Monitoring and Evaluation of ICT Integration in Secondary School Teaching and Learning in Tanzania

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Abstract

This study explores the monitoring and evaluation (M&E) of Information and Communication Technology (ICT) integration in teaching and learning in secondary schools across Tanzania. The study reviewed existing literature on ICT integration in secondary school education with data collected qualitatively from 15 participants comprising five (5) teachers and ten (10) students from one secondary school in Arusha City Council in Tanzania. The results showed that the monitoring and evaluation of ICT integration in teaching and learning do focus on ICT infrastructure, ICT in the school curriculum, and ICT in the school culture, which are the key factors that influence the full integration of ICT in teaching and learning. The study recommends the monitoring and evaluation matrix for ICT integration to establish the effectiveness and efficiency of ICT in teaching and learning.

Keywords: *Monitoring, Evaluation, Assessment, secondary education, ICT integration*

Introduction

The use of Information, Communication and Technology (ICT) is rapidly changing global operations in production, business and education due to its efficiency and effectiveness in improving service delivery (Alam, 2018). Subsequently, governments, states, and education institutions are expending enormous sums of money on ICT integration in teaching and learning in order to take advantage of the benefits it offers (Osang & Mbarika, 2019; Alqahtani, 2017). The benefits of ICT in teaching and learning include but are not limited to enabling quick dissemination of

knowledge and skills to students (Osang & Mbarika, 2019; Osang et al., 2015); mediating teaching and learning in the eventuality that schools are closed down like in times of Covid-19 (Pozo et al., 2021 & Manyilizu, 2023a and b); increasing students' engagement in class activities hence, improves knowledge retention (Goldhaber et al., 2021; Huang & Chan, 2021; Manyilizu, 2023a); creating conducive environment which enhances subject content mastery, wide-ranging information and variety of content delivery methods (Waruingi et al., 2021; Machamu et al., 2018 & Manyilizu, 2023a and b).

Nonetheless, in order to maximally benefit from integration of ICT in teaching and learning, the integration of ICT needs to be well monitored and evaluated for its efficiency and effectiveness (Romrell et al., 2014; Kihoza et al. 2016). The integration of ICT in teaching and learning involves a computerized process in facilitating learning (Alkhawaldeh & Menchaca, 2014; Adamu et al., 2022). The integration of ICT in the teaching and learning process ensures that all learning activities are undertaken by using a computer that is a computer-based learning as opposed to computer-assisted learning (Burr et al., 2016). The teaching and learning activities include lesson planning or preparation, lesson presentation or delivery, and assessment (Mchalo et al., 2021).

Research on ICT integration in education identifies multiple levels, from emerging to transforming stages, reflecting varying levels of technology adoption in teaching and learning. Tondeur et al. (2008) emphasize on systemic integration, requiring both teacher-level efforts and institutional support. Baylor and Ritchie (2002) highlight the importance of effective planning, while Fishman and Zhang (2003) stress alignment between school strategies and national policies. Valverde-Berrocoso (2012) argues for autonomous school ICT policies to complement broader frameworks. UNESCO provides a global perspective, underscoring the need for continuous monitoring, professional development, and infrastructure investments to sustain ICT-driven educational transformation. Therefore, the study aimed to investigate monitoring and evaluation of ICT integration in teaching and learning in secondary education.

Literature Review

Information, Communication and Technology

Information Communication and Technology (ICT) has been defined as electronic devices that facilitates creation, process, storage, management, exchange, and dissemination of information to the intended users (UNESCO, 2020; Pargaonkar et al., 2019; Shamim & Abu Raihan, 2016;

Noor-Ul-Amin, 2013). In teaching and learning, ICT is understood as a set of electronic devices and technologies that are used to facilitate teaching and learning. The ICTs is composed of ICT hardware, software, the network, telecommunications, applications and tangible ICT resources and human infrastructure which formulate knowledge and skills required to manage ICT resources (Duncan, 1995; Schalken *et al.*, 2005). Some of the ICT tools used in teaching and learning in schools, particularly secondary schools, include software applications, the internet, local network infrastructure like video conferencing, and hardware such as computers and other devices. In Tanzania, the most commonly used ICTs in teaching and learning in secondary schools include computer/laptop/mobile devices (e.g. mobile), the internet, power point projector, e-mail, school portal (website), Google Docs, Smart Board/Interactive Board, CD ROM/DVDs, Radio, TV, Drop Box, Note Share, Digital/video Camera, photocopy, scanner, printer and ICT experts (Lubega et al., 2014 & BEST, 2022). Therefore, the study considers the integration of the ICT in teaching and learning in terms of ICT infrastructure, ICT in curriculum, and school ICT culture.

