ability and a lack of skills necessary for day-to-day living (Byrd, 2022). It is argued here that assuming such kinds of learners would have a relatively similar capability to those displayed by normal learners is wrong. Therefore, it is quite unfair to assess these learners with examination items similar to those attempted by normal learners. The proper identification should be well planned to enable these learners taught using different curriculum, and hence varied assessment methods. Consequently, it is argued here that the currently used curriculum and assessment methods do not guarantee inclusive assessment.

Conclusion and Recommendations

The key theme of this paper is inclusive assessment; the purpose is to establish whether inclusive assessment is a myth or a reality. The paper has highlighted the principles of inclusive assessment and how NECTA has strategised to propel efforts towards inclusive assessment. In this paper, it is learned that five categories of learners with special needs have been accommodated by NECTA during examination sessions. These are learners with Total Blindness (TB), learners with Low Vision (LV), learners with Hearing Impairment (HI), learners with Intellectual Impairment (II), and learners with Physical Impairment (PI). The paper has further brought to readers' attention how NECTA is leveraging inclusive assessment by ensuring that a friendly environment is created to accommodate learners with impairments. By doing so, one would assume that NECTA is working hard to adhere to the principles of inclusive assessment, and hence inclusivity in assessment is a reality.

However, if one looks at the challenges and weaknesses discussed in the previous two sections, s/he would easily conclude that inclusive assessment in Tanzania is still a myth. It is argued here that NECTA alone cannot address all the challenges of inclusive assessment. Other stakeholders including the government, NGOs and international organisations can be engaged to address the challenges. Nevertheless, one thing needs to be noted, NECTA does not have the guiding policy for inclusive assessment. The lack of policy and other associated challenges presented in the fore pages need to be acted upon to counteract the situation. However, this paper notes that NECTA is on the final stages of developing the policy guideline for inclusive assessment. It is believed that with such policy document and other initiatives to address the challenges, NECTA and Tanzania in general will improve significantly on inclusive assessment. In most cases, assessment is perceived lightly focusing on standardised tests. It is recommended here that it is necessary to view assessment as a

measurement of learning outcomes, thus, serving multiple purposes; hence, requires multiple modalities. This is a key step to address misunderstandings and eliminate barriers to inclusive assessment. If that is taken on board, inclusive assessment will prevail and all learners will be part and parcel of the assessment process. The emphasis of inclusive education is mainly on the placement; thus, inclusive education is regarded as the opposite of segregated education (UNESCO, 2020). This is misleading because the key point is that all students need the best education. For inclusive education to hold its significance, it should provide all students with relevant learning opportunities in mainstream settings; it should support all learners in their learning endeavours.

It should be noted that assessment is a key component of that support as its output guides the teaching and learning processes. Policy statements are required to address the negative impacts of assessment and improve inclusive assessment. For instance, to ensure fair assessment of individuals with special needs, inclusive assessment policies at national and school levels need to be developed. Without such policies, exclusion in assessment processes will remain predominantly, hence, leaving out a good number of people with disabilities. Thus, NECTA should propel necessary efforts to finalise the policy document for inclusive assessment. In addition, guidelines developed by (Tanzania Institute of Education, 2020) need to be fully implemented; there should also be guidelines to teach and assess other segments of learners with other types of disabilities accommodated by NECTA and other assessment bodies.

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Mathematics Teachers' Use of National Assessment Feedback Reports in Improving Pedagogical Practices in Secondary Schools

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ABSTRACT

Despite its importance in contributing to economic development, the trend of Mathematics performance has been low. The National Examinations Council of Tanzania (NECTA) provides Mathematics assessment reports to the schools, highlighting students' strengths and weaknesses and recommending teachers to improve their teaching and learning practices. However, Mathematics performance in national examinations is still poor. This study examined how Mathematics teachers utilise Form Two National Assessment - Students' Item Response Analysis (FTNA-SIRA) feedback reports to enhance their teaching practices. Specifically, the study focused on teachers' perceptions and use of assessment feedback reports and their challenges. This qualitative study employed a phenomenology design that purposively selected 33 participants from ten (10) districts after obtaining their consent. The study used interviews and open-ended questionnaires to collect and analyse information using thematic analysis. Mathematics teachers admitted they hardly access feedback reports, and most of them revealed that they could not use them despite understanding their importance. Three Mathematics teachers from urban areas admit that using assessment feedback they accessed from the NECTA website improved their classroom teaching practices. However, underutilisation of the feedback is due to frailty in utilising online copies, reports remaining at the district or heads of schools' offices, and low motivation and skills in implementing the recommendations provided. Underutilisation of assessment feedback hardly informs any pedagogical improvement, which risks the continuation of poor Mathematics performance. The study recommends establishing strategies for teachers' effective use of assessment feedback for improving pedagogical practices, including capacity building, feedback use framework and motivation.

Keywords: Assessment feedback, mathematics performance, pedagogical practice, national assessment.

INTRODUCTION

Mathematics plays a central role in modern technological development due to its application in key areas, such as the current development of artificial intelligence, that are critical for economic development (Seah et al., 2021). Despite this importance, studies report low Mathematics performance in many countries around the world, such as the Philippines, Pakistan, Fiji, Ghana and Greece (Karakolidis et al., 2016; Khan et al., 2018; Guinocor et al., 2020; Peteros et al., 2020; Chand et al., 2021; Fokuo et al., 2022). It is noted that a continuation of poor performance in the subject jeopardises the advancement and use of technology in promoting economic development. Kuznetsova et al. (2021) and Lafuente-Lechuga (2020) show the crucial role of Mathematics in achieving sustainable development in societies. They argue that Mathematics plays a central role in solving problems related to daily life activities and enhancing understanding in business, industry, economics, social and humanitarian sectors, which are crucial for sustainable development. Few studies from Tanzania by Kihwele and Mkomwa (2023), Mazana et al. (2020), Ndume et al. (2020) have reported the prevalence of poor performance in Mathematics. Evidence from NECTA indicates that form four students' Mathematics results are lower than form two results. Table 1 indicates the trend of performance in five years.

Table 1: Mathematics Performance Trend of FTNA with Corresponding CSEE

Basic Mathematics (FTNA)				Basic Mathematics (CSEE)			
Year	Sat for Exam	% Passed	% Failed	Year	Sat for Exam	% Passed	%Failed
2020	600,751	15.94	84.06	2022	520,332	20.08	79.92
2019	570,591	21.09	78.91	2021	484,439	19.54	80.46
2018	503,761	22.95	77.05	2020	435,345	20.12	79.88
2017	485,494	32.00	68.00	2019	424,652	19.92	80.08
2016	408,191	21.55	78.45	2018	360,225	19.91	80.09

Source: NECTA

Several studies have reported various factors associated with poor performance in Mathematics. These factors include students' attitudes towards the subject. Most students perceive the subject as difficult (Kihwele & Mkomwa, 2023). Furthermore, teachers lack relevant, innovative pedagogical practices to assist students in learning and promote their interest towards the subject (Shoaib & Saeed, 2016). Teacher qualifications, low teaching motivation, and inadequate resources and materials hinder teachers' pedagogical creativity in enhancing students' learning. Chand et al. (2021) also report that ineffective design of the curriculum is one of the causes of poor performance. The implication is that the content seems to have limited applications and confirms its irrelevance to societal needs. The education authorities have responded to poor performance in several ways, including supporting teachers in implementing various initiatives, such as remedial classes for poor-performing students.

Consequently, teaching and learning resources have been provided and complemented with capacity-building programmes for subject teachers. Ndume et al. (2020) added that teachers implement their self-tailored innovations to improve performance using mobile learning in Mathematics. Kihwele and Mkomwa (2023) also mentioned the 'King and Queen of Mathematics' initiative as one of the strategies to raise the performance of Mathematics. However, these initiatives and innovations are fruitless as individual teachers implement them haphazardly. There are no proper guidelines from the policies; consequently, they are not systemically organised. As a result, poor performance of national examination results prevails despite the fact that assessment feedback is provided for improvement. NECTA sends assessment reports to the schools, highlighting observed challenges and recommending what teachers should do to improve teaching and learning. The purpose of these feedback reports is to minimise common learning mistakes and maximise learning achievement and

performance. Despite the feedback reports, the performance has not yet improved (See Table 1). The alarming trend has led the study to determine if teachers utilise the national assessment feedback during teaching to minimise common mistakes. The assessment reports in five consecutive years indicated that most reported factors for poor performance are similar (See Table 2). The observation implies that the reports do not reach the teachers, and those who receive them are not utilising them effectively.

Table 2: Factors for Poor Performance as Reported in SIRA

S/N	Core Factors for Weak Performance	2020	2019	2018	2017	2016
1	Inability to formulate the correct mathematical expressions and equations	Y	Y	Y		
2	Inability to recall and apply correct formulae rules, theorems, properties and concepts to solve problems in different topics	Y	Y	Y	Y	Y
3	Inability to perform metric unit conversion and proper manipulations	Y	Y			
4	Failure to interpret plane figures related to congruence and similarity, regular polygons and frequency distribution table when solving related problems	Y	Y			
5	Failure to perform units' conversion, make proper substitutions, sketch figures or diagrams and graphs and interpret information presented in diagrams and graphs	Y	Y	Y		
6	Lack of knowledge and skills in a specific topic	Y			Y	Y
7	Inability to use concepts/formulas/laws correctly, failure of the students to identify the demands of the questions				Y	
8	Lack of skills to comprehend word problems mathematically or diagrammatically			Y	Y	Y
9	Inability to identify the task of the questions		Y	Y	Y	Y

Source: NECTA

Despite the NECTA's efforts to provide assessment feedback reports to elevate Mathematics performance in schools, the poor performance trend in the subject continues. This study examined how teachers use FTNA-SIRA feedback reports to improve teaching practices. Form Two National Examination assessment feedback reports are ideal for this study due to their expected impacts in enhancing teaching and learning and preparing students for the Form Four National Examination. Therefore, the main objective of the current study is to examine the use of FTNA-SIRA feedback reports among Mathematics teachers for improving pedagogical practices in secondary schools. The study focused on the following specific aspects; -

- (i) To investigate how Mathematics teachers in secondary schools perceive national assessment feedback in improving teaching and learning.
- (ii) To explore how Mathematics teachers use national assessment feedback to improve pedagogical practices.
- (iii) To explore handicaps for Mathematics teachers' use of assessment feedback in improving pedagogical practices in secondary schools.

Theoretical Perspective

Feedback is a socially constructed process in which instructors establish and maintain the classroom setting (Handerson et al., 2019; Boud & Molloy, 2013). Dawson et al. (2019) argued that instructors are more likely to make decisions about their feedback processes based on their opinions rather than published evidences. Thurlings et al. (2013) proposes that the effectiveness of feedback processes is indispensable with the learning theory. The characteristics of effective feedback processes are related to specific learning theories which learners, either students or teachers, are facilitated. Each learning theory explains which mechanisms lead to particular learning outcomes. Learning theories comprise three basic components: inputs, means, and results (Driscoll, 2000). Therefore, the sociocultural perspective by Vygotsky (1978) provided the conceptual framework of the study. It has implications to both feedback providers and receivers on how they utilise feedback and perceived the expected outcome. Figure 1 shows the assessment feedback flow from NECTA to teachers and students,

aiming to improve classroom teaching and learning situations. The flow passes through various administrative offices and online platforms, specifically the NECTA website. Teachers, as the targeted receivers, have the role of reflecting on the feedback, their students' learning situation and pedagogical practices. From this reflection, teachers are expected to learn and adjust or innovate supportive pedagogical techniques that will impact students' learning and improve learning outcomes. The role of NECTA is to assess and provide feedback from the learning outcomes.

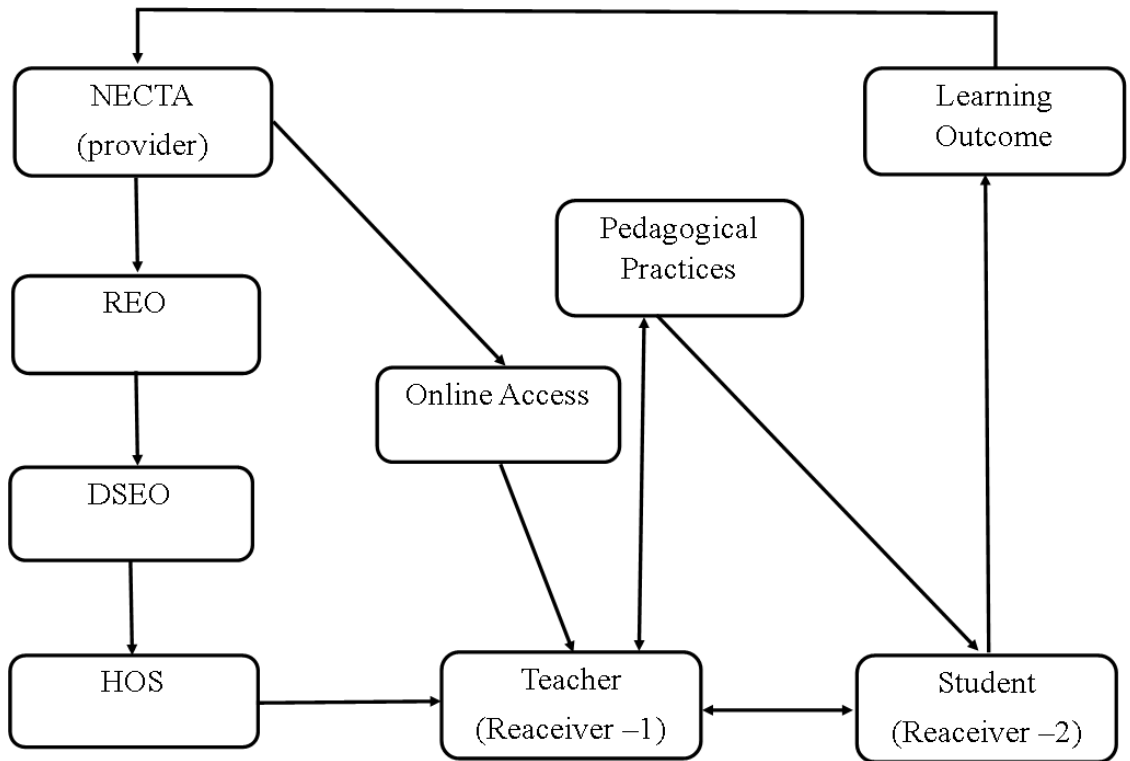


Figure 1: Assessment Feedback Flow Modified from socio-cultural Theory

In improving teachers' pedagogical practice through feedback, rescue dialogue between teachers and students is fundamental. In addition, Smith et al. (2016) conceptualised feedback dialogues as responsive pedagogy. The rescue dialogue entails the interchange between the learner's internal feedback and external feedback provided by the

teacher. Teachers' actions support students in proceeding through zones of proximal development. The situation indicates that feedback processes start with learners at a particular stage. When teachers receive feedback reports, they utilise the feedback to guide learners to the next phase (i.e., zone of proximal development) to realise the outcomes. From that perspective, after the teacher receives feedback from the authority, they should find a means to discuss the report of the previous assessment experiences. The discussion will help identify common mistakes and work on the recommendations by improving pedagogical practices to enhance learning outcomes.

Perceptions and Use of Assessment Feedback Reports

Learning effectiveness depends on the essential component, which is feedback. Assessment feedback refers to information a provider (assessor) gives concerning performance or understanding (Wisniewski et al., 2020). Feedback quality relies on clarity, accuracy, precision, selective, goal focus, and timeliness (Butler & McMunn, 2014). Assessment feedback is the response report provided after a national assessment from the assessing authority to teachers, students and the general public indicating students' strengths, weaknesses and recommendations for improvement for the particular assessed subject. Effective feedback affects significantly teachers' pedagogical practices and learners' performance. However, the assumption is that if a teacher is positive in terms of perceptions and belief, will eventually practice well. Therefore, to attain the benefits of effective feedback, teachers must have a positive perception of assessment feedback and practices. Lee (2008) insisted that Teachers' beliefs and values are key elements for influencing feedback practices. However, according to Brown and Harris (2009) believed that it is logical to consider teacher's conceptions and perceptions if you want to maintain consistency with the contextual demands in which the teacher operates. Adendorff (2007) added that feedback does not happen accidentally, teachers must learn

how to give and receive feedback effectively using specific techniques. Moss and Brookhart (2009) indicate teachers' two common misconceptions about feedback. The findings by Selvaraj et al. (2021) posit that teachers perceived feedback has a strong effect on students' academic performance, while on the other hand, feedback is a challenge for teachers to use in teaching and learning environments due to time constraints and teachers' inability to provide students with the feedback needed for self-improvement. Teachers view effective feedback as the return of graded or marked works and detailed corrections of assessed work. Dessie and Sewagegn (2019), regarding the influence of teachers' perceptions on feedback, showed no significant relationship between themselves and assessment feedback. However, teachers perceive feedback's power to improve students' learning as positive.

In contrast, Weaver (2006) states that feedback is expressed in oral or written form, and the nature of the information is ultimately shaped by tutors' values, beliefs, and understandings. The mismatch between teachers' perceptions and their practice of feedback emanates from a lack of appropriate awareness, knowledge, and skill about the purpose, nature, and content or forms of feedback in schools (Dessie & Sewagegn, 2019). The researchers further recommended intensive training to teachers about the nature of feedback to improve students' learning. Continuous monitoring and supervision are crucial to identify the gaps of feedback in actual teaching and learning processes. Lymo et al. (2022) explored secondary school teachers' practices in written English and found a positive belief about feedback in written lessons. Furthermore, there was a mismatch between teachers' perceptions and actual feedback practices, as controlling and judgmental feedback are mostly provided. The mismatch is influenced by inadequate training, many students, time shortages and errors teachers can hardly correct. The findings depict similar outcomes in

Mathematics subjects. The reviews on teachers' perceptions suggest that teachers have a positive conception of the role of assessment feedback in improving pedagogical practices and students' performance. However, it is noted that effective feedback practices need further interventions.

Challenges in Utilising Assessment Feedback Reports

The challenges teachers have been encountering in utilising national assessment feedback reports have not been covered widely in the literature on feedback utilisation. Various studies (e.g., Lema & Maro, 2018; Dessie & Sewagegn, 2019; Lymo et al., 2022) depicted that the common challenges for teachers to utilise assessment feedback include a lack of awareness, knowledge and skills about the purpose, nature, and content of feedback. Others include inadequate training, a large number of students in a classroom, limited school time and too many errors amongst students. However, Lema and Maro (2018) indicated that class size did not influence teachers' utilisation of feedback in teaching and learning Mathematics. Paris (2022) found that the biggest challenge in utilising effective feedback is how instructors manage affective responses and mindsets towards feedback. Teachers' perspective towards feedback determines how effective the process would be.

Kyaruzi et al. (2018) identified that Mathematics teachers' assessment challenges include the lack of assessment skills to implement effective school-based assessments (Osaki et al., 2004). These challenges may influence their conceptions and perceptions of their own teaching and assessment practices, including the quality of feedback practices. Malaba (2013) noted that teachers' comments constitute shallow feedback, which does not help improve students' performance. The comments provided to students are not constructive to improve their work. Jamshidian (2019) mentioned the common challenges in providing feedback to teachers on their educational performance,

including lack of motivation to improve performance, failure to consider factors affecting teacher's performance, inappropriate feedback provision, and lack of follow-up. Thus, as evident from the available literature, most studies have focused on teachers' feedback provision and practices at all levels of education, leaving aside how teachers perceive, access and practice assessment feedback reports from the national assessment authority. This paper, therefore, intends to bridge the literature gap by investigating how teachers perceive and use the standardised FTNA-SIRA assessment feedback reports to improve pedagogical practices and elevate students' performance in Mathematics subject.

Methodology

The study employed a phenomenology design to understand Mathematics teachers' lived experiences regarding accessing and using assessment feedback to improve their teaching practices. Brinkmann et al. (2014) assert that phenomenology is the study of lived experiences and reflection of life phenomena and their structure to gain a deeper understanding of their meaning. Therefore, the design was appropriate to study teachers' lived experiences using FTNA-SIRA feedback reports to enhance their pedagogical practices. The study involved thirty-three (33) participants from ten (10) selected districts of Tanzania Mainland. The districts were purposively selected due to their low performance in STEM subjects in FTNA for five consecutive years. The participants were purposively selected based on their leadership authority or access and use of the FTNA-SIRA feedback reports. The participants included four (4) District Secondary Education Officers (DSEO), seven (7) Heads of Schools and 22 Mathematics teachers for form two classes. The study drew on the ideas of Auerbach and Silverstein (2003), which emphasised obtaining respondents' consent and informing participants about study objectives as part of ethical consideration. The data collection process employed open-ended

questionnaires, telephone calls and in-depth interviews. The study conducted telephone calls to DSEO and face-to-face interviews with HOS to inquire about their involvement in receiving, distributing, and giving directives to teachers using the FTNA-SIRA reports. Consequently, Mathematics teachers filled in open-ended questionnaires with information related to access and use of FTNA-SIRA feedback reports. Content analysis was used to analyse the data, where coding methods, theme development, and interpretation of the results were employed (Saldana, 2013). The sense-making process from the collected data enabled researchers to understand how FTNA-SIRA feedback reports are accessed and used amongst Mathematics teachers to enhance pedagogical practices.

Findings

The study examined using FTNA-SIRA feedback reports amongst Mathematics teachers to improve secondary school pedagogical practices. The study found mixed perceptions among Mathematics teachers concerning access and use of FTNA-SIRA feedback reports. It was also noted that not all teachers accessing FTNA-SIRA reports used them for pedagogical improvements. Lastly, critical challenges undermine the use of FTNA-SIRA feedback reports to improve teachers' performance.

Perceptions on the use of FTNA-SIRA Assessment Reports

The study found a contradicting perception concerning the FTNA-SIRA feedback reports distribution channels. While the DSEO of the same district claims to have received and distributed the feedback reports to schools for use, teachers from the visited schools admitted to not having received the reports for the last two years. For example, when asked about the mechanism of ensuring feedback reports, DSEO-2 responded,

We collect assessment feedback reports from the REO office, then we distribute them to our head of schools to disburse to teachers as per subject specific requirements, especially to those teaching examination classes.

Contrary to this claim, teachers admit they hardly access these reports, which makes them believe they are not important to them. Teacher-18 revealed,

It has been almost two years, and we have not received the assessment feedback reports for forms two and four classes. Maybe they are unimportant to teachers.

Although, in other schools, HOSs admitted to receiving the feedback reports and distributing them to teachers for scrutiny and use, as HOS-1 say,

I collect one copy of the assessment feedback report of each subject for form two and form four from the district educational officer, and I distribute them to respective teachers. I insist them to use the reports to improve performance.

DSEOs believe that reports reach the schools through various means, such as printed copies or online links, and teachers use them, as DSEO-1 says,

Assessment feedback reports from 2015 to 2021 are available on the NECTA website, and they can access them there.

Teachers agree with DSEO that the reports are available online, but they do not have a means to access them, such as computers or internet connections. Teacher 2 claimed,

I have heard those report books are on the NECTA website, but as you know, I don't know how I can find them there, and we do not have access to the internet here in school.

These dilemmas make DSEOs believe teachers are reluctant to use online copies; as one said,

The problem is our teacher's hesitancy to use ICT devices to obtain teaching and learning-related materials.

In reality, teachers are inexperienced in using the reports due to a lack of training, ICT facilities, and internet in their working environment.

Researchers asked Mathematics teachers, HOS, and DSEOs to ascertain their perceptions of using FTNA-SIRA feedback reports to enhance teaching and learning. The findings show that teachers perceive FTNA-SIRA feedback reports positively and are believed to improve Mathematics teaching and learning practices. Mathematics teachers, for example, say that the feedback helps them to identify students' challenges in responding to examinations, implying that teachers adjust their assistance to students. Furthermore, teachers broaden their horizons in understanding various concepts differently from what they previously knew. Teacher 1 confirms these findings by saying,

The report book is useful when looking for better solutions for the past examination question items; it provides a teacher with a marking guide when students are solving such past papers.

Consequently, HOS-1 added,

I always insist and encourage them to use the reports to improve performance, as they share the same positive belief that the report has a pivotal role in enhancing teaching and learning to improve students' performance.

Mathematics teachers perceive that sharing the feedback reports with students promotes their curiosity in learning through studying what and how best candidates respond to examination questions. Some Mathematics teachers admitted sharing the feedback report copies with students to learn the best responses from candidates who performed well. Teacher 4 said,

When I receive feedback reports, I make copies and divide them to learners in groups where they discuss and present to the class what they observed in each question and where to improve for the forthcoming examinations.

Contrary to this perception, two Mathematics teachers reported they do not share the feedback report with students, fearing it will promote rote learning rather than develop meaningful learning. Teacher 11 cemented the finding as she said,

In daily classroom teaching, I do not and cannot share these feedback reports during teaching because it can take away their attention and concentrate on the sample of candidates correct and incorrect responses presented rather than what they are supposed to correct (Teacher-11).

However, the study found misconceptions about the rationale of NECTA's sharing of feedback reports among teachers. One teacher believed that students should rely on NECTA feedback as a source of learning rather than any other textbooks. For example, in her response to the questionnaire, she writes,

Through the feedback report, I assure my students about the accuracy in responding to examination questions as provided from NECTA reports, and they should not rely much on books produced by different individuals and organisations which contain some mistakes.

FTNA-SIRA Feedback Reports Use and Pedagogical Improvement

The findings reveal that five (5) Mathematics teachers out of twenty-two admitted to having access to FTNA-SIRA feedback reports in their respective schools, and they use them to enhance their pedagogical practices. Regarding the use, they reported two types of feedback reports used among teachers. The first use is reflecting on their pedagogical skills and making appropriate adjustments. The second is sharing the reports with students to learn how to respond to examinations. The two approaches constitute improving pedagogical practices that enhance students' performance.

Reflecting Pedagogical Practices

Three Mathematics teachers out of five who reported using the feedback reports said they use the report to enhance their teaching skills and practices. The reports help identify challenging topics most students fail in and plan for appropriate support, such as changing instructional strategies and supplementing learning resources. Teacher 22 confirmed these findings:

From the report, I obtain topics in which students perform poorly and put much emphasis on such topics during teaching. This is done by giving them more practical examples relating to stated topics.

Another response indicated that feedback reports help them understand most students' mistakes in responding to questions. Teacher 13, in her response, revealed,

Assessment reports help me identify common mistakes students make when talking about specific questions, and I share them with them during classroom discussions to avoid such mistakes.

Teachers admitted to learning how to construct examination questions and how best students can respond. The feedback enhances teachers' abilities to assess learners and provide appropriate guidance in teaching and learning processes. Teachers admitted to using self-reflection to improve classroom teaching.

Sharing with Students to Improve their Examination-responding Skills

Teachers admitted they produced copies of the sections where reports indicated the best and weakest responses to examination questions. Teachers believe that sharing feedback helps students understand how to respond to examinations in a better way. Teacher-4 confirmed these findings by saying:

I make copies and divide them among learners into groups.

Also, Teacher-13 confirms similar findings, adding,

I share with them [students] so they avoid committing the same mistakes.

These teachers' voices indicate the efforts to share and utilize the feedback from the assessment reports, cementing their beliefs that students will improve their learning through understanding the weaknesses of their predecessors. In a similar situation, teachers guide students to read the feedback reports kept in the school library. Teachers say that students can study and find their mistakes in

responding to examinations. Unfortunately, the teachers did not follow up to confirm whether students read or learned how to respond to questions. Teacher-16 confirmed the findings by saying:

I advise each student to read that report from the school library.

Although findings reveal the emphasis placed to students to use reports for learning, it is only for a few whose their teachers have access to the reports and shares them.

Feedback Reports Custodianship

DSEO and HOS admitted encouraging teachers to use feedback reports to enhance teaching and learning. The study found that, from NECTA, the reports are channelled to REOs, then to DSEOs, who will distribute them to schools. After the feedback reports had reached the schools, they used different custodianship models to promote the use of reports among teachers and students. In one school, HOS admitted that after receiving the reports, he distributed them to subject teachers for further use. DSEO 2 admitted,

After receiving the reports, I distribute them to subject teachers through their departments. However, the use depends on specific subject teacher to improve the performance.

In other schools, they keep reports in the library, where teachers and students can read them at their convenience. For example, HOS 2 acknowledged,

We obtain few report books for each subject from the district headquarters. These report books are available in the school library for teachers and students to utilise.

Teacher-16 from a different school presented the same observation that the reports are available in the school library. But they are not sure whether students read them to understand what they should improve.

Impediments in using FTNA-SIRA Feedback Reports

The majority of teachers, seventeen (17) out of twenty-two (22) Mathematics teachers, admitted they have never received or seen the

FTNA-SIRA feedback reports in their schools. The situation indicates a challenge on the distribution channel from NECTA to schools where, at some level, the responsible offices do not give the reports their due importance. Teacher 2 confessed,

I have heard that the report books are accessible on the NECTA website. However, the school cannot manage to access these reports in the website.

In some schools, teachers admit they receive few copies, and in some subjects, they do not receive them at all. Teachers acknowledge they understand the importance of these feedback reports, but they are inadequate. Due to its inadequacy, only a few teachers teaching form two and form four (examination classes) are given, despite their importance to all teachers across school classes. DSEO-1 confesses,

Sometimes the copies of reports received in the district are insufficient for our schools.

HOS-6 echoes the claim:

We obtain a few copies of reports per each subject from the district headquarters.

Another Mathematics teacher confirms the inadequacy of these reports, saying,

For our school, the supplied number of report books is limited to teachers only. Also, some subject report books are not distributed to all.

Another impediment found by the schools is that these feedback reports arrive late. According to teachers, the delay of the reports affects the teaching methods and strategies to assist students' learning. HOS-1 presents this claim:

The reports may also be availed to the school by the end of next term, which we cannot use for learning improvement.

DSEO 4 also reported the finding on the process that resulted in the late distribution of the reports as he said,

The report books take longer to reach our district offices, which makes it difficult to distribute them to schools timely. Sometimes, most of the reports remain in the stores at the district level. For instance, in the past two years, we received the reports in the second term when form two and form four had seats for mock examinations (DSEO-4).

Despite receiving a few copies a long time after the reports were released, two (2) teachers out of 22 admitted that they had no idea how to use the reports properly to improve teaching practices. HOS-10 reports,

Teachers are sometimes unaware of what to do with the feedback report books. They can take them from my office after a week, you can find them abandoned in the staff room.

Since teachers lack the necessary skills to use the feedback reports for teaching improvement, they do not take care of them or access replacements on the NECTA website.

Discussion

The study examined using FTNA-SIRA feedback reports amongst Mathematics teachers to improve pedagogical practices in secondary schools. The findings above indicate that the distribution channels of assessment feedback reports are problematic and lack accountability, resulting in inaccessibility, late distribution and inadequate copies in schools. In a few cases, assessment reports reach the schools late, and teachers lack relevant competencies for effective utilisation, which inform their pedagogical practices. The process contradicts Adarkwah (2021), who reported that effective feedback should be provided and used consistently and on time. The findings imply that many teachers cannot access and use the reports, which renders their distribution futile, requiring immediate intervention for teachers to access online copies to meet the NECTA's purpose of sharing such feedback. Nevertheless, few schools whose teachers have an ICT passion can access the report books in soft copy from the NECTA website. The findings are consistent with Jamshidian (2019), who postulated that

inappropriate feedback provision to teachers limits their pedagogical practices that affect students' learning achievements. A mechanism to capacitate and facilitate teachers to access feedback report from NECTA website is vital to enhance its timely access and utilization in improving teaching and learning. Teachers positively perceive that using FTNA-SIRA feedback reports can improve Mathematics teaching and learning practices and enhance students' learning outcomes. Mathematics teachers perceived that the feedback helps them to identify students' challenges in responding to examinations, implying that teachers adjust their assistance to students. On the other hand, teachers broaden their horizons in understanding various concepts differently from what they previously knew. The findings provide evidence that the use of assessment feedback has a critical contribution to elevating teachers' pedagogical competencies.

These findings are concurrent with Selvaraj et al. (2021), who stated that teachers perceived feedback has a strong effect on students' academic performance, while on the other hand, feedback is a challenge for teachers to use in teaching and the learning environment due to time constraints and teachers' inability to provide students with feedback they need for self-improvement. Dessie and Sewagegn (2019) showed no significant relationship exist between their perception of the practice and their assessment feedback. However, as Adarkwah (2021) reports, it is noted that teachers highly perceive the power of feedback to improve students' learning. Teachers have varying beliefs on using feedback reports in the sense that the reports help students develop curiosity and promote rote learning. Furthermore, they replace other resources such as textbooks. Conversely, few teachers perceive sharing feedback with learners might harm learning efficacy. The perception indicates teachers have limited innovative skills in interpreting the feedback and impacting teaching techniques. Awareness creation should be over-emphasized to allow more teachers to use assessment

feedback for self-reflection and improvement and promote students' learning and achievement. Although most teachers do not have access to FTNA-SIRA feedback reports, those with access have indicated the critical advantage of the feedback reports, such as identifying students' mistakes, challenging topics, and how to respond correctly to some questions. For those who access feedback reports, the outcome of using them has been teachers' adjustment of their teaching techniques, styles, and methods to strengthen students' concepts on specified topics and promote better approaches to responding to questions. In tandem with these findings, Lyimo et al. (2022) identified that teachers had a positive belief about feedback, but there was a mismatch between what the teachers perceived to do and their actual feedback practice. Inadequate training, many students, time shortage and written errors for teachers to correct influenced the mismatches. Education authorities and stakeholders should provide a clear framework for teacher training to capacitate their awareness and abilities to utilize the reports for improved teaching and learning.

Unfortunately, those who had no access to the feedback reports were unaware of the recommendations of the assessment reports and did not have any clear framework for using those results to make programmatic changes to improve students learning. The findings show a necessity of providing them with capacity-building training, as Ramollo and Kanjee (2023) assert that competence in using assessment feedback is a prerequisite for teachers. Inaccessibility to feedback reports implies teachers lack self-reflection, which denies them opportunities to evaluate their pedagogical practices and look for alternatives that promote student learning. Ultimately, the status of FTNA-SIRA feedback reports use hardly inform any pedagogical improvement, resulting in poor student performance in national examinations. It is noted that various factors impede the effective utilisation of the FTNA-SIRA feedback reports in schools. The factors

include lack of capacity-building training, insufficient copies of reports, late distribution, inadequate access to online assessment reports due to limited ICT facilities, and the budget for internet facilities. There is no clear framework for using the reports in the classroom, as each teacher uses them differently. Although NECTA plays its role in preparing the reports promptly, the accountability of REO, DSEO and HSOs for distributing and supervising their use is still questionable. In this context, teachers prove their innocence as they hardly access the reports and lack guidance, proper framework, capacity building, and motivation to utilise them. These findings are in line with the results by Lema and Maro (2018), Dessie and Sewagegn (2019) and Lymo et al. (2022), which depicted that the most common challenges for teachers to utilise assessment feedback include lack of appropriate awareness, knowledge, and skill about the purpose, nature, and content or forms of feedback in schools, inadequate training, large number of students in a classroom, limited school time and too much errors among students. NECTA in-line with PoRALG should prioritise teachers motivation, administrators accountability and professional development programs focusing on effective use of assessment feedback reports, equipping teachers with strategies to analyse and apply feedback reports for continuous improvement of teaching practices.

Conclusions and Recommendations

The study examined using FTNA-SIRA feedback reports among Mathematics teachers to improve secondary school pedagogical practices and enhance students' academic achievement. Despite challenges in accessing assessment feedback reports from the findings, teachers positively perceive these reports as a catalyst for adjusting their teaching practices. Teachers had different approaches to using these reports. The findings imply that teachers require a reliable mechanism of timely accessing the reports and capacity-building support for optimal utilisation of these assessment feedback reports. Study findings further imply that Mathematics teachers can effectively

utilise FTNA-SIRA feedback reports to improve their pedagogical practices if they receive proper supervision and relevant support. The study recommends establishing a coordinated and accountable channel for distribution, monitoring, and providing teachers capacity-building support and strategies for effective use of assessment feedback to improve pedagogical practices. However, Mathematics teachers should be motivated to interpret and implement recommendations from the assessment reports through their school-based community of learning.

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Investigating the Effect of Assessment Feedback on Students' Learning and Performance in Tanzania: Lessons from Secondary Education Mathematics

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ABSTRACT

This qualitative study investigated the effect of assessment feedback on students' learning and performance in Mathematics in form three secondary classes in Moshi Municipality. The study explored the nature of assessment feedback used by Mathematics teachers and the perceived effect of such feedback on students' learning and performance. The sample consisted of 24 form-three students and two (2) Mathematics teachers from two community secondary schools. Employing a case study design, the study used classroom observation, interviews, focus group discussion (FGD), and document analysis as methods of data collection. The data were then coded into patterns, categories and themes. The findings revealed that task-level feedback that is evaluative dominated Mathematics classes. This task level, evaluative feedback either verbal or written does not help learners to get a deep understanding of various concepts through making revisions and solving Mathematical problems of a similar nature which may in turn improve their learning and performance. The study recommends that professional development programmes for in-service teachers focusing on the provision of effective feedback should be conducted regularly to equip them with appropriate knowledge and skills. The programmes will enable teachers to provide effective feedback which will, in turn, enhance students learning and improve performance in Mathematics at CSEE.

Keywords: Assessment feedback, effective feedback, formative assessment, Mathematics classrooms, learning and performance

INTRODUCTION

Students' low performance in Basic Mathematics as depicted in the Certificate of Secondary Education Examinations (CSEE) results in Tanzania, is a great concern of many stakeholders. Despite being one of the core subjects at the ordinary level of secondary education, performance in this subject has been on a decline for many years (Mabula, 2015; Masele & Tweve, 2018; Mazana et al., 2020). For example, CSEE 2019 results show that only 20.03% of students passed the examination while 80% failed (NECTA, 2020). Such poor performance in Mathematics continue to attract concerns from assessment stakeholders, particularly on whether or not such failing graduates have the required knowledge and skills to cope with 21st-century technological advancement. This is given the fact that Mathematics is an integral part of science and technology and that it plays a great deal in developing and/or advancing various scientific and technological theories (Mazana et al., 2018).

The massive failure in Mathematics as experienced in secondary schools is attributable to several factors. These include family support, beliefs about Mathematics, teaching and learning strategies, interests in Mathematics, availability of learning materials and students' self-confidence (Masele & Tweve, 2018; Mazana et al., 2018; Mutodi & Ngirande, 2014). While some factors relate to students themselves and teachers, others have to do with schools and even parents. Among the factors which relate directly to teaching and learning is assessment feedback which is considered to play a pivotal role on students' learning and academic achievement in various subjects (Black & Wiliam, 2010; Pokorny & Pickford, 2010). However, Anderson and Palm (2017) asserts that, enhancement of learning and performance in any subject depends on the nature of feedback that learners receive from their teachers or peers.

