



Opportunities and strategies in integrating ICT in secondary schools: The case of Kibaha District, Tanzania

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ABSTRACT

Technology is revolutionising education through interactive, student-centered learning that fosters collaboration, critical thinking, and information access. This study seeks to investigate possibilities and strategic measures for effective ICT integration in secondary schools in Kibaha District. The study is theoretically underpinned by a constructivist perspective that emphasises the active nature of knowledge construction and the Technology Acceptance Model (TAM), which focuses on perceived usefulness and ease of use in technology adoption. The study employed a descriptive survey design and a mixed-method approach, engaging school heads, teachers, and students through purposive sampling. A total of 113 participants were involved, including three school leaders, 15 teachers, and 95 students. All selected students and teachers completed questionnaires, while interviews were conducted with the three school heads. Questionnaires were used as the primary method of quantitative data collection. Furthermore, this study obtained qualitative data from interviews and classroom observations. The analysis of data was done using descriptive statistics and thematic analysis. The results indicated that the ICT enhances teacher-student interaction, lesson preparation, critical thinking, understanding, and student engagement. Some of the identified strategic approaches for facilitating integration included teacher training, improving infrastructure, increasing internet access, and collaborating with the community. Moreover, the study provides evidence for utilising human capital, institutional resources, and ICT facilities to improve teaching and learning. The study recommends continuous teacher training, improved ICT infrastructure, stronger school-community support, and sustained funding to enhance ICT integration.

Keywords: ICT Integration, Secondary Schools, Strategic Approaches, Teacher Competence, Tanzania

I. INTRODUCTION

Information and Communication Technologies (ICTs) have brought about a revolution to global social, economic, and educational systems. The role of ICT as accelerator of development has been well established, it allows for innovation, wider access to knowledge, and better services. In schools, the use of ICT supports efficient school administration, better student academic achievements and learning environments. Evolving global trends of promoting use of ICT as a strategy for educational reforms and social development. (Msambwa & Daniel, 2024; Chuma & Raphael, 2025).

In Tanzania, the Development Vision 2025 emphasizes building a well-educated and technologically competent society as a driver of national growth. The government has introduced policies and frameworks—including the National ICT Policy (2003) and the ICT Competency Standards for Teachers (2015)—to promote ICT adoption in education (Ndanu, 2025; Kalinga, 2024). These projects reflect the value Tanzania places on ICT as a means of enhancing education quality, digital literacy and innovation in secondary education. But schools are clearly being creative in the use of ICT when considering just how seriously short most schools are falling with respect to resources as well as infrastructure. A range of stakeholders—such as teachers, students, parents, Non Governmental Organizations [NGOs] and school boards—are involved in processes that develop ICT initiatives in secondary education. Positive attitude, community involvement and resource mobilization are the opportunity factors which can be exploited in-order to venture into the effective utilization of ICT in class room. (Rajabu & George, 2025).

Previous studies from Tanzania and elsewhere within Africa have pointed out challenges such as poor facilities, untrained teachers, and insufficient funding. (Nzilano, 2025; Shekaoneka & Arthur, 2024; Barakabitze et al., 2019), less documentation of opportunities and facilitators that encourage ICT uptake in low-resource settings. Through its attention to both constraints and possibilities, this research contribution highlights tendencies towards a more rounded view of ICT integration in Tanzanian secondary schools. (Milner-Bolotin & Martinovic, 2025; Salazar et al., 2025; Bosire, 2025).



ICT adoption into secondary throughout gains new relationships with knowledge, focuses teaching practice and increases learning outcomes. (Msambwa & Daniel, 2024). It supports peer learning, student motivation and life-long education if it is effectively implemented in the classes. (Chuma & Raphael, 2025). ICT further enables a shift of pedagogy from teacher-centered to learner-centered strategies and the provision of interesting and interactive learning environment. (Makolo et al., 2025). Successful ICT integration depends not only on infrastructure but also on teacher competencies, institutional readiness, long-term investment, and curriculum adaptation (Ndanu, 2025; Kalinga, 2024).

Throughout Africa, technology policies and infrastructure in schools are being put in place by governments to support the education system so students have access to better education, but hurdles such as lack of resources and teacher capability still remain leaving a void around understanding facilitating factors that enable schools to easily integrate ICTs in the hand of constraints. (Chuma & Raphael, 2025). In terms of the development of ICT in Tanzania, the 1970s had restrictions in place limiting the use of computers and television. It wasn't until 1984, when the market started to be liberalised, that ICT's usage began to grow. The National ICT Policy in 2003, and the ICT Competency Standards for Teachers that were developed in 2015 have played significant roles in infrastructure and educational systems. (Ndanu, 2025; Kalinga, 2024). These developments align with Tanzania's Development Vision 2025, which calls for a technologically skilled, well-educated society.