ICT Integration in Teaching and Learning

Teaching is a process of imparting desirable skills, knowledge and attitude to a learner while learning is the process of acquiring desirable knowledge, skills and attitude through teaching, studying or experience (Munna &, Kalam, 2021; Gross,2022). The teaching process in education comprises of four key activities: lesson planning and preparation, lesson presentation or delivery, assessment, and feedback (Mchalo et al., 2021). These stages are interdependent and form a continuous cycle aimed at enhancing teaching effectiveness and learning outcomes.

Lesson planning and preparation serve as the foundation, involving the development of learning objectives, instructional strategies, and teaching materials (Tondeur et al., 2008). Effective planning ensures that teachers are equipped to address diverse learner needs and challenges, particularly when integrating ICT resources (Chen, 2023). The lesson presentation or delivery phase translates the planned content into practice, using instructional techniques such as lectures, discussions, and multimedia presentations (Baylor & Ritchie, 2002). Student-centered approaches, such as collaborative projects and technology-enhanced learning, have been shown to increase engagement and promote deeper understanding (Valverde-Berrocoso, 2012).

Assessment plays a crucial role in measuring student progress, incorporating both formative (e.g., quizzes) and summative methods (e.g., exams) to inform instructional adjustments (Fishman & Zhang, 2003). This stage ensures that teachers can address knowledge gaps effectively and align teaching with student needs.

Lastly, feedback and reflection provide students with constructive insights into their performance while also guiding teachers in refining their instructional practices (Tondeur et al., 2008). The feedback loop fosters continuous improvement, ensuring that future lessons are better aligned with learning goals. Together, these four activities form an iterative process, emphasizing planning, delivery, evaluation, and improvement, thereby promoting effective teaching practices and enhanced student learning outcomes.

The teaching activities can be executed by different methods such as; pencil-paper based or pure traditional method, the blended method or pure computer-based method (Burr et al. 2016). The traditional teaching method involves no use of ICT, the blended teaching mode is ICT assisted in which ICT assists some of the activities, and the computer-based teaching is fully computerized; all the activities are done through computer; it is e-teaching. Integration of ICT in teaching and learning is the usage of technology in preparation, delivery assessment of curriculum content and students also using the technology to transact curricular content

Monitoring and Evaluation of ICT Integration in Teaching and Learning

Monitoring is a continuous assessment to determine if progress is made in achieving expected results, while evaluation is an assessment process to determine the effectiveness and efficiency of a programme. Monitoring the ICT integration involves observing, measuring and recording the performance of ICT in teaching and learning. There are different levels of integration of ICT in teaching and learning and various measuring indicators used to gauge them, such as ICT infrastructure, ICT in the curriculum and ICT in school culture (Njagi & Oboko, 2013; Luger, 2007; Marshall, 2007; Adam, 2007; Balanskat et al., 2006).

Context, Input, Process and Product Model

The Context, Input, Process and Product (CIPP) model was developed by New Partnership for Africa's Development (NEPAD), which championed the integration of ICT in schools through the NEPAD e-schools project

(Sergis & Sampson, 2014). The model was for comprehensive monitoring of the e-schools projects. Each aspect of the CIPP model is used to monitor and evaluate related issues in integrating ICT in e-schools.

The context aspect requires collecting and analysing needs to determine objectives, set priorities and establish expected outcomes in line with the prevailing context. The Input aspect in the model is related to the resources which are required to meet the required goals and objectives. The Process helps to determine how well the project is being implemented, the challenges or issues encountered and how best to make. Finally, the Product is related to the outcome, and needs are grouped into parts to determine whether they are being achieved. The model is good at performing compressive analysis of e-school projects but lacks a specific focus on teaching and learning.