Assessment Feedback Practices in Tanzania

In 2005 Tanzania introduced a competence-based curriculum for students' learning and assessment in secondary schools due to perceived irrelevance of content-based curriculum in the 21st century (Komba & Kira, 2013). The effectiveness of competence-based curriculum depends on the efficacy of the assessment practices utilized by teachers which are also dependent on the nature of feedback provided to the learners (Kumar & Rajasekhar, 2019). Despite many years of using competence-based curriculum in the country, studies have revealed that teachers are not practising effective formative assessment in which feedback is at the centre (Komba & Mwandaji, 2015). According to Lema and Maro (2018), Mathematics teachers are not able to provide constructive feedback as a result of little knowledge they have in the area of feedback provision. Teachers have a predominant use of checkmarks such as ticks and crosses to indicate correctness of students' responses as well as general comments which are sometimes irrelevant in both exercises and examination scripts. Additionally, Kyaruzi et al. (2019), revealed that teachers do not consider feelings and emotions of the students when delivering feedback; they reprimand low achieving students. This reduces the likelihood of using the feedback given to these learners. Moreover, the nature of feedback given to students seems to be influenced by several factors such as teacher's feedback illiteracy (Lema & Maro, 2018), as well as high teacher-students ratio in classrooms (Ndalichako, 2017).

Feedback and Students' Learning

Studies have also revealed that feedback has great potential in enhancing students' learning and academic achievement. Elaborative feedback from either teachers or peers helps students to review their work and improve various areas based on the suggestions given before moving on to the next lesson or assessment tasks (Kyaruzi et al., 2018; Owen, 2016). However, feedback influences students' learning only

when it is relevant and of high quality and when students recognize it as such (Crichton and McDaid, 2016). Therefore, students' perception of assessment feedback from their teachers is crucial in their learning. When students perceive that teachers' feedback is useful, they opt for feedback use in improving their academic performance. Students expect and get satisfied when feedback from their teachers specifies the errors and provide strategies on how to improve their future assessment tasks (Kyaruzi et al., 2019). This seems to suggest that not all feedback provided to students enhance learning (Brown et al., 2016; Harris et al., 2014); but it is only the feedback that students consider to be useful. Therefore, concrete and constructive feedback stimulates learners to profitably engage with tasks, hence leading to better learning outcomes which can be determined by increased performance in the subsequent tasks.

Feedback and Performance

In essence, the aim of feedback is to improve students' academic performance (Wang & Zhang, 2020). Studies show that feedback influence students' academic performance positively when students perceive it helpful and use it (Winstone et al., 2017). Therefore, improvement in performance can easily be achieved through effective teacher feedback delivery. However, increase in performance depends on the quality and the nature of teacher feedback practices (Kyaruzi et al., 2019). Meanwhile, some studies have also shown that there is no remarkable effect of feedback on students' performance (Wang & Zhang, 2020). Hence, a disagreement on the significance of feedback in academic performance. Nevertheless, learning engagement remains pivotal in the creation of relationship between feedback and performance (Zhang & Hyland, 2022). Thus, although feedback may not necessarily have direct effect on students' performance, indirectly, it may do so by altering students' study habits which enhance their learning and finally improve their performance.

The Current Study

The inspiration to conduct this study emanated from the need to address poor performance in Mathematics, alongside presumed role of assessment feedback in enhancing students' learning and performance. As presented earlier on, the provision of effective assessment feedback has been identified among the factors that enhance learning which in turn improves students' academic performance (Wiliam, 2011). Persistent poor performance in Mathematics in certificate of secondary education examination (CSEE) (Mabula, 2015; Mazana et al., 2020), brings some questions on the nature of feedback that Mathematics learners receive from their teachers, whether or not it enhances learning and performance. Therefore, this study investigated the nature of feedback utilized by Mathematics teachers in community secondary schools in Tanzania and its influence on students' performance in Mathematics. The study was guided by three specific objectives:

1. To investigate the nature of assessment feedback presented to students as they learn Mathematics;
2. To explore the influence of assessment feedback on students learning and performance in Mathematics examinations;
3. To identify limitations hindering teachers in administering effective feedback to students in their learning of Mathematics

Methodology

This qualitative study employed a case study design which enabled the exploration of the phenomenon (assessment feedback provision) in its natural settings using various sources of data for triangulation purposes (Creswell et al., 2007). The sample consisted of two Mathematics teachers teaching form three classes and all form three students from two community secondary schools from Moshi Municipality. Stratified purposive sampling was used to select 12 students from each school summing up to 24 who participated in FGD. The study involved both male and female students in equal proportion;

that is, 12 girls and 12 boys. Additionally, from three terminal examination results were used to select the upper, middle, and lower achievers' representative samples. This sampling technique was considered important because the selected schools have both boys and girls, and learners have varied experiences and perceptions towards assessment feedback based on their gender and performance in examinations. The study employed four methods of data collection, namely; classroom observation, interviews, FGD and documents analysis. Classroom observation focused on what and how feedback is delivered in classroom settings. Secondly, one-on-one semi-structured interviews with teachers were conducted to obtain their opinions about the nature of feedback they use. In addition, FGD was devoted to collect data about the common feedback practices students experience from their teachers. Lastly, documents analysis was employed to investigate the nature of written feedback used by teachers as revealed in students' exercise books and marked examination scripts. Data collected from all sources were thematically analysed, whereby data from interview and FGD were transcribed and re-read together with data from classroom observation and document analysis to reveal emerging issues related to the study. Finally, data were organized (to identify patterns), coded and categorised into themes based on the study objectives.

Findings

The study findings are presented along the three specific.

Nature of Assessment Feedback utilized by Mathematic Teachers

Data collected from the participants and the documents revealed that, mathematic classrooms were dominated by verification feedback which was evaluative given either verbally or in a written form. Teachers used verification feedback to determine whether students' responses were correct or wrong. During the lessons, verbal verification feedback was common while document analysis of

examination marked scripts and exercise books revealed that written verification feedback was common. Teachers used check marks which are ticks (✓) for a correct response and crosses (×) for wrong answers. In addition, data from document analysis, FGD and interview revealed the dominance of evaluative feedback in the form of scores, marks, percentage and marks and grades simultaneously. During one-on-one interviews, teachers were asked to explain how they provide feedback for students' written assignment. One teacher replied that; *"In students' scripts I put scores and grades..."* (Interview T₁, 8th September 2020).

The presence of evaluative feedback was also echoed when students were asked during FGD how their teachers provide feedback in their written assignments. One of the students replied by saying; *"He just puts marks and grades."* Adding to that another student claimed that, *"the teacher uses marks, grades and comments such as good and study hard."* The use of evaluative feedback was also noted during document analysis of students' exercises and homework at both schools whereby the assigning of scores, grades, percentage, and marks was observed. Evaluative feedback continues to be predominantly used despite that various studies, for instance Hattie and Timperley (2007), who revealed that the use of evaluative feedback encourages competition among learners and avoiding difficult task hence not enhancing students, learning.

Characteristics of Feedback Practices

Despite that, mathematic teachers utilized verification and evaluative feedback which are ineffective in enhancing students learning of Mathematics (Noor et al., 2010); the feedback had low occurrence, delayed, and generalized.

Delayed Feedback

The study found out that, students not only receive ineffective feedback but also the feedback was delayed especially for written

assignments such as weekly tests, midterm tests, terminal, and annual examinations. During interviews, when teachers were asked to state how long it takes to give feedback after a written assignment, they had the following responses.

For weekly test which is done every Monday, I provide feedback on Friday, but for midterm test, terminal, and annual examinations it takes one to two weeks to give feedback (interview T₁).

Another teacher responding to the same question had the following to say:

For exercise it takes only one day; for the test because you need to consider many things during marking you cannot mark within a single day because you can only mark ten to twenty scripts per day. Therefore, it takes three to four days to finish marking and giving feedback (interview T₂)

Such responses suggest that teachers do not give prompt assessment feedback. Even the possibility of giving feedback after three to four days was uncertain, because, if the teacher can only mark ten to twenty scripts per day it may take him/her at least seven days to finish marking 150 papers which is an average number of students in form three classes, which have up to three streams. Through observation, the researcher noted that a subject teacher was still marking terminal examinations that were administered three weeks before and throughout the entire marking period students did not receive any feedback. At another school it was observed that three weeks after doing the examination, students' marked scripts were still in the teacher's office and there was no feedback given to students concerning that examination as reported by students during FGD. These findings suggested that students not only received feedback which does not support their learning but also it is delayed. Therefore, students are

taught new topics/concepts without having a deep understanding of the previous topics. Failure to understand the previous topics makes difficult for the students to learn new topics because there is vertical relationship between one topic and the other, meaning the knowledge obtained in first topic helps learners to learn the next topic.

Low Occurrence

Data collected through interviews and FGD revealed that there was low occurrence of feedback in Mathematics classrooms. Mathematics teachers not only provide delayed feedback but also sometimes do not provide feedback at all. Responses given by teachers during interviews as well as learners during FGD indicated such inadequacy of feedback in Mathematics classrooms. For example, when one teacher was asked about the effect of the class size on provision of feedback, he responded as follows:

Sometimes it limits me to test many topics because if I will test many topics, I will not manage to mark all scripts. Moreover, it makes me unhappy to mark those exercises or tests while I face the pressure to give classroom instructions without fail. (Interview T₁)

The above statement from the teacher reveals that there are instances when teachers do not mark students' work, hence absence of assessment feedback provision, because feedback is a result of deep analysis of the students' work. The statement further implies that, some teachers consider the marking exercise a tedious job hence not undertaken with the right frequency. Similarly, during FGD, students had explanations on how long it takes for them to get feedback after a written assignment or test. One student from Umoja (pseudonym) secondary school stated that;

It depends. For example, end of topic exercises takes at least one week for feedback to be received. But for the midterm and terminal or annual examinations, it may take three to four weeks to get feedback. (FGD S7)

Their counterparts from Ushindi (pseudonym) Secondary school responding to the same question had the following to say:

For examinations, it takes much time, for example we did a terminal examination [three weeks back] but we are yet to receive any feedback until now. (FGD S10)

Adding to that another student said;

For midterm tests, we did not receive any feedback since July and sometimes teachers burn our examination scripts without giving us any feedback. (FGD S1)

On top of that, another student emphasized the low occurrence of feedback by saying: *Sometimes our teacher brings back our scripts unmarked and he does not do any correction” (FGD S3)*

These statements from students concur with what the researcher observed in the field whereby a good number of exercises and home works placed on Mathematics teachers’ desks were not marked at all. These findings suggest that feedback provision is very rare practice in Mathematics classrooms as a results students repeat similar mistakes in subsequent tasks hence low performance at CSEE.

Generalized Feedback

Generalization of feedback was another characteristic of feedback utilized by Mathematics teachers in the schools that were involved in the study. Data collected through interviews, FGD and lesson observation showed that generalized feedback is the most common form of feedback used by Mathematics teachers. For example, when one teacher was asked about his preferred practices, he replied;

“... because of overcrowded classes I provide general feedback to the whole class in order to save time; it is difficult to provide feedback to individual learners.” (interview T1).

Similarly, during lessons observation, the researcher noted that teachers were solving mathematical problems on the chalkboard themselves as a means of giving corrective feedback when all students in the class had failed to solve the same. Generally, findings revealed the dominance of generalized feedback over individualized one. However, generalized feedback is not helpful on students' learning because each student has individual strength and weaknesses hence strategies for improvement need to be individualized.

Perceived Effect of Feedback on Students' Learning and Performance

The second objective of the study to establish the influence of assessment feedback on students' learning and performance in Mathematics. The findings are presented in the next subsections.

Influence of Assessment Feedback on Learning

During interviews, teachers were requested to give their views about the role of feedback in improving students' learning. They had the following responses: *"Feedback helps student to learn, without feedback there is no learning"*

Another teacher argued that,

Feedback plays a great role in improving students' performance. It helps them to know the areas which they are good at. This enables them to make revision on those areas which they are not good at in order to attain maximum marks in their examinations; it also makes them happy and motivated to learn (interview T2).

Similar opinions to what was shared by T2 were given by students during FGD when they were asked to tell how they use feedback in their day-to-day learning. The responses from Ushindi secondary school students were as follows:

I use the feedback to make revision because sometimes teachers repeat same questions in examinations.

Another student responded by saying,

I use the given feedback to find and solve other questions with the same concepts hence helps me to have a deep understanding about that concept.

Similar opinions were given by participants from Umoja Secondary school (pseudonym). Most of them claimed to use feedback to find more questions of similar nature in the past papers and try to solve them using the approaches given in the feedback especially when they are close to the examination period. Such explanations from teachers and learners underscore the importance of feedback on students' learning of Mathematics. Therefore, it is crucial that teachers provide feedback to the learners who should in turn be encouraged to use feedback from both teachers and peers to improve their learning, and ultimately their performance in the subject.

Influence of Assessment Feedback on Performance

This study also captured the perceptions of teachers and students on the effect of assessment feedback on learner's performance in Mathematics. When responding to the question about the role of feedback on students' learning, teachers had the following responses; *"Feedback helps to improve learning because they score better in subsequent assignment"* (interview T1)

Likewise, while responding to the question on whether the feedback given to learners helps to improve performance, T2 said:

Yes, it helps them to improve their learning, for example, the first test I gave them, only ten students passed but after giving them feedback, fifty students passed the next test, so it is obvious that feedback also improve performance. (interviewT2)

Such explanations from teachers indicate how feedback for one task helped the learners to learn more and get better scores in subsequent tasks. Likewise, students were asked to give their views about the

influence of feedback on their performance in Mathematics at Ushindi Secondary School during FGD. One of them had the following observations: It helps me to be confident when entering the examination room and sometimes when I find some questions discussed during feedback provision, I can easily remember what my friends said about that concept during discussion (FGD)

Another respondent from Umoja (pseudonym) had the following to share:

Sometimes the same question or questions of similar concept we did in one assignment and receive feedback appears in the next assignment, in this case it is easier to attempt such a question (FGD)

The statements from these students suggest that feedback helps students to solve mathematical questions with similar concepts or similar questions to the ones that appeared in their previous tasks. This helps to raise their performance in these tasks. Generally, it is evident that, feedback has influence on performance, though its effect depends on how learners utilize the given feedback in their day-to-day learning. Therefore, it can be argued that feedback affects students' performance indirectly through enhancing their learning which occurs only when students use the given feedback.

Limitations to Providing Effective Feedback

The study further found out that there are several factors which limit teachers to provide effective feedback in Mathematics. These factors include; teacher's feedback illiteracy, class size, workload, overloaded curriculum and high-stake examinations.

Teacher's Feedback Illiteracy

Data collected through interviews indicated that teachers' understanding about feedback is very low as most of them consider assessment feedback to imply getting information about learners'

strength and weaknesses in a particular topic, which is immediately followed by planning for future lessons. They do not consider feedback as informing the learners about their strength and weakness in different areas as well as strategies for improvement. Such misconception was depicted clearly when the teachers were asked to express their understanding about assessment feedback. For instance, interviewed teacher T1 said,

Assessment feedback is the way you examine and check how students have understood the taught concept; it helps to know whether the learners have understood the lesson (Interview).

Moreover, when he was asked, what was he taught during pre-service training about feedback, he said,

At the college I was taught that whenever you teach make assessment which gives feedback" (Interview). Responding to the same question, teacher T2 said, "Aaah, no. We were not taught about feedback provision (Interview).

Therefore, it can be argued that, teacher's little knowledge about feedback originates from teacher training institutions where they are not prepared properly, because assessment feedback not only inform teachers about his/her teaching but also tells learners about how they progress.

Large Class Size and Heavy Workload

The findings show that class size and workload are other challenges hindering teachers to provide effective feedback. It was noted that, in both schools that were involved in the study, teachers are teaching more than 150 form three students divided in three streams. This means that, each class had more than 50 students. Therefore, in their response on how large number of students and workload affect the nature of feedback they offer to their students T1 said, *"My teaching load, leads to delayed feedback and make marking exercise very tedious hence*

teachers avoid giving test and assignment to the learners” On the side of class size, he commented that, “Large classes make the marking of exercises tedious hence teachers opt not to provide assignments, or give just a few questions for students to work on” (Interview). In addition to the teacher’s responses the researcher noted that, teacher T1 was not able to finish marking terminal examination scripts on time due to other administrative responsibilities which forced him to be away from the school compounds for some days. Moreover, responding to similar question T2 said,

Sometimes, it becomes difficult for me to test students in many topics because when you do that you will have many questions and therefore you will not manage to mark all scripts. It sometimes makes you dislike marking those exercises or test (interview).

These findings suggest that in the presence of large classes and heavy workload teachers cannot provide constructive feedback to their learners. Therefore, an appropriate teacher-students ratio is important for effective provision of feedback and eventual meaningful learning of Mathematics.

Overloaded Curriculum Content and tension of High-stake Examinations

Overloaded curriculum and high-stake examinations are other factors hindering feedback provision. Teachers were found to be busy struggling to cover the syllabus which is overloaded in order to have time for testing their students before high-stake examinations. Through interview with one Mathematics teacher at Umoja Secondary School it was noted that, all schools in Moshi municipality sit for similar examinations for terminal and annual examinations. Therefore, there is a sense of competition between the schools. The effect of overloaded curriculum and high-stake examination was further revealed during an interview with T2 who stated that,

... sometimes even politicians need us to complete topics early, so we forget to provide feedback, we forget to provide assessment tasks because what we care about most is to complete the topics in order to please them (Interview T2)

When he was further asked; about the effects of not giving feedback students? He said,

It obviously affects their learning, but sometimes in this teaching profession is not respected because even politicians interfere a lot and sometimes they come to pressurize our school management and the management cascade that pressure on us that we must cover all the topics as soon as possible. They do not understand that syllabus indicates duration of completing each topic (Interview).

Generally, statements from participants indicate that Mathematics teachers are working under high pressure of completing to teach the overloaded curriculum in order to have ample time to test and retest their students as they prepare them for annual examinations which are conducted across the municipality. This in turn has forced teachers not to provide formative assessment which could have helped them to identify students' weaknesses and strengths for each taught concept hence providing feedback that would help learners to have deep understanding of those concepts before moving on to the next topic. Therefore, statements from the teachers revealed that, formative assessment practices are ignored for the sake of completing the curriculum content earlier than the stipulated time.

Discussion

The findings of this study indicate that, assessment feedback has positive effect on students' performance in Mathematics because it is used to make revision, reading to get deep understanding of the concepts, and preparing for subsequent assignments. Moreover, feedback makes student confident as they approach next assignments. This is consistent with findings from previous studies by various

researchers such as Winstone et al. (2017) who observed that constructive feedback increases students' performance. However, feedback does not affect performance directly, but it does so by changing student's personal study habits (Wang & Zhang, 2020). This study like another previous study conducted by Yin and Wang (2016) found that, one of the important aspects of feedback is to trigger students learning motivation understanding the variance between their current performance and the expected one hence investing more efforts to reduce the gap through revising their works, solving questions of similar concepts, and repeating reading the concept which positively affect their learning and performance. Therefore, it can be summarized that, increase in performance depends on how students use feedback which also depends on the quality and kind of feedback given (Kyaruzi et al., 2019a).

However, this study revealed that, task level feedback which includes evaluative feedback in terms of comments; grades and scores as well as verification feedback were the common feedback practices in the sampled schools. This concur to other findings by Hattie and Timperley (2007) who claimed that, task level feedback is the most dominant assessment feedback used by teachers. Moreover, the use of evaluative feedback in verbal or written form is said to be dominant in classrooms as it has been found in this study. Additionally, the study found that teachers use verification feedback in form of ticks for correct responses and crosses for incorrect solutions in both students' exercises and examinations scripts similar to what was reported by Lema and Maro (2018) in their study about utilization of feedback in teaching and learning Mathematics in Tanzania secondary schools. Furthermore, the study revealed that, teachers use of verbal and written comments was another dominant form of feedback used by teachers, though, the comments were vague and sometimes irrelevant. This was also reported by Lema and Maro (2018), who observed that, comments are a

dominant form of feedback amongst secondary school teachers in Tanzania, yet the nature of comments reflect teachers' insufficient knowledge in the area of feedback provision. Since the task level feedback is said to be ineffective for enhancing deep learning (Hattie and Timperley, 2007), it can be argued that it contributes to poor performance in the national Mathematics examination. Thus, this is the case with Mathematics performance in Tanzania secondary schools, and particularly the community secondary schools which the present study explored.

Moreover, the findings of this study revealed that, assessment feedback seem to be more of a generalized. Teacher's feedback is given in groups (the whole class) while; individualized feedback was found to have no room. In addition, the feedback was delayed and sometimes not given completely hence students entirely depended on peer feedback. These findings correspond with the findings of other scholars who reported that, due to large classes teachers were unable to use effective assessment practices and to provide support to individual students (Kitta & Tilya, 2010; Marais, 2016). Therefore, it can be asserted that, generalized feedback which is also delayed and inadequate as it has discussed contribute to poor performance in Mathematics. This is due to the fact that, generalized feedback does not address the individual needs of the learner which are unique (Wiliam, 2011), while delayed and inadequate feedback make students repeat similar mistakes in subsequent assignments hence leading to poor performance.

Again, the findings of the current study revealed that sometimes teachers do not mark or provide feedback to their learners completely. These findings are similar to other scholars observed that, there is a tendency of teachers to neither mark students' work nor help with correction (Kyaruzi et al., 2019a; Ndioho & Joy.C, 2017). Generally, it can be argued that, this task level, evaluative feedback which is generalized, delayed and inadequate either verbal or written does not

help learners to get deep understanding of various concepts through making revision and solving questions of similar concepts contributes to poor performance in Mathematics at CSEE.

Conclusion and Recommendations

This study attempted to assess the nature of assessment feedback utilized by mathematic teachers in selected community secondary schools in Tanzania and its influence on students learning and performance in Mathematics. Findings showed that task level feedback which was evaluative in nature dominated mathematic classrooms. Additionally, feedback was more generalized, delayed and rarely occurred. This kind of feedback might be one of the factors that contribute to poor performance of students in Mathematics at CSEE. On the one hand, the study recommends professional development programmes for in-service teachers focusing on the provision of effective feedback should be conducted regularly to equip them with appropriate knowledge and skills. These will enable teachers to provide effective feedback which will, in turn, enhance students learning and improve performance in Mathematics at CSEE. On the other hand, students should be encouraged to use feedback given by teachers and peers in order to understand various concepts which in turn will improve their performance at CSEE.

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Differentiated Assessments for Learners with Neurodevelopmental Disabilities in Inclusive Elementary Schools in Tanzania

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ABSTRACT

Differentiated Instructions and modifications in curriculum and assessments are considered a prerequisite for the successful inclusion of learners with disabilities in general education. This qualitative study assessed the current provisions and the aspired changes in the curriculum, assessments, and transition plans for learners with Neurodevelopmental Diversities such as Autism in Tanzania. A total of 21 participants partaken in this study. The participants were obtained through purposive and snowball sampling methods. Data collection methods included in-depth interviews, documentary reviews and non-participant observation. Data were analyzed thematically, aided by the vivo 12. Participants were of the opinion that there is a limited provision with regard to only time (an additional twenty minutes in every hour for mathematics and ten minutes in each hour for other subjects) within the subsidiary legislation of the Examination regulations released by the National Examination Council of Tanzania (NECTA) in 2016. The provision, however, does not mention any neurodevelopmental disabilities in the categories of disabilities and the special provisions entitled to them. Lack of reasonable accommodations in the type and structure of questions, rigid modality of responses to the examination questions for learners with learning disabilities and limited flexibility in time and room arrangements have been mentioned as barriers to proper assessments for such learners. The study concludes that there is a need to embrace the evidence-based practices of responsive education, instead of the “one-size-fits-all” kind of education. This will help to improve the curriculum for all learners instead of the approach to “fix” the deficits of learners with neurodevelopmental disabilities.

Keywords: *Differentiated Assessments, Neurodevelopmental Disabilities (NDD), Autism Spectrum Disorders (ASD), Learning Disabilities and Inclusive Education.*

INTRODUCTION

Responding to the global mandate to include all learners in general education as enshrined in the Salamanca Statement (UNESCO, 1994), scholars worldwide have proposed theoretical and methodological approaches which describe the necessary curricular and instructional adjustments for learners with Special Educational Needs in inclusive settings (Strogilos et al., 2020; 2021). However, there has been a concern worldwide that learners with disabilities such as Autism Spectrum Disorders and other neurodevelopmental disabilities continue to face social oppression, systematic social exclusion and pedagogical exclusion in classrooms and in the national examinations (Strogilos et al., 2017; 2021; Strogilos & Tragoulia, 2013). For students with NDD, meaningful access to the curriculum and national examinations that effectively respond to their strengths and individual learning needs remains an elusive issue.

Curriculum and assessment modifications are essential for the social and academic progress of students with disabilities in general education classrooms. Curriculum modifications include curriculum adaptations and curriculum augmentations (Strogilos et al., 2015). A curriculum adaptation refers to the use of supplementary aids such as visual aids and technological means. Curriculum augmentation involves the additional instruction of specific strategies in order for the student to acquire skills (for example learning how to learn strategies). The aim of curriculum and assessment modifications is to accommodate the diverse needs of the students under a universally designed curriculum (Philip, 2022). The implementations of universally designed curriculum call for restructuring of the traditional lessons by providing alternate means and curricular augmentations to promote students' access, improve their participation, and increase their understanding in different areas of learning. The strategies aim at changing the way information is presented and the way students

respond without altering the curriculum content (Strogilos et al., 2021; Strogilos & Tragoulia, 2013; Tragoulia & Strogilos, 2013). Instructional strategies effective for learners with neurodevelopmental disabilities in inclusive classrooms include cooperative learning, peer-mediated instruction, student-directed learning and embedded instructions which incorporate techniques such as prompting, fading, reinforcement, and error correction procedures (Strogilos et al., 2015). Strength-based approaches are defined as approaches that acknowledge, utilize and leverage the strengths, interests and resources of learners with Neurodevelopmental Diversities (NDD) to address their needs, optimize their school experiences and improve their outcomes. Learners with NDD have strengths and interests in visual and sensory processing abilities, music, art, sports, computer and video games, cooking, comics and cartoons (J. White et al., 2023).

Formative assessments are very important as they inform on how and where to adjust the teaching and learning strategies (Strogilos et al., 2017). Specialized instructions, activity-based learning and real-life experiences work effectively for learners with NDD. The specialized instructions and assessments need to be based on the student's strengths and interests so as to help them access the information they need. For instance, visual processing has been identified as a strength for many learners with NDD (J. White et al., 2023), hence visual supports such as photographs and video-modeling are supposed to be commonly used in instruction and assessments. Because of the wide range and variety of learners with NDD needs, it is important to identify their Special Interest Areas and strengths early so as to match them with resources and activities of instructions and assessments as a way to individualize planning and implement properly so as to meet with their individual needs (Stefanidis & Strogilos, 2015; Strogilos & King-Sears, 2019; Tragoulia & Strogilos, 2013). In response the global agenda to ensure access and quality education for all, Tanzania

launched the National Strategy for Inclusive Education (NSIE 2009-2017). The document engrossed on financing and resourcing inclusive education as well as developing curricular and materials to support learning and developing inclusive assessments and evaluation tools (URT, 2017). This provision was meant to ensure participation and retention in schools for all Learners with disabilities. However, it is only around 15% of the 400,000 school-aged children with disabilities who are enrolled in primary and Secondary Schools in Tanzania (Action Aid et al., 2020). Paucity in the implementation of the differentiated instructions coupled with inflexible formative, continuous and summative assessments contribute largely to these numbers (Laiser, 2023; Strogilos et al., 2020). Limited information exists on the type of differentiated instructions offered for learners with neurodevelopmental disabilities such as Autism Spectrum Disorders, Intellectual impairments and learning disabilities in inclusive classrooms in Tanzania (Manji & Hogan, 2013). Less is known on the provisional formative and summative differentiated assessments in all levels of education (Laiser, 2023; Philip, 2022). It is from this understanding, this study assessed the current provisions and the aspired changes in the curriculum, assessments, and transition plans for learners with neurodevelopmental diversities in inclusive settings in Tanzania.

Neurodevelopmental Disabilities – The Conception

Differentiation means to proactively plan varied approaches to what learners need to learn, how they will learn it, and how they will show what they have learned in order to increase the likelihood that each student will learn as much as he or she can and as effectively as possible (Tomlinson, 2003). Differentiation is a strategy associated with responsive teaching and assessments and a means for ensuring access to the curriculum for all learners (Strogilos et al., 2017). In the other hand curricular modifications refers to the adjustments in the cognitive

demands of the work offered to learners with disabilities such as a different math problem or fewer items to complete. Neurodevelopmental Disabilities (NDD) refers to a group of conditions that are caused due to impairment in physical, learning, language, or behavior areas. These conditions begin during the developmental period and may impact the day-to-day functioning of an individual and usually last throughout a person lifetime. Developmental disabilities include; Global Developmental delay (GDD), Intellectual Disability (ID), Autism Spectrum Disorder (ASD), Communication Disorders, Learning Disorders and Physical Disabilities (Colvin et al., 2022; Ruparelia et al., 2019; Staker, 2016; Vander Wiele, 2011). Students with Neurodevelopmental disabilities such as Autism, Intellectual Impairments, Sensory and physical impairments are commonly educated through modifications in the content and the process of teaching (Laiser, 2023; Strogilos et al., 2015, 2020).

According to Janney and Snell (2013) the types of modifications can be instructional, curricular, or alternative. Most frequent modifications for learners with disabilities are; changes on how materials are presented, environmental adjustments as well as response alterations (Strogilos et al., 2020). In essence, effective inclusion occurs when educators modify the curriculum and assessments to match the needs of all students. However, limited knowledge exists about the types and quality of these modifications (Kurth et al., 2015; B. White, 2022). Many research studies have reported a lack of curriculum modifications in inclusive education systems for learners with disabilities. In a study conducted in Europe by Tomlinson (2003, 2017) participants proposed an “exams-free” pedagogy to enhance diversity in modifications. In Singapore, the education system plays a central role in maintaining quality control through high stakes examinations, such as the Primary School Leaving Examinations (PSLE) (Strogilos et al., 2021). In Maldives they use re-teaching, continuous instructional coaching, and lots of scaffolding for

individual students. While in Korea it is reported that teachers struggle to implement differentiated instructions to the point that the government decided to introduce the SMART (Self-directed, Motivated, Adaptive, Resource-enriched, and Technology-embedded intervention) (Morningstar et al, 2015). In other western countries standardized assessments have been used to evaluate student learning and not assessments in relation to students' ongoing progress. Other kinds of curriculum modifications documented includes; the reduction in the cognitive demands which means the less workload and picture-based stories than text-based stories, change in presentation of the materials, environmental adjustments as well as response alternations (Morningstar et al, 2015). According to Finnerty, Jackson and Ostergren, (2019), teachers provide access to the mainstream class content for students with severe disabilities when modifications are tangible, student-centered as well as well-blended with the class materials and instruction. There has been a consensus among researchers that effective inclusion occurs when educators modify the curriculum according to the needs and strengths of students.

Theoretical Framework

This study is informed by two theories; the first one is the Social Model of Disability and the second one is the Social Cultural Theory (SCT) which was proposed by Lev Vygotsky. The social model of disability helps to expound the perspectives of the nature of disability and the Socio-Cultural Theory shapes the propositions on the justification for the differentiated instruction, curriculum modifications, reasonable accommodations and assessments differentiations needed for learners with neurodevelopmental disabilities. Social model of disability proposes that a person's disadvantage is the combination of personal traits and social setting. It expounds that "disability" is brought about through the influence of two factors; one is a person's physical or mental traits and second is the surrounding environment which is at

least partly constructed by others (Burchardt, 2004; Thomas, 2004). According to the social model of disability, both factors must be present before the “disability” condition can surface. It insists on the social origins of impairments and the sociology of impairment (Hughes & Peterson, 1997). The social model of disability was chosen to inform this study because of its relevancy as a key tool in the analysis of cultural representation of disability. This model has become the conceptual analysis in challenging stereotypes and archetypes of disabled people by revealing how conventional structures do reinforce the oppression of disabled people (Oliver, 2013; Thomas, 2004). These qualities of social model of disability make it fit to guide this study on the assessment of the provisional differentiated instructions and assessment methods for learners with neurodevelopmental diversities in Inclusive settings in Tanzania.

The social model of disability focuses on the changes required in the society in order to help individual with disability live and thrive in our communities. The changes it advocates are in terms of Attitudes, Social support, Information, Physical structures as well as reasonable accommodation in the education policies and practices so as to remove barriers for learners who have diversity of needs in the school systems (Oliver, 2013). The second theory which informs this study is the socio-cultural theory (SCT), which was put forward by the Russian Psychologist Lev Vygotsky. Lev Vygotsky developed his theory following his interactions with children with disabilities (John-Steiner & Holdbrook, 1996). Two key elements of the socio-cultural theories are The Zone of Proximal development (ZPD) and the Scaffolding. It explains the role of the ZPD of a child and its interdependence on the role of scaffolding support in helping the child to reach their maximum potential. The zone of proximal development explains the gap between what an individual can do without the support and the potential of what they could have done with the support of a more competent peer

(History, 1896; John-Steiner and Holdbrook, 1996; To & Vygotsky, 1995). On the other hand, scaffolding is the terminology used to explain the appropriate amount of support offered to a child to be able to perform a certain task (History, 1896; John-Steiner & Holdbrook, 1996; To and Vygotsky, 1995). These two key terminologies helps to guide the narrative on the essence of differentiated instructions and the level of support and modifications required in the curriculum and assessments for learners with Neurodevelopmental disabilities in Inclusive settings.

The Current Study

The aim of the current study was to assess the current provisions with regard to differentiated assessments for learners with Neurodevelopmental disabilities in elementary schools in Tanzania. It sought to answer two research questions (i) what are the current provisions in regard to assessments and examinations for learners with Neurodevelopmental disabilities in Tanzania? (ii) What are the teachers' opinions in regard to differentiated assessments and the aspired changes for learners with Neurodevelopmental disabilities in elementary school?

Methodology

This qualitative study employed a multiple-case study research design. The study involved 35 participants (14 special and Inclusive Education teachers, 7 students with Neurodevelopmental disabilities, and 14 normal students) from the 7 Inclusive Schools within the 5 local region authorities of Tanzania (Dar es Salaam, Mbeya, Dodoma, Iringa and Tanga). Among the schools, three (3) were public-owned and four (4) were privately owned schools. Three (3) schools were chosen from rural areas of Tanzania and the four (4) were chosen from big cities to represent the two diverse socio-cultural realities. Purposive sampling was used to select both teachers and students with ASD. However, when it comes to students with ASD, purposive and convenient sampling techniques were used. Purposive sampling was first used to

select students with ASD, then convenient sampling was used to select students who were able to talk amongst students with ASD. This is due to the fact that not all autistic learners were able to speak. The normal students were conveniently selected. The purpose of involving the normal students was to make students with ASD feel comfortable during discussion. In this study, teachers were interviewed while students with ASD were mixed with other normal students for a group discussion. Also, the study employed documentary review as a method for data collection; the 2016 NECTA examinations regulations was reviewed. Data were analyzed thematically aided by the Nvivo 12 computer software. The thematic analysis of data followed the six stages proposed by Braun and Clarke (2006). These stages are (i) Familiarize oneself with the data, (ii) generate initial codes (iii) search for themes (iv) define themes (v) name themes and (vi) write the report.

Findings and Discussion

Based on the main research objective for this study, which is to assess the current provisions with regard to differentiated assessments for learners with Neurodevelopmental Disorders in Inclusive elementary schools. Findings were obtained from the two research questions and participants' responses were captured in terms of themes, which were developed from the codes. The participants' responses, observation checklist and narratives together with the documentary review findings have all been captured under the six themes explained below, which are; - status of inclusion for learners with NDD, activities-based learning, strengths-based approach to learning and assessments, Differentiated Curricular, Differentiated Formative and Summative Assessments and Formal and Planned Exits/Transitions.

Status of Inclusion for Learners with Neurodevelopmental Disorders (NDD)

As we delve into the findings it is worth noting that participants and school administrators claimed to practice inclusive education. However, the researchers' observation suggests that no public-owned school in the selected regions implemented inclusion of learners with neurodevelopmental disabilities in general classrooms. There has been observed inclusion of learners with physical disabilities, visual impairments, and hearing impairments. All learners with neurodevelopmental disabilities such as autism spectrum disorders, intellectual impairments and learning disabilities were put together in a separate classroom (special unit) and were not included in the mainstream classrooms.

Another thing worth noting is that; majority of the teachers were not aware of any of the technical terminologies used in the Inclusive Education approaches. Such terminologies include curriculum adaptations, reasonable accommodations, differentiated instructions etc., and those used in the Neurodevelopmental disabilities field such as aggressive behaviors, sensory perceptions disorders, prompts, reinforcements, dyslexia, and dysgraphia. This is contributed by a lack of training in these areas. However, their responses after detailed elaborations carried out by the researcher, they were able to mention some modification and adaptations made by special and inclusive education teachers in the classroom. It is worth noting that these modifications, adaptations, and differentiations that are teacher-initiated were mainly reported in the privately owned schools. There is a significant gap in the implementation of inclusive education that has been observed in the public-owned schools; however, it is beyond the scope of this study. The findings here are presented thematically and not reported school by school; whenever the issue arises it shall be

explained on how it has appeared in public-owned and privately-owned schools respectively.

Activities-based Learning

The participants (teachers and students) provided several ways in which the curriculum and instruction is being differentiated in schools. Some of the differentiations mentioned were not being implemented in the public-owned schools at the moment. There was a commendable level of seriousness in implementing the differentiations in the privately-owned schools, with some few hindrances due to the same learning objectives for all learners and same assessment methods and final national examinations for all students. Majority of the participants mentioned activities-based learning as the instructional differentiation carried out by teachers and approved by the school administrators as a way to alter how the content is taught, how learning is demonstrated and how students can respond (Strogilos et al., 2017) They consider this approach to be effective because it takes into consideration the students' interests and their learning styles (Strogilos et al., 2021; J. White et al., 2023). This can be ascertained through their responses as follows:

As a school, we have decided to modify the curriculum by teaching through practical and make children active participators in the learning process. We avoid lecture methods and too much writing on papers (Teacher A).

Because we can play sports such as football, basketball and we can work on the computer, we can read and write and we can play video games (Student X)

We have different classes for different vocational skills such as cooking, mechanics, decoration, tailoring, gardening, animal keeping, office works, library and child care, this is special for the older children we do

teach them and prepare them to be assistant teachers by giving them opportunities to look after the younger children at school (Teacher B)

It is argued here that the steps taken by teachers and schools to accommodate the needs of learners with NDD in inclusive settings through the activities-based learning are in line with the required standards of Universal Design for learning, and are also in line with the strengths-based approaches (Opini & Onditi, 2016; J. White et al., 2023). However, the barriers still exist as the summative assessment methods and the national examinations methods have not been adjusted to reflect the practice in schools and thus these learners end up not qualified to sit for the National Examinations. Hence, their efforts and skills cannot be formally assessed and given the due recognition.