However, existing research has largely focused on barriers (Ndanu, 2025; Shekaoneka & Arthur, 2024; Barakabitze et al., 2019). Education is able to draw on community resources, committed teachers, NGO collaboration and imaginative use of available resources elements which are insufficiently reported. Failure to consider these opportunities and strategies can blind policymakers and educators to possible practical approaches to enhancing ICT integration. The integration of ICT in Tanzanian secondary schools is not uniform across the nation, particularly in rural and semi-urban areas despite policy recommendations that are designed to promote technology use. (Chuma & Raphael, 2025). Schools often struggle to meet the technological and human resource demands needed to fully implement ICT in teaching and learning. Existing research has predominantly focused on barriers such as inadequate infrastructure, lack of teacher training, and limited funding (Ndanu, 2025; Shekaoneka & Arthur, 2024; Barakabitze et al., 2019). This emphasis on constraints has left a knowledge gap regarding enabling opportunities and strategies that allow schools to adopt ICT even in low-resource conditions.

Focusing on the above positive factors may cause education policy makers to reverse a search for concrete ways that might accelerate ICT implementation in general & internet use specifically. Awareness on the existing opportunities is pivotal to influence policy and direct resource allocation that contribute in a sustainable way for ICT integration. (Rajabu & George, 2025). The study therefore tries to investigate the prospects and strategic propositions that allow successful implementation of ICT in secondary schools in Kibaha District, providing evidence that can be utilized to guide national educational planning as well as local planning.

1.1 Research Objective

- i. To determine existing opportunities that encourage the uptake of ICT in secondary schools.
- ii. To explore strategies adopted by schools and by key stakeholders to improve the integration of ICT.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study is grounded on the bases of Constructivism (Piaget & Inhelder, 2008) and Technology Acceptance Model (TAM) (Davis, 1989), as a two-pronged perspective to examine the integration of ICTs in Tanzanian secondary schools. Constructivism supports learners in constructing their own knowledge by interacting, reflecting and experiencing. In schools, ICT tools (such as computers, projectors and online platforms) create an interactive and collaborative learning environment which helps to develop the ability of critical thinking, problem solving and engaged learners. (Piaget & Inhelder, 2008; Chuma & Raphael, 2025). This pedagogical approach shifts teaching from a teacher-centred to a learner-centred model, placing the learners at the centre and giving them a more active role in their own learning. TAM, gives us a deeper understanding of the psychological drivers that propel the adoption of ICT by not only teachers, but also students. When both, teachers and students, believe that a particular ICT is going to be useful and won't be too difficult to use, they're more likely to work effectively with it. (Davis, 1989; Chuma & Raphael, 2025).

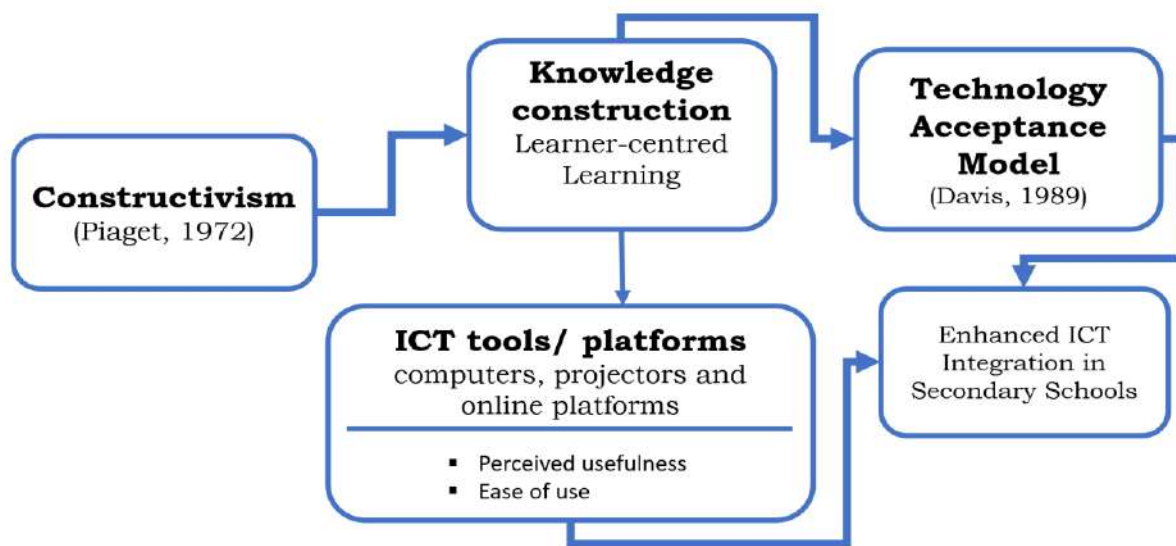


Figure 1

Theoretical Framework linking ICT Adoption and Knowledge Construction in Secondary Schools

Source: Author's construct (2025).