The CIPP model is relevant to this study since its aspects: Context, Input, Process and Products are factored in the integration of ICT in teaching and learning. Therefore, these aspects are also considered in the monitoring and evaluation of ICT integration.

Pedagogical Approaches for ICT Integration Framework

The Pedagogical Approaches for ICT Integration Framework has evolved through contributions from multiple educational researchers, organizations, and institutions that focus on integrating ICT into education. These organizations include the ICT Competency Framework for Teachers (ICT-CFT) established by UNESCO (2000), TPACK Framework established by Punya Mishra and Matthew J. Koehler (2006), and ISTE Standards established by The International Society for Technology in Education (ISTE) (1998). The framework has been used in Singapore for the integration of ICT in teaching English and Mathematics in primary schools and monitoring and evaluating ICTs in teaching and learning (Lim et al., 2012). The framework focuses on the level of production, which involves pupils' creation of the digital work, and the collaboration level in which pupils learn with or from ICTs. The model posits that more passive behaviors, such as listening and reading, are associated with learning from ICTs, while more active behaviors, such as writing, creating and updating, are associated with learning with ICTs. In addition, the model acknowledges that learning from computers is done through various forms, such as computer-assisted instruction, computer-based instruction and intelligent learning systems, among others. With respect to learning from computers, a computer is seen as a tutor. The model is relevant to this study because it is used to evaluate and monitor

ICT integration at the production level, like the creation of digital work and collaboration level in which students learn with or from ICT. However, it fails in the sense that it is not able to determine moderating factors in the implementation of the learning process.

Technological, Pedagogical and Content Knowledge Framework

The **Technological, Pedagogical and Content Knowledge (**TPACK) framework was designed by Mishra and Koehler (2006) and it posits that teachers' expertise with respect to integration of ICTs into learning and teaching activities. It is based on the assumption that teachers need to integrate three sources of knowledge: Pedagogical Content Knowledge, Technological Content Knowledge and Technological Pedagogical Knowledge. The framework is relevant to the current study since it focuses on the sources of knowledge that teachers need to know in the integration of ICT in teaching and learning, which are the same concepts that this study investigates. Nonetheless, the framework fails to take into consideration students or pupils who should be the target population in the learning and teaching process.

InfoDev Monitoring and Evaluation Framework

The InfoDev Monitoring and Evaluation (M&E) Framework, developed by the World Bank, assesses how ICT pilot projects contribute to development goals (World Bank, 2005). It integrates formative and summative assessments, offering continuous feedback during project implementation and evaluating outcomes post-project to inform future initiatives. A key feature is its focus on "proof of concept" evaluations, determining if successful pilots can be scaled effectively in other contexts. The framework aligns project evaluations with broader objectives like poverty reduction and improved education, particularly in line with the Millennium Development Goals (MDGs) (World Bank, 2005).

The framework adopts a mixed-methods approach, using baseline studies, surveys, and participatory evaluations to generate evidence for ICT investments. The framework helps ensure projects align with regional and national development priorities by combining real-time operational feedback with long-term impact assessments. Ultimately, it offers insights for policymakers, donors, and managers, supporting accountability and scalability for sustainable development. The InfoDev framework considers a variety of broad development or context issues related to ICTs for educational development (Wagner et al., 2005).

The framework specifies a plan to determine implementation fidelity for ICT integration into education and specifies what is supposed to be achieved. Second, measures that determine the required outcomes are also put in place in order to establish whether the implementation process will be able to attain the required objectives. Lastly, the framework requires measurable indicators and acceptable methodologies to be in place that should be used to determine the impact of ICTs in education.