Strengths-based Approach to Learning and Assessments

The dominant thought across schools and participants has been that learners with neurodevelopmental diversities are mainly visual-audio learners and they do avoid scripts and lecture methods. This finding is consistent with the literatures on the different learning styles and the fact that Differentiated Instruction is the process in which modified activities and learning outcomes are an integral part of the curriculum (Hugo & Hedegaard, 2020; Strogilos et al., 2023; Tragoulia & Strogilos, 2013). Participants have mentioned the use of technological aids such as computer, audio books, and key boards with enlarged fonts and reduced hand-writing activities and replacing it with typed works to differentiate the instructions and the process of teaching and learning. Other methods used are the altering of presentation, whereby picture-based stories are used instead of the letter-based stories. This was reported during interviews:

So, the main strategy that we use is by using books which have larger fonts which enable the children to read with ease, books with many pictures, teaching little things (small contents) but using an extended

period of time until they master. For example, if we are teaching about fruits, we make sure that we teach them in even ten different ways until the child has mastered the content that we want them to master (Teacher C)

For me to do well in school, I think we need more assistive devices, I need to be educated, and all my educational needs should be provided, for example audio books and Assistive devices for writing (Student Y).

For example, sitting arrangement, those with diverse learning needs are supposed to sit at the front so that they can hear and see properly and it also increases their understanding (Teacher A).

Also, the use of videos and audio visuals in some of their subjects help to increase their understanding of the subject matter (Teacher D).

Arguably, this alteration should also be considered in the national examinations by doing assessments using picture-based questions instead of the letter-based questions. This finding is consistent with literatures which exposes that when curriculum modifications are used, students with disabilities increase their engagement in academic related responses and decrease their problematic behaviors (King-Sears et al., 2021). It is worth noting that the adaptations made to the curriculum are considered an essential inclusive strategy. They should be also reflected in the continuous assessments, summative assessments and national examinations for effective inclusion of students with neurodevelopmental disabilities in the mainstream schools (Philip, 2022)

Differentiated Curricular

The participants suggested that differences of learners in readiness levels, interests and learning profiles need to be taken into consideration when planning instruction and assessments. In their arguments, they noted that differentiated instruction provides a framework of learning and teaching to meet the diverse needs of all

students in a classroom. It appears to them that the current curriculum is the traditional one whereby all children are supposed to receive the same instruction and undergo through the same assessments most of the time. They insist on the need to have a differentiated content of the assessment and the curriculum by altering the complexity of the content as well as altering the quantity according to the students with disabilities grade, age, type and severity of disability of an individual child. This was mentioned during the interviews:

Yes, we have some few modifications even though they are not documented officially. Learners with autism and other related disabilities are supposed to learn a few things in the curriculum content so that they can be able to grasp them and master them. Normally, they were supposed to just learn in the three levels and graduate but recently they say we should put them in grade four after they have mastered the three levels, but upon joining the grade four they do meet with huge and heavy contents that are not fit for them and they cannot cope with others (Teacher E).

So, in general the curriculum has not addressed the specific issues that need attention in children with autism and other neurodevelopmental disorders (Teacher B).

Sometimes you may plan to teach them inside the classroom but the child doesn't want to stay inside the class so as a teacher you have to be flexible and follow the child. For example, if you planned to teach number, you may go outside and play football while counting, or you may teach them counting through skipping the rope (Teacher G).

The differentiated curricular suggested by the participants can include the reduction in the difficulty level of the content or use of “less content” to match with the perceived low ability level of students with special learning needs (Strogilos et al., 2021). It can also be accompanied by the one-on-one instructional support such as the adult support, peer support, extended time, rewards, assistive technology,

extra resources, pictures as well as environmental adjustments (Strogilos et al., 2020; Symes & Humphrey, 2011)

Differentiated Formative and Summative Assessments

In this study, the majority of participants, especially teachers, voiced their aspirations on the changes they would like to see on the type of questions, assessment process as well as the methods that learners use to respond to the question in the examinations. In their opinion, students with neurodevelopmental disabilities such as Autism Spectrum Disorders, Intellectual impairments, sensory and learning disabilities have been left out in the formal assessment systems and are not even considered in the national examinations. This is due to the limited differentiations in the content of the examinations as well as the alterations in the process and environments of examinations. This argument is backed up by the fact that neurodevelopmental disabilities is not mentioned anywhere in the NECTA examinations guidelines document (NECTA, 2016). The guideline does not acknowledge the needs of learners with Autism, Intellectual Impairments and Learning disabilities, and hence mention no any differentiated support for them. The documentary search indicated a preliminary provision within the subsidiary legislation where by learners with disabilities have been provided with the additional twenty minutes for every hour in mathematics and additional ten minutes for every hour in other subjects (NECTA, 2016). This provision has been enshrined within the general provisions under the subsection (29) of the Special treatment for candidates with special needs, and it state that;

⁽¹⁾A private candidate with special needs or Head of school that has candidates with special needs may apply to the Executive Secretary for provisions of special services... ⁽⁴⁾A candidate with a disability which slows down his writing speed in the examinations shall be offered with additional of twenty minutes

in every hour for mathematics and ten minutes in each hour for other subjects (pg. 31-32).

According to the participants, this provision seems to be insufficient to address the diversities of needs for learners with neurodevelopmental disabilities. First of all, it impliedly suggests that learners with special needs or their heads of schools should apply for the differentiated assessments, instead of the authority to provide beforehand the modified assessments based on the diversity of the learners in schools. In their opinion the subsidiary legislation should stipulate the modifications and adaptations in the type of questions, modality of examination administration as well as the environmental adjustments that are deemed necessary. As it was commented during the interview:

There are no different evaluation and testing modifications for the needs of these learners. As I said earlier; these things are not formally documented, hence not clear on the implementation. From level one to level three they are in special classes and later join to inclusive classes from grade four so they struggle to cope with the grade four studies in general (Teacher E).

For example, we have a child called XYZ here, who is verbal, but he has a great ability in academics. If you look at him, you may not realize if he possesses such abilities and he also has physical disabilities. However, if you rank him according to the Tanzanian curriculum, he may seem to be behind others, and also he cannot learn hand works because he has some impairment in his hands and legs. A child like XYZ was supposed to have Oral examinations and not written examinations because of his limitations (Teacher G).

Most of the children with autism are good in Oral examinations and practical examinations (Student Z)

The first thing I would have advice is for the examinations to be more practical than written. Because if we make all the examinations to be written we fail to assess those with autism better (Teacher F)

There should be a way to assess children orally, using more picture than text questions or writing by using computers and other assistive devices and practical on the daily life skills. For example, if the examination required a child to mention the things that we do use in the dinning/kitchen, the ones with autism will be told to point to the cup, or a knife or a plate from the mixture of objects (Teacher C).

This finding is consistent with the literatures which expounds that low quality of inclusion of learners with neurodevelopmental disabilities in summative assessments and national examinations is attributed by the traditional beliefs that the success of inclusion is largely dependent on the disabled learners' individual characteristics (Strogilos et al., 2023; Tragoulia & Strogilos, 2013). When the education system fails to include learners with NDD in the assessments and national examinations, all the blame goes to the individual learners with NDD and their ability to assimilate into a largely undifferentiated examinations environment. Limited modification in the national examinations can be attributed to educators' belief that the offered modifications should be based on the students' ability to adjust themselves to the traditional examinations environment (Majoko, 2017; Mapunda et al., 2017; Possi & Milinga, 2017; Segall & Campbell, 2012; Sifuna, 2007).

Formal and Planned Exits/Transitions

Unclear transitions from one level to another as well as the informal exits in primary schools without getting proper recognitions and awards from the National Examination Council of Tanzania based on their skills and competence levels is another concern that was presented by participants. Participants revealed that there is no documented procedure and the differentiated curriculum to take

through the learners with neurodevelopmental disabilities from the special units to inclusive classrooms. A learner is expected to move from the special unit preparatory classes to grade four and adapt to the undifferentiated curriculum, instructions and the same amount of content and the difficulty level, just like their typically developing peers. This concern suggests for the formally documented differentiated content of the curriculum for learners with intellectual disabilities, autism and learning disabilities from pre-primary to upper primary levels to make their inclusion pathway clear and their transitions and exit levels well defined. In light to the participants' responses below, the differentiated curriculum content will inform the type of assessments and national examinations accommodations required for this kind of learners so as to widen their opportunities for further education and employments in the future. Some participants commented:

In essence, there is no clear or smooth transition from special classes to inclusive classes. For example, in numbers; those with special needs do join upper grades while they have not learnt all the numbers that their peers have already mastered (Teacher D).

We do separate them in their own classes until they have mastered the pre-reading skill is when we bring them to join the inclusive classes. We prepare them in their own classes for pre-primary education so that we can have enough time to build their capabilities and once they join inclusive classes, they will be able to move well with others (Teacher A).

From level three, a child can be taken to join grade four because they believe once a child has mastered all the three levels they are competent enough to join grade four. However, in real sense, they do not have the same competency level as their typically developing peers because in grade three children do learn to count up to ten thousand, but for those with special needs such as autism and intellectual impairments, they only learn up to one hundred. Thus, being in the same grade now

(grade four) the ones with special needs are now made to carry a big load. I think the ministry is still in the process to make it better
(Teacher G)

According to Kurth and Keegan (2014), educators are not supposed to focus on what skills learners lack but rather on what support should be in place in order for learners to be successful. The Kurth and Keegan (2014) methodological approach in evaluating the educator-made modifications suggests that in the efforts to ensure the competence of learners with NDD during transitions and exits assessments, the curricular content should not be different. However, it should be differentiated to the degree which does not exclude the learners with disabilities from the common competence activities of their peers. This will need a balance between the differentiated activities (similar to the common activity) and a different activity (more special than necessary)(Strogilos et al., 2021).

Different learning needs of learners with NDD require a variety in the development of modifications. For example, learners with mild learning difficulties might need more “instructional” modifications, whereas learners with severe learning difficult require more “curricular” modifications. Instructional modifications can include the one-on-one support provided to a student by an adult, the peer support provided by a classmate, and the adaptations on the sitting space within the classroom. Others can be provision and use of supportive technology, provision of extra time during class activities and examinations as well as the support when someone else is writing the examination for the student with neurodevelopmental disability.

Conclusion and Recommendations

Generally, teachers’ opinions suggest for curriculum modifications and adaptations in instructions and assessments so as to reflect the intentions of the education system in embracing the best-practices of

responsive education and not “one size fits all” kind of education. Based on their voices one can depict that differentiated instruction and assessments practices helps to improve the curriculum for all learners, instead of the approach to “fix” the deficits of learners with neurodevelopmental disabilities. They have insisted that activities-based learning creates early work-related experiences at school by capitalizing on students’ special interest areas which contributes to their long-term goals. It has been stressed that deploying the digital and technology in instruction and assessment is critical for successful inclusion of learners with NDD.

The use of Visual supports and assistive devices such as video-modeling, dictation software programmes to compensate for deficits in writing. This is to say, our education system needs to recognize powerful effects of students’ diversities, interests and strengths rather than viewing them as deficits to be changed. There is a need to balance between the traditional practices and a way of operating from a deficit-based model, which is dedicated to “fixing” the students, to practices that recognize and leverage their diversities, strengths and interests and empower them. This area has not been studied enough in Tanzania. Hence, more studies are recommended in this regard. Due to the small sample covered under this study, the findings cannot be generalized. However, a further quantitative survey is recommended in this area so as to generate findings that include a larger sample. This study also recommends for serious deliberations to have formally differentiated curriculum, assessments and national examinations adaptations and modification.

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Formative Assessment Practices and its Influence on Students' Learning and Achievement in Biology: Lessons from a Selected Community Secondary School in Moshi, Tanzania

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ABSTRACT

This qualitative study explored current teachers' formative assessment practices in Biology classrooms and how these practices influence performance in the subject. The study employed a case study design in a single selected community ordinary-level secondary school in Moshi municipality. It purposively involved two Biology teachers and twenty students selected from classes that do not have national examinations. Data were collected through semi-structured interviews with teachers, classroom observations, and focus group discussions with the students, as well as a review of students' exercise books. The data were transcribed verbatim, then coded and themes generated through interpretive phenomenological analysis. The findings showed that teacher's oral questioning dominated the assessment practices. Other strategies such as peer assessment, student-student interactions, descriptive feedback, and sharing of learning intentions with students seemed to be unfamiliar to the Biology teachers involved. The study recommends among other things, in-service training for teachers on how to employ alternative formative assessment practices during instruction to promote students' learning and achievement in Biology.

Keywords: Formative assessment, feedback, peer assessment, classroom questioning, student's learning, and performance

INTRODUCTION

In recent years there has been a paradigm shift in assessment, whereby formative assessment has gained popularity in the education arena. The shift is because Formative assessment is an integral part for efficient competence teaching and learning (Gavotto-Nogales et al., 2015). It is also part of a continuous process that involves a series of practices such as; sharing of learning intention and criteria for assessment with the students, peer assessment, feedback and collaborative learning activities and self-assessment. Heritage (2007) refers to Formative assessment or assessment for learning as a circle of assessments that allow both teachers and students to adjust their teaching and learning. In formative assessment, the cycle begins with, the teacher diagnosing the students' prior knowledge of the subjects, followed by sharing learning intentions and criteria for assessment with the students.

Then, administering collaborative learning activities that align with the learning intentions which help the students to attain the intended learning goal (Moss & Brookhart, 2012). Meanwhile, the students take charge of their own learning through peer assessment which involve learners to assess their peers' work with the aid of the criteria for assessment set beforehand, providing detailed feedbacks that inform them on their errors and how to rectify them (Gavotto-Nogales et al., 2015; Landry et al., 2014). Indeed, sharing of learning goals and criteria for assessment assist students to self-assess their learning progress (Moss & Brookhart, 2012). During classroom instruction, teachers use information gathered from classroom questioning and collaborative learning tasks to develop evidence of students' learning (William & Thompson, 2008). The analysis and interpretation of these information assist both teachers and students to identify what and how to improve (Gavotto-Nogales et al., 2015; Panayiotis & James, 2014). Thus, teachers have been practicing formative assessment in their classrooms for

checking conceptual understanding of the learners towards the subject and they have been trying to assist their learners in areas of learning difficulties, while the eventual summative assessment is pivotal in measurement of learning over period of time. (Black & Wiliam, 1998; Guskey, 2003). However, literature has indicated that teachers are still employing traditional teaching and assessment strategies which are primarily teacher-centered and therefore limiting competence learning (Kurebwa & Nyaruwata, 2013; Salema, 2017; Tarmo, 2014b). The present study sought to explore what current formative assessment practices are employed by teachers and how do the teachers use these practices in Biology classrooms to improve learning and performance in Biology.

Methodology

The study used qualitative research approach with a single case study design. A case study was considered appropriate since the study targeted generating a comprehensive and in depth explanation about a social phenomenon (Yin, 1994). A single ordinary level community secondary school was purposively selected for the study. The study involved two Biology teachers and twenty students from purposively selected classes that do not have national examinations (form one and three). Data were collected through semi-structured interviews with teachers, focus group discussion (FGD) with students, classroom observations and the review of students' exercise books. All interviews took forty minutes and were tape recorded. Each FGD lasted for thirty minutes and were not tape recorded, but key points were written down by the researchers. In addition, all FGDs were conducted in Kiswahili language which was familiar to all students. The study applied interpretive phenomenological analysis (IPA), whereby the researchers made sense of data, interpreted them and proved an account of experiences in a narrative form (Smith et al., 2009). The analysis involved multiple stages; firstly, the interviews recordings were

transcribed, then the transcript were read repeatedly in order to preserve the original narration. FGD data were translated into English without losing the meaning. The transcription was done verbatim. Both data from interviews and FGD were coded manually, sorted and themes were generated through the use of *Ms Word*. The themes were interpreted to create one narrative story with extracted pieces from the transcripts in order to affirm the given information (Igor & Smith, 2014). Notably, data from observations and document analysis were used to verify the information provided during the interviews and FGDs (Adu, 2017; Yin, 1994).

Findings

Current Formative Assessment Practices

Classroom questioning and end-of-topic exercises

Findings of the present study showed that, teachers use exercises, group works and tests upon coverage of a particular topic. Besides, the nature of questions asked focused on lower levels of Bloom's taxonomy, which emphasize on conceptual recalling and most of these exercises were hardly marked. This means that students may have few opportunities to self-evaluate their own learning progress. Thus, the exercises seldom encourage critical thinking and problem solving. The findings also revealed that teachers rely heavily on oral questioning as the means to assess the conceptual understanding of the students and to encourage classroom interactions. One of the interviewed teachers commented: "*Oral questioning is easy and I can make self-evaluation during the lesson...*" (Teacher's voice; P1).

Another teacher claimed that;

I mostly use oral questioning because it is an easy way to assess many students and it encourages them to participate during the lesson. Oral questions motivate students especially when I appreciate students' responses. (Teacher's voice; P2)

In addition, it was observed that teachers dominated oral questioning during instruction while students remained passive. The mostly asked questions were of low levels, teachers answered their own questions when students failed to produce answers and, in some cases, leaved the question unanswered. Some of teachers' questions observed during instruction were: *"Define excretion."* *"...List the five kingdoms of living thing"*

Moreover, the study findings illuminated that students' questioning is minimal during instruction. Students hardly asked questions to either a teacher or their peers. The student's views from FGD highlight on that:

Some time you are afraid to answer a question because you can't pronounce English words properly and if pronounce badly others will laugh. (Student's 1 voice).

Another student stated that:

"Most of us do not go to the teacher for help (if you don't understand), you just disregard it." (Student's 2 voice)

Arguably, inadequate or lack of students' questioning during classroom instruction can be attributed to either by inability of students to understand English language which is used during lessons, or teacher's dominance. Therefore, such situation can hardly foster peer learning through student- questioning and it may also limit gathering of information that may indicate evidence of learning.

Nature of Classroom Interactions

Study findings illustrated that teachers exhaust oral questioning as a strategy for encouraging classroom interactions. These findings suggest that teacher-questioning is the foundation for teacher-student interaction during classroom instruction. Nevertheless, peer to per interaction was also found out to be a supporter of learning and formative assessment. Through FGD, students revealed that they can

share knowledge with their peers and they understand better when taught by their peers. As one of them stated:

Group works help us to learn from one another so if you initially did not understand a concept, then you will understand it during the discussion... (Student's voice retrieved from FGD)

Peer Assessment

Although students were able to interact through group discussions, it was found out that they lacked knowledge on the use of peer assessment in their learning. Some of them opined that peer assessment is un-authentic means of assessment. Moreover, the findings showed that on its occasional use, peer assessment face a number of challenges such as: students' biasness during assessment and under assessment. This was revealed through FGDs whereby students strongly agreed that peer assessment was a challenging practice;

Peer assessment is not a good thing because when my fellow student assesses my work will do it badly maybe due to envy or jealous and when my peer knows my results, he/she will gossip about them and I will feel terrible (student's 1 voice)

Another participant stated that:

Peer assessment is a bad thing and we do not want it at all because when my peer finds out my marks, he/she will speak ill about me especially if I have failed (student's 2 voice)

It is argued here that students' wrong perception that peer assessment is about marking a neighbour's work and not supporting each other is a misconception of peer assessment. Further, lack of knowledge on peer assessment demonstrated by the students suggests that teachers hardly implement peer assessment properly during the lessons. Therefore, it is likely that the use of peer feedback is still uncultivated field during instruction.

Sharing of Learning Intentions with the Students

It was also found out that teachers seldom shared with the students the learning objectives. Instead, they simply inform students about the topic or/and sub-topic to be covered. Regarding that, one of the students said:

The teacher shares with us only the topic to be covered (Student's 1 voice).

Another student noted:

At the beginning of the lesson the teacher tells us the topic to be covered (Student's 2 voice).

Another student commented:

Sometimes the teacher just begins to teach without telling us the topic (Student's 3 voice).

Arguably, students hardly recognized their achievements, errors, and area to improve during classroom instruction.

Nature of Feedback

Study findings revealed that Biology teachers preferred grading, and scoring for the purpose of creating competition among students, error flagging such as; writing question marks, putting circles, and drawing lines on students' work, were observed in students' works. The findings also illuminated that, teachers corrected all the questions on the blackboard from the tests and exercise. This implies that, Teacher's corrections prevail among other kinds of written feedbacks, and that teachers believe collective corrections amounts to effective feedback. The findings further disclosed that teachers also used punishment as a form of feedback. The students who failed tests and scored grade F were punished. Both teachers and students expressed their views concerning such punishment-feedback. One teacher commented:

If they fail so much, I may go and give them punishment because I think they are not studying hard (Teacher's voice P1).

One of the students stated: *"If you fail and scored F, then you are caned"* (Student's 1 voice from FGD).

Generally, teachers appear to use a diversity of feedbacks both positive and negative basing on the situation at hand. But they hardly employ descriptive feedback which inform students on their strength, weakness and how to improve in future works.

Teachers' Knowledge on Formative Assessment Practices

The study findings showed that teachers had inadequate knowledge about formative assessment. This is also reflected in their practice because they hardly implement some aspect of formative assessment such as peer assessment and descriptive feedback. Therefore, teachers were asked through interviews to share their understanding on the concept of formative assessment and one of them commented: *"I don't remember; Formative Assessment is guidance and counseling..."* (Teacher's voice p1)

Another teacher said:

Formative assessment is an assessment that is conducted to evaluate the achievement of the lesson taught based on the lesson objectives through classroom tasks and questioning.
(Teacher's voice P2)

Among other factors teachers' knowledge and experience determine their practice, thus such inadequate knowledge in formative assessment influences their current practices which hardly nurture learning of Biology.

Discussion

The purpose of this study was to explore current formative assessment practices by Biology teachers and how these practices influence

students' learning and performance in Biology. Assessment is one of the imperative aspects in education without which, it is hard to establish whether learning has taken place and that students are following the learning process or not. Studies show that formative assessment plays important role in enhancing learning and performance especially of lower achievers (Andersson & Palm, 2017; Black & Wiliam, 2010). Yet, teachers have been observed to adopt limited strategies for executing formative assessment to the extent that students' learning gets curtailed. A few of the strategies that the present study observed to be preferred by the teachers include teachers' oral questioning and few classroom tests. The finding in the current study, that teachers are using oral questions as part of formative assessment, is in line with findings by Arslan (2006), who claimed that teachers' questioning has higher rate of recurrence as compared to students' questioning during the lesson.

However, as highlighted by Almeida (2010), and as found out in the current study, teachers' questions emphasize rote learning and memorization. Likewise, Salema, (2017) and Mkumbo (2012) studies showed that even in national examinations in Tanzania, which are administered by the National Examination Council (NECTA) Biology questions highly comprise of remembering and understanding levels. Arguably, such questions limit critical thinking and application of Biology concepts. In line with the findings of the current study, studies by Ndalichako (2015) and Tarmo (2014) observed that teachers utilize traditional assessment strategies that limit inquiry learning. Moreover, the finding that teachers answer questions when students cannot, correspond with a previous study by (Tarmo, 2014), which disclosed that teachers' answer their own questions, before proceeding with a new concept or changed the nature of their questions when students fail to respond. These observations clearly show that teachers hardly invest time in scaffolding students' learning through formative

assessment or they seem to be in a rush to cover the lesson's content. Likewise, Komba and Mwandaji (2015) findings show that teachers stress highly on syllabi coverage and due to that they hardly wait to find out the students' learning progression through time-to-time assessment. The importance of formative assessment is also expressed in Stiggins (2002) claim that, classroom questioning foster students' confidence, motivation and improve a sense of ownership of their learning. The findings of the present study have also shown that teachers extensively employ lecture method which is in essence not compatible with competence-based learning. Such lecturing denies what Costa et al., (2015) observed that student-student interactions promote learning among themselves through collaborative learning tasks and feedback from the peers.

Furthermore, they argue that classroom interactions indirectly influence learning performance and academic achievements. This is also observed by Wang (2017) who acknowledges that when students interact with their peers through asking questions and discussions, they engage better. According to Gavotto-Nogales et al., (2015) students understand better when the information is conveyed to them using peer's language. As a results, it improves conceptual understanding and retention of materials (Siddig & AlKhoudayr, 2018). The present study found that students were passive mostly during instruction and they hardly asked questions either to the teacher or their peers. Besides, teachers hardly used collaborative learning strategies to encourage student-student interactions. It was observed that in a classroom there were more than fifty students which seemed to hinder effective interactions at a large extend. Study findings by De Paola et al., (2013) and Yelkpiri et al., (2012) concur with the present study regarding the difficulties on interacting an a congested class. However, Adimonyemma et al., (2018) disagree with findings of the present study because in their case, student-to-student interactions

were very efficient in large classes. Thus, this is to say that even with large classes, ways can be found through which student-student interactions for a better learning. The present study also found that teachers hardly employ peer assessment during the lesson and students lack an understanding of the significance of peer assessment in learning. In correspondence to that, Komba and Mwandaji, (2015) and Salema, (2017) observed that teachers do not employ peer assessment in their classrooms. Moreover, Alzaid, (2017) findings expose that teachers seldom train students on how and why they should practice peer assessment. As a result Pocock et al., (2010) disclose that students over evaluate or under evaluate their peers' work. However, Double et al., (2020) explain that peer assessment is a strategy which promotes both classroom interaction and student-content interaction. Additionally, Gavotto-Nogales et al., 2015 emphasize that during peer assessment students self-asses their work with reference with their peers' work and then assess their peers' works.

Despite that, Moss and Brookhart (2012) express that sharing of learning objectives play a significant role in improving students' learning and performance. Findings of the present study reveal that teachers seldom share with the students the learning objectives. It was found that teachers do not communicate the lesson objectives to be covered in a lesson. This implies that students end up lacking an insight to where they are going. Correspondingly, Ndalichako (2013) study findings illuminate that teachers do not inform students on criteria for success which blocks students from understanding what is expected of them and be able to evaluate the extent to which they can attain the expected goals. But, Stiggins (2002) argues that when teachers share the learning objectives through verbal communication and using learning activities that reflect learning objectives, then students can self-evaluate and be informed about their own learning

progress. Leahy et al., (2005) explain that teachers should comprehend the learning objective prior to the lesson so that they may effectively rely learning objectives to the students in a simplified language. Arguably, the practice of sharing learning objectives with students is less exhibited in Biology classrooms. The study findings have further shown that teachers use verifying, corrective and elaborative comments on students' response and it was also observed that teachers used written comments to signal students 'errors'. Moreover, the findings of this study show that teachers use scoring feedback to foster competition among students and identifying students' academic position. The tendency of fostering competitions among students increases the gap between the higher achievers and the lower achievers (Rahman, 2018).

In such cases, the lower achievers are highly neglected while teachers focus more to the higher achievers. And yet, Black and Wiliam (1998) explain that descriptive and individualized feedback promote learning improvement to the lower achievers. Notably, when feedback evaluate students according to their pace, it then encourages lower achievers to engage more during the lesson Ozan and Kincal (2018). Furthermore, the study findings revel that, teachers hardly provide students with detail feedback that inform on their errors and how to modify them. This suggests that students miss out essential information that can improve learning and performance. This is because descriptive feedback assists students in realizing and filling their learning gap with the intended learning target (Hattie & Timperley, 2007; Heritage, 2007). Again, constructive and timely feedback gives a clear and detail information to students' work and aids guidance for future work with a regard of learning targets (Gavotto-Nogales et al., 2015; Moss & Brookhart, 2012). Hence, teachers should discourage feedback that instills competition among students. The study has exposed that, teachers punish students who score F. In the same way, Abejehu,

(2016); Ndalichako, (2013) and Rahman (2018) findings show that students who fail to meet the benchmark are punished by their teachers. The use of punishment as a form of feedback is a negative practice since it discourages students and foster low self-esteem (Al-Bashir et al., 2016; Ndalichako, 2013). With that reference, Brinko (1993) and Heritage (2007) argue that feedback should be motivational so that it can create a positive learning environment for students. Therefore, teachers should less employ negative feedback during instruction. As observed in the current study, a good number of studies demonstrate that teachers have inadequate knowledge and skills for practicing formative assessment effectively (Andersson & Palm, 2017; Kitta & Afeli, 2017; Kurebwa & Nyaruwata, 2013). Likely, inadequate teachers' knowledge on formative assessment practices may be one of many hindrances for effective learning and performance in Biology.

Conclusion and Recommendation

This study advocates for alternative forms of assessments that gather the evidence of learning. The former would occur when teachers careful analyze and use the information from assessment tasks to modify teaching and learning techniques during classroom instructions. Therefore, in-service teachers training on formative assessment practices is crucial especially in areas of; peer assessment, descriptive feedbacks, self-assessment and collaborative assessment tasks. This is because teachers' formative assessment practices in classroom are key catalyst in facilitating learning and can improve performances of students.

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Applauding or Criticising the Announcement of the Best School and Student in the National Examination: Which Way to Go?

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ABSTRACT

On 29th January 2023, the National Examination Council of Tanzania (NECTA) stopped announcing the best-performing schools and students. The announcement drew mixed reactions (some applauding or criticising) among education stakeholders. Using a descriptive survey design, this quantitative study specifically identified reasons for the applause or criticism; compared statistically the identified reasons; and the private and public education stakeholders on the announcement. The questionnaires were used to collect data from 500 stakeholders who were selected through a multi-stage sampling technique in Arusha, Dar es Salaam, Mwanza, Mbeya, and Dodoma cities. The collected data were analysed using Descriptive Statistics and Independent t-tests. The findings indicate that, the applauding reasons include different study environments; no longer motivation for studying, improved understanding and restoring original logic of schooling. Other reasons are the announcement served no good purpose; the announcement marketed the schools; and it was not fair to compare schools using the British and NECTA systems. Contrarily, the criticism reasons are the Government escapism from under-investment in public schools; denying of information to education researchers; suppressing information and putting society in the dark; removing the incentives for students; cause unforeseen consequences; leader's in-charge subjectivity/selfishness move and the Council ignores the foundational reason for the announcement. Furthermore, there is a very minimal statistically significant difference between the reasons for applauding ($M=3.611$, $SD=.825$) and the reasons for criticising ($M=3.645$, $SD=.829$) the announcement. The t-test results portrayed no statistically significant difference between the private and public education stakeholders on the announcement. Therefore, none is more powerful than the other between the applause and criticism of the announcement. The private and public education

stakeholders should look for an alternative approach to improving results in the national examinations than depending on the announcement of the best schools and students.

Keywords

Applauding, criticising, best school, best student, national examination

INTRODUCTION

School academic performance has attracted the attention of several researchers and education practitioners as it is used to sanction or reward schools (Hanushek & Raymond, 2005). The given performance is always reflected in school's performance rankings which is typically useful as the foundation for accountability systems (Cilliers et al., 2019). Therefore, the school performance ranking has recently become a common feature of numerous education systems in the world, attempting to measure and compare the relative performance of individual schools (Njiru et al., 2020). The study argues that critics of school performance rankings are keen to compare oranges to apples and tend to significantly overstate the difference.

The critics are endorsed by Neves et al. (2014) who argue that the school performance rankings and comparisons between schools are problematic from both technical and methodological perspectives. Njakululu (2015) notes that the obsession with mean scores has driven some schools to employ some unorthodox ways of ensuring acceptable mean scores against the guidelines of Kenya's education ministry. In addition, Ouma (2023) discusses the implications of ranking students nationally in examinations from which they conclude that, the Ministry of Education in Kenya is on the right path in discarding academic rankings to enhance the quality of curriculum delivery to its students. Susilowati (2020) highlights the complexities and shortcomings of ranking students and schools based on academic performance regardless of the national examination being an integral part of a

system implemented to improve the quality of national education. Furthermore, the given ranking is said to have different implications (depending on either high-stakes or low-stakes) such as encouraging unintended behaviour (e.g. gaming, teaching to the test, neglecting unrewarded tasks); focusing only on publicizing information about school performance; creating sufficient or insufficient reputational pressure for higher-level education administrators or school staff and parents' willing or reactions on the rankings (Andrabi et al., 2017; Camargo et al., 2018; Cilliers et al., 2019). The history of school academic performance ranking is traced back to 1990 when NECTA announced national primary and secondary school examinations every year (Ngalomba, 2023).

The ranking was strengthened when Tanzania introduced "Big Results Now in Education," an accountability programme which published national and district school rankings (Cilliers et al., 2019). The ranking has always become the key national debate among students and parents in which they often use the ranking in determining school choices (Ngalomba, 2023). Specifically, while announcing the results of the 2022 Certificate of Secondary School Examination, the NECTA did not provide school rankings for the first time in decades. In addition, on Sunday, January 29, 2023, the NECTA announced that it will no longer announce the best-performing school and student (The Chanzo Reporter, 2023). The announcement has drawn mixed reactions among Tanzania's education stakeholders from which some were either applauding or criticising the decision. Supporting the NECTA's decision, the minister for education, science and technology said that, the rankings had become controversial because they determined performance based on only one factor-the final examination while other factors at play were not taken on board (Ngalomba, 2023). He added that the announcement of the ranking has not considered a number of candidates in schools, teacher-student rations, and this can

translate to longer working hours for teachers as well as poor student supervision, thereby compromising quality. In addition, NECTA's acting executive secretary said the council will no longer announce the best-performing school and student in the examinations when he was announcing the 2022 Certificate of Secondary Education Exam (CSEE) results (The Chanzo Reporter, 2023). He said that, announcing best performing schools and students is technically marketing the schools, something which is not productive since students have different study environments. The announcement drew mixed reactions among Tanzania's education stakeholders from which some were either applauding or criticising the decision. At the moment, there is scarce statistical comparison concluded on which reasons are more powerful among the education stakeholders who have applauded or criticised this decision. Therefore, this study statistically compared the reactions (reasons) among education stakeholders regarding the announcement of the best school and student in the national examination. It specifically identified the reasons for the applause or criticism of the announcement, compared statistically the identified reasons of the two groups, and compared statistically between the private and public education stakeholders on the decision made by the NECTA.

Methodology

This study used a quantitative approach due to the nature of the main objectives. This approach enabled the collection of data from a larger population of surveyed education stakeholders (Vijayendra, 2023). The approach facilitated the study to obtain objectivity and generalize findings to other situations (Lee, 2006). It as well enabled the study to quantify the performance of study variables i.e. power of applauding or criticising the announcement of best school and student in the national examination (Wu & Little, 2011). This study applied descriptive cross-sectional survey design as it facilitated studying individual education stakeholder stakeholders as a unit of analysis. It

assisted in covering a large geographical area while measuring the individual education stakeholder's views, attitudes, and characteristics. It also produced the easy way of analyzing the information from the surveyed education stakeholder stakeholders regarding the power of applauding or criticising the announcement of the best school and student in the national examination (Doyle et al., 2020). This study was conducted in five Tanzanian cities: Mbeya, Dar es Salaam, Mwanza, Dodoma, and Arusha in Tanzania. These cities were selected because cities they are among big cities in Tanzania the country which and absorb many education stakeholders. They have numerous zonal headquarters of private and public education organizations. They have more TVET institutions compared to many towns. Principally, they represent the major zones of Tanzania.

The study involved public and private schools' administrators, representatives from the Education Commissioner office in the Ministry of Education, Science and Technology, some representatives from NECTA, representatives from Non-governmental Organizations (NGOs) dealing with education issues, some representatives from faculty of education in universities, public and private schools' students and graduates, education journalists, education researchers and analysts. A total of 500 respondents were involved in this study i.e. 75 public and private schools' administrators, 20 representatives from the Ministry of Education, Science and Technology, 20 representatives from NECTA, 120 representatives from Non-governmental Organizations (NGOs) dealing with education issues, 50 some representatives from faculty of education in universities, 80 public and private schools' students and graduates, 20 education journalists, 20 education researchers and analysts and 95 teachers from public and private schools. The multi-sampling technique was used in this study in which the population was identified purposively, randomly stratified and eventually conveniently approached for data

collection. The purposive sampling technique facilitated to identify the education stakeholders who best suited to attend the research objective of this study. In other words, it enabled the identification and selection of information-rich education stakeholders related to the objective of the study at hand. The respondents who were selected using this sampling technique include education journalists, school administrators, education researchers and analysts, education faculty members, representatives from the Ministry of Education, Science and Technology and NECTA. Furthermore, the stratified random sampling technique was used to stratify the purposively and other selected education stakeholder into strata of their background information in ensuring that almost every case of the education is included in the study. These education stakeholders particularly included representatives from Non-governmental Organizations (NGOs) dealing with education issues, public and private schools' students and graduates, and teachers from public and private schools.

Finally, the convenience sampling technique was used to win all the mentioned education stakeholders who were readily available and willing to participate in the study. The absence of a sampling frame of education stakeholders at the moment of study dictated the use of convenience sampling technique from which it allowed to gather data that could not have been possible otherwise. Being that the case, the convenient sampling technique yielded to 500 respondents. The main variable of this study is power of criticising or applauding on the announcement of the best school and student in the national examination. The given variable is operationalized using reasons for either criticising or applauding the announcement (Neves et al., 2014; Njakululu, 2015; Andrabi et al., 2017; Camargo et al., 2018; Cilliers et al., 2019; Susilowati, 2020; Ngalomba, 2023; Ouma, 2023). The reasons for applauding are different study environments; no longer motivation for studying, improved understanding and restoring original logic of

schooling. Other reasons are the announcement served no good purpose; the announcement marketed the schools; and it was not fair to compare schools using the British and NECTA systems. The statement items regarding such reasons were prepared and tested using five points Likert Scale (1-strongly disagree to 5-strongly agree). Contrarily, the reasons for the criticism of the announcement are the criticism reasons are the Government escapism from under-investment in public schools; denying of information to education researchers; suppressing information and putting society in the dark; removing the incentives for students; cause unforeseen consequences; leader's in-charge subjectivity/selfishness move and the Council ignores the foundational reason for the announcement. The statement items regarding such reasons were prepared and tested using five points Likert Scale (1-strongly disagree to 5-strongly agree).

In this study, the data were collected through questionnaires. The questionnaires were used as they offered a fast, efficient, and inexpensive means of collecting large amount of data regarding power of either criticising or applauding the announcement of best school and student in the national examination. The validity and reliability of the used questionnaire were ensured through pre-testing (expert assessments of the items), pilot study, literature review from which the items were adopted, ensuring correlation analysis using Pearson product Moment Correlation Coefficient (r), and Cronbach Alpha Coefficient formula. The collected data were analysed using descriptive statistics and independent t-tests. The descriptive statistics method were used by following some procedures. These procedures include data preparation to ensure the dataset was clean, consistent, and ready for analysis; using descriptive statistics to analyze and describe the data using frequency and percentage; measures of central tendency and dispersion (mean and standard deviation) for distribution analysis. The descriptive statistics was used to quantify and describe the

background information of the respondents and their data set at general about power of either criticising or applauding the announcement of best school and student in the national examination. This method was also used to identify the reasons for either applauding or criticising the announcement of best school and student in the national examination. On the other hand, the independent t-test was used to compare the reactions of the private and public education stakeholders on stopping the announcement of the best school and student in the national examination. The test was performed by establishing mean scores of both groups, compare the mean score, interpreting the outputs in the tables and present and discuss the results. The data analysis using both methods was performed by a computer using the IBM SPSS Statistics i.e. Version 26. The descriptive statistics results were presented using frequencies and standard percentages, mean scores, standard deviations, and standard t-tests results.