The measurable indicators in the framework include input (ICT equipment and software), outcome indicators (impacts on the teachers and pupils or students), and cost indicators to determine the worthiness of the integration. The framework is of significance to the study since its indicators are also factors or measuring matrices considered in monitoring and evaluating ICT integration in teaching and learning in schools. The framework, therefore, helps to determine the effectiveness and efficiency of the ICT integration in education in terms of its outcomes and is relevant in monitoring and evaluation of ICT in teaching and learning. Nevertheless, the framework is complicated to understand, and its measurable indicators focus on the implementation, outcome and measuring indicators with little regard on the cultural and individual aspects and perceptions, which may influence the integration of ICT in teaching and learning in schools.

Electronic Maturity

E-maturity is when schools make strategic and effective use of ICT to improve teaching and learning outcomes (BECTA, 2008). However, in order to achieve e-maturity in teaching and learning, the school has to go through different stages and levels in the implementation of ICT: ICT in the curriculum, ICT infrastructure and school culture, culture school organization and management, teaching processes (Fornell & Vivancos, 2009). The stages have different descriptions, which are indicators of the level of integration. For instance, in infrastructure, students and teachers have broadband access, ICT equipment, and the availability of digital resources, as well as evidence of use and technical support. E-maturity can be equated with the integration of ICT. The levels of e-maturity are initial, e-enabled, e-confident, and e- mature.

In comparing all levels in ICT infrastructure (Livingstone, 2012 & Valverde Berrocoso, 2015), Initial level schools have a basic ICT infrastructure and have started to use digital resources in teaching and learning, but there is little reflection on ICT use. However, e-enabled schools have a better ICT infrastructure than at the previous level and

have started to develop ICT strategic action planning. Teachers integrate ICT into the curriculum and use digital resources more frequently. E-Confident Schools have classrooms with projectors or interactive whiteboards (IWB), a reliable broadband or cable network and resources available throughout the school and remotely. Finally, in e-Mature, all e-confident level features are reinforced, and ICT is embedded in all the school activities. All stakeholders share the ICT vision. All teachers are confident in their ICT and use ICT in their daily performance. The level of e-maturity can be replicated to monitor and evaluate the integration of ICT in teaching and learning.

According to the reviewed frameworks and models, the integration of ICT in teaching and learning can be at different levels or stages depending on how ICT is used in the teaching and learning process. The models have different indicators or performance matrices used to monitor and evaluate the integration of ICT in teaching and learning. Every reviewed framework has strengths and weaknesses, and they are applicable in a specific context. Some have generally focused on the adoption and use of ICT and the components of integration of ICT that should be considered, such as context, input, process, and product, but have not addressed other areas of integration. The frameworks are relevant to the current study since they have some indicators and concepts of integration that can guide the study. However, since they have not completely addressed the Tanzanian context, there is a need for the establishment of a framework for monitoring and evaluation the integration of ICT in teaching and learning in the Tanzania context.

In addition to the framework and models reviewed to guide the study, both system and program theories were also used. The system theory was championed by Ludwig Bertalanffy (Bertalanffy, 1968). The theory focuses on the relationship between parts and their connection to the whole (Chikere & Nwoka, 2014). Thus, components of the system can be clearly understood if their relationships and their contextual connections are examined instead of looking at the components in isolation. These components include system-environment boundary, input, output, processes, and external stakeholders. Systems theory attempts to solve problems by looking at the whole rather than the specific elements. Systems theory thus examines entities at various levels in terms of organizations, processes, and relations which cause them to stand together as recognizable entities (Lai & Lin, 2017; Chikere & Nwoka, 2014; Mele et al., 2010). The theory is applicable in monitoring and evaluation of the system since it looks at every part of the system.

The program's theory consists of descriptions to explain why and how programs perform (Sharpe & Bay, 2011). The theory considers stakeholders, scientific and integrative perspectives, and it has three components: inputs or program activities, output and the processes (Rogers, 2008). For instance, the inputs are responsible for defining the program and in monitoring and evaluation of the system, inputs such as ICT infrastructure will determine the amount of effort that is required to produce an outcome (Rosenberg & Jones, 2018). The theory activities ensure that the system achieves its aim like skills training and capacity building. The output is what gives the outcome that the system requires, while the outcome is the expected results that benefit the stakeholders. The impact will benefit the stakeholders and the community. The two theories are applicable to the study since they are able to monitor and evaluate the integration of ICT systems according to the functions and activities that they perform.