Findings and Discussion

Among the surveyed education practitioners 53% were male while 47% were female (**Table 1**). The majority of the surveyed education stakeholders were the male though with insignificant difference with female number. This implies that, both male and female were involved in this study as the education stakeholders who could respond on the announcement of the best school and student in the national examination. The range of ages of surveyed education stakeholders were between 20 and 50 and above years. The results of surveyed education stakeholders indicate that, 23% of the stakeholders had the age between 20-29 years, 28% between 30-39 years, 39% between 40-49 years, and 10% between 50 and above years (Table 1). The majority of the surveyed education stakeholders had therefore the age between 40 and 49 years old. Nevertheless, almost every category of age is taken into account in the study when exploring on the power of either

criticising or applauding the announcement of best school and student in the national examination. Since the unit of analysis of this study was two categories of education stakeholders in Tanzania, the stakeholders were asked to identify the particular category they belonged to. The public education stakeholders included public schools' administrators, representatives from the Ministry of Education, Science and Technology, some representatives from NECTA, some representatives from faculty of education in public universities, public schools' students and graduates, public education journalists, public education researchers and analysts. On the other hand, the private education stakeholders involved private schools' administrators, representatives from Non-governmental Organizations (NGOs) dealing with education issues, some representatives from faculty of education in private universities, private schools' students and graduates, private education journalists, private education researchers and analysts.

In so doing, 52% of the stakeholders belonged to public institutions while 48% belonged to private institutions (**Table 1**). The majority of the surveyed education stakeholders belonged to public institutions though with minimum difference between the two institutions was noted. This implies that, there was good representation of education stakeholders from both public and private institutions in this study. Regarding education level of the surveyed stakeholders, the results display that, 53% of the stakeholders had undergraduate level while and 47% of the stakeholders had postgraduate level of education (**Table 1**). The majority of the surveyed education stakeholders had undergraduate education level though with minimum difference with postgraduate level of education. This implies that, there was good representation of education stakeholders with both undergraduate and postgraduate level of education in this study.

Table 1: Background Information of the Respondents

Information	Scale	Frequency	Percent
Sex	1. Male	265	53.0
	2. Female	235	47.0
	Total	500	100.0
Age	1. 20-29 years	115	23.0
	2. 30-39 years	195	28.0
	3. 40-49 years	140	39.0
	4. 50 and above years	50	10.0
	Total	500	100.0
Institution	1. Private	260	52.0
	2. Public	240	48.0
	Total	500	100.0
Education Level	1. Undergraduate	265	53.0
	2. Postgraduate	235	47.0
	Total	500	100.0

Source: Field Data, July (2023)

Reasons for Applauding or Criticising the Announcement of Best School and Student

One of the objectives of this study was to identify the reasons for either criticising or applauding the ceasing of announcing the best school and best student in the national examination in Tanzania. The results in Table 2 of this study portray that, the reasons for applauding the announcement of the best school and student were different studying environments among the candidates for national examination ($M=4.357$, $SD=.641$), announcing is no longer the motivation ($M=3.849$, $SD=.892$), the stopping announcement will improve understanding and restoring the original logic of going to school ($M=3.568$, $SD=.807$), the announcement served no good purpose i.e. hooliganism of meritocracy (3.509 , $SD=.712$), it was not fair to compare schools that taught using the British system with those using the NECTA system ($M=3.247$, $SD=.917$) and marketing the schools (ranking was a capital in the business of education) i.e. modern-day education calls for more collaboration than competition ($M=3.129$, $SD=.983$). Contrarily, the reasons for criticising the stopping of announcing the best school and

student in the national examination include the Government is trying to escape from under-investment of public schools ($M=4.383$, $SD=.650$), it challenges education researchers to analyse the education system and recommends scientific solutions ($M=3.741$, $SD=.879$), it is suppressing information and putting society in the dark i.e. still there was something to learn from the same questionable ranking ($M=3.520$, $SD=.813$), it removes the incentives that existed for students to work harder in their lessons and removing the announcement has unforeseen consequences ($M=3.610$, $SD=.717$), it is just subjective move of someone who is in charge to look for one's leadership difference i.e. selfishness ($M=3.572$, $SD=.932$) and the Council either doesn't know, forget or ignore the foundational reason for the announcement ($M=3.045$, $SD=.983$).

These results imply that, the education stakeholders have strong reasons for either criticising or applauding for stopping the announcement of the best school and student in the national examination in Tanzania. These reasons are likewise supported previously by different researchers (e.g. Neves et al., 2014; Njakululu, 2015; Andrabi et al., 2017; Camargo et al., 2018; Cilliers et al., 2019; Susilowati, 2020; Ngalomba, 2023; Ouma, 2023). However, most of such researchers criticised the ranking of schools and students in examination.

Table 2: Reasons for Applauding/Criticising the Announcement of Best School and Student

Reasons	Sample Size	Mean	Standard Deviation
Reasons for Applauding			
different study environments	500	4.357	.641
no longer motivation for studying	500	3.849	.892
improved understanding and restoring the original logic of going to school	500	3.568	.807
the announcement served no good purpose (hooliganism of meritocracy)	500	3.509	.712
it was not fair to compare schools that taught using the British system with those using the NECTA system	500	3.247	.917
marketing the schools (ranking was a capital in the business of education) i.e. modern-day education calls for more collaboration than competition	500	3.129	.983
Reasons for Criticising			
The Government is trying to escape from under-investment of public schools	500	4.383	.650
It challenges education researchers to analyse the education system and recommends scientific solutions	500	3.741	.879
it is suppressing information and putting society in the dark i.e. still there was something to learn from the same questionable ranking	500	3.520	.813
it removes the incentives that existed for students to work harder in their lessons and removing the announcement has unforeseen consequences	500	3.610	.717
It is just subjective move of someone who is in charge to look for one's leadership difference i.e. selfishness	500	3.572	.932
The Council either doesn't know, forget or ignore the foundational reason for the announcement	500	3.045	.983

Source: Field Data, July (2023)

Statistical Comparison of the Reasons between the Critique and Applauders

This study mean of mean scores to statistically compare the reasons for criticising and applauding stopping announcement of the best school and student in the national examination in Tanzania. Using the mean of mean scores in Table 3, it is noted that the reasons for applauding the stop of announcing the best school and student in the national examination had the mean of mean score of ($M=3.611$, $SD=.825$) while the reasons for criticising the stop of announcing the best school and student in the national examination had the mean of mean score of ($M=3.645$, $SD=.829$).

These results imply the very minimal statistically significant difference between the reasons for applauding and the reasons for criticising the announcement by the NECTA. In other words, there is minimal difference of the reasons on announcing or not announcing the best school and student in the national examination by the NECTA. This is the new contribution to the body of knowledge as the previous studies (e.g. Neves et al., 2014; Njakululu, 2015; Andrabi et al., 2017; Camargo et al., 2018; Cilliers et al., 2019; Susilowati, 2020; Ngalomba, 2023; Ouma, 2023) could establish this statistical comparison.

Table 3: Statistical Comparison of the Reasons between the Critique and Applauders

Reasons	Sample Size	Mean	Std. Dev.	Mean of Mean	Std. Dev.
Reasons for Applauding					
different study environments	500	4.357	.641	3.611	.825
no longer motivation for studying	500	3.849	.892		
improved understanding and restoring the original logic of going to school	500	3.568	.807		
the announcement served no good purpose (hooliganism of meritocracy)	500	3.509	.712		
it was not fair to compare schools that taught using the British system with those using the NECTA system	500	3.247	.917		
marketing the schools (ranking was a capital in the business of education) i.e. modern-day education calls for more collaboration than competition	500	3.129	.983		
Reasons for Criticising					
the Government is trying to escape from under-investment of public schools	500	4.383	.650	3.645	.829
it challenges education researchers to analyse the education system and recommends scientific solutions	500	3.741	.879		
it is suppressing information and putting society in the dark i.e. still there was something to learn from the same questionable ranking;	500	3.520	.813		

it removes the incentives that existed for students to work harder in their lessons and removing the announcement has unforeseen consequences	500	3.610	.717		
It is just subjective move of someone who is in charge to look for one's leadership difference i.e. selfishness	500	3.572	.932		
The Council either doesn't know, forget or ignore the foundational reason for the announcement	500	3.045	.983		

Source: Field Data, July (2023)

Statistical Comparison of the Private and Public Stakeholders on the Announcement

This part presents the comparison between reasons' mean scores of two different group of private and public education stakeholders i.e. are private education stakeholders more reactive (criticising/applauding) than public education stakeholders on stopping the announcement of the best school and student in the national examination in Tanzania? Is there a significant difference in the mean criticising/applauding scores for private and public education stakeholders? The reference here was one categorical independent variable (i.e. Private/Public Education Stakeholders); and one continuous dependent variable (e.g. reasons for criticising or applauding). The two variables used were education stakeholders (with private coded as 1, and public coded as 2) and RCA, which is the total score that education stakeholders recorded on a five-item reasons for criticising/applauding scale. Checking the information about the assessed groups, Table 4 provides correct mean and standard deviation for each of groups (Private/Public Education Stakeholders). The number of stakeholders in each group (N) is also right and no data is missing.

Table 4: Group Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Total RCA	240	35.02	5.91	.37
Private	260	34.17	5.11	.37
Public				

Source: Field Data, July (2023)

In meeting required assumptions, the results in Table 5 indicate that, the significance level for Levene’s test is 0.06 which is larger than the cut-off of .05. This implies that, the assumption of equal variances has not been violated hence the t-value reported used the one provided in the first line of the table.

Table 5: Independent Samples Test

		Levene’s Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total RCA	Equal Variances Assumed	3.508	.064	1.624	408	.109	.85	.52	-19	1.89
	396.359				.099	.85	.51	-17	1.87	
	Equal Variances Not assumed									

Source: Field Data, July (2023)

In finding out whether there was a significant difference of RCA between Private and Public education stakeholders, the column labelled Sig. (2-tailed) under t-test for equality of means was used.

Table 5 then indicates that, the Sig. (2-tailed) value is .109. This implies that, there is no a statistically significant difference in the mean RCA scores for Private and Public education stakeholders. Additionally, it was important to calculate the effect size for independent-samples t-test in order to provide an indication of the magnitude of the differences between Private and Public education stakeholders in RCA. The eta squared statistics was used in this study representing the proportion of variance in the dependent variable that is explained by the independent (group of education stakeholders) variable i.e.

$$\text{Eta squared} = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

$$1.62/1.62^2 + (240+260-2)$$

$$1.62/2.6244+498$$

$$1.62/500.62$$

$$\text{Eta squared} = .003$$

With reference the guidelines by Cohen (1988) for interpreting this eta value (i.e. .01=*small effect*, .06=*moderate effect*, .14=*large effect*); the effect size is very small i.e. .003 (.3%). This implies that only .3 % of the variance in RCA was explained by education stakeholders. Summarily, an independent-samples t-test was conducted to compare the RCA scores for Private and Public education stakeholders. There was no significant difference in scores for Private Education Stakeholders (M=35.02, SD=5.91) and Public Education Stakeholders [M=34.17, SD=5.11; $t(408) = 1.62, p = .11$]. The magnitude of the differences in the means was very small (eta squared=.003). With reference to all above results, it is concluded that there was no a statistically significant difference in the level of RCA between Private and Public education stakeholders in Tanzania. The Private and Public education stakeholders were noted to have no difference in RCA particularly on the announcement of the best school and student in the national examination in Tanzania.

Conclusion and Recommendations

This study statistically compared the reactions (reasons) among education stakeholders regarding the announcement of the best school and student in the national examination. It specifically identified the reasons for the applause or criticism of the announcement, compared statistically the identified reasons of the two groups and compared statistically between the private and public education stakeholders on the announcement made by the NECTA. It is found that, the reasons for the applause of the announcement include different study environments; no longer motivation for studying, improved understanding and restoring the original logic of going to school; the announcement served no good purpose (hooliganism of meritocracy); it was not fair to compare schools that taught using the British system with those using the NECTA system; marketing the schools (ranking was a capital in the business of education) i.e. modern-day education calls for more collaboration than competition. Contrarily, the reasons for the criticism of the announcement include Government is trying to escape from under-investment of public schools. It challenges education researchers to analyse the education system and recommends scientific solutions. It also suppresses information and put society in the dark. It removes incentives that existed for students to work harder in their lessons and removes the announcement that has unforeseen consequences.

Furthermore, the mean scores indicate very minimal statistically significant difference between the reasons for applauding and the reasons for criticising the announcement by the NECTA. The t-test results portrayed that, there was no statistically significant difference between the private and public education stakeholders on the announcement of the best school and student. It is concluded that, none is more powerful than the other between applauding or criticising the announcement of the best school and student in the national examination. The private and public education stakeholders should therefore look for the alternative approach of improving results in the national examinations rather than depending on the announcement of the best school and student.

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Transforming Biology Assessment through Written Feedback in Tanzania Secondary Education: Insights from Action Research

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ABSTRACT

This study examined the impact of written feedback in Biology assessment in secondary schools, focusing on both student and teacher perspectives. Using action research with 80 students and their teacher, the study spans four months across three reflective cycles. Central findings reveal that descriptive, non-evaluative feedback empowers students. Feedback clarifies misunderstandings, offers specific improvement guidance, and makes "next steps" manageable. Further, descriptive feedback exposes students to broader problem-solving strategies. The study also shows that written feedback transcends mere evaluation. It becomes a reflective dialogue, with students actively using feedback to improve, and teachers acting as facilitators, guiding students towards better learning outcomes. Consequently, assessment shifts from simply judging to a transformative partnership. Both students and teachers contribute actively, aligning assessment with the ultimate goal of enhanced learning.

Keywords: Action research, assessment, reflection, written feedback

INTRODUCTION

Assessment is the cornerstone of education, shaping student learning experiences and providing vital feedback for both students and teachers. Within the context of education, assessment for learning (AfL) stands out as a powerful tool for empowering students, not only in gauging their progress but also in fostering independent learning and goal achievement. Today, various researchers are emphasizing the role of feedback between teachers and students, and such has gained significant traction in Tanzania's educational landscape (Al-Bashir, Kabir & Rahman, 2016 and, Tanzania Institute of Education, 2013). However, effective implementation of AfL principles continue to be challenging, particularly in the realm of written descriptive feedback, which has the potential to transform learning in secondary education.

Written descriptive feedback plays a crucial role in AfL, acting as a bridge between a student's current understanding and learning objectives. Beyond mere assessment, it informs students about their strengths, areas for improvement, and strategies for growth (Brookhart, 2017). Compared to fleeting oral feedback, written feedback offers several advantages. It serves as a tangible record, allowing students to revisit and self-reflect, and can be tailored to individual needs, providing detailed and personalized guidance. Notably, effective feedback can trigger "double-loop learning," prompting students to move beyond surface-level errors and critically examine their learning strategies and assumptions (Carless, 2019). Despite the recognition of AfL's potential and the compelling benefits of written descriptive feedback, a significant research gap exists in understanding its specific impact and effective implementation within the context of Biology teaching for secondary education in Tanzania. While studies have acknowledged the importance of AfL and descriptive feedback in general, there is a scarcity of research specifically explore their influence and practical application in Biology

classrooms in Tanzania. The problem is also seen in Contextual factors, whereby the unique challenges facing education in Tanzania, such as large class sizes, limited resources, and a culture of high-stakes testing, require tailored investigations into how AfL and descriptive feedback can be adapted and optimized in this context. Within the realm of Teacher training, equipping Biology teachers with the competencies and strategies to effectively provide written descriptive feedback remains a crucial but underexplored area.

Such a research gap translates into a possibility that several secondary school Biology students may not have access to the transformative potential of AfL and meaningful feedback, hindering their learning outcomes, critical thinking skills, and scientific inquiry development. Therefore, this study aimed at addressing the following research question: How can written descriptive feedback be effectively implemented in secondary school Biology classrooms in Tanzania to enhance student learning outcomes? By addressing this question, this study may contribute valuable insights to fill the current research gap and inform practical strategies for enhancing the learning and teaching of Biology in Tanzania; Equipping Biology teachers with the skills and knowledge to provide effective written descriptive feedback developing context-specific AfL approaches for Tanzanian secondary schools.

Literature Review

Assessment for learning (AfL) stands as a cornerstone of transformative education, promoting student empowerment and deep understanding through a continuous cycle of assessment, feedback, and adjustment (Black, & William, 1998). Feedback, the heart of AfL, acts as a bridge between student performance and learning goals, offering insights into strengths, weaknesses, and pathways for improvement (Sadler, 1989). Numerous studies reinforce the critical link between effective feedback and enhanced learning outcomes,

highlighting its influence on student motivation, self-regulation, and metacognitive skills (Hattie, & Timperley, 2007; Wiliam, 2011). Guiding the implementation of AfL, several principles inform the design and delivery of impactful feedback. Notably, Black and Wiliam, (1998) propose five key principles: focusing on what students can do next, providing specific and actionable guidance, aligning feedback with learning goals, facilitating student self-assessment, and offering feedback in a timely and regular manner. These principles emphasize the transformative potential of feedback, moving beyond mere assessment to empower students to actively participate in their learning journey.

Within the AfL framework, written descriptive feedback emerges as a particularly potent tool for supporting student learning (Brookhart, 2017). Compared to fleeting oral feedback, written comments offer tangible permanence, allowing students to revisit, reflect, and internalize insights at their own pace (Carless, 2019). More importantly, effective written feedback, characterized by its specificity, detail, and focus on improvement strategies, has been shown to foster deeper understanding and knowledge retention (Wiggins and McTighe, 2011). Studies by Andrade and Crandall, (2009) and Kluger and Dunning, (2000) further demonstrate how descriptive feedback promotes self-efficacy and metacognitive awareness, encouraging students to become active participants in their learning process. The significance of written descriptive feedback is accentuated in the context of secondary Biology education in Tanzania. As King'aru, (2014) highlights, the dominance of traditional knowledge-centered teaching often neglects the crucial role of practical activities and meaningful feedback. This gap is further widened by challenges faced by Biology teachers, including large class sizes, limited assessment literacy, and a culture of standardized testing (Mpapalika & Vhurumuku, 2013; Sanga, 2017). Consequently, many teachers resort to generic,

evaluative feedback, missing the opportunity to capitalize on the transformative potential of AfL and double-loop learning (Carless, 2019). Equipping Biology teachers with the skills and knowledge to provide effective written descriptive feedback becomes crucial to address these challenges and catalyze transformational learning in Tanzanian classrooms. By incorporating robust AfL practices, emphasizing detailed and personalized feedback, and fostering student self-assessment skills, educators can bridge the gap between intention and understanding in Biology education. This shift, informed by principles of AfL and supported by targeted teacher training initiatives, holds the potential to empower students, enhance learning outcomes, and cultivate a generation of critical thinkers and problem-solvers, capable of applying their knowledge and skills to navigate the complexities of scientific inquiry. Therefore, there is little double loop learning because of the teacher's poor assessment practices. Change to students learning Outcomes in Biology can be improved if both teachers and students are transformed, engaging in effective written descriptive feedback.

Methodology

This study embraced a constructivist philosophical approach, aligning itself with qualitative research methodologies and adopting an action research design. The choice of action research was influenced by the intention to equip teachers with the essential skills needed to provide written feedback employing double-loop learning techniques, thereby enhancing students' learning experiences. Qualitative data served as the primary focus of this study. Moreover, the researchers considered self-reflection to critically assess their own beliefs, biases, and teaching methods and analysis. Thus, the researchers analyzed their reflections as well as reflections shared by participants to identify patterns, trends, challenges, and successes. The research unfolded over 16 weeks,

comprising 80 intensive hours of study. Within this timeframe, a structured intervention plan was implemented, which included the following:

1. Reconnaissance – to identify current assessment strategies of teachers;
2. Training of teachers – to introduce them to written descriptive feedback;
3. Evaluation – to assess whether written descriptive feedback improved student learning for the Biology subject.

The data collection process took place between July and October, 2020. This research design paved way for a comprehensive exploration of the impact of written feedback rooted in double-loop learning, providing valuable insights into the transformative potential of this pedagogical approach. The review of the documents such as examination scripts, students' focus group discussion and entry interview for Biology teacher were done during reconnaissance stage, July, 2020 to assess the current assessment practices and after intervention stage during evaluation: exit interview, focus group discussion, and document review were conducted to observe the change after intervention.

Study Site

The study's geographical scope encompassed Nyamagana Municipality in Mwanza City, Tanzania. The study was carried out at Jitegemee Secondary School in Nyamagana District. The school is a co-secondary school comprising both ordinary and advanced levels, with a population of 1700 students, and 72 teachers. The school has 8 Biology teachers, 6 of them teaching ordinary level and 2 teaching advanced level. This school is well equipped with science and computer laboratories. The rationale for selecting the school was that, it is very resourceful with experienced teachers as well as a large number of students so the researcher was able to get enough representatives. The Form Three class had a total of 300 students who were allocated to three

streams (A, B, and C). Moreover, the qualitative data collected in each stage of an action research were thematically analyzed.

Findings

Overall results of this intervention study have shown that written descriptive feedback helps both teachers and learners to self-regulate their learning by reflecting on each stage of learning. The results are presented in three steps of action research: reconnaissance, intervention, and evaluation.

Reconnaissance

The study findings revealed the use of standardized assessment practices in Biology teaching, and the impact of feedback on students learning. Standardized assessments were found to be a predominant method used by teachers to evaluate students' knowledge and skills and therefore feedback involved just ticks and crosses and finally a grade. These assessments were characterized by teacher-focused assessment, rigid scoring systems, and limited feedback giving direction on how to improve learning. The focus was primarily on testing memorization and recalling rather than encouraging critical thinking or problem-solving skills, all of which served to demotivate students' learning.

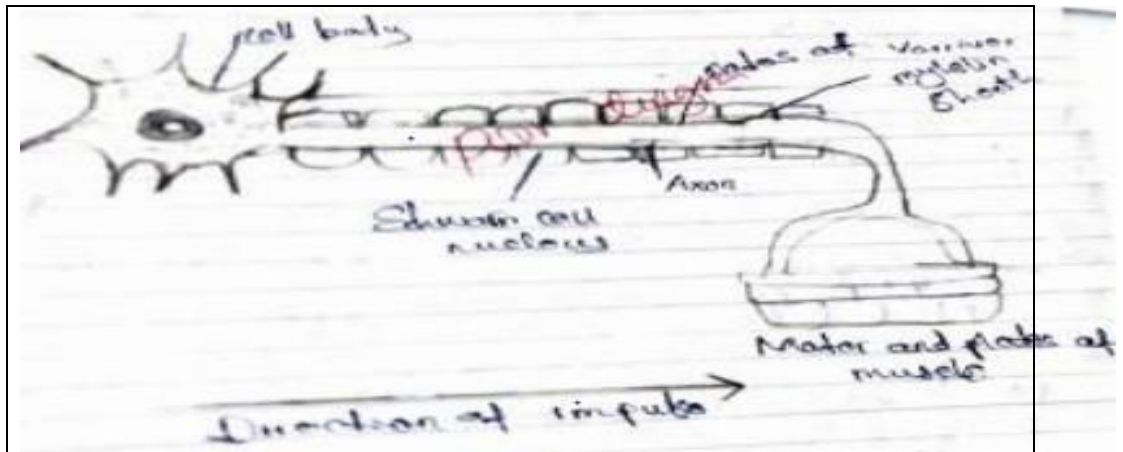


Figure 1: Sample of Written Feedback Provided by a Teacher before Intervention

Figure 1 shows that, the teacher gave negative written feedback to a student who sat for the Biology terminal examination. The feedback simply tells the student that the drawing is poor, without indicating how to improve and what is missing. The feedback is rather on the drawing skills and not on a Biology concept. This finding corroborates with findings of other assessment research that suggest that such practices adversely impact students' motivation and confidence (Johnson, Smith, and Miller, 2020). Furthermore, the findings align with previous studies (Smith, 2019) that underscore the prevalence of standardized assessments emphasizing error identification. Literature indicates that a narrow focus on errors diminishes students' intrinsic motivation, hindering their engagement with the learning process (Brown & Jones, 2018). The research highlighted the demotivating impact of these assessment practices on students. The constant emphasis on errors and a lack of positive reinforcement led to reduced self-confidence and enthusiasm for learning. Students felt discouraged and disengaged, as their efforts were met with a focus on what they got wrong rather than celebrating their achievements. The

findings of this study during students' focus group discussion echoed that:

Teachers give us ticks and crosses, and if someone gets low marks, we end up being punished. This makes most of us not attend some classes...it is embarrassing. Instead of being instructed on what to do we are punished! It is not fair! (Student 5, 2020. Focus Group Discussion).

The demotivating impact of error-focused assessments on students resonates with previous research (Garcia & Martinez, 2017). As evidenced by participant quotations, students expressed feelings of discouragement, leading to disengagement and a fragmented learning experience. This resonates with the literature on the importance of positive reinforcement and constructive feedback for cohesive learning environments (Johnson & Smith, 2016). In our investigation, it became evident that teachers predominantly relied on a single-loop assessment feedback strategy, which significantly hindered the provision of effective written feedback and obstructed students' learning processes. Single-loop assessment, characterized by conventional feedback methods aimed at immediate problem-solving without fostering a comprehensive understanding of the learning process, was pervasive in teachers' instructional approaches (Carless, 2019). This method limited feedback to mere marks or grades, neglecting the provision of explanations or avenues for students to grasp the reasoning behind the grading system or enhancing their performance. The use of single-loop feedback was substantiated during an interview with a Biology teacher, quoted that:

I often give feedback by writing comments on student's script during marking like see me, excellent, poor. Also, I always punish the students who scores low grades (Collaborative teacher, interview, July, 19, 2020).

Consequently, this approach severely curtailed students' capacity to comprehend feedback, hampered their engagement, and ultimately restricted their learning opportunities. This observation underscores the urgent need for a shift towards more comprehensive feedback strategies to enhance the quality of education and foster a deeper understanding among students. In summary, the findings underscore the need for a paradigm shift in assessment practices. Teachers of Biology must embrace assessment practices that celebrate successes, identify areas for improvement, and actively involve students in their learning journey. Incorporating student feedback mechanisms (Harrison & Thomas, 2018) and promoting a growth mindset (Dweck, 2016) can contribute to a more cohesive and empowering educational atmosphere. The current focus on standardized assessments, error identification, and teacher-centric evaluation approaches do not only demotivate students, but also hinder their potential for future learning. Addressing these issues is imperative for creating an educational environment that nurtures a positive learning experience, encourages student engagement, and facilitates continuous improvement.

Intervention Phase: Empowering Teachers through Written Descriptive Feedback

Intervention

During the intervention phase, teachers underwent comprehensive training on Assessment for Learning strategies and the art of crafting effective written descriptive feedback (Wiggins & McTighe, 2017). Subsequently, a scaffolding phase was initiated, whereby teachers collaboratively planned assessment tasks with the researcher. This planning phase integrated thoughtful considerations for feedback mechanisms, ensuring alignment with learning objectives and individual student needs. The collaboration fostered a sense of shared responsibility for student learning outcomes, emphasizing the

partnership between teachers and researchers (Hattie & Timperley, 2007).

Shifting Roles: from Evaluators to Mentors

A notable finding was the transformative shift in teachers' roles. Through intervention, teachers were transitioned from mere evaluators to mentors, guiding students through personalized feedback. This shift echoed the principles of formative assessment, emphasizing the importance of feedback as a tool for learning rather than a mere judgment of performance (Black & Wiliam, 1998).

This is evident from a teacher's testimony during an interview that

You have opened my eyes ...although I have been teaching for 17 years in secondary schools, I have never thought about this type of feedback if it could be effective as I have experienced in this study. It made me reflect on my teaching practices and decide what to improve, it is like a mirror image! Also, my students were confidently able to give and receive written feedback even physically challenged students (with hearing impairment) were able to receive and give feedback which earlier was not possible. My teaching has changed completely. I feel like I am lucky to be a part of this study" (Collaborative teacher, interview, September 25,2020).

Student-Centered Learning and Reflective Planning

As teachers embraced written descriptive feedback, the classroom dynamic evolved towards a more student-centered approach. Lesson planning began to include reflective considerations on assessment tasks, aiming not just at testing knowledge but at fostering deep understanding (Carles, 2019). This shift indicated a profound pedagogical change, focusing on meaningful student engagement and understanding.

Engaging in Double-Loop Learning Through Written Descriptive Feedback

A significant finding of the intervention phase was the evident engagement of teachers in double-loop learning through the implementation of written descriptive feedback. Traditionally, assessments focused on identifying errors and providing corrective measures without delving into the underlying thought processes. However, the intervention encouraged teachers to adopt a reflective approach, where they did not only identify mistakes, but also probed the fundamental assumptions and strategies leading to those errors. Through written descriptive feedback, teachers engaged in a deeper level of reflection. They examined not only what went wrong but also why it went wrong, encouraging them to question their instructional methods and the effectiveness of their assessments (Argyris & Schön, 1996). This reflective process fostered a continuous cycle of improvement, enabling teachers to refine their teaching techniques and assessment strategies iteratively. This finding highlights the transformative potential of written descriptive feedback as a tool for promoting double-loop learning among educators. By encouraging teachers to critically reflect on their teaching practices and adapt their approaches based on student responses, the intervention facilitated a profound shift in pedagogical paradigms, emphasizing the importance of ongoing, reflective improvement for both teachers and students.

Increased Student Engagement, Agency, and Learning

Crucially, the impact of this intervention was profound on students. Their engagement increased significantly, reflecting a new found agency in their learning journeys. With personalized feedback guiding them, students became active participants in their education, leading to substantial improvements in their learning outcomes and overall academic performance (Brookhart, 2017). The findings from this intervention phase underscore the transformative power of written

descriptive feedback in reshaping the educational landscape. By empowering teachers with the tools and knowledge to provide meaningful feedback, a shift occurred not only in classroom dynamics but also in student engagement and learning outcomes. These results substantiate a growing body of research emphasizing the crucial role of formative assessment and target feedback in enhancing students learning experiences.

Evaluation Phase

Deepening Engagement and Enhancing Learning Outcomes

The evaluation phase of the intervention revealed positive transformations in the teaching and learning process. Teachers continued to engage in double-loop learning through the systematic application of written descriptive feedback, consistently probing the underlying assumptions and methodologies that influenced student performance (Argyris & Schön, 1996). This ongoing reflective practice does not only deepen educators' engagement with their teaching strategies but also had a direct impact on the learning outcomes of their students. The iterative feedback loops (The cyclical process of assessment, feedback, and adjustment, where each step informs the next, leading to continuous improvement.) created a dynamic classroom environment where both teachers and students actively participated in continuous improvement efforts.

Deepening the Learning of Biology

The evaluation phase revealed a profound impact of written descriptive feedback on the learning of Biology, taking on board both theoretical and practical sessions. In theoretical classes, personalized feedback enabled students to grasp complex biological concepts with clarity and precision. Through detailed explanations tailored to individual misunderstandings, students gained a deeper understanding of theoretical principles, fostering a robust foundation in Biology (Sadler, 2005). Moreover, in practical sessions, written feedback provided

students with explicit guidance on experimental techniques, data analysis, and scientific reasoning. This targeted feedback not only corrected errors but also elucidated the underlying scientific principles, enabling students to refine their practical skills and develop a nuanced understanding of experimental methodologies (Quigley, Marshall & Deaton, 2018). Consequently, written descriptive feedback emerged as a vital tool in bridging the gap between theory and practice, facilitating a holistic and comprehensive learning experience in the field of Biology.

Cultivating Student Agency and Self-Regulation

A notable outcome of the evaluation phase was the cultivation of student agency and self-regulation. Through personalized written feedback, students were empowered to take ownership of their learning journey (Nicol & Macfarlane-Dick, 2006). Encouraged by the detailed guidance provided by teachers, students became proactive in identifying their strengths and areas for improvement. This newfound agency did not only enhance their motivation but it also nurtured essential skills for lifelong learning, aligning with the broader goals of education (Zimmerman, 2002). The impact of written descriptive feedback extended to the realm of learning Biology, empowering students to take ownership of their academic progress. In theoretical classes, the detailed feedback encouraged students to delve deeper into specific topics, conduct independent research, and explore biological phenomena beyond the classroom curriculum (Nicol & Macfarlane-Dick, 2006). In practical sessions, feedback on laboratory experiments motivated students to refine their methodologies, designed their investigations, and critically analyzed experimental outcomes. This heightened sense of agency nurtured self-regulation, inspiring students to actively seek knowledge, engaged in scientific inquiry, and cultivated a genuine passion for Biology (Zimmerman, 2002). Through this process, written descriptive feedback played a pivotal role in shaping

Biology learners into self-directed, inquisitive individuals, fostered a lifelong love for the subject.

Fostering Collaborative Learning Environments

The impact of written descriptive feedback transcended individual student-teacher interactions and permeated the broader classroom environment. Collaborative learning became a cornerstone of the educational experience, as students actively engaged in peer discussions, leveraging feedback to enhance their understanding (Hattie & Timperley, 2007). The feedback-rich atmosphere fostered a sense of camaraderie and collective responsibility for academic growth, creating a vibrant, intellectually stimulating learning community. Moreover, written descriptive feedback facilitated collaborative learning environments in Biology classes. In theoretical sessions, students engaged in peer discussions, using feedback as a catalyst for intellectual discourse and collaborative problem-solving (Hattie & Timperley, 2007).

In practical sessions, feedback not only improved individual performance but also encouraged students to collaborate on experiments, share insights, and collectively analyze data. This collaborative atmosphere not only enhanced the depth of learning but also cultivated essential teamwork and communication skills vital for future scientific endeavors (Quigley, Marshall, & Deaton, 2018). Thus, written descriptive feedback emerged as a cornerstone in fostering a Biology classroom characterized by shared knowledge, mutual respect, and collaborative learning experiences. In summary, the evaluation phase reaffirmed the enduring impact of written descriptive feedback on the teaching and learning process. By fostering double-loop learning, empowering student agency, nurturing collaborative environments, and strengthening teacher-student relationships, written descriptive feedback emerged as a

transformative pedagogical tool, shaping a positive and enriching educational landscape.

Discussion

Descriptive written feedback significantly enhanced both teachers' assessment practices and students' learning experiences. This improvement fostered a more collaborative learning environment, allowing teachers and students to engage more effectively through the use of scaffolding. This reflective process empowered educators and learners to adapt and employ diverse strategies, not only addressing learning challenges in Biology but also extending to other disciplines. This constructive feedback loop played a crucial role in refining instructional methods. These findings align with the outcomes of studies conducted by Carless, (2019), Tagg, (2007), and Rahman, Abdurrahman, Kadaryanto and Rusminto, (2015). According to these scholars, scaffolding emerges as a well-considered and efficient technique for enhancing teachers' knowledge. Its capacity to implement tasks at a higher level of competence facilitates a nuanced reflection on current practices, promoting improvement through meaningful dialogue between trainers and trainees.

The integration of scaffolding, as supported by these studies, has proven instrumental in elevating teaching practices and contributing to a more effective and dynamic educational experience. Moreover, the incorporation of double-loop feedback practices resulted in a heightened comprehension of subject content among teachers. The study's findings underscored that educators could adapt their instructional approaches through meaningful dialogues with students, aligning them with agreed-upon success criteria and learning objectives. This parallels the conclusions drawn by Duncan and Buskirk-Cohen, (2011), who observed that teachers refine their instructional methods, and students enhance their performance

through learner-centered assessment. This approach, characterized by increased dedication and creativity compared to traditional assessment strategies, empowers teachers to receive feedback from students that is reflective of standards and learning objectives, thereby enhancing the quality of classroom instructions. Double-loop feedback played a pivotal role in redirecting students' attention from merely covering the syllabus or focusing solely on passing exams to fostering a genuine commitment to learning. The evidence presented in this study demonstrated that students, upon receiving detailed written feedback from both teachers and peers, were able to articulate strategies for future improvement. These findings align with the research conducted by Amua-Sekyi, (2016), supporting the notion that teachers' assessment practices significantly impact students' cognitive processes and thinking skills.

Conclusion

In the reconnaissance phase, a deep understanding of existing assessment practices was gained. Traditional evaluation methods were identified, where teachers primarily utilized single-loop feedback, limiting learning opportunities for students. This phase highlighted the necessity for a pedagogical shift towards more constructive and engaging feedback methods. During the intervention phase, teachers underwent rigorous training in Assessment for Learning (AfL) and the art of crafting detailed written descriptive feedback. Guided by this newfound knowledge, teachers transitioned from evaluators to mentors. They engaged in double-loop learning, critically examining their teaching strategies and adapting them based on student responses. This phase emphasized collaboration, leading to a student-centered approach where feedback became a tool for empowering student agency and self-regulation. In the evaluation phase, the sustained impact of written descriptive feedback was evident. Teachers continued their reflective practices, enriching their teaching methods

and deepening student engagement. The feedback process was instrumental in bridging the gap between theoretical knowledge and practical skills in Biology education. Students became active participants, utilizing feedback to fuel independent research and collaborative problem-solving. The learning environment transformed into a collaborative space, fostering shared knowledge, and mutual respect, and enhancing overall learning outcomes. This study demonstrates that written descriptive feedback, when harnessed effectively, can revolutionize Biology education. It not only empowers teachers to refine their pedagogy but also nurtures students into self-directed, inquisitive learners. By encouraging collaboration, critical thinking, and a deeper understanding of Biology concepts, this approach paves the way for a new era in education where feedback becomes a catalyst for continuous improvement and meaningful learning experiences.

In a nutshell, during reconnaissance, the findings of this study revealed that teachers and students applied single loop assessment strategies, employed the same assessment strategies repeatedly as the results the students' learning kept on being below standards, the use of teacher-centered assessment practices, as well as poor questioning, and teachers' lack skills for providing written descriptive feedback, especially in crowded classrooms, this led to the unclosed feedback loop. However, during the intervention in all three circles, the results show that training a teacher through scaffolding, clinical supervision, reflection, and collaboration changed the teacher's perception and practices on the use of written descriptive feedback hence the paradigm shift from a single loop to double loop assessment practices and this was possible due to change by using learner-centered assessment strategies and ability to construct higher-order questions to elicit learners' critical thinking also the application of written feedback practices that necessitated double loop assessment hence closing the

feedback loop through timely, prompt, positively phrased effective written descriptive feedback. Similarly, during the evaluation, the results show that teachers and students were able to transfer knowledge to other disciplines. The collaborative teacher was also prepared to train other staff members at the institutional level on how to use written descriptive feedback that obeys double-loop assessment practices to improve learning Biology and other subjects (Hattie, & Timperley, 2007; Nicol & Macfarlane-Dick, 2006; Quigley et al., 2018; Zimmerman, 2002).