The five frameworks and two theories reviewed have provided adequate concepts and information on integrating ICT in teaching and learning in schools. They have established the level or stages and areas of integration of ICT in teaching and learning in schools. Moreover, they have revealed various indicators or performance matrices that are used to monitor and evaluate the integration of ICT in teaching and learning. Despite the strength and relevance of every model to this study, none comprehensively addressed all the levels and areas of integration of ICT in teaching and learning in the Tanzanian context. The system theory has addressed the limitation of most of the models that focused only on the integration of ICT in some stages of teaching and learning as opposed to looking at it as a system or a whole. Correspondingly, the program theory also explains why and how programs integrally perform, such as why and how ICT integration performs in teaching and learning. Although the frameworks and theories are relevant to study in terms of indicators of integration, which are commonly shared, none of them is designed for schools or focuses on Tanzania's situation. Consequently, the current study establishes a framework for monitoring and evaluating the integration of ICT in teaching and learning in the Tanzania context.

Methodology

The study used a descriptive research design to gain a comprehensive understanding of the phenomenon under study. The study used a qualitative approach, which enabled the respondent to narrate and explain their views. The study was conducted in one public secondary school in Arusha city council in Tanzania. A total of 15 respondents were sampled

using purposive sampling techniques: 10 were students while 5 were teachers. The primary data were collected from respondents using an interview as a data collection method, while secondary data was collected from the literature review. The researcher reviewed five frameworks for monitoring and evaluation of ICT integration in teaching and learning, which highlighted the ICT integration components and its assessment criteria. The monitoring and evaluation models helped gather and gain more information on ICT integration, its use, and criteria for monitoring and evaluating teaching and learning in secondary schools. Moreover, two theories, system and programme theories, were reviewed in order to shed light on the factors to consider in conducting an assessment of the ICT integration process in schools. The collected data were summarised and compared to the context of Tanzania and used to propose a framework for monitoring and evaluation of integration of ICT in teaching and learning according to the study's objective.

Results and Discussion

The study's findings are based on the literature review and data collected from the respondents. Table 1 is the summary of the findings:

Table 1: ICT integration level in teaching and learning

		Initial	e-enabled	e-confident	e-matured
ICT INFRASTRUCTURE	**Planning for acquisition of resources**	Basic level of planning for purchasing ICT equipment exists.	Some level of ICT purchase planning takes place, including standardisation of ICT equipment, use of laser printers, and purchasing with warranty	Procurement planning and standardisation of ICT equipment takes place. Older computers are disposed of with necessary precautions against environmental pollution.	There is an integrated approach to procurement which considers full operating costs of ICT equipment and technical support provision.
	LAN & Broadband Access	Network exists in some areas of the school. School is connected to the Schools Broadband Programme. Internet access is distributed through the Local Area Network.	Most rooms and computers are connected to the school network, facilitating access to online and network resources.	A high-speed and reliable network extends to all areas of the school. All computers are connected to the network, facilitating access to online and locally based server resources.	Resources are accessible from a central server. All teachers and students have secure access to server space and their e-portfolio from within the school and remotely.
	Technical Support	Technical support is carried out using mainly voluntary assistance. Occasionally a technician is paid to carry out urgent work.	Technical Support is provided by an external company on a call-out basis as required. No technical support contract is in place.	Technical support is factored into procurement planning, all equipment is procured with an appropriate warranty. Formal technical support contract with Service Level Agreement (SLA) is in place with an external provider.	Technical support is planned and integrated with ICT procurement planning and takes into account full ICT operating costs.
	Software & Digital Content.	Limited digital content is available. TIE digital content is used regularly. Central licensing agreements are availed of.	The school has a range of appropriate digital content resources to support learning at all levels.	There is easy access to appropriate digital content that teachers have catalogued by subject/ curriculum area.	The school creates its own customized digital content which is accessible from home and school by all stakeholders.
	I C T	Some classrooms have	Some rooms have digital	All learning areas have access to	All learning areas have access

		Initial	e-enabled	e-confident	e-matured
		desktop computers. A laptop and portable projector, printer, digital camera, drop down screen whiteboard... are available as shared resources.	projectors and computers. Peripherals, such as digital cameras and scanners are used for ICT integration activities.	a range of ICT equipment including digital projectors and wirelessly enabled tablet PC's. Laptop trollies are used to improve access to resources.	to a range of ICT equipment. Provision is made for the incorporation of students' mobile devices.
	Licensing	It is unclear whether all software in use in the school is properly licensed.	The school is developing a software licensing programme for the applications installed on the school's equipment.	The school has a log of all licenses for software and applications in use throughout the school.	The school ensures that all new installations of hardware and software meet the required licensing standards.
ICT IN THE CURRICULUM	**Teacher Understanding**	Teachers have a general understanding of how ICT integration can improve teaching and learning.	A few of teachers understand methodologies to integrate ICT into the curriculum	Most teachers understand how ICT integration can be used in the curriculum to improve student learning	Teachers have determined their own methodologies for integrating ICT into the curriculum.
	Planning	There is little planning for ICT integration, with ICT activities focused on students' acquisition of ICT skills, e.g. word processing	There is some planning for ICT integration, with the focus mainly on teacher preparation, whole class teaching, group and individual work	Teachers plan in a structured way through timetable and scheduling of ICT integration in their lessons and classroom activities	The school devotes time to exploring new approaches to using ICT integration to improve student learning.
	Teacher Use	Teachers use computers primarily in isolation from regular classroom learning activity.	Teachers use ICT for lesson planning and as a teaching tool.	Teachers use ICT to provide learning opportunities that support cross-curricular, subject-based and constructivist learning approaches.	Teachers have embedded ICT into their practice to facilitate student directed learning. There is consistent evidence of collaborative, discovery-based and authentic ICT activities throughout the school.

		Initial	e-enabled	e-confident	e-matured
	Student Experience	Students occasionally use ICT as part of the learning process.	Students experience ICT activities regularly.	Students experience ICT activities regularly and use ICT to collaborate on curriculum activities both within the school and with other schools.	Students are facilitated to use ICT to support and assess their learning, e.g. creating digital content and electronic - portfolios
	Inclusive Education	Teachers are aware that ICT can enhance the learning opportunities of students with Special Educational Needs (SEN).	Teacher's use of ICT focuses on the development of literacy and numeracy for students with special educational needs.	Teachers use ICT diagnostic tools, assistive technologies and ICT resources to address curriculum objectives with students with special Educational needs.	ICT is integral to all aspects of SEN teaching and learning as well as in the development of IEPs. ICT resources and assistive technologies are incorporated into all levels of school planning
SCHOOL ICT CULTURE	**Access**	Teachers and students have limited access to ICT resources.	Teachers and students have regular access to ICT resources.	ICT resources are readily available to staff and all students throughout the school.	ICT resources are available to staff, students and the wider school community outside of school time
	Evidence of Use	There is little visible evidence of ICT use	There is visible evidence of use of ICT use, e.g. displays of project work.	Evidence of ICT use is visible in all areas throughout the school.	The school disseminates and shares examples of good practice beyond their own school community.
	Website/Online Presence	School has or is actively planning an online presence, e.g. a blog or basic website.	School has an active and up-to-date website.	School has an active and up-to-date website.	Schools uses a Content Management System (CMS) to create a communicative space where the school community publishes content and which conforms to accessibility guidelines.

		Initial	e-enabled	e-confident	e-matured
	Projects	Some teachers engage in school-based ICT project work.	School is involved in projects that integrate ICT (national and/or international), e.g. e-Twinning	School has experience of integrating ICT in interdisciplinary and large-scale project work.	Students and teachers regularly develop small-scale projects for external collaboration, e.g. through the use of a Virtual Learning Environment or wikis
	Organization & Communication		There is some communication between school, home and the Department of Education & Science via e-mail or text messaging.	School makes regular use of ICT to communicate with teachers, parents, Board of Management and the wider community. School has an e-mail newsletter.	School encourages parents and the wider community to use ICT to communicate with the school. Teachers, students and parents have online access to student records and timetable.