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Competence-Based Assessment in Tanzanian Teacher Education in the Fourth Industrial Revolution: A Comprehensive Analysis

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ABSTRACT

Competence-based assessment plays a pivotal role in shaping the quality and effectiveness of teacher education programs in the dynamic landscape of the Fourth Industrial Revolution (4IR). Understanding the existing assessment practices and their alignment with competence-based principles is essential for enhancing the preparation of future educators in this context. This study examined the assessment practices in Tanzanian teacher education programs gaining insights into how student teacher assessment is done and the alignment of competence-based principles in the preparation of student teachers. A survey involving 531 participants was conducted to gather data on Statistical analysis were employed to explore variations in assessment experiences based on gender, age, and education level. The findings indicate that traditional pen-and-paper assessments remain the dominant assessment method in Tanzanian teacher education, comprising a substantial 69%. Notably, 52% of student teachers believe are evaluated on their aptitude to seamlessly integrate technology into teaching and learning, accentuating the criticality of digital skills. Furthermore, our study unveils a multifaceted assessment landscape for innovation and critical thinking, with 25.2% of students always feeling assessed, in contrast to 13.6% who seldom or never experience this evaluation. Remarkably, gender emerges as a potent influencer in technology integration assessments, while age distinctly shapes the evaluation of research skills and collaborative abilities. Moreover, the findings

underscore that competence-based assessment in Tanzanian teacher education is progressively adapting to meet the demands of the 4IR. However, they also underscore the need for a more diversified and innovative assessment approach to effectively address the evolving educational landscape. This study highlights the pronounced impact of gender, age, and education level on assessment experiences, underscoring the imperative for tailored approaches in nurturing future educators.

Keywords: Competence-based assessment, teacher education, assessment methods, fourth industrial revolution

INTRODUCTION

In the fourth industrial revolution (4IR) context, teacher education plays a pivotal role in preparing educators to effectively respond to the evolving demands of this transformative era (Navani & Nag, 2021; Weleschuk et al., 2019). Competence-based teacher education introduces a change in thinking, emphasizing that learners are not mere recipients of knowledge but active participants in their learning journeys, empowered to take charge of the educational process (Awodiji & Katjiteo, 2023; Boud et al., 2020). The competency-based approach places a strong emphasis on acquiring 4IR skills, which include critical thinking, problem-solving, digital literacy, creativity, communication, and collaboration. These skills are crucial for navigating the complexities of the 4IR, where adaptability and agility are paramount (P21, 2007). Competence-based assessment practices in teacher education programs need to evolve to effectively address the demands of the 4IR. This evolution entails harnessing technology for assessment purposes and addressing the unique challenges faced by developing countries, such as Tanzania, in integrating these innovations (Kayembe & Nel, 2019). By doing so, teacher education programs can better equip future educators with the competencies required to navigate the complexities and seize the opportunities presented by the 4IR (Bogers et al., 2022; Mohamed Hashim et al., 2022; Nguyen & Khuong, 2020). In 4IR, the landscape of learning has undergone a profound and disruptive transformation driven by digital

technologies such as augmented reality, virtual reality, and online learning (Reaves, 2019). This shift has placed a significant emphasis on the need to equip educators with an understanding of these changes and the ability to impart relevant skills to learners (Adegbite & Adeosun, 2021). As education evolves in response to technological advancements, it becomes imperative to embrace competency-based assessments that foster individual growth and creativity. Competence-based assessment practices in the 4IR require clear objectives, and active learner involvement (Reaves, 2019). 4IR demands specific skills for navigating and harnessing innovative technologies (P21, 2007). These competencies include complex problem-solving, critical thinking, creativity, and intercultural fluency, all of which have a universal presence in various global skill frameworks (Kayembe & Nel, 2019; Reaves, 2019; World Economic Forum, 2018). In contemporary education, competence-based assessment has become indispensable (Kitta & Tilya, 2010). It engages learners of all backgrounds, fosters continuous development, and promotes personal growth. The central focus of authentic assessment lies in individual improvement rather than comparative evaluation (Kitta & Tilya, 2010). These assessments serve as informative tools for both learners and educators, shedding light on the learning and teaching processes (Sanga, 2017). Effective competency-based assessment prepares graduates for a dynamic job market, ensuring that assessments remain dependable, valid, and adaptable to evolving needs (Bukhari et al., 2023; Kayembe & Nel, 2019; Popkova, 2020).

Competency-based Assessment Approach in Teacher Education

The Competency-based Assessment is an approach that focuses on assessing students' mastery of specific skills, knowledge, and abilities that are relevant in the context of the 4IR. In this model, the emphasis is on measuring students' ability to apply their knowledge and skills in authentic, real-world situations, rather than relying solely on traditional knowledge-based assessments. Competencies assessed may include critical thinking, problem-solving, collaboration, adaptability, digital literacy, and other skills that are crucial in the 4IR (Herppich et al., 2018; Kitta & Tilya, 2010). Competency-based Assessment aligns

with the needs of the 4IR, where rapid technological advancements and changing work environments require individuals to possess a broader set of skills beyond academic knowledge. According to the World Economic Forum (2018) the 4IR is dominated by the fusion of technologies, blurring the boundaries between the physical, digital, and biological realms which demands a workforce that can adapt to innovative technologies, think critically, and solve complex problems. One example of a competency-based assessment framework is the one developed by the Partnership for 21st Century Skills (P21). The P21 framework identifies essential skills, including critical thinking, problem-solving, collaboration, communication, creativity, information literacy, media literacy, technology literacy, and flexibility. Assessments based on this framework focus on evaluating students' mastery of these competencies through authentic performance tasks and projects. By emphasizing the practical application of knowledge and skills, this assessment model helps prepare students for the challenges and opportunities of the modern world (P21, 2007).

Assessment Practices in Teacher Education Programs in Tanzania

In Tanzania, teacher education programs employ diverse assessment practices to evaluate student teachers' knowledge, pedagogical skills, and professional dispositions. Common assessment methods encompass written examinations, teaching demonstrations, lesson-planning tasks, reflective journals, and portfolios (Omwodo et al., 2019). Written examinations gauge theoretical subject matter knowledge, educational theories, and teaching strategies, primarily relying on multiple-choice questions and essay prompts. However, Oluoch (2019) argue that this approach may not effectively assess practical teaching abilities and real-world application teaching demonstrations and lesson planning tasks assess pedagogical skills and instructional planning. Student teachers are observed while designing and delivering lessons to assess their ability to engage students, employ effective teaching strategies, and manage classroom dynamics (Orodho et al., 2020). Reflective journals and portfolios assess student teachers' capacity for self-reflection, critical thinking, and professional growth. They document teaching experiences, challenges, and

successes (Nyakwara et al., 2018; Tanzania Institute of Education, 2019). In Tanzania, assessment in both certificate and diploma programs heavily relies on summative written exams, with limited emphasis on practical training. Students must pass exams in subject content, pedagogical content, and education studies (Tanzania Institute of Education, 2019). Bachelor's degree programs, offered by autonomous colleges and universities, follow a similar curriculum with summative exams at the end of each semester, however, still written exams are prevalent, with limited task-based assessment (NACTE, 2004).

Shortcomings in the Existing Assessment Practices

While assessment practices in teacher education programs in Tanzania serve certain purposes, they are not without shortcomings. Several key limitations can be identified, necessitating a critical examination of the existing assessment practices. One of the primary shortcomings is the overemphasis on summative assessments, such as written examinations, that primarily focus on knowledge recall rather than the application of knowledge in authentic teaching contexts (Oluoch, 2019). This approach may not adequately measure student teachers' pedagogical skills, critical thinking abilities, and capacity to address diverse student needs. Furthermore, the current assessment practices often lack a comprehensive and holistic approach to evaluating student teachers' development across multiple dimensions (Orodho et al., 2020). Assessments tend to focus on discrete skills or isolated tasks, rather than considering the integration of knowledge, skills, and dispositions that are necessary for effective teaching. Another limitation is the limited use of technology-mediated assessments in teacher education programs (Omwodo et al., 2019; Nyakwara et al., 2018). With the rapid integration of technology in the education sector, there is a need to explore innovative assessment methods, such as video-based observations, digital portfolios, and online simulations, to better evaluate student teachers' competencies in utilizing technology for instructional purposes. Further, studies (Fernández et al., 2023; Haleem et al., 2022; Mohamed Hashim et al., 2022; Shetty et al., 2023; Vieira & Pedro, 2023) are suggesting that found that initial teacher

education programs do not adequately prepare future teachers to meet the demands of today's digital society due to insufficient integration of Information and Communication Technologies (ICT).

The Impact of Gender, Age, and Educational Background

Gender, age, and education are critical dimensions that intersect and influence the assessment practices and outcomes in teacher education programs. This literature review explores how these factors impact the assessment of aspiring teachers, shedding light on the complexities and challenges faced in ensuring equitable and effective assessments. Gender plays a significant role in the assessment of student teachers. Research indicates that gender bias can affect the evaluation of teaching skills and subject knowledge. Martin et al., (2016) reported that female student teachers may face biases related to stereotypes about nurturing and classroom management which can impact their teaching performance. Conversely, male student teachers may encounter biases associated with assumptions about their competence in specific subject areas. Age is another dimension influencing assessment practices in teacher education programs. Mature or older student teachers, often referred to as non-traditional students, bring a wealth of life experiences and prior career knowledge to their teacher training. While this can be an asset, it may also introduce challenges in adapting to new pedagogical approaches and technology (Drame et al., 2020). Additionally, educational background is a crucial factor affecting student teachers' assessment. Variations in prior education can result in disparities in subject knowledge and pedagogical skills. For instance, student teachers with diverse educational backgrounds, such as those with degrees in science or engineering transitioning to teaching, may require tailored assessment approaches to address their unique needs (Ingvarson et al., 2021; Perez-Felkner et al., 2012).

Methodology

The study employed a quantitative data collection approach, using a structured survey to collect the data from educational stakeholders to comprehensively investigate competency-based assessment in Tanzanian teacher education. This approach allows for a multifaceted

exploration of the research questions. A total of 531 participants participated after purposive sampling to ensure representation across various institutions, regions, and roles within teacher education programs. A structured survey gathered responses about assessment methods in Tanzanian teacher education and the incorporation of 4IR skills, the survey included closed-ended and open-ended questions. SPSS software was used to analyse data obtained in the survey by using descriptive statistics like frequencies and percentages, means, as well as inferential techniques such as regression analysis. In the study, out of the 531 participants, 50.9% were male, 47.1% female and 2.1% preferred not to disclose their gender. This indicates a balanced representation of male and female participants in the study.

Table 4: Gender Distribution of Participants (n=531)

Gender	Number of participants	Per cent
Male	269	50.9
Female	249	47.1
Prefer not to say	11	2.1

This distribution is important in the context of the 4IR as it highlights the inclusivity of the study and allows for a comprehensive understanding of the perspectives and experiences of student teachers. The largest group (46.9%) falls below the age of twenty-five, and the small group consisting of 9.3% were above the age of forty-five.

Table 5: Age Distribution of Participants (n = 531)

Age range	Number of participants	Per cent
Below 25	248	46.9
25 - 34	131	24.8
35 - 44	101	19.1
above 45	49	9.3

Age distribution offered a diverse age range among the participants, with a higher representation of younger individuals, particularly those below the age of twenty-five, which suggests the study captures the

perspectives and experiences of a generation of pre-service student teachers who are living in the 4IR.

Findings and Discussion

The Current Assessment Practices in Teacher Education Programs in Tanzania

The participants' responses about the current assessment practices utilized in Tanzanian teacher education programs indicate; Coaching and Mentorship (37%), Pen and Paper (69%), Project-based (42%), Incubation (7%), Action Research (20%) and other methods (1%).

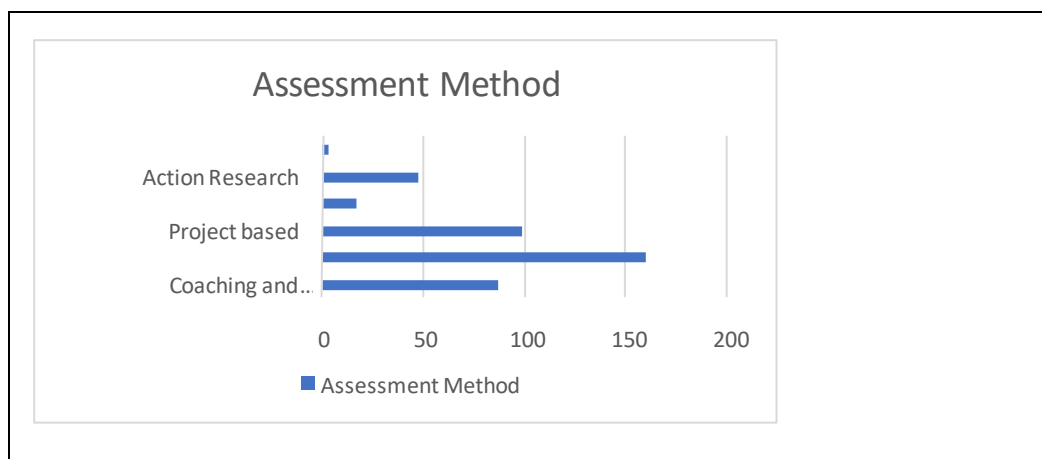


Figure 2: Current Common Assessment Method in Higher Education to Assess Student Teachers

The findings, showing that 69% of teacher education program respondents rely heavily on pen-and-paper assessments, prompt a closer look at the impact of traditional assessment methods. Existing literature offers insights into both the advantages and disadvantages of this approach. Pen-and-paper assessments excel in efficiently evaluating large groups and enabling standardized, bias-reduced grading (Brown & Knight, 2015; Popham, 2009). However, they can inadvertently promote rote memorization, stifle critical thinking, and hinder creativity (Smith & Ragan, 2005; Tofade et al., 2013). They may not align with real-world skills, raising concerns about authenticity and relevance (Wiggins, 1998). These assessments may also overlook factors like psychology, culture, and context (Brown, 2022). To address the

multifaceted skills required of future educators, teacher education programs should explore a variety of assessment methods alongside traditional ones (Komba & Mwakabenga, 2021).

Assessment of 4IR skills in Teacher Education

In the context of teacher education and the imperative of preparing future educators for the 4IR, it is crucial to underscore the significance of aligning assessment practices with competence-based principles. This alignment not only enhances the readiness of prospective educators but also ensures that assessments effectively incorporate the essential 4IR skills, as defined by the Partnership for 21st Century Skills in 2007. These skills encompass Live and Career Skills, Learning and Innovation Skills, as well as Information, Media, and Technology Skills. The following parts are the findings of how 4IR skills integration in assessment in teacher education in Tanzania.

Assessing the Integration of Technology into Teaching and Learning
Respondents' perspective on the proficiency of assessment methods in incorporating technology varies differently with most respondents agreeing to the statement. The study findings are in Table 3.

Table 6: Ability to Integrate Technology in Teaching and Learning

Responses	Frequency	Per cent
Strongly Disagree	4	.8
Disagree	20	3.9
Neutral	14	2.8
Agree	167	32.9
Strongly Agree	264	52.0

The findings indicate that most student teachers highly value its assessment. Approximately 84.9% (combining those who strongly agree and agree) acknowledge the importance of assessment on their ability to integrate technology into their teaching and learning practices. This aligns with prior research showing positive attitudes (Djoub, 2018; Hartman et al., 2019; Merillo & Domingo, 2019; Tzafilkou et al., 2023). Moreover, student teachers in the study by Sreekala and

Maria (2017) perceived technology integration assessments as burdensome rather than beneficial. Merillo and Domingo (2019) highlighted frustrations among student teachers due to inconsistent support and unclear assessment criteria for technology integration. Tzafilkou et al. (2023) pointed out a gap between the perceived relevance and actual skill development in technology integration assessments. These studies offer alternative viewpoints, underscoring challenges, and concerns in teacher education programs in integrating technology in assessment.

Assessing the usage of Technology as a Tool for Research

When examining technology's role as a tool for research, there is a similar positive perception among student teachers as indicated in Table 4.

Table 7: Ability to use Technology as a Tool for Research

Responses	Frequency	Per cent
Strongly Disagree	25	6.7
Disagree	11	2.9
Neutral	70	18.7
Agree	189	50.5
Strongly Agree	79	21.1

The findings indicate over 71.6% of respondents agree or strongly agree with the assessment of their skills in using technology for research purposes. Multiple studies echo our findings, highlighting the importance of technology integration and research skills in teacher education. For example, Hartman et al. (2019) and Merillo and Domingo (2019) conducted similar studies, emphasizing the significance of teacher candidates' proficiency in technology integration. These studies align with our results, emphasizing a consensus among student teachers regarding the importance of technology integration in their assessments. Likewise, Sreekala and

Maria (2017) emphasize the critical role of technology in modern education, supporting our findings regarding student teachers' positive perceptions of technology as a research tool. However, Gomez et al. (2022) present a slightly distinct perspective, suggesting that while technology integration is crucial, there may be variations in student teachers' perceptions of its importance in their assessments. Additionally, Merillo and Domingo (2019) suggest that student teachers may have reservations about assessing technology research skills, potentially explaining the notable neutral responses in our data.

Assessing the ability to offer Innovative Ideas, Strategies, and Solutions

The findings offer insights into how student teachers' assessment is done in terms of their ability to generate innovative ideas, devise strategies, and present solutions. The findings reveal a diverse spectrum of assessment frequencies, with a mere 0.8% of respondents claiming have never been in this capacity.

Table 8: Ability to offer Innovative Ideas, Strategies, and Solutions

Response	Frequency	Per cent
Never	4	.8
Rarely	66	12.8
Sometimes	156	30.3
Often	159	30.9
Always	130	25.2

The findings indicate that student teachers have opportunities for assessments related to creativity and innovation. However, there is a segment for whom these assessments are infrequent, suggesting variations in assessment practices across different teacher education programs. This highlights the potential need for a more consistent and comprehensive approach to foster and evaluate creativity and

innovation in future educators. Studies like Hartman et al. (2019) and Sreekala and Maria (2017) support the importance of assessing and nurturing these abilities in teacher preparation. However, Nakano and Weschsler (2018), Perry and Collier (2018), Twist (2021), and UNESCO (2021) offer opposing perspectives, suggesting caution in overemphasizing these assessments due to potential stifling effects and concerns about fairness, bias, and equity.

Assessing ability to Evaluate and Interpret Ideas and Information

The findings reveal the distribution of assessments and evaluations of student teachers' ability to evaluate and interpret ideas. A substantial portion (34.5%) indicated occasional assessments and a similar percentage (35.9%) reported frequent assessments.

Table 9: Ability to Evaluate and Interpret Ideas

Response	Frequency	Per cent
Never	3	.8
Rarely	24	6.7
Sometimes	123	34.5
Often	128	35.9
Always	79	22.1

These findings imply that most student teachers have opportunities for assessments related to this skill, albeit with variability in the frequency of such assessments. Similar findings in the studies by Liu et al. (2014), Lorencová et al. (2019), and S. E. Anderson et al. (2011) underscoring the value of assessing critical thinking and interpretive abilities in teacher candidates to ensure the quality of teacher education. However, other studies highlight the complexities and challenges in assessing interpretation and evaluation skills among student teachers. Research by Bambawale et al. and Wanner & Palmer (2018) points out difficulties in adequately assessing these competencies, while S. E. Anderson et al. (2011) indicated the nuanced nature of these skills

within teacher education assessment, which may pose measurement challenges.

Assessing ability to Organize, Evaluate, and Communicate Information

When asked about assessment on the ability to organize, evaluate and communicate, a small percentage (2.8%) strongly disagree, 4.7% disagree, 10.8% remain neutral while most student teachers acknowledge their proficiency in this area, with 54.4% agreeing and 27.3% strongly agreeing with the statement.

Table 10: Ability to Demonstrate Skills in Organizing, Evaluating, and Communicating Information

Responses	Frequency	Per cent
Strongly Disagree	10	2.8
Disagree	17	4.7
Neutral	39	10.8
Agree	197	54.4
Strongly Agree	99	27.3

These results suggest that student teachers believe they have assessed their skills in organizing, evaluating, and effectively communicating information. Similarly, Hartman et al. (2019) found these skills correlate with effective classroom instruction. Studies by Merillo and Domingo (2019) and Sreekala and Maria (2017) show that comprehensive training in these areas leads to greater instructional effectiveness. These findings align with most respondents who reported possessing these skills, indicating program recognition. However, Anderson et al. (2011) noted a gap between claimed emphasis and actual assessment rigour in teacher education.

Assessing the ability to Collaborate and Contribute to the Project Teams

The findings indicate that 8% of student teachers never assessed, and 5.7% mentioned that assessment occurs rarely. Moreover, for 31.7%

assessment happens sometimes, 27.8% assessed often and 32.6% felt they always assessed and evaluated on their ability to collaborate and contribute to project teams.

Table 11: Ability to Collaborate and Contribute to the Project Teams

Response	Frequency	Per cent
Never	8	2.3
Rarely	20	5.7
Sometimes	112	31.7
Often	98	27.8
Always	115	32.6

These findings suggest that the assessment of collaboration and contribution to project teams is common among student teachers. Research by Anderson et al. (2011) found effective collaborators create engaging classrooms. Sreekala and Maria (2017) showed teachers trained in collaboration reported higher job satisfaction. However, Beniwal (2020) and Kolleck et al., (2021) argue programs may overestimate skill development. This instigates further findings with actual teaching practices not based on a self-reported assessment.

Impact of Gender, Age, and Education on Assessment Practices

To assess how age, gender, and education impact competency-based assessment in integrating 4IR skills among student teachers, a regression analysis of the findings indicated the impact of each variable. The study focused on six key assessment areas: Collaborating and contributing to project teams, using technology for research, evaluating, and interpreting ideas, integrating technology into teaching, offering innovative solutions, and organizing, evaluating, and communicating information.

Gender

The ANOVA results show a significant relationship between the Gender variable and the predictors in the model. Overall, the model explains the variance in Gender ($F = 11.149$, $p < .001$), indicating that

the predictors collectively contribute to understanding Gender differences.

Table 12: ANOVA on the Impact of Gender

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.857	6	2.643	11.149	.000 ^b
	Residual	76.801	324	.237		
	Total	92.659	330			

a. Dependent Variable: Gender

These ANOVA findings suggest that there are significant differences in the assessment and evaluation of various skills and abilities between different genders. Further coefficients reveal the specific nature of these differences and their implications for teacher education programs and practices.

Table 13: Coefficients Analysis on the Impact of Gender

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1 (Constant)	.846	.139		6.077	.000
Integration of technology into teaching and learning	-.117	.041	-.206	-2.873	.004
Technology as a tool for research	.033	.039	.060	.853	.395
Innovative ideas, strategies, and solutions	.098	.046	.168	2.138	.033
Evaluating and interpreting the ideas and information.	.149	.038	.292	3.952	.000
Organizing, evaluating, and communicating information	-.118	.041	-.205	-2.913	.004
Collaborating and contributing to the project teams	.126	.036	.246	3.478	.001

a. Dependent Variable: Gender

Gender influences the assessment of various skills in student teachers. Specifically, male student teachers tend to receive lower scores in

assessments related to integrating technology into teaching, as well as evaluating and interpreting ideas, compared to their female counterparts. Conversely, female student teachers tend to score higher in assessments related to organizing, evaluating, and communicating information, offering innovative ideas and strategies, and collaborating in project teams. However, there is no significant gender difference in assessments related to using technology as a research tool.

Age

The ANOVA results for the dependent variable "Age" indicate statistically significant differences among the predictor variables.

Table 14: ANOVA on the Impact of Age

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.617	6	9.770	13.504	.000 ^b
	Residual	234.392	324	.723		
	Total	293.009	330			

a. Dependent Variable: Age

The regression model was significant ($F = 13.504, p < .001$), suggesting that these predictor variables collectively explain a significant amount of variance in age. Table 12 indicates the value of each predictor.

Table 15: Coefficients Analysis on the Impact of Gender

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1	(Constant)	3.262		13.422	.000
	Integration of technology into teaching and learning	.103	.071	.102	.147
	Technology as a tool for research	-.384	.068	-.391	.000
	Innovative ideas, strategies, and solutions	.020	.080	.019	.801
	Evaluating and interpreting the ideas and information.	.313	.066	.344	.000
	Organizing, evaluating, and communicating information	-.124	.071	-.121	.081
	Collaborating and contributing to the project teams	-.271	.063	-.297	.000

a. Dependent Variable: Age

The findings indicate that age is impacting certain variables in assessment practices. Specifically, the ability to use technology as a research tool is associated with younger ages, while higher scores in the ability to offer innovative ideas, strategies, and solutions and the

ability to collaborate and contribute to project teams impacted by older ages. However, age does not impact technology integration, organizing and evaluating information, and evaluating and interpreting ideas.

Education

The findings indicates that the variable Highest level of Education significantly affects the predictors in the model ($F = 6.036, p < .001$). This suggests that there are statistically significant differences in the highest level of education among student teachers based on their experiences on assessment.

Table 16: ANOVA on the Impact of Education

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.951	6	5.992	6.036	.000 ^b
	Residual	321.651	324	.993		
	Total	357.601	330			

a. Dependent Variable: Highest level of Education

The table of coefficients indicates each predictor affected by education level on assessment practices and whether it is significant or not.

Table 17: Coefficients Analysis on the Impact of Gender

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1 (Constant)	4.685	.285		16.454	.000
Integration of technology into teaching and learning	.139	.083	.125	1.678	.094
Technology as a tool for research	-.047	.080	-.043	-.586	.558
Innovative ideas, strategies, and solutions	-.201	.093	-.177	-2.155	.032
Evaluating and interpreting the ideas and information.	.268	.077	.268	3.481	.001
Organizing, evaluating, and communicating information	-.153	.083	-.135	-1.843	.066
Collaborating and contributing to the project teams	-.256	.074	-.254	-3.449	.001

a. Dependent Variable: Highest level of Education

The findings reveals that the ability to organize, evaluate, and communicate information (Beta = -.177, p = .032) and the ability to offer innovative ideas, strategies, and solutions (Beta = .268, p = .001) is significantly influenced by the level of education among student

teachers. These two abilities are impacted by the highest level of education attained by student teachers. However, the highest level of education does not affect the abilities related to technology integration, using technology for research, evaluating, and interpreting ideas, and collaborating and contributing to project teams.

Conclusion

The findings from Tanzanian teacher education programs' assessment practices reveal that most student teachers' common assessment method is traditional pen-and-paper tests, which may prioritize memorization over critical thinking. Secondly, a significant majority feel assessed on their ability to integrate technology into teaching and research, showing that institutions emphasize technology's importance. Additionally, student teachers recognize the significance of research skills using technology. When it comes to innovation skills there's room for improvement in fostering creativity. Findings indicate most student teachers participate in assessment evaluating and interpreting ideas, but variability exists.

Finally, organizing, evaluating, and communicating information is important in teacher education programs. The assessment practices also vary by gender, age, and education level. Gender significantly impacts assessment practices, with variations observed in technology integration, research skills, innovation, and collaboration assessments. Age also plays a role, particularly in research skills and collaboration assessments. Education level affects assessments related to technology integration, organizing, and communicating information, offering innovative ideas, and collaboration. The findings highlight the prevalence of traditional assessment methods and the importance of technology integration and research skills in teacher education programs in Tanzania. They also suggest room for improvement in fostering innovation and creativity and ensuring consistent assessment practices across programs. Additionally, gender, age, and education level significantly impact assessment experiences, indicating the need for tailored approaches in teacher education.

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Formative Assessment Practices and its Effect on Employability Skills to Vocational Students in Tanzania

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ABSTRACT

The study evaluated the effect of formative assessment practices on employability skills development. Specifically, the study explored students' perceptions on essential employability skills for vocational career; examined formative assessment practices in vocational training centres and assessed the influence of formative assessment practices on employability skills among vocational students in Tanzania. It adopted a pragmatism paradigm which enabled the use of sequential explanatory mixed methods design. Data were collected from 97 vocational students and six vocational tutors sampled from Chang'ombe and Mwanza Vocational training centres. The quantitative and qualitative data were analyzed using regression model and content analysis techniques respectively. The study found that, vocational Students perceive a number of employability skills as essential for their career. The vocational education and training centres employ workshop, industrial projects and field placement as formative assessment practices to enhance such employability skills. However, formative assessment which is essential for employability skills, accounts only for 40%, compared to 60% of its counterpart summative assessment. Therefore, the study recommends for curriculum review to give formative assessment a more weight than summative assessment. Further study may develop measuring scale for employability skills among vocational education graduates in Tanzania.

Keywords: Formative assessment, employability skills, labour market, vocational education, global economy.

INTRODUCTION

The global education systems are pressurized by the global economy to develop employability skills among graduates towards the labour market demand (Idris, 2012; Voinea, 2018; Scholtz, 2020). Employability skills as a set of skills, knowledge, and personal attributes, is essential for graduates to enable them get employment or retain one's employment position productively (Yorke, 2006). The skills, as established by the Australian employability skills framework, include communication, team work, problem solving, initiatives and enterprising, planning, self-management, resource management, learning and technological skills (Australian Government, 2004). Whereas, employees need them to cope with the working environment, employers need their workers to possess them in order to achieve their organizational objectives in the competitive market (National Council of Educational Research and Training, 2020). Those skills are required by employees not only at entry level of the job, but also in career development and promotion (Robinsons & Garton, 2008).

The need to develop employability skills among vocational students can be traced back to 1950 industrial revolution in Europe, where the change of production technology and globalization processes necessitated skilled workforce to meet the labour market demand (Nourian & Gloddousi, 2015). As the global governments strive to achieve sustainable development goals 2030, employability skills among vocational students are tool to achieve decent works for economic sustainability (ILO, 2021; United Nations, 2019). Consequently, the assessment methods required restructuring to ensure that vocational students develop relevant vocational skills for their career (Carey, 1997). The methods should enhance the development of hands-on skills required by employers in both, public and private sectors (Scholtz, 2020). Such assessment should be conducted in the natural context of work and provides valuable

feedback for improvement of both, students and instructors (Liu, 2012; Budi & Sulisworo, 2018). The assessment should be formative rather than summative to detect faults and skills gaps among learners to be worked out by both, students and tutors (Centre for Educational Research and Innovation, 2008). Formative assessment, also, should provide direct feedback for improvement before vocational students accomplish their study programmes (Vingsle, 2014). It should enable students to judge the quality of the product they are producing and take affirmative actions for improvement (Voinea, 2018). Further, it should enable tutors to identify skills gaps and address them before students to join the world of work (Saedon et al., 2010). It serves as a platform for continuous improvement through valuable feedback interactions among students, tutors, and management (Beard & Bussey, 2007).

Therefore, due to its pivot role in enhancing employability skills, formative assessment is widely used in both, developed and developing countries, such as Malaysia, Indonesia, Australia, Norway, United Kingdom, United States of America, India, Nigeria, and South Africa (Scholtz, 2020; Liu, 2012; Budi & Sulisworo, 2018; Robbins et al., 2018; Lester, 2011; Dahlback et al., 2020; OECD, 2013). The role of formative assessment in VET, cannot be over emphasized due to its power to enhance student learning and effective teaching, hence students develop the desired skills (Yorke 2001). Some scholars argue that formative assessment can contribute to student development and retention (Yorke, 2005), employability skills (Cassidy 2006), and lifelong learning (Boud, 2000). Others describe how formative assessment can facilitate class participation (Dancer & Kamvounias 2005) and improve students' attendance, performance, and presentation (Ghazi & Henshaw 1998). Formative Assessment (FA) should not be reserved for an examination achievement after the teacher has completed instruction, but rather alongside the teaching

and learning processes Ginsburg (2009). In Tanzania, formative assessment gained momentum in 2005, when education system was changed from content to competency-based education (Kadau & Mallya, 2023). The purpose was to track competence development among students before they graduate (NECTA, 2021). The feedback provided during such assessment is essential for detecting default during competence development, hence attract intervention measures for improvements (Poulos & Mahony, 2008; Sadler, 1989) and used to improve their learning (Black & Wiliam, 1998). Vocational education and training (VET) institutions in Tanzania were established under vocational education and training Act, CAP 82, to provide quality vocational skills to students for occupational, industrial or technical works (URT, 2019).

VET adopts formative assessment for developing employability skills to its graduates in 822 vocational centres in all regions of Tanzania (MoEST, 2021). Despite the adoption of formative assessment, most of vocational graduates are not employed in Tanzania (Mihyo et al., 2020). This situation has raised a need for exploring students' perceptions on essential employability skills for vocational career; examining formative assessment practices in vocational training centres and assessing the influence of formative assessment practices on employability skills in vocational students in Tanzania. The formative assessment theory by Sadler (1989) guided the study based on its assumption that assessment should enhance learning, and feedback in assessment is vital to track learning progress (Sadler, 1989; Heritage, 2010).

Methodology

The study employed a pragmatism paradigm and a sequential explanatory mixed methods design to utilize quantitative and qualitative data collection and analysis methods and techniques

(Creswell, 2014). Data were collected through questionnaires from 97 students who were randomly selected from electrical installation department, fitter mechanics department and truck mechanics department in both Dar es Salaam and Mwanza regional vocational training centres. Follow-up face to face Interview was conducted to six vocational tutors and documentary analysis from Chang'ombe and Mwanza vocational training centres in Dar es Salaam and Mwanza regions. Each interview duration ranged between 30 to 45 minutes in the vocational workshop where vocational tutors were supervising practical works for their respective students. The documentary analysis involved vocational curriculum and formative assessment sheets in the workshops. The interest was to see the marks distribution for formative assessments, compared to summative assessment.

The choice of the study area was based on the nature of such centres. The chosen centres are giant in Tanzania, with adequate resources, students and staff compared to the rest. The researcher obtained introduction letter from The Open University of Tanzania, which was presented to Vocational Training Centre authorities whom introduced the researcher to students and vocational tutors from fitter and truck mechanics as well as electronics departments. Students and staff were requested for their consent to participate in the study and their identities were kept anonymous. The quantitative data were coded into themes then subjected into statistical package software for social sciences (SPSS) to generate mean and standard deviation. The qualitative data were analyzed through thematic analysis where transcripts were coded and then categories and themes were generated. The multiple regression model was used to test the hypothesis that, formative assessment practices influence positively and significantly the development of employability skills among vocational students. The model specifications were:

Model specifications

$$FA = \beta_0 + \beta_1TWCs + \beta_2CTPs + \beta_3CIs + \beta_4SCs + \beta_5DTs + \beta_6RMs + \beta_7TPs + \epsilon$$

Whereby:

FA = Formative assessment

TWCs = Team work and collaboration skills

CTPs = Critical thinking and problem-solving skills

CIs = Creativity and innovation skills

SCs = Social and communication skills

DTs= Digital and technological skills

RMs= Resource management skills

TPs = Technical and professional skills

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ = Coefficients of variables used in the study

ϵ = Error term

Results and Discussions

Students' Perceptions on Essential Employability Skills in Tanzania Vocational Career

The vocational students' perceptions on essential employability skills in Tanzania are presented in table 1.

Table 1: Students' Perceptions on Essential Employability Skills in Tanzania Vocational Career

Employability skills	Min	Max	Mean	Std Deviatio n	N
Social and Communication Skills	1	5	3.55	.842	97
Critical Thinking and Problem Solving	1	5	3.39	.953	97
Creativity and Innovation Skills	1	5	3.51	.805	97
Technical and Professional Skills	1	5	3.46	1.001	97
Digital and technological skills	1	5	3.30	1.002	97
Resource management skills	1	5	3.76	.933	97
Team work and Collaboration Skills	1	5	3.82	.866	97

As indicated in table 1, most students perceived team work and collaboration skills as well as resource management skills as the most essential employability skills in Vocational skills as compared to technical and professional skills which are core in their field. Triangulating these results, interviews were conducted to vocational tutors, who argued the following:

Key employability skill in technical and vocational career is resource management. This is due to the fact that we use expensive materials like flat bars, plates, steel and round pipes, so an individual who avoid wastage of such materials and who can work friendly with others, observe customer care is preferable (Fitter Mechanics tutors, Sept 2023).

The lathe, milling and drilling machines and their versions change frequently. Therefore, a graduate who

is easy to adapt new technology and innovate products for the labour market get employment easily' (Fitter mechanics tutor, September 2023)'.

The results are in-line with Bano and Vasantha (2019) who categorized employability skills as professional, methodological, interpersonal, personal skills, analytical and digital skills. Furthermore, the findings are in line with Australian study by Gill (2018) who argued that employers require problem solvers, workers' readiness to work, practitioners, networking, and time management skills. Therefore, it can be argued that, there is no single skill which can enable one to get employment, whether wage of self, because employment in a competitive labour market, is a complex phenomenon which entails a lot of abilities from an individual. Therefore, employability skills are a set of knowledge, skills, and behaviours which vocational students are required to possess.

Formative Assessment Practices in Tanzania Vocational Training Centres

The analysis of the vocational training curriculum documents, field assessment forms, and practical workshop schedules indicate that, there are formative assessment methods in vocational training centres. The formative assessment weighs about 40% of the students' assessment while summative assessment accounts for 60% of the total assessment. This formative assessment is expected to enhance employability skills. The interview was conducted for triangulation purposes. One tutor commented:

Students are given practical assignment in the workshop or in the garage where tutors observe and assess the quality of student works, and award marks accordingly. The assessment enables students to get immediate feedback and correct the errors for improvement (Truck mechanics tutor, Sept 2023).

Another tutor said:

In their second year, students are placed for field practice in the real world of work where electrical works are performed. We visit them to observe and assess their works then award them marks accordingly, which accounts for 40% marks (Electrical tutor, September 2023).

The results indicate that vocational training centres conduct different formative assessment, such as workshop assignment, field placement and industrial projects in order to enhance employability skills. The formative assessment has little weight compared to its counterpart summative assessment.

The Influence of Formative Assessment on Employability Skills Development

The regression model was run to predict the influence of formative assessment on employability skills development among vocational students.

Table 2: Regression Table

Variables	Coefficients	t-statistic	Sig Decision	
(Constant)	.073	.616	.539	
Social and Communication Skills	.058	1.808	.074	Supported
Critical Thinking and Problem Solving	-.003	-.182	.856	Rejected
Creativity and Innovation Skills	-.085	-2.541	.013	Supported
Media and technological skills	-.072	-2.558	.012	Supported
Resource management skills	.352	9.843	.000	Supported
Technical and Professional Skills	.087	3.098	.003	Supported
Team work and Collaboration Skills	.648	16.636	.000	Supported
Diagnostic tests				
R-Squared	97%			
Adjusted R-squared	97%			
F-statistics	1234.458			
Prob(F-statistics)	0.00000			
Durbin-Watson test	1.561			

Thus, the multiple regression model of this study is;

$$FA = 0.073 + 0.648TWCs - 0.003CTPs - 0.085CIs + 0.58SCs - 0.072DTs + 0.352RMs + 0.087Ps + \epsilon$$

The model is fit for the study because the Prob F-Statistics is below 0.0000 which is not above 0.5 as the rule of the thumb.

Hypothesis Testing Results

The study hypothesized that formative assessment practices influence positively and significantly the development of employability skills among vocational students. The results, as indicated in table 3, reveals positive coefficients and significant influence of formative assessment

on the development of team work and collaboration skills with ($\beta = 0.648, p < .000$) social and communication skills with ($\beta = 0.058, p < .013$), resource management skills with ($\beta = 0.352, p < .000$), as well as technical and professional skills with ($\beta = 0.982, p < .000$). However, there is negative coefficients and significance influence of formative assessment practices on creativity and innovation skills with ($\beta = -0.087, p < .003$) as well as media and technology skills with ($\beta = -0.072, p < .012$). Moreover, there is a negative coefficient and insignificant influence of formative assessment on critical thinking and problem-solving skills with ($\beta = -0.003, p < .856$) in vocational training centres. The results suggest that formative assessment practices by themselves cannot develop all the essential employability skills. Some skills rely on other factors. The results differ from previous studies related with assessment for employability skills which established that, formative assessment provides immediate feedback on the quality of learning outcomes. However, the studies did not specify which employability skills can be developed through formative assessment and which cannot (Government of Welsh, 2016; Haris et al., 2017; Yusop at al., 2022; Crystal et al., 2022; Alt et al., 2023).

Conclusion and Recommendations

Students in vocational education and training centres in Tanzania perceive the following as essential employability skills are: team work and collaboration skills, critical thinking and problem solving, creativity and innovation skills, social and communication skills, digital and technological skills, resource management skills, technical and professional skills. Such skills may enable them to secure jobs or retain their job positions and develop their career. Similarly, vocational education and training centres in Tanzania employ workshop, industrial projects and field placement as formative assessment practices to enhance employability skills. Despite the significance and positive relationship between formative assessment and employability

skills in vocational education, the approach is marginalized by accounting only for 40%, while summative assessment weighs 60%. The weighing ration 4:6 between formative and summative assessment practices deviates from Sadler's theory of formative assessment which insists on the 'on sport' correction of errors to enhance employability skills development. Basing on this observation, the study recommends for curriculum review to give formative assessment a more weight than summative assessment, at least 75:25 as the national embarks on competence-based education. Also, vocational education and training centres should be capacitated in material, technical and expertise resources in order to perform technical and vocational projects which enable their students practice their skills in a real world of work. Further study may develop measuring scale for employability skills among vocational education graduates in Tanzania.

Limitation of the Study

There are more than 35 vocational training centres in Tanzania, but the study sampled vocational students and tutors from only two vocational training centres and both owned by the Government; this is a limitation. However, such situation could not affect the results because all vocational training centres in Tanzania follow similar curriculum practice, regardless of their geographical location or type of ownership.

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Proposal for Aligning the National Examinations Council of Tanzania's Roles with Principles of Education for Self-Reliance

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ABSTRACT

The paradigm shift from content to competence-based curriculum in the first decade of the 21st century had brought with it the inevitability of transforming the National Examinations Council of Tanzania (NECTA) towards competence-based assessment (CBA). Although the council has a success story of fulfilling its mission of providing fair, efficient, and effective educational assessment, it does not seem to have fully shifted its attention to those educational reforms made. This study was undertaken to highlight the need for transforming NECTA so that its operations are in line with the principles of Education for Self-Reliance (ESR) and CBA. It employed the bibliometric strategy; the study retrieved information using the Google Scholar tool using keywords such as education for self-reliance, national curriculum framework, NECTA guidelines and education policy, CBC, and NECTA Act. Although a total of 63 were retrieved, only 8 documents met the inclusion criteria. content analysis was used to analyse the data. The findings revealed that although NECTA claims to have shifted its attention towards competence-based assessment procedures, it has not fully integrated those CBA procedures to grasp the principles of ESR. It concludes that NECTA's current operations are not aligned with the objective for which it was formed. The study recommends a need for transformation of NECTA's assessment procedures to be able to match with the 21st century situation.

Keywords: Assessment for learning, competence-based assessment, continuous assessment, education for self-reliance

INTRODUCTION

As the National Examinations Council of Tanzania (NECTA) celebrates its golden jubilee, there are several achievements worthy of noting. However, some occasions require a critical reflection. While public examinations are perceived as a tool for curriculum evaluation (Njabili, 1999), the rule of thumb requires that those public examinations closely align with the educational philosophy. As it might be recalled, the foremost function of the NECTA, according to the Parliament Act No. 21 that established it, as well as the revised version of 2019, is to formulate examinations policy following the principles of Education for Self-Reliance and the Education and Training Policy (URT, 1973; URT, 2019). This suggests that the establishment of the council was a strategy to ensure that the educational processes – the intended, implemented and attained curriculum – are well coordinated in line with both the philosophy and policy of education.

Freire (1970) argues that education can never be neutral but serves the purpose of either exploiting or liberating the masses. Thus, it can be argued that education under the ESR had the goal of rescuing the Tanzanian society from the ills of colonial education as well as building a new society, focusing on local conditions. As such, the philosophy was formulated to guide the nation's firm goal of building socialism (Nyerere, 1968) through education (Nyerere, 1967). For that matter, the intended curriculum, implemented curriculum, and attained curriculum (Akker, 2003) – all were expected to follow the tunes of ESR. This study was designed to assess the extent to which the National Examinations Council of Tanzania has been fulfilling its function of setting and implementing the examinations policy in line with the principles of Education for Self-Reliance (ESR). Specifically, the objective was to establish the congruence of the ESR and CBA ideals with the NECTA assessment guidelines and procedures (URT, 2021) as

a way to make a case for transforming the NECTA's assessment procedures.

Methodology

The study relied on review of documents through bibliometric strategy, which is a technological tool for retrieving documents that are related with the study a researcher undertakes (Koseoglu et al., 2015). This involved four considerations – authenticity, credibility, representativeness and meaning – as a framework for selection of documents adopted from Morgan (2022). In the context of the present study, authenticity was thought imperative as it is used to indicate the extent to which the accessed documents genuinely provide the link between principles of ESR and NECTA operations in the 21st century. The documents were searched from Google scholar; key words related to the study, such as education for self-reliance, competence-based curriculum, NECTA assessment guidelines, education and training policy, national curriculum framework, and NECTA Act were used. Although Google scholar search yielded 63 documents, only eight (8) documents met the criteria. These documents had direct link with the research topic. Table 1 presents the inclusion and exclusion criteria used to include the documents.

Table 1: Inclusion and Exclusion Criteria

S/N	Inclusion Criteria	Exclusion Criteria
1.	Originality of the documents for which the study builds its case	Documents on the topic under the study that made reference to the original documents
2.	Directives towards the topic studied from the government sources	Documents that referred to the directives
3.	Guidelines of the examinations practices	Documents referring to the guidelines provided
4.	Guidelines on principles for attaining the set objective	Documents providing related studies on the principles

As a result, documents related with ESR, the NECTA examinations guidelines, the NECTA Act of 1973 and its 2019 revision are some of the documents included in the study. Others include the national curriculum framework for basic education and teacher education, Education and Training Policy (ETP) of 1995 and 2014, and the guidelines on competence-based curriculum. The documents were then subjected to content analysis where their interpretation was made and results provided.

Results

A review of *education for self-reliance* (Nyerere, 1967) provides several descriptions with a bearing on the examination procedures. Box 1 presents the ESR ideals related to the Act No. 21 of 1973.

Box 1: ESR ideals expected to guide the NECTA operations (Adopted from Nyerere, 1967 pp. 7-8)

- i. At present time, our curriculum and syllabus are geared to the examinations set; only to a very limited extent does the reverse situation apply.
- ii. ... it is easy to say that our primary and secondary schools must prepare young people for the realities and needs of Tanzania; to do so, it requires a radical change.
- iii. The importance of examinations should be downgraded because they only assess a person's ability to learn facts and present them on demand within a limited time period. This approach excludes assessing other qualities such as the ability to reason and a willingness to serve others.
- iv. A teacher who is trying to help his (or her) pupils often studies the examination papers for past years and judges what questions are most likely to be asked next time; he/she then concentrates his/her teaching on those matters, knowing that by doing so he/she is giving his/her children the best chance of getting through to secondary school or university. And the examinations our children at present sit are themselves geared to an international standard and practice which has developed regardless of our particular problems and needs.
- v. What we need to do now is think first about the education we want to provide, and when that thinking is completed think about whether some form of examination is an appropriate way of closing an education phase. Then such an examination should be designed to fit the education which has been provided.
- vi. The purpose is to provide a different education – one realistically designed to fulfil the common purpose of education in the particular society of Tanzania.

- vii. The object of teaching must be provision of knowledge, skills and attitudes which will serve the student when he or she lives and works in a developing and changing socialist state; it must not be (merely) aimed at university entrance.

As discussed shortly, the extent to which the NECTA's operations have responded to the principles of ESR on the ground is subject to debate. This is in consideration that the examinations that are provided each year since its inception to date, despite the introduction of CBA in 2005, is still the same. One would have expected that the education reforms in the name of paradigm shift from content to competence-based education would involve change towards CBA, only to note a slow or rather an insignificant shift in both teaching and learning as well as assessment procedures.

NECTA Assessment Guidelines: A Critical Analysis

A review of the NECTA guidelines on assessment procedures for secondary schools and professional levels (URT, 2021) suggests that the council guides the assessment procedures based on the cognitive processes approach. Nowhere does the council guide assessment of competences as the competence-based assessment requires. The assessment guidelines cover aspects such as moderation, administration, scoring and recording of test results, assessment of learners with special needs, monitoring and evaluation of tests and examinations, all related to cognitive processes. A few statements are presented to indicate that the council's assessment procedures do not match with the education reforms requiring application of CBA as Box 2 provides.

Box 2: NECTA guidelines on assessment procedures (Adopted from URT, 2021)

- i. NECTA is responsible for the collection of school Continuous Assessment (CA) records which contribute 30% to Form Four, Form Six and Professional final examination (p. v).
- ii. Competence-based assessment focuses on the understanding of concepts and the acquisition of skills and competences, as it emphasizes on higher-order thinking skills (p. 13).
- iii. Though NECTA conducts only formative and summative assessments, it ensures that other types of assessments, such as diagnostic assessments, are well conducted to meet the requirements of competency-based assessment and the challenges of the 21st century (p. 18).
- iv. CA involves test, terminal and annual examination as they will contribute to the final national examination results (p. 74).
- v. NECTA, being the body mandated to conduct formative and summative assessment at the national level in Tanzania, is responsible for making follow up on CA to ensure its standard. Specifically, the role of NECTA in monitoring and evaluation is to analyse the quality of the assessment tools used to generate CA. The tools will include question papers, marking schemes and score sheets (p. 78).
- vi. For summative evaluation, NECTA will be analysing each item that has been done. The analysis will indicate the factors that enabled the students to respond to the items correctly and those that hindered them from responding correctly (p. 78).
- vii. The NECTA, school quality assurance, Ward Education Officers, Heads of schools and College principals will be responsible for monitoring and evaluation of assessment to have quality Continuous Assessment (CA) (p. 78).
- viii. Although NECTA conducts assessment at national level, teachers and tutors are key players in the assessment process at school and college level. This is because they can largely assess not only the cognitive domain but also the affective and psychomotor domains (79).

Considering the aforementioned NECTA guidelines, it seems that the NECTA guidelines do not effectively respond to ESR ideals. Nowhere in Box 2 can one see the link with principles of ESR presented in Box 1. Such inconsistencies amount to the need to transforming the NECTA so as to ensure its roles are in line with the objective for which it was established.

Discussion

Considering the aspects reviewed from NECTA guidelines in Box 2, it can be realized that those guidelines do not show a close link with the ideals of ESR as presented in Box 1. This suggests that there is unclear connection between the principles of the ESR and the NECTA's operations in relation to the National Examinations Council Act of 1973 (URT, 1973) and its revision of 2019 (URT, 2019). Although the educational reforms made at the beginning of the 21st century call for competence-based assessment, there is little carried out to transform the council's assessment procedures.

Even after the national curriculum framework for basic education and teacher education (URT, 2019) which insists about a link between the educational processes with the education philosophy in place, the NECTA assessment guidelines (URT, 2021) does not reflect the principles of ESR. One might surmise that perhaps educational reforms made were unclear when it comes to their application (Komba & Mwandangi, 2015; Losioki, 2018; Mkimbili & Kitta, 2020; Nkya, Huang & Mwakabungu, 2021; Paulo, 2014; Tarmo, 2022) by the NECTA. There seem to be misconceptions regarding the flow of education activities that affect NECTA's assessment procedures. The flow of education process commences with the definition of the philosophy of education relevant to a given context (Nyerere, 1967; Ornstein & Hunkins, 2018), followed by the formulation of education policy which spells out the

aims and objectives of education for which curriculum development and evaluation procedures have to embrace. In the context of Tanzania, the education and training policy reiterates that education processes are geared towards attainment of self-reliance (URT, 1995; 2014). To implement the education philosophy and policy in the context of Tanzania, two institutions of the government were formed; one for developing curricula in line with the philosophy and policy espoused, that is, Tanzania Institute of Education (TIE) (URT, 1975); the other for evaluation of those curricula, that is, NECTA (URT, 1973, 2019). The processes of curriculum development and evaluation as undertaken by TIE and NECTA respectively necessitate the choice of the conceptual orientation or paradigm relevant to the education philosophy in place - out of several paradigms that exist (Eisner, 1985; Feiman-Nemser, 1990; Volante & Earl, 2002).

In the case of Tanzania, the paradigm that dominated from 1967 to 2005 was the cognitive processes approach (Pendaeli, 1978). This paradigm engaged learners with tough and demanding cognitive tasks so as to strengthen their mental muscles as a means to promote problem-solving skills (Eisner, 1985; Ornstein & Hunkins, 2018). Nonetheless, no matter how efficient it might have been implemented, the paradigm could not align well with the principles of ESR and CBA as it believes on cognition processes while ESR requires learners develop competences for productive work (Masudi, 2002; Temu, 1998). This mismatch of the paradigm-philosophy seemingly accounts to the NECTA's reliance on cognitive assessment procedure, which Nyerere (1967) strongly decries. A review of the NECTA assessment guidelines (URT, 2021) reveals that the council's assessment procedures are contrary to the tenets of CBA in several fronts. As Box 2 attests, the guidelines indicate that the council is responsible for the collection of school and college continuous assessment (CA) records in the form of written tests, terminal examinations, annual examinations, and final

national examinations (URT, 2021). Those assessment tools are cognitive in nature. This is contrary to the CBA, whose features, among others, include teaching and assessment being intertwined; assessment focusing more on the process rather than outcome of learning (Andrade & Heritage, 2018; Drisko, 2014; Heritage, 2010; Losioki, 2018, Mkimbili & Kitta, 2020). The recording of CA under CBA involves ascertaining how learners are able to improve through the teachers' feedback and motivation (Adalberon, 2020; Mosha, 2012). O'Sullivan and Bruce (2014) stress that in the context of CBA, learning and change go hand in hand; it is no longer about the ability to recall and memorize facts and assessment for intellectual capacity. The heart of CBA is the ability to perform a given task. This suggests that CA cannot be assessed by external authorities distant from the teaching and learning processes as assessment occurs as learners continuously interact with teachers (O'Sullivan & Bruce, 2014).

In the final analysis, one doubts the practicality of the involvement of the NECTA, school quality assurance, Ward Education Officers, Heads of schools and college principals in monitoring and evaluation of assessment so as to obtain quality CA (URT, 2021). Since CA is said to involve test, terminal and annual examinations that contribute to the final examination results (URT, 2021) and not a myriad of teaching and learning activities that could form authentic CA, the place of out-of-school/college officers does not seem to count other than extending bureaucratic complications. Rather, one would expect the NECTA officers to be largely involved, working in concert with the schools and colleges in the assessment and recording of the CA rather than taking the active role in recording and disseminating the final examinations. This would have been the opportune moment for the council to ensure that both the CA and summative examinations provide the information related to learners' progress not only in academics but rather, in development of competences. Short of this infers that not only does the

council function in contrast to the purposes for which it was established; it also works in contrast to the national curriculum framework. Considering the influence of examinations on students' lives teaching to test may continue unabated, private tuitions would continuously serve as means to passing examinations (Anangisye, 2020; Chingtham, 2015), and NECTA would serve as stumbling block for the Tanzanian educational vision.

Conclusion and Recommendations

This study suggests a mismatch between what was intended regarding the object and functions of NECTA and the assessment practices the council has been employing. Thus, one can conclude that there is misunderstanding of the principles of the ESR as an education philosophy among institutions formed to develop curricula and evaluating curriculum in Tanzania as well as procedures for implementing the ESR philosophy (Hundsdofer, 1982). In such a situation, the NECTA's failure to interpret curriculum in a desired manner has negatively affected teaching, learning and assessment procedures for attaining self-reliance in Tanzania.

It is unfortunate, one can admit, NECTA has not undertaken the roles for which it was established as it has largely assumed the summative evaluation to be more important than the processes of changing and becoming self-reliant among Tanzanian young people completing their education cycles. It is argued here that NECTA cannot work in isolation from the ESR, CBA and the national curriculum framework ideals and yet claim to be responsible to the nation for handling examination matters. This study recommends that NECTA needs to adopt the assessment mode that pays attention to the process rather than outcome of education, in which formative assessment takes an overriding role. Within the formative assessment, the council needs to establish various criteria of attainment in terms of knowledge, skills

and values. Secondly, the NECTA should play an active role in the CBA process by participating in the field, that is, in schools and colleges bearing the fact that the changes that occur in learners need to be spotted as they occur. Thirdly, it is also recommended that the Tanzanian Institute of Education (TIE) designs the syllabi that clearly integrates knowledge, skills, and values competences for each of the content from which the NECTA can straightforwardly develop the competence-based assessment procedures. Fourthly, is also recommended that the NECTA be involved in performance-based assessment to be able to record individual learners' abilities to act as well as to self-regulate their social well-being in the course of learning.

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The Assessment Literacy for Secondary School Teachers in Tanzania

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ABSTRACT

In this quantitative study, the assessment of literacy for secondary school teachers in Tanzania was examined using the Assessment Literacy Inventory (ALI), originally developed by Mertler and Campbell in 2005. Data were collected from 100 randomly selected secondary school teachers using the modified inventory which matched the local context. The purpose of employing ALI was to evaluate the levels of competence within the seven assessment standards and determine significant differences among the variables. The findings revealed that teachers had different levels of skills across these standards. Higher performance was observed in the area of "Choosing Assessment Methods that are Appropriate for Instructional Decisions," which scored an average of 1.52. In contrast, "Developing assessment methods that are appropriate for instructional decisions" had the lowest average score of 0.98. The Findings also revealed that significant differences were found in the mean competence of teachers with varying professional qualifications (p -value = 0.013). Teachers with master's degree qualifications had a mean score =10.20, which was higher assessment literacy compared to teachers with Diploma qualifications which had the mean score =7.7. However, the amount of time teachers spent in teaching (teaching experiences) had no significant impact on their assessment literacy (p -value = 0.429). Generally, the study revealed a worrying trend and indicated that Tanzania secondary school teachers have limited levels of assessment literacy. To address this, the Ministry of Education, Science and Technology should prioritise the enhancement of assessment literacy amongst secondary school teachers through comprehensive professional development programmes in collaboration with educational institutions.

Keywords: Assessment literacy, teachers, educational assessment, assessment literacy inventory; assessment standards

INTRODUCTION

Assessment is an important part of teaching and learning because it guides many educational decisions. This is why educators, including secondary school teachers, need to have the right skills in educational assessment to evaluate their students effectively. Besides, a growing board of knowledge asserts that assessment of students' achievement is a cornerstone of all levels within the system of education (Almosa & Alzahrani, 2022; Akayuure, 2021; Agu et al., 2013). Dutta (2020) added that assessment is an important tool for ensuring quality in the teaching and learning processes. The process of assessment provides information that facilitates most of the decisions in the educational process (Szarka, et al., 2022). Therefore, assessment offers formative and summative evidence upon which educational decisions are made (Akayuure, 2021).

On the other hand, assessment may take different forms and can be used for different purposes. It remains to be the daily business for educators across all levels of education and with the power to shape the curriculum and the teaching and learning processes. Teachers are responsible for designing and implementing different assessment methods in the classroom environment in order to collect information that can facilitate informed decision making. Cagasan (2020) holds that teachers need to demonstrate high level of assessment literacy in order to plan, design, implement and evaluate assessment schemes effectively. According to DeLuca et al. (2015), assessment literacy is referred to ability for a teacher to construct, administer and score assessment while maintaining reliability and validity. Popham (2011) viewed assessment literacy as teachers' demonstration of knowledge and understanding of assessment and its practices. For a teacher to be

literate in the field of assessment, s/he should know the skills, knowledge, or competencies to be assessed, reasons for the assessment to be conducted and the effective assessment methods to be used (Almossa & Alzahrani, 2022). Generally, assessment literacy is seen as the ability of a teacher to appropriately use the principles and assessment methods to obtain information that can lead into meaningful decision concerning the teaching and learning process (Delosa, et al. 2021). Most of the definitions of assessment literacy are largely rooted in the seven standards for Teacher Competence in Educational Assessment of Students developed jointly by several organizations. These organizations include the American Federation of Teachers (AFT), the National Council on Measurement in Education (NCME), and the National Education Association (NEA) (1990). These standards reflect seven broad competences a teacher needs to have to be considered literate in educational assessment.

These seven standards include: (a) choosing assessment methods that are appropriate for instructional decisions; (b) developing assessment methods that are appropriate for instructional decisions; and (c) administering, scoring, and interpreting the results of both externally-produced and teacher produced assessment methods. Others are (d) using assessment results when making decisions about individual students, planning teaching, developing curriculum and school improvement; (e) developing valid pupil grading procedures which use pupil assessments. Finally, (f) communicating assessment results to students, parents, other lay audiences, and other educators and (g) recognizing unethical illegal and otherwise inappropriate assessment methods and uses of assessment information (AFT, NCME, NEA, 1990). Scholars are guided by several standards for teacher competence in education assessment to design and use a number of instruments for measuring assessment literacy of teachers. The mostly recognized tool was the Assessment Literacy Inventory (ALI) developed and used by

Mertler and Campbell (2005). ALI has been extensively used to measure and evaluate teachers' assessment literacy across all levels of education since its development. Muhammad et al (2019) conducted a survey of 101 teachers in Iraq using classroom assessment inventory (CALI) with a modification of ALI and found that most of the teachers even if responded to be adequately trained for assessment, they still had low levels of assessment literacy. Frad and Tabatabaei (2018) have also used ALI to investigate the assessment literacy of teachers in Iran and found that most of them were at low level of assessment literacy. Hailaya (2014) used the same instrument in Phillipines to survey the assessment literacy of 582 teachers and found that elementary and secondary school teachers in the country possessed relatively low assessment literacy. Furthermore, a study by Yamtim and Wongwanich (2014) used ALI to investigate classroom assessment literacy of 19 primary school teachers at Wat Phai Rong Wua School and found that, most of the participants had poor level of assessment literacy.

The study suggested the need for improving teachers' level through continuous professional development. In a similar vein, Larsari (2021) employed ALI to examine teacher assessment literacy (TAL) of learners' writing developments. This study basically focused on learners' writing achievements and explored the implications for teacher development. The findings underscored that instructors' assessment literacy significantly influences learners' writing ability. The study recommends strengthening of teacher education programmes by providing assessments that are practical and oriented towards enhancement of effective teaching practices. Notably, assessment literacy is one of the four core skills required in the teaching profession. In view of its significance, Tanzania has always striving to incorporate courses related to educational assessment for teacher preparation programmes at its all levels of education. Studies

conducted outside Tanzania (See, Muhammad et al, 2019; Frad & Tabatabaei, 2018; Hailaya, 2014) have indicated gaps of knowledge and skills in the field of assessment by most of the teachers. However, in Tanzanian context, there is inadequate literatures on the assessment literacy of secondary school teachers. Therefore, the purpose of this study was to measure the assessment literacy of secondary school teachers in Tanzania in relation to assessment standards and propose measures on how to improve their assessment literacy.

Research Question

- i. What is the level of assessment literacy for secondary school teachers in Tanzania?

Hypothesis

- i. There is no significant difference in the assessment literacy level of secondary school teachers when measured by their professional qualifications.
- ii. There is no significant difference in the assessment literacy level of secondary school teachers when measured by their teaching experience.

Methodology

This study was guided by quantitative research approach, whereby correlational survey design was employed to establish the significant difference between variables. The study employed probability sampling technique to enable each respondent an equal chance to participate in the study. The sample size of 100 secondary school teachers was obtained through stratified proportional and simple random techniques. Assessment literacy inventory (ALI) was used as the tool for data collection. This tool was adopted and developed from the original ALI developed by Mertler and Campbell (2005). The current study consisted of two sections of ALI. Section A had three items on demographic information of the teachers' gender, professional

qualifications, and teaching experience. Section B consisted of 35 multiple choice questions arranged in five scenarios with each scenario having seven questions. The seven questions corresponded to the standards for teacher competence in assessment of students (AFT, NCME, NEA, 1990). Therefore, there were five questions in each standard (one from each scenario). Each multiple-choice item had the stem (in form of a question or statement) and four alternatives (choices). The alternatives also consisted of one correct answer (key) and three distractors. Validity and reliability of the instrument were assured through expert review and Cronbach alpha (0.78) for internal consistency which is higher for maintaining the data for further analysis. Both descriptive (Mean and Standard deviation) and inferential statistics (Analysis of Variance-One way ANOVA) were performed whereby the Statistical Package for Social Sciences (version 23) software assisted in running the data. The confidence interval was taken under 95% with significance level of 0.05. Ethical issues such as confidentiality, anonymity and respondents' privacy were all maintained and ensured.

Findings and Discussion

The findings of the study focused on the stated objective and research questions as revealed in the subsequent sections.

Table 1: The Level of Assessment Literacy for Secondary School Teachers in Relation to Assessment Standards

Standards and Corresponding Items	Min	Max	Mean	Std. Deviation
Standard one: choosing assessment methods that are appropriate for instructional decisions (items; 1, 8, 15, 22, 29)	0	4	1.52	1.147
Standard two: developing assessment methods that are appropriate for instructional decisions (items; 2, 9, 16, 23, 30)	0	3	.98	.869
Standard three: administering, scoring and interpreting the results of both externally-produced and teacher produced assessment methods (item; 3, 10, 17, 24, 31)	0	4	1.10	.909
Standard four: using assessment results when making decisions about individual students, planning teaching, developing curriculum and school improvement (Items; 4, 11, 18, 25, 32)	0	4	1.50	.886
Standard five: developing valid pupil grading procedures which use pupil assessments (Items; 5, 12, 19, 26, 33)	0	3	1.14	.904
Standard six: communicating assessment results to students, parents, other lay audiences and other educators (Items; 6, 13, 20, 27, 34)	0	4	1.10	.995
Standard seven: recognizing unethical illegal and otherwise inappropriate assessment methods and uses of assessment information (Items; 7, 14, 21, 28, 35)	0	3	1.40	.756

Choosing Assessment Methods Appropriate for Instructional Decisions

Had a minimum score of zero and a maximum score of four. The mean score for this standard was 1.52, indicating that, on average, teachers scored below the midpoint. The standard deviation was 1.147, suggesting a considerable variation in the scores. This indicates that teachers have some level of familiarity with appropriate assessment methods for instructional decisions, but there is a room for improvement. One possible explanation for the prevalence of traditional assessment methods, which primarily focus on recalling information rather than measuring mastery of intended skills, could be teachers' lack of appropriate skills in selecting the best assessment methods (Le et al., 2023). This finding suggests that teachers may be relying on familiar assessment techniques, even if they are not ideal for evaluating students' learning outcomes accurately. Arguably, the use of assessment methods that do not align with their intended purposes can hinder the improvement of the teaching and learning process (Agu et al., 2013). This implies that some teachers might be assessing students merely for the sake of assessment, without utilizing the assessment results to enhance instruction and learning. The findings underscore the importance of ensuring that assessment methods are appropriately aligned with instructional goals, as they play a crucial role in informing teaching practices and facilitating students' progress.

Developing Assessment Methods Appropriate for Instructional Decisions

Had a minimum score of zero and a maximum score of three. The mean score for this standard was 0.98, which is below the midpoint. The standard deviation was 0.869, indicating a moderate level of variation in the scores. This suggests that teachers have a relatively lower level of competence in developing appropriate assessment methods for instructional decisions. The mean score value indicates

that teachers struggle more significantly in the aspect of developing appropriate methods of assessment. The study conducted by Morris (2017) further supports the notion that teachers face challenges in developing appropriate assessment methods. It specifically highlights that teachers scored the lowest in items related to this particular standard. This reinforces the need for intervention and support to enhance teachers' understanding and application of assessment techniques. One possible explanation for inadequate literacy of teachers in this domain is the lack of training on assessment methods. As Khan et al. (2022) suggest, teachers may heavily rely on traditional paper and pencil tests as the sole method of assessment due to a lack of exposure to alternative approaches. This narrow focus on a single assessment format limits the opportunities for teachers to develop a comprehensive understanding of various assessment methods available to them.

Administering, Scoring, and Interpreting the Results of both Externally-Produced and Teacher-Produced Assessment Methods

Had a minimum score of zero and a maximum score of four. The mean score for this standard was 1.10, which is below the midpoint. The standard deviation was 0.909, suggesting a moderate level of variation in the scores. This indicates that teachers have some familiarity with administering, scoring, and interpreting assessment results, but there is a room for improvement. This is aligned with Larenas et al (2022), who found that teachers generally possess lower proficiency levels in administering, scoring, and interpreting assessment results. This suggests that the issue under discussion is not isolated to a particular context or region, but may be a more widespread concern among educators. In Zimbabwe, Chada (2022) underscores the challenges faced by teachers in the administration of assessments. Many teachers reported a lack of awareness regarding their exact responsibilities in this regard. This lack of clarity can hinder their ability to choose

appropriate assessments and effective interpretation of the results. Interestingly, the study mentioned by Nurdiana (2022) suggests that despite the involvement of teachers in administering and scoring assessments, a significant portion of teacher programmes do not adequately incorporate assessment skills. This indicates a potential gap in teacher education programmes, where there may be insufficient emphasis on equipping teachers with the necessary skills and knowledge in assessment practices.

Using Assessment Results when Making Decisions about Individual Students, Planning Teaching, Developing Curriculum, and School Improvement

The data shows that the mean score for using assessment results when making decisions about individual students, planning teaching, developing curriculum, and school improvement was 1.50, indicating that teachers have a low level of proficiency in this area. The minimum score was 0, indicating that some teachers missed all the items on this standard, while the maximum score was 4 (out of 5), meaning that no teacher scored all the items correctly on the same standard. The standard deviation was 0.886, indicating moderate variability in teachers' abilities. These findings generally show that teachers are less skilled in using assessment results for decision-making.

This is aligned with Weng and Shen (2022), who reported that teachers' insufficient skills may lead to irrational educational decisions. In the same line, Fitriyah et al. (2022) reported that teachers face challenges in using assessment results for improving student learning. This deficit in the ability to utilize assessment results for informed decision-making could have detrimental consequences in education. As highlighted by Almosa and Alzahrani (2022), Dutta (2020), and Szarka et al. (2022), assessments play a fundamental role in shaping educational decisions and ensuring teaching and learning quality. However, teachers'

inadequacy in this area, as supported by Weng and Shen (2022) and Fitriyah et al. (2022), may lead to irrational decisions, hamper student learning improvements, and hinder effective curriculum development. The support document and the broader context provided by Chen et al. (2021) and Huber and Skedsmo (2016) underscore that assessments serve as the cornerstone for educational decisions. Thus, it is crucial for teachers to possess the necessary assessment literacy to maximize positive impact of assessments on individual students, teaching strategies, curriculum enhancements, and overall school improvement efforts.

Developing valid Pupil Grading Procedures which use Pupil Assessments

On this aspect, the findings indicate several key points. Firstly, the mean score of 1.14 suggests that, on average, teachers scored below the midpoint of the grading procedure assessment, implying that there is a room for improvement in their understanding and application of these procedures. Additionally, the minimum score of 0 reveals that some teachers did not answer any questions correctly, suggesting the need for fundamental support in this area. Conversely, the maximum score of 3 out of 5 implies that no teacher scored correctly all the items. This suggests that there is still a room for improvement even amongst those with better performance.

The moderate standard deviation of 0.904 indicates a notable level of variation in the scores, suggesting that while some teachers may have a decent grasp of grading procedures, others might struggle more. These findings are in line with prior research such as Hung and Wu (2023), who emphasized the challenges teachers face in grading practices. Furthermore, Athuman's (2023) study whose focus is on biology teachers in Tanzania, reinforces the idea that grading can be particularly challenging, especially in competence-based assessments.

Therefore, the findings of the current study underscore the importance of providing ongoing professional development and support to help teachers enhance their skills in developing valid grading procedures, thereby ensuring fair and accurate assessment practices in education.

Communicating Assessment Results to Students, Parents, other Lay Audiences, and other Educators

The data show that the mean score for communicating assessment results to students, parents, other lay audiences, and fellow educators was 1.10. This indicates that teachers have a low level of proficiency in this area. The minimum score of 0 indicates that there are teachers who missed all the items on this standard, while the maximum score of 4 (out of 5) indicates that no teacher scored all the items correctly on the same standard. The standard deviation was 0.995; this indicates significant variability in teachers' abilities in this domain. These findings generally show that teachers are less skilled in communicating assessment results effectively. This is in line with Marzaini et al. (2023), who also reported moderately low competence among teachers in this aspect. While Larenas et al. (2022) reported that teachers had difficulty with this skill, Shapovalovy and Evans (2022) indicated the importance of enhancing educators' assessment literacy to address these challenges. It is argued here that if teachers are not skilled in communicating the results of assessments, it can lead to misunderstandings, hinder student progress, and limit parental involvement in the education process. Therefore, improving teachers' proficiency in communicating assessment results is essential for effective education practices.

Recognizing Unethical, Illegal, and Otherwise Inappropriate Assessment Methods and Uses of Assessment Information

The data show that the mean score for recognizing unethical, illegal, and inappropriate assessment methods and uses was 1.40. This indicates that teachers are less competent on this aspect. On one hand, the minimum score of 0 indicates that there are some teachers who missed all the items in this standard. On the other hand, the maximum score of 3 (out of 5) indicates that no teacher scored all five items in this standard. The standard deviation of 0.756 shows that there is variation in teachers' competence levels in this area. Teachers being less competent in recognizing inappropriate assessment practices has also been reported by Jaber (2023) who noted a low ability to recognize unethical assessment procedures. Jaber noted that low ability to recognize unethical assessment procedures can lead to misinformed assessment practices with adverse consequences. These consequences may include unfair treatment of students, misallocation of resources, and a lack of trust in the education system. To ensure integrity of assessment practices and protect the rights of students, it is imperative to enhance teachers' understanding and recognition of unethical and inappropriate assessment methods, and their potential negative impacts. Therefore, there is a clear need for improvement in teachers' understanding and recognition of unethical and inappropriate assessment methods and their potential negative consequences.

Table 2: Means, Standard Deviations, and One-Way Analyses of Variance in Determining the Significant differences between Assessment Literacy and Professional Qualifications

Measure	Diploma		Bachelor Degree		Postgraduate Diploma		Master		F (3, P-96)	Value
	M	SD	M	SD	M	SD	M	SD		
Literacy	7.67	2.75	9.03	1.97	8.00	1.55	10.20	2.78	3.786	0.013

The findings in Table 2 show that teachers with master's degree qualification had higher mean scores (10.20) of assessment literacy

compared to teachers with diploma qualification (7.67). Furthermore, when the hypothesis was tested to establish the significant differences in the assessment literacy level of secondary school teachers when measured by their professional qualifications. The findings revealed that there is significant differences amongst the professional qualifications ($p=0.013$). The findings of the current study postulate that the higher the teacher's education qualification the better the assessment literacy and vice versa. These findings are in agreement with the study of Odiemo and Kinyua (2018) who found that the level of education is significant towards validity and reliability of teacher made test. Therefore, the current study suggests further research to explore more on the reasons for higher qualifications to have higher assessment literacy while all respondents were qualified to teach in secondary schools and assessing teaching and learning activities. Researchers, however, thought of two reasons for their differences. Firstly, some secondary school teachers with master's degree qualifications went through diploma teacher education prior to joining the university's bachelor degree of education, whereby the course of educational measurement, assessment, and evaluation is offered. Thus, these teachers had an opportunity to learn educational measurement twice (at diploma and first-degree levels).

Thus, it is expected that these teachers have higher expertise compared to those with diploma qualifications who studied once in their diploma teacher education. Secondly, from the experiences in teaching at secondary schools prior to joining higher learning institutions, teachers with bachelor's and master's degree qualifications are assigned higher classes (forms) to teach. It is expected that these teachers would teach effectively and complete the syllabus in due time and provide more assessment tasks to students, and in turn, students may perform better in their final examinations. Thus, through performing several assessment tasks, they gain knowledge and skills on assessment unlike

their counterparts with a diploma level of education. The mean competencies in the field of educational assessment amongst teachers of different teaching experiences were compared to determine if teaching competence influences teachers’ assessment literacy. The results of the comparison have been presented in Table 3.

Table 3: Teacher’s Assessment Competence according to their Teaching Experience

Experience	N	Mean Competence	Std. Deviation	Minimum	Maximum
1-5 Years	30	8.66	1.76	6.00	12.00
6-10 Years	40	9.20	2.91	4.00	13.00
11-15 Years	16	8.25	2.35	5.00	12.00
16 Years and Above	14	8.28	1.32	7.00	10.00
Total	100	8.76	2.34	4.00	13.00

Source: Field data (2023)

Teachers with 6-10 years of experience demonstrate the highest mean competence, with a score of 9.20. Meanwhile, teachers with 1-5 years of experience exhibit a slightly lower mean competence of 8.67. Educators with 11-15 years of experience show a mean competence of 8.25 and those with 16 years and above of experience display a similar mean competence of 8.29. To test whether the observed differences were significant, an analysis of variance (ANOVA) was run at a 95% confidence level and the results of analysis are presented in Table 4.

Table 4: ANOVA Table for Determining Significant differences between Assessment Competence and Teaching Experience

Assessment competence

	Sum Squares	of df	Mean Square	F	Sig.
Between Groups	15.316	3	5.105	.930	.429
Within Groups	526.924	96	5.489		
Total	542.240	99			

Source: Field data (2023)

The results of the one-way ANOVA indicate that there are no statistically significant differences in the assessment competence mean scores of teachers based on their teaching experiences. This conclusion is based on the F-statistic of 0.930 and the associated p-value of 0.429. This suggests that, despite having many years of teaching experience, teachers still lack most of the essential skills needed to be competent in the field of educational assessment. The findings from this study diverge from other studies that observed significant differences among the variables (Agu et al., 2013; West, 2000). For example, the study by West (2000) indicates a strong positive relationship between teachers' years of teaching experience and teacher ability to assess teaching and learning activities. Arguably, the findings of the current study act as a wakeup call for the Tanzania Institute of Education – a key player in supporting teachers' professional growth – to continue with capacity building for all teachers in areas of educational assessment, regardless of their teaching experience. It is expected that the knowledge and skills acquired will improve teachers' capacity to assess teaching and learning activities and help avoid common pitfalls that will occur along the way.

Conclusion and Recommendations

In the context of secondary education in Tanzania, a concerning trend emerges as teachers consistently display low levels of assessment literacy across the seven examined standards. With mean scores often falling below the midpoint, it is evident that there is substantial room

for improvement in their competence, especially in the areas where teachers struggle the most. Such areas include developing appropriate assessment methods, using assessment data effectively for decision-making, and creating valid grading procedures. These shortcomings may lead to persistence of outdated assessment practices, hindering accurate evaluation of students' true learning outcomes and potentially impeding overall educational process. While some studies indicate similar challenges in assessment literacy worldwide, addressing these issues through targeted professional development and support is imperative so as to enhance educational practices and ensure quality in Tanzanian secondary education system. Based on the findings and discussion above, this study recommends the following. One, the Ministry of Education, Science and Technology should prioritize the enhancement of assessment literacy among Tanzanian secondary school teachers through comprehensive professional development programmes in collaboration with educational institutions.