Source: Adapted from Departamento de Educación del Gobierno Vasco (2011), Fornell & Vivancos (2009), National Centre for Technology Education (2008) and Solar, Sabattin, & Parada (2013) and field data from one school in Arusha, Tanzania.

Table 1 above demonstrates the level of ICT integration in teaching and learning in secondary schools. The lowest level of ICT integration, according to the illustrations, is initial, followed by e-enabled, and e-confident. In contrast, the fullest level of integration is e-matured. Most schools in Tanzania are in the initial stage, with only a few at the e-enabled level. This rating on the integration of ICT in teaching and learning in either initial or e-enabled is caused by inadequate and outdated ICT infrastructure, inadequate ICT knowledge, skills and competency, lack of proper enforcing policies, and poor monitoring and evaluation of ICT integration. Moreover, only a few of the teachers understand methodologies to integrate ICT into the curriculum. Correspondingly, only a few schools are involved in projects that integrate ICT (national and/or international), such as e-Twinning. Similarly, technical support is provided by an external company on a call-out basis as required since no technical support contract is in place. The schools have limited digital content available, and digital TIE digital content is used regularly. Besides, it is unclear whether all software in most of the schools are properly licensed, while some schools at e--enabled are developing a software licensing programme for the applications installed on the school's equipment. The findings concur with the findings from the study by Burr et al. (2016), which reported that the mode of teaching in secondary is paper-pencil based. The authors emphasized that the use of ICT is minimal and not highly integrated.

The fullest level of integration, e-matured, involves an integrated approach to procurement, which considers full operating costs of ICT equipment and technical support provision. Additionally, resources are accessible from a central server. All teachers and students have secure access to server space and their e-portfolio from within the school and remotely. Correspondingly, technical support is planned and integrated with ICT procurement planning and takes into account full ICT operating costs. In addition, teachers have embedded ICT into their practice to facilitate student-directed learning. Consistent evidence of collaborative, discovery-based and authentic ICT activities throughout the school exists. Likewise, students are facilitated to use ICT to support and assess their learning, e.g., creating digital content and electronic – portfolios. Finally,

ICT is integral to all aspects of SEN teaching and learning as well as in the development of IEPs. ICT resources and assistive technologies are incorporated into all levels of school planning.

The fullest integration of ICT in teaching and learning can be in the stages of teaching, as identified by Mchala et al. (2024). The full integration of ICT in lesson planning and preparation, presentation or delivery and assessment ensures full integration. Effective teaching and learning activities can only be if an efficient and effective mode is used (Munna & Kalam, 2021). The integration of ICT in teaching and learning enables teachers and students to effectively acquire the skills and knowledge needed (Gross, 2022). Correspondingly, the use of ICT enables adequate lesson planning and preparing ensures that teachers are well-equipped to address diverse learning needs (Chen, 2023)

To monitor and evaluate the level of integration of ICT in teaching and learning, the integration and performance of ICT are gauged with the integration indicators or matrix at every level, as demonstrated in Table 1 above. The presence of ICT infrastructure and its use, the incorporation of ICT in the school curriculum, and the school culture indicate the level of integration.

Conclusion

The study revealed the need for monitoring and evaluation of the ICT integration in order to determine its effectiveness and efficiency. The proposed framework for monitoring and evaluation of ICT integration in teaching and learning in secondary schools in Tanzania is intended to enable schools to gauge the integration of ICT in schools. The framework is focused more on ICT infrastructure and its use, the incorporation of ICT in the school curriculum and the school culture as significant areas of ICT integration in schools. This framework can be applied to all levels of education, such as primary, secondary and tertiary levels of education, although it is designed for secondary schools. Moreover, it can be used to monitor and evaluate ICT integration in all stages of learning, such as e-assessment. In this regard, ICT integration is evident in ICT infrastructure, in the curriculum, and the general ICT culture in school. Due to the benefits of ICT integration in teaching and learning, the study recommends that this framework be used for continuous assessment of ICT integration in secondary schools.

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