These programmes should equip teachers with the skills to select suitable assessment methods, administer assessments effectively, interpret results, and utilize assessment data for informed decision-making. Two, teacher training institutions should revise their curricula to include thorough training on assessment practices, emphasizing the selection of appropriate assessment methods, the development of valid grading procedures, and ethical considerations. Three, educational officers should provide ongoing support and mentorship to teachers, encouraging the application of assessment knowledge in the classroom. Lastly, teachers themselves should engage actively in professional development opportunities, workshops, and peer collaboration to continuously improve their assessment literacy and contribute to better educational outcomes.

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Integrating Learning Management System and Digital Library for Students' Assessment

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ABSTRACT

Information and Communication Technology (ICT) has recently advanced in education sector where teachers and other educational stakeholders use learning management system (LMS) to improve students learning. Tanzania in the meantime, has implementing multiple initiatives aimed at enhancing ICT integration in education. The initiatives includes connection of National ICT broadband backbone, implementing various ICT projects such as Tanzania Education and Research Network (TERNET) and the use LMS and digital library (DL) through Tanzania Institute of Education (TIE). Apart from the government initiatives, a critical gap exists in the knowledge and proficiency of both tutors and students in utilizing LMS and DL skills to enhance creativity. This study seeks to address this issue by exploring the integration of LMS and DL to preserve the talents and skills of educators and students. The research utilized a mixed-method approach that involved questionnaires and interviews from tutors. Data were analyzed both inferentially and descriptively. The study found that 33% of tutors were competent to ICT skills related to LMS and DLs. Furthermore, the study proposed a digital library system (DiLaS) prototype as a blueprint for integrating LMS and DLs to support students in learning and assessment. The paper recommends that the government should draw policy strategies that support innovation in digital systems to preserve exceptional skills.

Keywords: Retention of talented skills, learning management systems (LMS), ICT skills, and digital library

INTRODUCTION

Learning management system (LMS) refer to the computer software that designed to manage user-learning interventions and provide access to online learning services for students, teachers, and administrators. It is used to upload, teach, and assess learning processes. Historically, the LMS started in 1960s where it was known as an offline LMS. It was not supported by the web-based systems (Rashid & Ullah, 2021). The LMS has passed through various evolutions, including the recent LMS such as google classroom and Edmodo. The use of LMS in African countries has not been effective due to technological challenges. The adoption of LMS in Tanzania has not implemented widely since very few universities and colleges use LMS in teaching their courses. For instance, during covid-19, all universities and colleges were closed implying that utilization of LMS was affected. LMS has the unique features which differentiate with other software and social media such as WhatsApp and Facebook.

The features of LMS includes Instructional features; they are used in course development, creation of assignments, test and management of the course. The content management features enable instructors to upload teaching materials such as files, slides, PDFs, audio files, and videos. On the other hand, it enables the student to upload the activities provided in the learning platform. User management features involves importing and exporting user accounts in LMS. In addition to that it creates and manages user accounts, group's accounts and maintenance of user passwords, profiles and other user's data. Interactive features enable communication between teacher and students. Some example of these features includes chat room, messaging, mutual uploading or downloading of files, digital drop boxes and the links for transfer files from LMS and other software such as Microsoft word and excel. Students and teachers should have an ability to post questions and receive answers from group members.

Visual features deal with visual appearance of the LMS platform. They include graphic interfaces, color, shapers of the buttons, font types, font sizes and link between one element and other elements. Digital library (DL) is an online database of digital objects that include text, still images, audio, video, digital documents, or other digital media formats. Xie, Joo and Matusiak (2020) defined DL as a representations of emergent and complex forms of collection of digital information, organization, design, storage, retrieval, and dissemination at various stages of development. Three distinct phases have characterized the development of DL. In the early years of DL, from 1991 to 2001, innovative and avant-garde projects were implemented in the actual world. The phase included a standards, iterative design, usability studies, and best practices for DLs have all been developed.

Secondly, in the 2000s, an open-access repositories and large-scale digitization projects were two features that contributed to content development. Though large-scale digitization initiatives improved the technology of DLs, the emergence of open-access repositories brought up questions about the diversity and complexity of DL development. Lastly, starting in 2010, large-scale DLs, such as the Digital Public Library of America, HathiTrust, and Europeana collections, are signified by their large collection size. Others include diversity of formats, general and specific collection development policies and the level of access and interoperability. Digital libraries designed to solve the challenges and implications of the library working in-house and remotely (Mehta & Wang, 2020). The physical library needs a user to be present in a room while DL do not require face-to-face appearance. The online collection includes e-books, e-newsletters, e-references, theses, and dissertations (Kato et al., 2021). Okeji and Mayowa-Adebara (2020) noted that as DL undergo various evaluation, majority of educators are also missing relevant knowledge on DL. Hamzah, Hultari, Purwati, and Nazaruddin, (2022) conducted research on the analysis of the

library information system (E-Library) based on the level of user satisfaction. The study revealed that 60.31 % of the users were quite satisfied with the performance of the DL (e-Library). Assessment in context of learning refers to strategies designed to confirm or measure what a student knows, demonstrate whether or not they have met curriculum outcomes or the goals of the running programs, or to certify proficiency and make decisions about students' future programs. Assessment includes strategies designed to monitor student progress during the learning process (Dunn & Mulvenon, 2019). In this case, it provides information that improves pedagogical practices and instructional outcomes in the classroom. The government of the United Republic of Tanzania has been implementing multiple initiatives aimed at enhancing ICT integration in education system.

The initiatives include; connection of National ICT Broadband Backbone in various educational institutions, implementing various ICT projects such as Tanzania Education and Research Network (TERNET) and the use of LMS and DL in Tanzania Institute of Education (TIE). Despite the initiatives made by the government of Tanzania to improve the status of ICT in TCs, full integration of ICT in the education system is still a challenge. A substantial number of teachers lack proficiency in computers including DL, LMS and multimedia skills (Fidelis & Onyango, 2021; Venance, 2020). Lubuva, Ndibalema, and Mbwambo (2022) found low levels of competence for tutors in ICT pedagogy to innovate teaching and preparation of digital contents for applying them in LMS. Okeji and Adebara (2020) conducted a study on evaluating the library school's curriculum in Nigeria. The study found that there is lack of qualified ICT staff to handle the course concerned with DL. It has further noted on the lack of computer laboratories equipped with modern computers with stable internet facilities. The objective of this study was to assess the integration of LMS and DLs for preserving and creating accessibility of

the exceptional talents and skills of educators and students. Talented skills can be either methodology of teaching or subject content. The preserved skills through DL will be assessed to student teachers through LMS. The talented students and teachers have passed away without documenting their works which could help the next generations. The research questions to be answered in this study are: 1) what are the software used by tutors to design multimedia content or notes? 2) What is the status of integrating LMS and DL in TCs? 3). what is the best prototype for developing digital library system (DiLaS)?

Methodology

Participants

Participants in this study were 340 tutors from ten TCs. The TCs were Butimba TC, Tabora TC, Mpwapwa TC, Morogoro TC and Korogwe TC. The above TCs have been selected because they are zonal ICT TCs so, they are well equipped with ICT infrastructure. In addition, the TCs are teaching computer science courses. Other five TCs were added from the regions near to the zonal TCs to minimize the cost and to obtain the required number of tutors. The additional TCs were Sumbawanga TC, Shinyanga TC, Mamire TC, Bustani TC and Dakawa TC.

Procedures

The research employed a mixed-methods approach that involved questionnaires from 320 tutors and interviews from 20 tutors in ten TCs. The study applied purposeful sampling to get zonal TCs. The researcher used a simple random technique to obtain 320 tutors for questionnaire because each tutor is responsible to integrate ICT in teaching his or her subjects (URT, 2007). 20 tutors for interview were purposeful selected from a principal for administrative matters and head of ICT department because of being expert in ICT.

Measures

The researcher adopted eighteen closed-ended questionnaires from (Batiibwe et al., 2017; Jude et al., 2014). The studies were selected because they used the similar model (SAMR) in measuring the status of ICT in academic institutions. Furthermore, the researcher added fifteen closed-ended questionnaires. Validity and reliability was confirmed by testing questionnaires with postgraduate students.

Statistical analysis

The study used multiple linear regressions with SPSS version 25.0 for inferential analysis. Tables, graphs, percentages, and frequencies from excel were used in the descriptive analysis for the purpose of obtaining the findings. Research ethics were considered because research clearance for TCs was sought from the University of Dodoma. There was equitable access to the data for every cluster including gender, program, and the year of study. The respondents' actual names during data collection were kept private to protect them from being victimized by their seniors.

Results

Background Characteristics of Tutors

The background information of tutors in TCs include their college affiliation, sex, age, teaching subjects, time spent in teaching TCs, and individual ICT background were taken into consideration. Generally, tutors participated well in providing their background information before attempting the questionnaires. Table 1 below provides an overview of the background details of tutors.

Table 1: Background Characteristics of Tutors

Items	Categories	Frequency (n)	Percentages (%)
College Participation	TC 1	30	9.4
	TC 2	25	7.8
	TC 3	20	6.3
	TC 4	23	7.2
	TC 5	57	17.8
	TC 6	13	4.1
	TC 7	22	6.9
	TC 8	37	11.6
	TC 9	68	21.3
	TC 10	25	7.8
Gender	Male	145	45.3
	Female	175	54.7
Age	Under 30 years	7	2.2
	30 to 45 years	237	74.1
	Above 45 years	76	23.8
Teaching subject	ICT	18	06
	Science	76	24
	Art	91	28
	Education	109	34
	Business	00	00
	Other	26	08
Number of years in teaching	Under 1 year	11	3.4
	2 to 5	137	42.8
	6 to 10	60	18.8
	Above 10 years	112	35.0
Academic qualification in ICT	Certificate	60	18.8
	Diploma	08	2.5
	Degree	33	10.3

	Masters	03	0.9
	Above Masters	00	00
	Non-ICT Profession	216	67.5
Attending ICDL	Attended	31	9.7
	Not attended	289	90.3
Attending ICT Short course	Attended	221	69.1
	Not attended	99	30.9
ICT profession development	E-learning	62	19
	Digital library	46	14.3
	Computer basics	80	25
	Other	44	13.7
	Not received	88	28

Software Used by Tutors to Design Multimedia Contents for DL and LMS

Teachers and tutors have a primary role of teaching, this is why the researcher asked about using software to create multimedia notes or contents for embedding in DL and LMS. The contents to be included in DL and LMS need enough visual aids to enable students understand the lesson easily. Power Point found to be used by 181 tutors (56%), followed by Lectora 18 (5.6%) and 55 (17.2%) were not able to use any software. Figure 1 below provides an overview of teachers' software-designing skills for multimedia content to impart in DL and LMS.

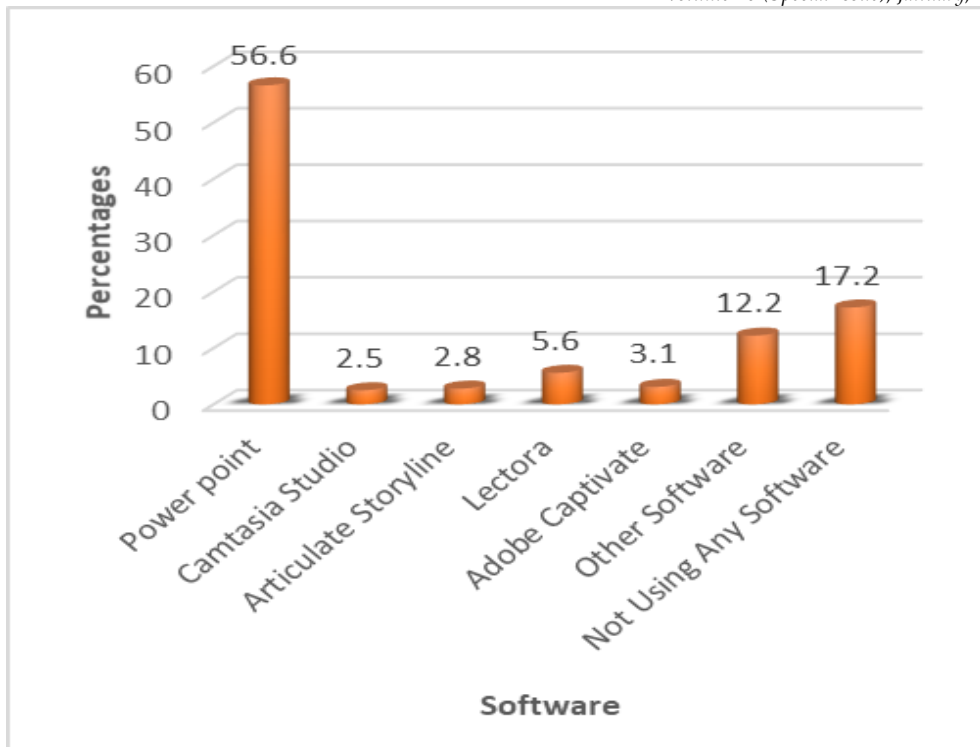


Figure 1: Multimedia Software used by Tutors for DL and LMS (Field data)

The Status of Integrating LMS and DL in Tanzanian TCs

The researcher used multiple linear regression to answer this objective. First, the researcher grouped the constructs relating with LMS and DL into four categories as adopted from Batiibwe et al. (2017) and Jude et al. (2014). The four groups were substitution, augmentation, modification and redefinition.

Testing of Assumptions

The key condition in multiple linear regression analysis is to ensure that the data meet the outliers, collinearity, and normality, amongst other assumptions, as interpreted in statistics (Field, 2017; Pallant, 2016). Multi-collinearity demonstrates extremely high or low correlations between independent variables. The study done by Pallant

(2016) explain a cutoff point ($> .10$) and variance inflation factors (VIF) below 10 as acceptable points in multiple regression tests.

Checking of Outliers on Competence in DL and LMS toward Methodology used by Tutors

The box plot analysis showed that there were no outliers. This implies that the data points within this analysis was closely around the central clusters. This implying a highly stable distribution and minimizing the potential impact of extreme values on the multiple linear regression assumptions. This result strengthens the linearity presumption and adds to the reliability of the next regression study. Appearance on outliers are summarized by figure 2 below.

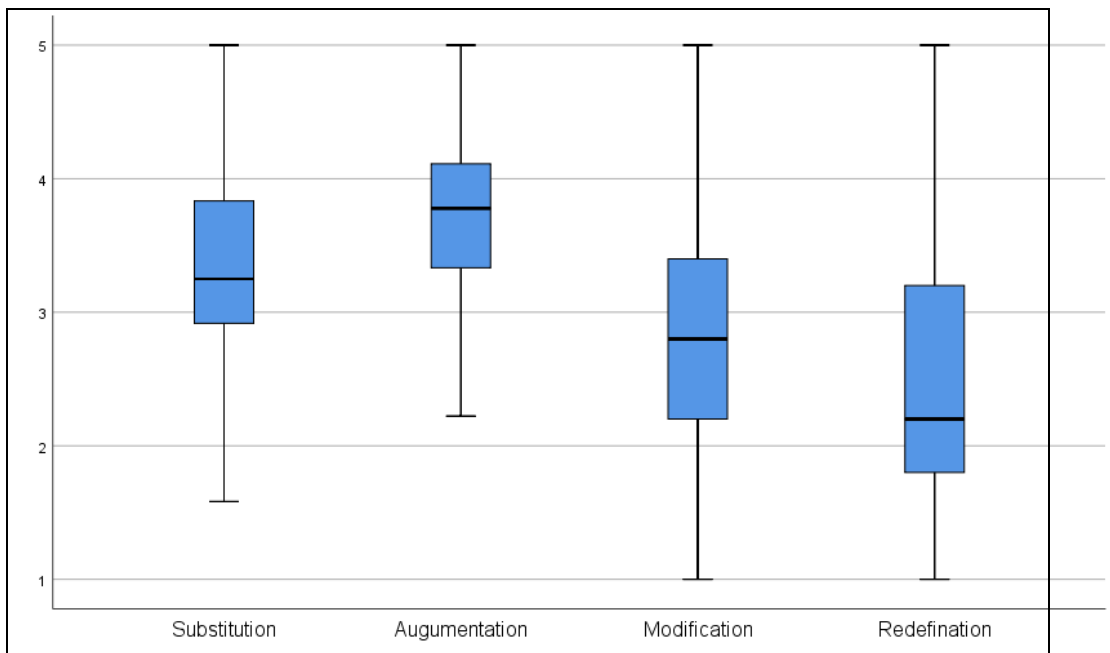
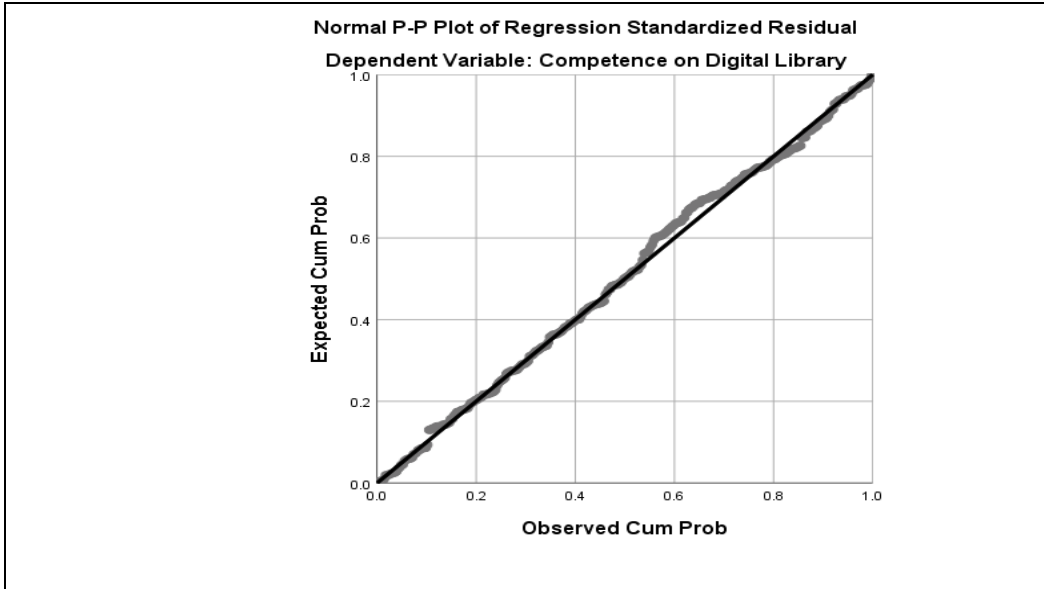


Figure 2: Outliers on Competence in DL and LMS (Field data)
Normality on Competence in DL and LMS

The observed data values are shown against the values that would be predicted if the data were normally distributed in a normal P-P plot. The plot's points should roughly lie along a straight line, sometimes

referred to as the "line of equality" or the "45-degree line," if the data has a normal distribution. Variations from this line signify deviations from the norm as shown in figure 3.



**Figure 3: Normality on competence in DL and LMS (Field data)
Linearity on Competence in DL and LMS**

Linearity involves interpreting a scatter plot in which every point for the data aligns precisely with the equality line. In this case, every data point on the scatter plot falls exactly on the line of equality, indicating a strong and linear relationship between the two variables. This points to a complete positive correlation, meaning that as one variable rises, the other rises correspondingly. Based on the linear relationship, accurate modeling and forecasting are made possible by this pattern, which indicates a very consistent and predictable association between the variables. The linearity is shown by figure 4 below.

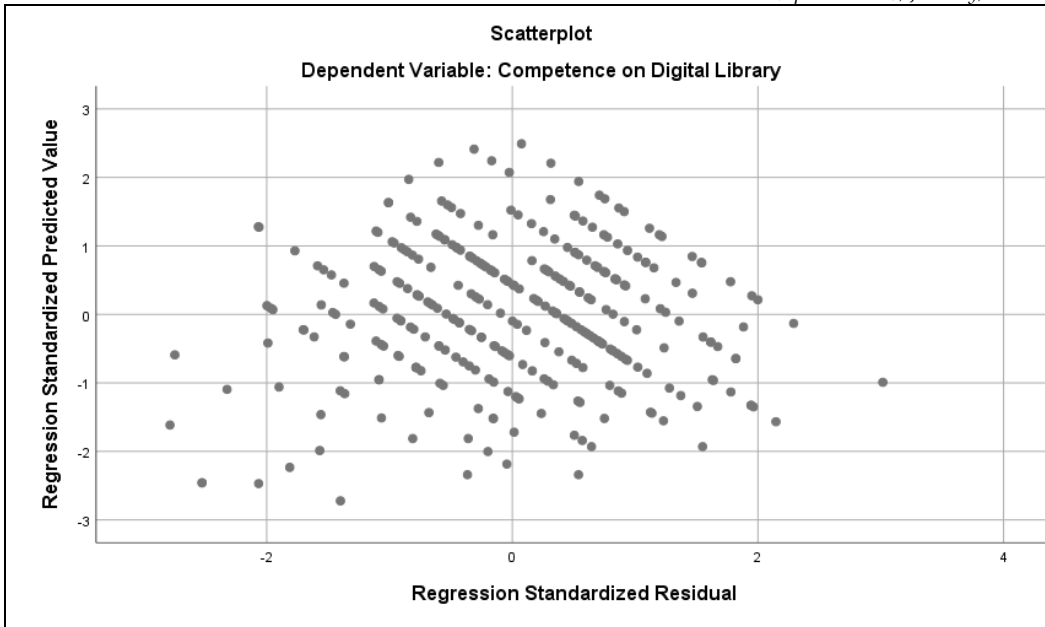


Figure 4: Linearity on Competence in DL and LMS (Field data)

Checking of Multi-collinearity on Competence in DL and LMS

The Variance Inflation Factor (VIF) values for the variables tolerance and competence on DL and LMS in the given data all fall below the generally recognized threshold of 5, showing the lack of multi-collinearity. This shows that there were no significant connection or redundancy between the two variables. Therefore, they are reasonably independent predictors in the analysis. Due to lack of interdependence between the variables, the association between the predictors and the dependent variable are more likely to be stable, which increases the regression model's reliability. Table 2 below show multi-collinearity on competence in DL and LMS.

Table 2: Checking of Multi-collinearity on Competence in DL and LMS

Competence on digital library	Tolerance	VIF
Substitution	0.615	1.625
Augmentation	0.609	1.641
Modification	0.422	2.369
Redefinition	0.460	2.176

Model Summary of Competence on DL and LMS

The regression model's R-squared value of 0.420, as reported in the model summary for "Competence on DL and LMS," means that the independent variable, "Competence on DL and LMS," can account for around 42% of the variance in the dependent variable. A substantial amount of the variance may be explained by this model while also taking the complexity of the model into consideration. This is indicated by the adjusted R-squared of 0.412, which takes the number of predictors into account. The mean difference between the observed and anticipated values is 0.553, which is the standard error of the estimate. A correlation between the variables' strength and direction is indicated by the R-value of 0.648. The model summary of competence on DL and LMS has been shown in table 3 below.

Table 3: Model Summary of Competence on Digital Library

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.648	0.420	0.412	0.553

ANOVA of Competence on DL and LMS

A statistically significant link between the competence levels and the dependent variable under investigation is revealed by the analysis of variance (ANOVA) for the effect of competence on DL and LMS. A

considerable amount of the total variance can be explained by the model. This has been shown by the regression sum of squares of 69.582 and the F-statistic of 56.924, both of which are significant at $p < 0.001$. This suggests that, variations in skills levels account for a significant portion of the variation in the dependent variable of 96.261. Basically, this is a reasonably low residual sum of squares. This indicates that a significant amount of the observed variation can be explained by the model. The ANOVA of competence in DL and LMS has summarized in table 4 below.

Table 4: ANOVA of Competence on DL and LMS

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.582	4	17.395	56.924	0.000
	Residual	96.261	315	0.306		
	Total	165.843	319			

Coefficients of Competences in DL and LMS

The Competencies of DL and LMS coefficients in the presented regression study show the associations between the dependent variable and the predictors (Substitution, Augmentation, Modification, and Redefinition) with standardized coefficients of 0.575 and 0.202, respectively. The results demonstrate that substitution and augmentation have positive and statistically significant effects on the competencies of the DL and LMS. This suggests that an increase in these competencies is correlated with a corresponding increase in the competencies of the DL and LMS. Modification and redefinition, on the other hand, show weak or non-significant because their p-values are bigger than 0.05 and their coefficients are around zero. The constant term, which represents the baseline value for DL and LMS competencies when all variables are 0, is statistically significant. This analysis indicates that while modification and redefinition have little

effects on the competences of DL and LMS, substitution and augmentation are crucial. It is concluded that, tutors are more competence in integrating LMS and DL at substitution and augmentation levels than at modification and redefinition levels. The coefficients of competences of DL and LMS are summarized by table 5 below.

Table 5: Coefficients of Competences of DL and LMS

Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
1 (Constant)	2.010	0.134		14.989	0.000
Substitution	0.493	0.047	0.575	10.509	0.000
Augmentation	0.165	0.045	0.202	3.668	0.000
Modification	-0.019	0.055	-0.023	-0.353	0.740
Redefinition	-0.057	0.048	-0.076	-1.192	0.128

The status of integrating LMS in Tanzanian TCs were further assessed with interviews from Principals and ICT tutors from ten TCs. Principals and ICT tutors from ten TCs were interviewed. It was recorded that eight TCs out of ten TCs were not using LMS. The lack of internet access for TCs was cited as the reason for not using LMS. A different respondent mentioned that some TCs' management do not have a positive attitude toward ICT integration. It was also noted that in previous years there was a TC claimed to use LMS without internet connection.

Educational ICT Prototype System from Literature Review

The prefix prot or proto, comes from Greek word meaning "first in time" or "first formed." A prototype refer to something that serves as a model or inspiration for activity that come later. The study done by Shao (2014) explored the use of mobile phones to support students

learning activities in mathematics for primary and secondary schools. A researcher proposed MoMath prototype on how SMS and IVR can be leveraged to support students in studying mathematics. Figure 5 below show the summary of MoMath prototype.

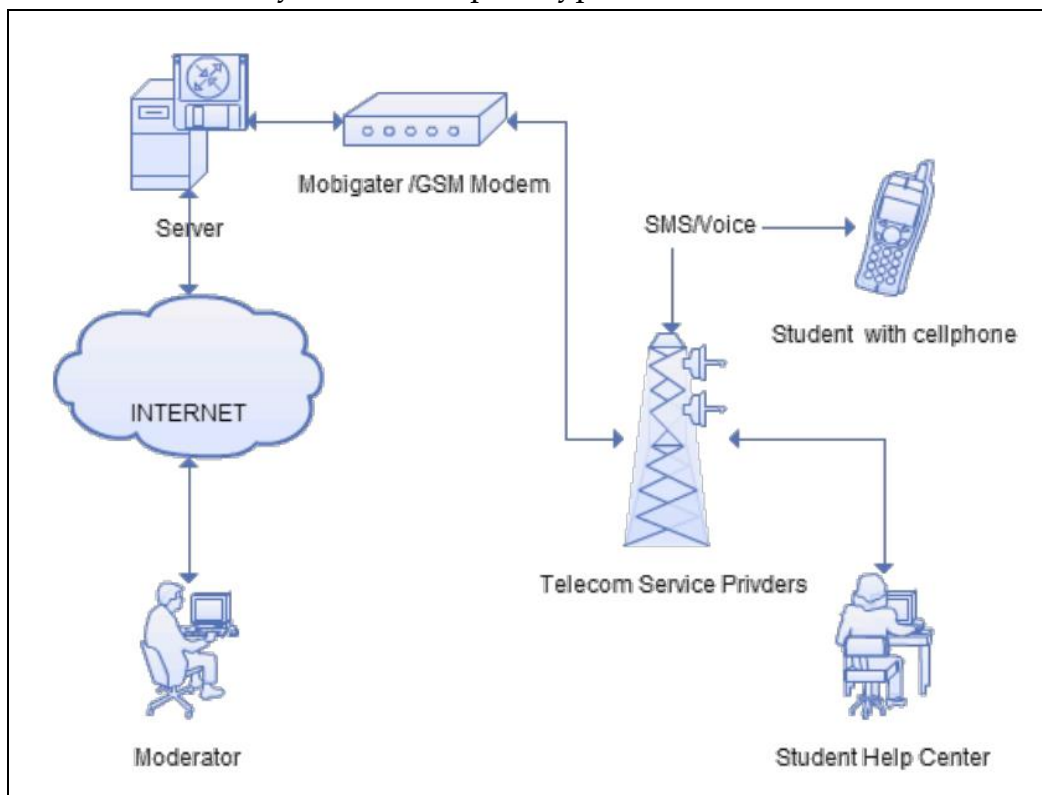


Figure 5: Components of a MoMath Prototype Adopted from Shao (2014)

Kato et al.(2021) explained the key components of designing DL. These are open access to information, the facility of access, uncomplicated interface design, high quality of the communication process, internet performance, performance assurance service, ease of communication through social network, and patron-driven acquisition. Further, DL should increase digitized content and assign metadata to it; increase server processing speed, bandwidth, and server port speed; and

promote the DL through social media (Jelena and Aleksandar, 2021). The components of DL are shown in figure 6 below.

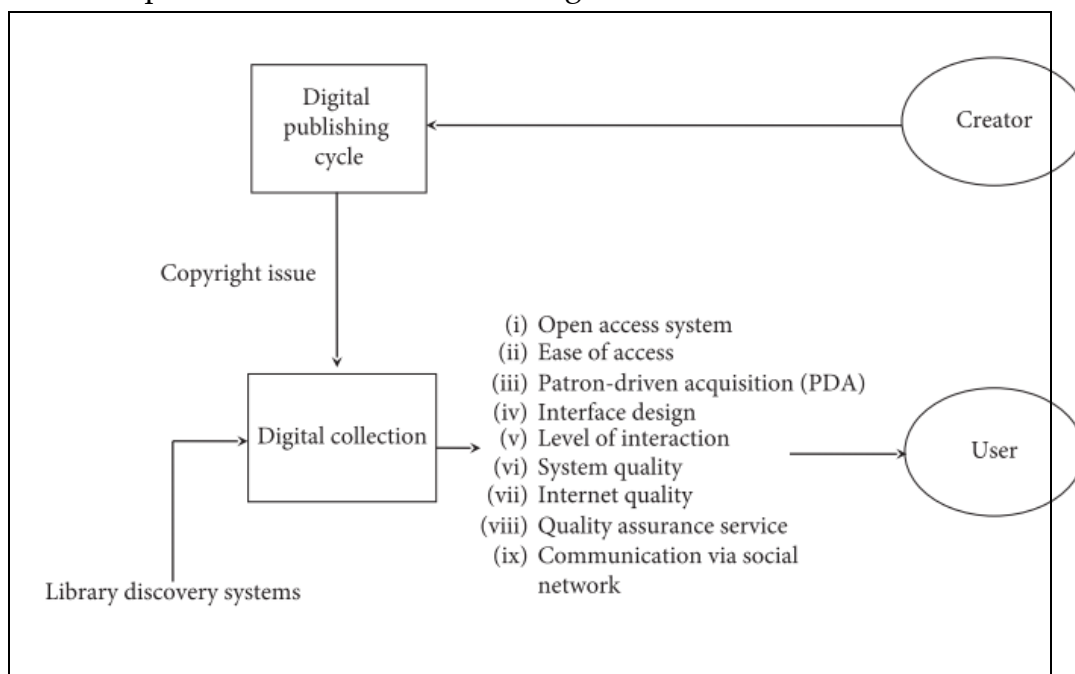


Figure 6: Proposed Digital Library Service from Kato et al. (2021)

Mageto (2021) proposed a prototype that would manage tasks that include appointments, lending, reserving, returning, processing payments, storage of book records, provide information and processing invoices for orders. There is need to consider the user experience when evaluating the DL to provide a useful insights of different aspects of the user interactions, interface, perceptions and affective variables (Barifah et al., 2020).

Discussion

The Software used by Tutors to Design Multimedia Contents for DL and LMS

The study found PowerPoint as the most frequently software used for designing multimedia contents. It appears from this that tutors' ability

to create multimedia content using other applications rather than PPT is restricted. The limited potential of ICT integration in TC as a result of tutors using PowerPoint in Tanzania was also reported by Machumu, Josephaty, Zhu, and Anania(2022). The lack of adequate multimedia abilities was also found to Tutors in TCs (Venance, 2020). Exemplary multimedia (digital) content that a tutor can create with a well-crafted narrative are shown in figures 7 below.

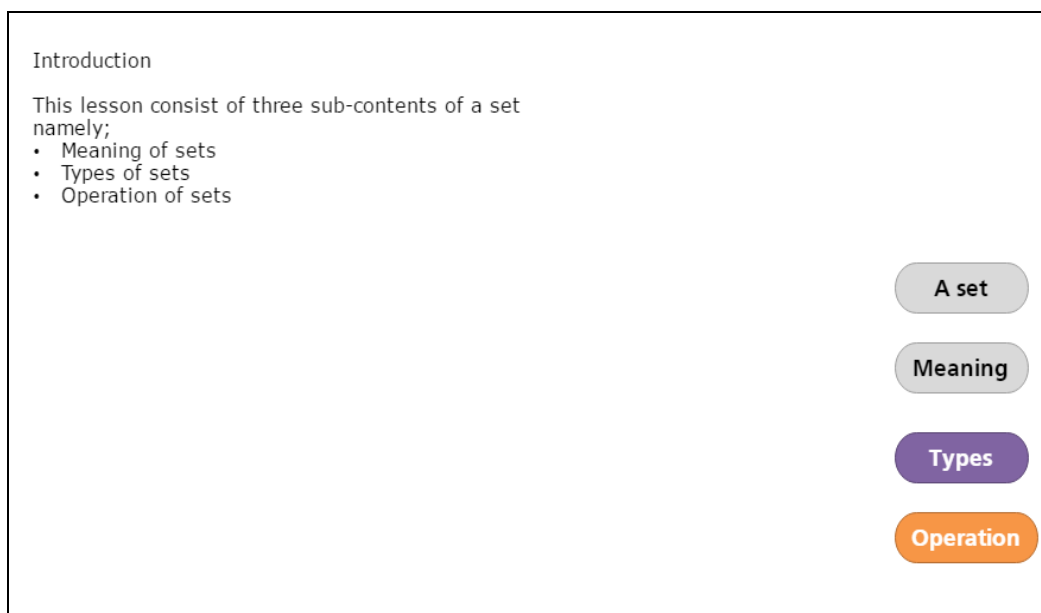
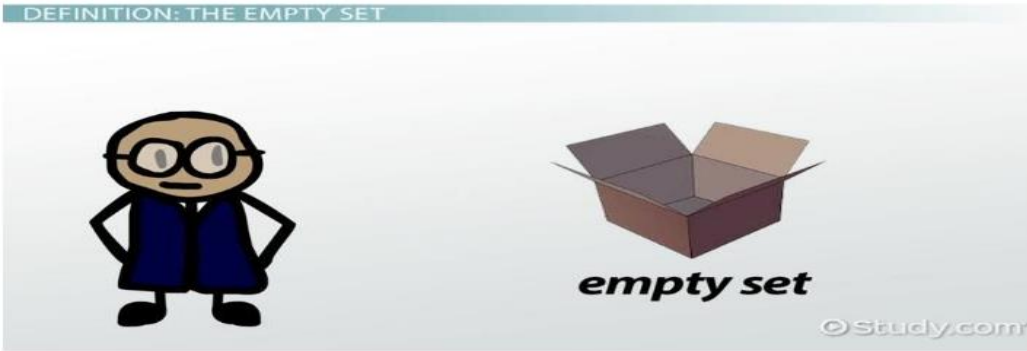


Figure 7: Multimedia (digital interactive) content for DL and LMS (A researcher own work)

After a learner click a button of type of a set; he or she will meet with different types of set. If the learner decides to study an empty set, he or she will click the button for an empty set. He or she will find the digital contents as shown in figure 8 below.

- Empty set
- ❖ Is a set with no elements, it is denoted by \emptyset , for example a set of lions in form three class

DEFINITION: THE EMPTY SET



Back

Figure 8: Multimedia (digital interactive) content for DL and LMS (A researcher own work)

The Status of Integrating LMS and DL in Tanzanian TCs

The study answered this question through questionnaire and interview of a principal and ICT tutor. Generally, TCs in Tanzania integrate ICT in term of LMS and DL at substitution and augmentation level. These are lower level of ICT integration compared to modification and redefinition (Puentedura, 2006; 2013; 2014). Similar results found by Jude et al. (2014) at Makerere university found that the integration of ICT is still at infancy stage. There is a need for the government and other stakeholders to shift from substitution and augmentation levels to modifications and redefinitions. The interviews revealed low levels of competencies of using LMS amongst TCs in Tanzania. The records indicate that only (20%) of TCs integrate LMS in teaching activities. In a similar vein, Winata, Fadelina, and Basuki (2021) validates the findings by showing that many librarians and users faced obstacles such as substandard internet networks and internet wastage when use DL and LMS. Similar non-significant results were found in the study of Okeji

and Adebara(2020) in which educators in the library schools identified challenges such as lack of qualified ICT staff to handle the course and lack of computer laboratories equipped with modern computers with stable internet facilities. The TCs and other stakeholders should ensure that the LMS operates efficiently because it plays a critical role in facilitating the e-learning process, exchanging learning resources, and streamlining learner assessment, as argued by 73.5% of participants in the Ngeze (2016) study. Also, in study done by Mhache (2017) found that, LMS like Moodle platform bridge the gap and provide access to education to all regardless of distance like during Covid-19. In addition, various studies examined on pre-service teachers' experiences on e-learning during the Covid-19. The study found that, experience on e-learning of pre-service teachers contribute in increasing their competence in applying ICT in their teaching (Pilli & Batur, 2023). Therefore, e-learning lead to student centered learning that increase innovation (Prosper & Mnyanyi, 2017).

The best Prototype for Developing Digital Library System (DiLaS)

The researcher proposed a prototype that integrate DL and LMS based on previous findings. A talented content expert will cooperate with digital content creator and multimedia expert to prepare the contents. The prepared contents will be sent to administrator ready for uploading in DiLaS. Students will learn contents; teachers will learn contents and methodologies for teaching and other educational stakeholders will provide feedback. The feedback provided will then be used as a tool for evaluation in learning. Finally, evaluation made will be used for further improvements in terms of subject contents and methodology of teaching. The summary of the DiLaS components have been summarized in figure 9 below.



Figure 9: Proposed Prototype for Digital Library System (DiLaS) (A researcher's work)

Conclusion and Recommendations

This study aims to explore the integration of LMS and DL to preserve the talents and skills of teachers, experts, and students. The study adopted both descriptive and inferential statistics to obtain the findings. The study found that ICT skills possessed by majority of tutors toward their methodology used to integrate ICT in TCs are inadequate to integrate DL and LMS. The ICT skills of tutors in TCs are inadequate because they are at levels of substitution and augmentation based on the model adopted. The government should raise the level of ICT integration in TCs up to modification and redefinition levels by improving ICT infrastructure and reviewing the education policy and

ICT syllabus at least every three years. Furthermore, there is a need of recruiting tutors with relevant skills in ICT and frequent ICT trainings should be provided. The study recommends to the government that the National Examination Council of Tanzania (NECTA) must have a policy and strategies that support innovators to implement DL systems. The strategies will preserve exceptional skills innovated by talented educational stakeholders for students' learning and assessment.

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Examiners' Feedback Reports and their Effects on Mathematics Performance in Tanzanian Secondary Schools

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ABSTRACT

The National Examination Council of Tanzania (NECTA) issues Candidates Items Response Analysis reports (CIRA) as feedback reports for improving performance in secondary schools. Despite such initiative, the performance is in critical condition. Therefore, this paper presented in the NECTA 50th years' anniversary conference which had the theme about 'Assessment bodies as stirrers for effective learning', evaluated such reports. Specifically, the study explored students' awareness of candidates' items response analysis reports; examined the perceived usefulness of candidates' items responses analysis reports; evaluated the availability of candidates' items analysis reports, assessed students access of candidates' items response analysis reports and evaluated the influence of candidates' items responses analysis reports on mathematics performance in secondary schools. The study adopted a sequential exploratory mixed methods design, multiple regression model and feedback intervention theory. Data were collected through semi-structured questionnaires and interview from students and teachers in secondary schools. The study found that, most of the students in secondary schools are not aware of examiners' feedback reports issued by the National Examination Council of Tanzania, hence do not make use of them, as the results they influence little on mathematics performance. Therefore, the study concludes that, there is a dire need for enforcing the effective utilization of such reports for improving performance. The study recommends therefore, teachers' professional training institutions, T.I.E and ADEM to incorporate the use of feedback reports in their training packages. Further study may develop intervention programme on effectiveness use of feedback reports for improving performance in secondary schools.

Keywords: Mathematics Performance, CIRA, CSEE, NECTA, Feedback Theory.

INTRODUCTION

This study as part of conference presentations for NECTA 50th years' anniversary, under the theme 'Assessment bodies as stirrers for effective learning' evaluated the influence of Candidates Items Response Analysis reports on mathematics performance in secondary schools due to the critical conditions of mathematics performance which threatens the development of reasoning, critical thinking, and decision-making skills to the learners who are prospective workforce for global, regional and national sustainable development (Narayani, 2015). Globally, Mathematics is taught as a branch of science which deals with number operations, computations, calculations, and problem solving (Yadav, 2019). Mathematics skills is essential for scientific innovations, technology development and business operation towards sustainable development (Algani, 2022).

Therefore, it is taught at different levels of education, from nursery, primary, secondary, tertiary and university level of education in both, developed and developing countries (Mazana et al., 2020; Mkenda, 2022). Despite its importance in human resource development, the performance of mathematics subject in the certificate Certificate of Secondary Education Examination (CSEE) is in critical condition (Ndume et al., 2020). There is empirical evidence of poor performance in Mathematics even in developed countries like England, China, Japan, Korea, Hongkong, Singapore and Russia (Richardson *et al*, 2020; Mullis, Martin, Foy, Kelly & Fishbein, 2019; Hanushek, Peterson & Woessmann, 2010; Bee & Kaur, 20214; Koul & Rahmawati, 2015). The situation is worse in developing countries such as Ghana (Ansa, Quansah & Migha, 2020), Rwanda (Mbarute & Ntivurugwa, 2022) and Tanzania (Joseph, 2013; Kyaruzi, 2017; Kalla et al., 2023; Masele, 2018; Tvako eta al., 2019; Kyaruzi et al., 2019; Mazana et al., 2020; Mbedule,

2020). In Singapore, students' poor performance in Mathematics subject is associated with students' misconceptions (Bee & Kaur, 2014). For the case of Ghana, minimal teachers' competences in Mathematics subject affect students' performance (Ansah et al., 2020). The study in Rwanda, noted shortage of resources, distance from home to school, little interest among students towards Mathematics subject and less parental involvement in students learning Mathematics as contributing factors for failure in Mathematics subject (Mbarute & Ntivuguruzwa, 2022). In Kenya, the study revealed that most of the students in secondary schools (76.4%) had negative attitudes towards Mathematics subjects (Njaggah, 2003). Since the Tanzania Development Vision relies mainly on the quality of its workforce, improving the academic performance in Mathematics subject is the national strategy. This is pointed out in the paradigm shift of education monitoring systems from school inspection to school quality assurance (Shahanga et al., 2021; Shahanga et al., 2021). In this sense, the poor performance in Mathematics as associated with pedagogical and poor teaching and learning environment requires the effective use of feedback reports (Michael, 2015).

Such reports are essential as they address digital literacy, negative attitude to the subject among students, lack of parental involvement as well as lack of responsibility and accountability among students, teachers, and school management (Mazana et al., 2020; Mbedule, 2020; Kyaruzi et al., 2019; Masele, 2018; Kalla et al., 2023). The performance reports in Mathematics assessment should serve as feedback for intervention improvement (Hattie & Tmperley, 2007). It should enable the interaction between students and their teachers to correct misconceptions and improve accuracy in number operations, and problem solving (Barana et al., 2021). It enables teachers to work shoulder to shoulder with their students to address issues raised in Mathematics feedback (Stovner, 2021). The meaningful feedback in

Mathematics works effectively to students if accompanied with teachers' guidance to direct students on how to perform Mathematic operations (Koskinen & Pitkaniemi, 2022). The effective use of examination feedback, bridges skills gaps through suggested improvement strategies towards high performance from the crisis of failure (Yusoff, 2013). It tells the desired directions towards maximum performance through effective implementation of the given recommendations (UCL, 2017). The suggested measures must be scalable, affordable, and manageable by different school stakeholders, such as students, teachers, parents, and management (Grayson, 2018). The students, as the victims of learning assessments, need to know why, which, and how the marks are awarded in each item response hence improve their preparation for the forthcoming examinations (OECD, 2011). This enables feedback to be a useful tool to students, teachers, and management as it gives directions from the current state to the desired future (Yusoff, 2013). It requires continuous reflection, collaboration strategies and intervention measures to address performance challenges (Santos & Pinto, 2010).

Feedback informs teachers and management on pedagogical weakness; it motivates learners and enable them to capitalize on their strengths and work out their weaknesses towards the pre-determined academic goal (Pearson, 2016). However, the study in South Africa indicates that there is inadequate use of constructive feedback to enhance teaching and learning Mathematics subject, hence prolonged poor performance of the subject (Naroth, 2010). In the context of Tanzania, the National Examination Council (NECTA), through candidates' items responses analysis reports gives recommendations to students, teachers, and school management as intervention measures towards improving the academic performance of Mathematics and other examined subjects (NECTA, 2017; 2018; 2019; 2020; 2021). Despite the improvements

recommendations, the pass rate in Mathematics has been very low in five years consecutively: 19.19% (2017); 20.02% (2018); 20.03% (2019); 20.12% (2020) and 19.54% (2021). Moreover, the pass rate for ten years, between 2012-2022 has been less than 25% (Mkenda, 2022). This situation makes the use of candidates' items responses analysis reports questionable, hence a need for thorough investigations. This study, therefore, this study examined examiners' feedback reports and their effects on Mathematics Performance in Tanzanian secondary. The study adopted a feedback intervention theory by Kluger and DeNisi 1996 which based on the assumption that relevant feedback information and individual initiatives influences the achievement of the performance target (Luger & DeNisi, 1996). The study was guided by the following specific objectives: to explore students' awareness of candidates' items response analysis reports and to examine the perceived usefulness of candidates' items responses analysis reports. Others are to evaluate the availability of candidates' item analysis reports, to assess students access to candidates' item response analysis reports, and to evaluate the influence of candidates' item response analysis reports on Mathematics performance in secondary schools. To achieve such objectives, the study tested the following alternative hypotheses:

- H₁ Students' awareness about CIRA contributes to improvement of Mathematics performance*
- H₂ Students perception about CIRA contributes to improvement of Mathematics performance*
- H₃ The availability of CIRA in schools contributes to improvement of Mathematics performance*
- H₄ Students' access of CIRA contributes to improvement of Mmathematics performance*

H₅ Students' use of CIRA contributes to improvement of Mathematics performance

Methodology

The study adopted a sequential exploratory mixed methods design in which data were collected through questionnaires and face to face semi-structured interviews. The questionnaires were administered to 252 four students and interviews were conducted to five Mathematics teachers. The simple random sampling was employed to select 252 students from five public secondary schools in Nyamagana City – Mwanza region. The five schools were also randomly sampled. Nyamagana City was purposively selected due to its favourable geographical location at the heart of the region. It was expected such reports to be adequately available and used in schools for improving Mathematics performance, as compared to schools in remote areas due to exposure and resource availability. The quantitative data were coded into themes and subjected into statistical package for social sciences (SPSS) software to generate frequency, percentages, and coefficients through multiple regression model. The qualitative data were subjected to content analysis where themes and subthemes were organically generated (Cresswell & Plano-Clark, 2018).

Model specifications

$$IMP = \beta_0 + \beta_1 WMC + \beta_2 PMC + \beta_3 VMC + \beta_4 AMC + \beta_5 UMC + \epsilon$$

Whereby:

IMP= Improved Mathematics Performance

WMC = Students Awareness of Mathematics' CIRA in Secondary Schools

PMC = Perceived Usefulness of Mathematics' CIRA among Secondary School Students

VMC = Availability of Mathematics' CIRA in Secondary Schools

AMC= Students Access of Mathematics' CIRA in Secondary Schools

UMC= Students Use of Mathematics' CIRA in Secondary Schools

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Coefficients of variables used in the study

ϵ = Error term.

Findings and Discussions

The statistical tests were conducted to evaluate the effect of candidates' item response analysis reports on improving performance in Mathematics subjects. The reliability test results as shown in table 1, indicates a Cronbach's alpha of 0.65, which is reliable and acceptable measure of internal consistence (Tavakol & Dennick, 2011). This means, the data and results are accurate and reliable for generalization.

The Multicollinearity Test

The analysis of associations among independent variables related to candidates' item response analysis reports were tested. Results in table 1 reveals that the Variance Inflation Factor (VIF) for students' awareness, perceived usefulness, and availability of CIRA in secondary schools have a VIF of 1. Such results imply that all the explanatory variables: Students' awareness, perceived usefulness, availability, and access of Candidates Item Response Analysis Reports (CIRA) as independent variables were free from multicollinearity, hence no need of redundancy (Shrestha, 2020).

Table 1: Multicollinearity Table

Variables	VIF	1/VIF
Students' awareness of CIRA	1.06	0.93
Perceived usefulness of CIRA	1.01	0.98

Availability of CIRA in schools	1.15	0.86
Students access of CIRA in schools	2.97	0.33
Students use of CIRA in schools	2.97	0.33
Mean (VIF, 1/VIF)	1.83	0.69

Diagnostic Tests Results

The results of multiple regression model used in this study was statistically significant and fit for the study as the R-squared was 76% and adjusted R-Squared was 76%. The result means, 76% of the independent variables explained the changes in dependent variable and only 24% of the remaining variables were not used in this study. The Durbin-Watson test results 1.81 which implies that, there is no autocorrelations among variables of the study (Beer & Swanepoel, 1988).

Regression Results

The study tested if Candidates Items Response Analysis reports (CIRA) predict performance in Mathematics subject in secondary schools. The hypothesis had five measurements which were students' awareness, perceived usefulness, availability, accessibility, and use of CIRA in secondary schools. Out of the five measurements, only one which based on perceived usefulness of candidates' items response analysis reports (CIRA) significantly predicted students' performance in Mathematics subject at ($\beta = 0.982$, $p < .000$). The rest of the variables such as students' awareness ($\beta = 0.008$, $p < .391$) and students' access of CIRA ($\beta = 0.004$, $p < .806$) positively but insignificantly predicted students' performance in Mathematics subjects. Further, the availability of CIRA in secondary schools ($\beta = -0.006$, $p < .616$) and the use of CIRA among students in secondary schools ($\beta = -0.001$, $p < .942$), negatively and insignificantly predicted students' performance in Mathematics subject.

This suggests that, candidates' item analysis reports, as examiners' feedback, had little contribution on improving performance in Mathematics subject in secondary schools. That means, the recommendation given by examiners to improve teaching, learning and Mathematics skills in such reports are not put into use. As a result, little positive improvement in examination performance year after year is observed. The result deviates from feedback intervention theory which emphasize the use of feedback as a tool for intervention strategies towards improved performance (Luger & DeNis, 1996). Also, the results differ from previous studies on availability, accessibility, and effective use of feedback reports to improve performance in Mathematics subject (Sambell et al., 2018; UCL, 2017; Stovner, 2021; Yusoff, 2013).

Table 2: Regression Table

Variables	Coefficients	t- statistic	Sig	Decision
(Constant)	.035	.520	.603	
Students' awareness of CIRA	.008	.858	.391	Rejected
Perceived Usefulness of CIRA	.982	.78.32	.000	Acceptable
Availability of CIRA in schools	-.006	-.502	.616	Rejected
Students access of CIRA in	.004	.246	.806	Rejected
Students use of CIRA	-.001	-.073	.942	Rejected
Diagnostic Tests				
R-Squared	76%			
Adjusted R-squared	76%			
F-statistics	1035.624			
Prob(F-statistics)	0.00000			
Durbin-Watson Test	1.814			

Thus, the multiple regression model of this study is:

$$IMP = 0.008SWC + 0.982PIC - 0.006ACS + 0.004SAC - 0.001UCS + \epsilon$$

The model is fit for the study because the Prob F-Statistics is 0.0000 which is not above 0.5 as the rule of thumb.

Descriptive Results

The descriptive analysis of qualitative data was conducted to validate the quantitative data. The results in frequency and percentage are presented in table 3.

Table 3: Descriptive Results on the Effects of Candidates' Items Response Analysis Report on Improving Mathematics Performance in Secondary Schools

Variables	Frequency	Percentage
Students who are aware of candidates' items response analysis reports in secondary schools	39	16
Students' who perceive candidates' items response analysis reports as important in Secondary Schools	153	61
Students who noted the availability of candidates' items response analysis reports in Secondary Schools	21	8
Students who accessed candidates' items response analysis reports in secondary schools	15	6
Students who used candidates' items response analysis reports in secondary schools	11	4

Source: Field data (October, 2023).

Students' Awareness of Candidates' item Response Analysis Reports

Students gave their responses on whether they were aware of the candidates' item response analysis reports or not. Out of 252 students, only 39 (16%), indicated that they were familiar with such feedback reports; the rest 213 (84%) students were not familiar. When asked the reasons for not being aware of such reports, most of the students

declared that they have never seen them; so, they are not aware of them. Triangulating such information, interviews were conducted to Mathematics teachers. Teachers were asked: “Are your students aware of the candidates’ item response analysis reports?” One of them commented:

We normally receive such reports every year. However, a single copy of the report for a class of 250 students is not enough. Since it is a single copy provided, it is retained by the teacher himself (Mathematic teacher school A: October, 2023).

This suggests that, most of the form four students in secondary schools (84%), were not aware of the candidates’ item response analysis reports. Lack of awareness suggests that they cannot utilize them to improve their performance. This result deviates from the feedback intervention theory which requires students to be aware of the feedback in order to plan for intervention strategies (Luger & DeNisi, 1996).

Students’ Perception on the usefulness of Candidates’ Item Response Analysis Reports

Students supplied their perceptions about the usefulness of candidates’ item response analysis reports on improving their performance in Mathematics subject. Out of 252 students, 153 (61%), perceived candidates’ item responses analysis reports as useful for improving the performance of Mathematics subject. When asked the reasons for their responses, most of the students said that such reports are important to enable them identify common mistakes in mathematical operations and how to avoid them. Also, they may help them to make proper work arrangement and develop skills for solving mathematical questions. Triangulating such information, interview questions were asked to Mathematics teachers “What are your views on the usefulness of

candidates' item response analysis reports on improving performance in Mathematics subjects?" One of them noted that:

The reports indicate the best answers, moderate, and the worst students attempt. Thus, they may enable students to learn the best ways of sketching, drawing and calculations. They enable students in solving past papers as they serve the role of marking schemes (Mathematics teacher, school B: October, 2023).

This suggests that students perceive such feedback reports as essential for improving their performance. It can be argued here that, if students are exposed to such reports, they can utilize them. This is in connection with previous studies which also suggest that feedback reports are essential in performance improvement (Naroth, 2010; Peason, 2016). The main difference between this study and the rest is that, while in those studies students believe that feedback is useful and are utilized to correct students' misconception, in this study, students perceive feedback reports as useful but they do not make effective use of them due to lack of awareness, unavailability and accessibility of such reports (Bee & Kur, 2014). This revelation suggests that perceiving usefulness without an actual use does not yield positive results, hence a need for intervention to stimulate the actual utilization of those reports.

The Availability of Candidates' Item Response Analysis Reports in Secondary Schools

Students were asked about the availability of candidates' items response analysis reports in their schools. Out of 252 students who gave their responses in this study, only 21 (8%), pointed out that such reports were available in their schools. A follow up question was asked about the place where such reports can be found in their schools. The places mentioned, included: The school library, academic office, the second master's office and the NECTA website. Triangulating such

information, an interview question was asked to the Mathematics teachers “Are candidates’ item response analysis reports available in your school?” All teachers relied “Yes, they are available.” When asked a follow up question on their whereabouts, they had mixed answers between library, second master’s office and academic office, just like their students. Then they were asked to locate any of the reports but they could not, giving different excuses. This suggests that there is poor management of such reports in schools; most of the students and teachers were not sure about their whereabouts (Yusoff, 2013; Garyson, 2018; Santos & Pinto, 2010). Arguably, with such findings, there is a need to place such reports in a single place, for instance, school library for students’ and teachers’ consumption.

The Accessibility of Candidates’ Item Response Analysis Reports in Secondary Schools

Students were asked if they have ever accessed the candidates’ item response analysis reports in their schools. Out of 252 students, only 15 (6%), agreed that they had an access to such feedback reports in their schools. Triangulating such information, interview questions were asked to Mathematics teachers “Do your students access the candidates’ item response analysis reports?” One of the teachers commented:

In most cases, students do not access print reports because reports are few compared to the number of students. Therefore, we identify key issues from the reports and communicate them to students in classes (Mathematic teacher, School D, October, 2023).

The results imply that there is little access to feedback reports among form four students in secondary schools. The lack of access to such document affects negatively the utilization of such feedback towards the desired performance. This result differs from other studies which

found that effective feedback is accessible to all potential stakeholders who are required to take intervention measures (Barana et al., 2021; Halthe & Tmperley, 2007). That means, if the reports are available in schools and in the NECTA's websites but they are not accessed by the beneficiaries, the reports are meaningless as they do not serve the purpose and objectives of their presence.

The use of Candidates' Item Response Analysis Reports in Secondary Schools

Students were asked if they had ever used the candidates' item response analysis reports to improve their performance. Out of 252 students, only 11 (4%), revealed that they had ever used candidate item response analysis reports in their schools. During interviews, Mathematics teachers were asked "Are candidates' item response analysis reports used in your school to improve performance in Mathematics subject?" One teacher pointed out that:

In our school with 32 streams, we are only two Mathematics teachers; the teaching load is too huge to engage with such reports. I just struggle to accomplish the syllabus (Mathematics teacher from school B, October, 2023).

This suggests that teachers in secondary schools do not influence their students to make use of feedback reports which affect the actual use of them. This result is contrary from the feedback intervention theory which insists on taking actions after receiving feedback. Therefore, feedback which is not used to improve performance is less relevant and a waste of resources (Luger & DeNisi, 1996). The results also differ from previous studies which instead on the use of feedback (Stovner, 2021; Koskinen & Pitkanieni, 2022). That means, if the reports are

prepared and distributed but not put into use to improve performance, the preparation of such reports is a waste of resources.

Conclusions and Recommendations

It is clear in this study that most of the students in secondary schools were not aware of candidates' item response analysis reports, although the printed copies are distributed by NECTA to schools and as well accessible online through NECTA's website. Further, lack of awareness on their availability in their schools and NECTA's website affects negatively their accessibility and use, hence little contribution on improving performance of Mathematics subject. Based on this observation, the study concludes that NECTA's feedback has not yet fully utilized so as to improve performance of Mathematics subject, hence a dire need for intervention mechanism. The study, therefore, recommends for Tanzania Institute of Education (T.I.E) and the Agency for the Development of Education Management (ADEM), as in-service teachers' professional development agencies, to incorporate CIRA in their training package to promote their use. Further study may develop training programme for school heads, teachers, and students on the effective use of examiners' feedback for improving academic performance.

Implication of the Study

The findings of this study may serve as feedback to the National Examination Council of Tanzania on the use of their product and services. To the ministries dealing with education, the findings of this study may be a tool for intervention on the effective utilization of the teaching and learning resources in schools. To the agencies for teachers' professional development like Tanzania Institute of Education (TIE) and the Agency for the Development of Education Management (ADEM), the study is a training need assessment report.

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Utilisation of Information and Communication Technology in Teaching and Assessment of Secondary School Students in Tanzania

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ABSTRACT

This study assessed the implementation of ICT as a pedagogical tool in teaching and assessment of secondary school students in Tanzania. The study employed a survey design with 179 secondary school science teachers. One teacher was randomly sampled from each of 179 randomly selected secondary schools. The teachers responded to questionnaires. Responses from questionnaires were coded and numbers entered into M-Excel for processing. Results obtained were presented in Tables showing absolute numbers and percentages. The study established that 62 per cent of teachers were trained in ICT as a pedagogical tool. They used the knowledge in teaching and assessment aspects such as searching teaching materials through internet (90%), examination word-processing (81%), typing notes (80%), processing examination results (59%) and using projectors in classroom instruction (56%). However, no teacher was found to use computer technology for assessment. Teachers faced various challenges in utilisation of ICT such as inadequate number of ICT equipment (78%), inadequate knowledge and skills in ICT (59%), unreliable internet (35%) and absence of electricity or power cut-off (34%). The study recommends that all teachers should be trained in the use of ICT in both teaching and assessment. Moreover, the challenges observed in the use of ICT should be addressed for effective utilisation and integration of ICT in secondary education.

Keywords: Information and Communication Technology, teaching, assessment, secondary school

INTRODUCTION

We are living in globalized, scientifically, and technologically advanced world where ICT has simplified access of knowledge and delivery of information. ICT in education is seen as a means of facilitating not only teaching but also assessment of learners (Murithi & Yoo, 2021). The concern about ICT in education is not just an academic exercise but even the changes in labour market demands have necessitated production of highly skilled personnel, who can use ICT knowledge and skills in their day-to-day activities. The school therefore, cannot ignore the utilisation of ICT (Murithi & Yoo, 2021). Many countries which have invested in ICT such as Japan, China, USA, and several others have exploited it to attain high economic development (Niebel, 2018).

Tanzania is among the African countries that have recognised the importance of ICT integration in education. In 2014, the country developed a new Education and Training Policy partly for the purpose of enabling the implementation of ICT as pedagogical tool for teaching and educational assessment. To align ordinary secondary school curriculum with the education policy, the Tanzania Institute of Education (TIE) reviewed the curriculum and put forward the objective to ensure that ICT facilities such as computers, printers, photocopiers, scanners, and internet connectivity are available to all secondary schools to simplify the teaching process and assessment of learning.

Following the development of Education and training policy in 2014 that accommodated ICT as a pedagogical tool, much effort has been made in training teachers on the use of ICT in teaching and assessment. This has been done through projects run by various agencies such as: The African Digital Schools Initiative (ADSI) programme implemented in 40 secondary schools across Tanzania (GESCI, 2020) and Universal Communications Service Access Fund (UCSAF) Project (URT, 2020) all of which supported the schools with ICT laboratory. This paper

assesses the utilisation of ICT as a pedagogical tool in secondary schools. Specifically, the study aimed at; establishing the number of teachers who have acquired ICT knowledge and skills from 2016 to 2022; finding out the extent to which teachers apply ICT in teaching and assessment of learning; and highlighting challenges faced by teachers in applying ICT in teaching and assessment.

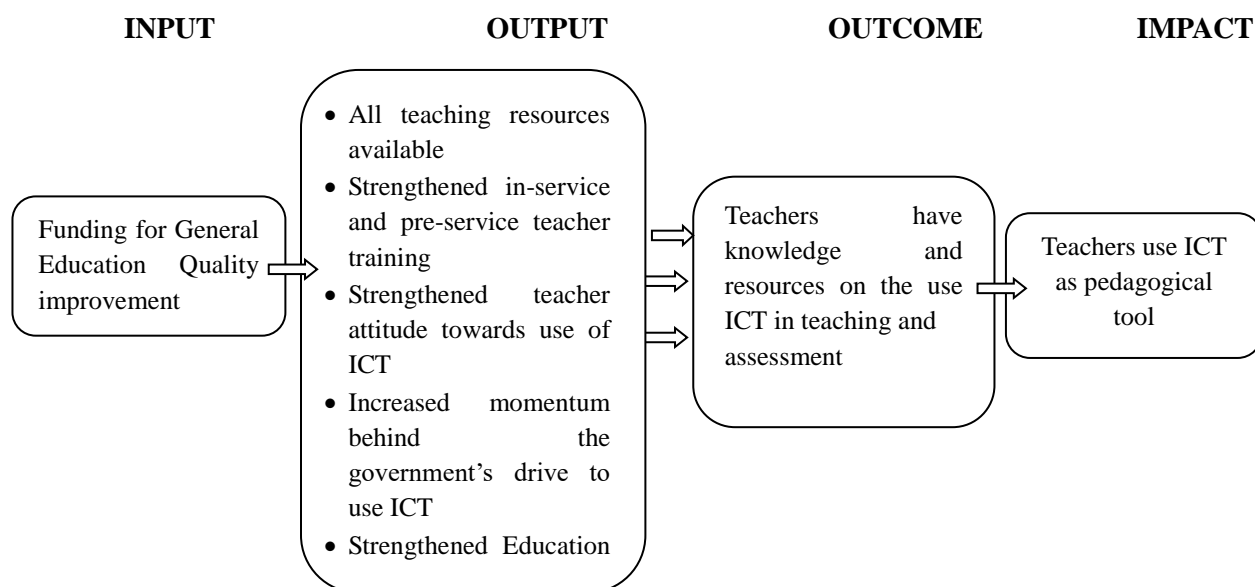
Research Questions

To achieve the research objectives, the following research questions guided the study:

1. How well are the teachers trained in the application of ICT in teaching and assessment of learning?
2. To what extent do teachers apply ICT in teaching and assessment of learning?
3. What challenges do teachers face in applying ICT in teaching and assessment of learning?

Conceptual Framework

The study thought to explore teachers' utilisation of ICT in teaching and assessment of students' learning. It was guided by a model which shows how activities are understood to produce a series of results that contribute to achieving the intended impact (Vogel & Zoe, 2012). The Model shows that good products result not only from investment but also proper planning and management of a set goal. This means that, utilisation of ICT in teaching and assessment requires teachers' training, and supply of ICT equipment and facilities to schools. The model is presented in Figure 1.



Conceptualization of ICT Integration in Education

Source: Adapted from Vogel and Zoe (2012, p.5)

Alkahtani (2017) defines ICT implementation in education as a wide process of applying technology to the curriculum to improve teachers' pedagogical skills. To Alkahtani, ICT is a tool that changes the way education is delivered as it helps teachers to organize and adopt high quality assessment. To Kirkland and Futurelab (2009), the implementation of ICT in education is the application of a new approach to questioning, the use of a new digital tool or a novel use of space – that brings about some value by altering the social practice of teaching and assessment. These definitions guided the concepts presented in this paper.

Teachers Training in the Application of ICT in Teaching and Assessment

The Education for All Global Monitoring Report, 2013/ 2014, explains that an education system is a function of teachers and it is only as good as its teachers. Teaching and assessing with the aid of technology

require deep knowledge and skillfulness in processing the subject matter contents and enriching learning (Mishra & Koehler, 2007; Turunen & Tuovila, 2012). In that stand, the advancement of technology has necessitated the need to capacitate teachers in order to increase their effectiveness and help them to use ICT innovations in teaching and assessing learners. SIPSE (2015) argues that, a suitable environment for ICT use should be made through the development of the ICT infrastructures, training of teachers on how to make the integration, and training of leaders on how to monitor and support teachers' integration of ICT in teaching and learning. Teachers' training on the use of ICT can be enhanced through teachers' network whereby, teachers from different schools meet at a certain place and undergo training by the experts (Lieberman & Wood, 2002), or teachers' professional communities of learning where teachers of same school share knowledge with the aim of improving their profession (Talbert, 1991).

Teacher's use of ICT in Teaching and Assessment of Learning

ICT as an educational tool forms a remarkable source of information for research, and class assignments. It also offers the means to broaden teachers' experience through interactive collaboration with other education stakeholders around the world (Alkahtani, 2017). Research has revealed that the use of different approaches offered by ICT enhance not only teaching but also simplify preparation of assessment tools and processing of examination results (Mbodila & Muhandji, 2013). Agbobli (2002) contends that, given the clear goals of education in human life, the use of ICT is a great way for people to achieve the goals. From this point of view, proper investment in such technology allows the development and improvement of the education system. Moreover, Zhao, Pugh, Sheldon, and Byers (2002) observe that application of ICT in any school depends on the availability of resources which include equipment, web access, human resources

(such as experts) to support innovative activities, planning time and physical resources such as large classroom space. Innovation which requires a substantial change in teaching and assessment practices and a significant increase in resources, need more support to succeed than the one which needs less resources and less change from the teacher's current practice.

Challenges facing ICT Application in Education

Research carried out by Leung, Watters and Ginns (2005) in Hong Kong on the challenges facing the integration of ICT in teaching in secondary schools, found out that most of the schools had shortages of computers, computer-based equipment, computer software and classroom space. Likewise, Alkahtani (2016, 2017) found out that in Saudi Arabia integration of ICT in education is challenged by teachers' insufficient knowledge in using computers such that, teachers who are at the initial stage of using computers take more time to plan ICT-based lessons than planning a non-ICT based one.

Alkahtani also noted that maintenance of ICT equipment, improvement of infrastructure in the schools in terms of quantity and quality and lack of teacher training which focus not only on the operation of the ICT equipment but also on the curriculum, in terms of content and delivery techniques, are the major challenges. Further research by Mbodila, Jones and Muhandji (2013) revealed that in USA there is a limited regional infrastructure for the full ICTs integration in education. The authors cautioned that it is very important for policymakers and planners before carrying out any ICT implementation in education, to carefully consider the appropriate rooms or buildings available, availability of electricity and telephone as well as looking at the ubiquity of different types of ICT in the country in general and in the educational system in particular. Moreover, research by the European Commission (2013) reported challenges such

as insufficient ICT infrastructure, support from colleagues, inflexibility of the curricula and lack of enough digital skills. In general, the implementation of ICT in education has two facets which are opportunities and challenges. It is very important to ensure that good policy, proper planning, well trained teachers, and suitable level of implementation is in place for proper use of ICT.

Methodology

This quantitative study employed a survey research design, involving analysis of teachers' response on the training, and use of ICT in assessment as well as challenges they encounter. The study involved a total of 179 respondents (90 biology and 89 chemistry teachers), who were randomly sampled from 179 secondary schools. The data were collected through questionnaires, which were physically distributed to 179 teachers during the 2023 marking exercise. The questionnaires were used because it enabled easy collection of data from many teachers in a short duration. Responses from questionnaires were first coded and numbers entered into M-Excel for processing. Results obtained were presented in numbers and percentages or Tables showing absolute numbers and percentages.

Findings

This part presents, analyses, and discusses the results. The results are presented based on the research questions. The results presentation is organized along the objects of the study, ranging from teachers' capacity building, through actual use of ICT and experienced challenges.

Teachers' Capacity Building in the use ICT for Teaching and Assessment

Teachers are in the centre of any education innovation. That means every innovation should be accompanied with teacher training if success is targeted. In this case it was important to ascertain the

number of teachers who have received training on use of ICT in teaching and assessment of learning from 2016 to 2022. The information gathered from the participants through questionnaire indicate that, 114 (62%) of the participants received training on use of ICT in teaching and assessment since 2016. The gained knowledge and skills are important in triggering the use of ICT as a pedagogical tool.

Teachers' use of ICT in Assessment of Learning

Ariyo and Akitunde (2012) asserts that the use of ICT knowledge depends on teachers' altitude. That means, possession of teacher ICT knowledge does not guarantee its use because some teachers may have negative attitude towards use of ICT. Thus, the second question required the participant to demonstrate the use of ICT by putting a tick (√) to each of the outlined aspect of teaching and assessment if he/she practices it and cross (X) if he/she does not practice it. Responses provided by the participants are summarised in Table 1.

Table 1: Teachers' Utilisation of ICT in Supporting Teaching and Assessment (n = 179)

S/N	Teaching Aspects	% of Respondents	Assessment Aspects	% of Respondents
1.	Using computer for searching teaching materials	90	Using computer for typing examinations	81
2.	Using computer to preparing teaching notes	80	Using excel to process examination	59
3.	Preparing teaching notes on slides	67	Using computer for registering candidates	56
4.	Using projector for classroom instruction	56	Communicating examination results to parents using network	21
5.	Using e-book for searching notes	49	Using computer network for	00

assessment

Results from Table 1 reveal that most of the teachers utilise ICT in various aspects of teaching and assessment. Most of these teachers use ICT in searching for teaching materials. However, none of the teachers use computer networks for assessment.

Challenges faced by Teachers in Implementing ICT in Teaching, Learning and Assessment

Information extracted from the third research question concerning challenges that teachers face in implementing ICT as a pedagogical tool, reveal that there are numerous challenges which were pointed out by most of the participants while others were pointed out by only a few participants. For the sake of clarity, the researcher grouped the challenges into major and minor ones such that major challenges are those which were pointed out by more than half of the participant whereas those which were pointed out by less than half of the participants were termed as minor challenges. The challenges are summarized in Table 2.

Table 2: Challenges faced by Teachers in Using ICT

SN	Challenge	Number of teachers	Percentage
Major challenges			
	Lack of or insufficient equipment	140	78
	Lack of or insufficient computer knowledge	105	59
Minor challenges			
	Lack of internet	63	35
	Erratic/unreliable electricity	61	34
	Lack of maintenance and updating of computer software	22	12

and hardware

Table 2 shows that the major challenges which was pointed out by majority of teachers was insufficiency of ICT equipment. This indicates that although most of the teachers have acquired knowledge on ICT use in teaching and assessment, the lack equipment hinder them from applying the technology in their day-to-day classroom practices. Lack of or insufficient knowledge of computer was observed to be the second major challenge. Although most of the Biology and Chemistry teachers had acquired knowledge on the use of computers in teaching, learning and assessment, among them, there are some who are yet to have sufficient knowledge especially those who happen to have attended related capacity building programmes just once.

Lack or absence of internet connectivity and lack or unstable electricity in schools were pointed out as minor challenges against the use of ICT in teaching and assessment of learning. These challenges constrain teachers' access to information communicated electronically. Some schools are found in the rural or remote areas where there is no electricity, some of which are at least using generators, whereas other schools are found in urban areas where electrical power supply is not frequent. Therefore, both schools are not only facing the problems of no electricity but also absence of internet, hence failure to utilise ICT. Lack of maintenance and updating of computer software and hardware was pointed out by very few teachers who participated in this study. This is an indicator that most of the schools have managed to build well-equipped vanished computer rooms which are regularly maintained.

Discussion

Since the study has found out that there are at least nine ways through which Biology and Chemistry teachers utilize ICT in their work, it is clear that ICT has proved to be important in Tanzania's secondary education and that it is obviously being implemented. This is in line

with arguments that effective implementation of ICT can play important roles in education by transforming teaching and assessment process (Yoo & Murithi, 2021). Teachers who use ICTs thoughtfully make learners more interactive and enjoyable (Kirkup & Kirkwood, 2005). In addition, the use of ICT in assessment simplifies elaboration of concepts which seem to be difficult in science (Senzige & Sarukesi, 2003; Yoo & Murithi, 2021). However, it is very important to make sure that adequate teachers training, careful planning, and appropriate levels of investment in computer equipment and facilities are in place before implementing ICTs in education to achieve maximum educational return.

Conclusion

Tanzania has managed to train more than half of her Biology and Chemistry teachers in ICT use in learning and assessment since 2016. The teachers have been using the acquired knowledge in various aspects of teaching and assessment such as preparing notes, preparing examination, searching materials in internet. However, there remains a number of teachers who are not using computer networks for assessment of learning. It is also clear that, although more than half of the teachers have been trained in ICT for education, some of them have not been able to use the related knowledge and skills because of lack or insufficient ICT equipment, unreliable internet, and electricity in some schools.

Recommendations

Based on the findings from this study, the researcher recommends that for proper teachers' use of ICT in teaching and assessment, the government, training institutions and schools should ensure that all teachers are trained on the use of ICT as a pedagogical tool. Additionally, ICT equipment and facilities such as internet connectivity should be in place for effective implementation of ICT in secondary

schools. This study focused on the use of ICT by science teachers as a means to support teaching and assessment. Thus, other subject teachers and learners were not involved. Further research may therefore be undertaken to find out non-science subject teachers' and students' experience on the use of ICT in their day-to-day teaching-learning process.

Significance of the Study

It is important to ensure that our teachers have adequate knowledge of using ICT in various aspects of teaching and assessment such as preparation of notes and using examination web to communicating examination results to parents. Thus, the results obtained from this research will inform the education stakeholders so that they can take the required measures to ensure that every teacher apply ICT in teaching and assessment of students.

Limitation of the Study

This study is limited to examining the use of ICT as a pedagogical tool to Biology and Chemistry teachers only. Therefore, the results cannot be generalized to utilization of ICT by teachers of all subjects in Tanzania.

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Manuscript Preparation - JIPE

Page format

Page set-up of the manuscripts should be on A4 or 8.5" x 11 "paper, typed double-spaced (24-26 lines per page), with margins of top 25mm, bottom 25mm left 40mm and right 20mm.

Font

The font size of 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 figure.

Title Page

This page must include the following information:

- The title of the manuscript which should be concise, specific, informative, and clear.
- Should be in bold, using font 14.
- The names (spelled out in full) of the author(s) of the manuscript including their corresponding affiliation(s) should be indicated immediately below the title.
- A complete mailing address (including the e-mail) of the person to whom all correspondence regarding the manuscript should be addressed and must also be indicated.

Abstract

The first page following the title page should contain an abstract. Abstract should contain up to 250 words mainly of the object and main findings 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 in *italics*.

Main Text

In the main text:

Introduction: Should describe the objective of the reported work and provide relevant background information.

Methodology (Where the study/research dictates): This part should identify the paradigms/approach, population, area of study,

procedures employed and any other relevant input to the realization of the study.

Findings: This section should explain all the important findings and provide information about the reliability of the results. Here, the use of tables and figures is allowed, but the use of text to emphasize important points is encouraged.

Discussion: It should describe the implications of the findings and any conclusions based on the findings. 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.

Tables and Figures

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 Figure caption should be typed in bold immediately below the Figure. Explain in footnotes all non-standard abbreviations used in each table.

Pagination

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.

Footnotes

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.