By integrating these theories, the research investigates the pedagogical role of ICT to foster active learning and behavioural factors for adoption and provides an integrated lens through which to view technology integration in secondary schools.

2.2 Empirical Review

2.2.1 Opportunities that Facilitate ICT Adoption in Secondary Schools

Internationally, availability of digital tools and resources, enabling policies, and teacher readiness are perceived as facilitative enablers in adopting ICT (Ifinedo et al., 2020; Kewalramani et al., 2020; Abedi, 2024). Research has indicated that integrated ICT can enhance teaching and learning, enhance teachers' pedagogical capabilities and have the potential to develop 21st century skills which is required in a knowledge-based society (Vandeyar & Adegoke, 2024).

Digital literacy programmes, capacity building and enhanced ICT infrastructure in the African perspective have led to a positive effect on technology adoption in rural or such schools with limited resources. (Mwapwele et al., 2019; Dyantyi & Mkabile-Masebe, 2025). In Tanzania, national policies, such as the National ICT Policy (2003) and ICT Competency Standards for Teachers (2015), and digital literacy initiatives have opened up spaces for ICT use in classroom instruction. (Kalinga, 2024; Bulugu & Nkebukwa, 2024). Institutional support, community involvement, and NGO partnerships have further facilitated ICT adoption (Rajabu & George, 2025). In addition, teacher skills, student's motivation and the leadership of a school are also factors that support ICT integration (Chuma & Raphael, 2025). These results suggest that opportunities for ICT adoption are multifaceted, including elements of human, institutional and policy level effects. Identifying these facilitators also assists schools in maximising resources and support structures to improve teaching and learning.

2.2.2 Strategic Approaches Employed by Schools and Stakeholders to enhance ICT Integration

Nationwide, schools utilize initiatives to promote integration, such as professional development, mentoring and an ICT-informed curriculum. (Vandeyar & Adegoke, 2024; Abedi, 2024). From Africa, planning, investment in infrastructure and collaboration with NGOs and local communities were found to have facilitated sustainable ICT adoption. (Barakabitze et al., 2019; Dyantyi & Mkabile-Masebe, 2025). In Tanzania, specific interventions consist of online teacher training models, ICT clubs and use of learner-centred digital platforms. (Msambwa & Daniel, 2024; Chuma & Raphael, 2025; Loisulie & Kondo, 2025). Leadership support, aligned with national policies, ensures sustainable integration (Raphael, 2022; Salazar et al., 2025). When technical support, resource provision, and stakeholder participation are combined, it has a positive impact on teacher confidence and student learning outcomes. (Bendera, 2024). Purposeful planning for integration of ICT with capacity development and community engagement is



crucial. Schools that integrate professional development with infrastructure support and community outreach can be successful in overcoming obstacles to sustainable use of ICT.

III. METHODOLOGY

3.1 Research Design and Participants

Descriptive survey design was used to investigate strategic factors affecting the incorporation of ICT in secondary schools in Kibaha District, Tanzania. This structure facilitated in-depth collection of data on perceptions and institutional conditions for ICT integration (Ndanu, 2025). The target population comprised school heads, ICT teachers, non-ICT teachers and students in public secondary schools. From this population, school heads and ICT teachers were purposively selected because of their experience with ICT adoption, while the remaining participants were selected using simple random sampling. A total of 113 members were involved, including 3 school leaders, 15 teachers and 95 students. All selected students and teachers completed questionnaires, while interviews were conducted exclusively with the three school heads.

3.2 Data Collection Procedure

Data were collected using a mixed-methods approach, including structured questionnaires, semi-structured interviews, and classroom observations. Teacher and student questionnaires captured perceptions and experiences regarding ICT strategies. Semi-structured interviews with school heads explored School heads to examine strategies and policies as well as implementation of ICT in schools. Information inspection lists were employed to inspect ICT infrastructure (e. g. hardware availability, software usage, and internet connectivity). This comprehensive approach ensured a nuanced understanding of how ICT is integrated into the educational environment and its impact on teaching and learning outcomes. g., computer laboratories, internet facilities and electricity). During school hours, the questionnaires were filled in person to ensure complete participation. The tools were constructed from prior studies (Ndanu, 2025) and the instruments reviewed by ICT education experts to enhance clarity, relevance and objectivity. A pre-test sample was administered to a school not selected as part of the main sample to test instruments and improve reliability. Ethical approval was based on the data collection, all participants gave informed consent. Participation was voluntary and confidentiality and privacy were maintained.

3.3 Data Analysis Techniques

Quantitative information obtained from questionnaires was described using descriptive statistics (frequencies and percentages) with SPSS. Data collected from interviews and observations as qualitative in nature was analyzed thematically, with responses categorized into themes such as ICT infrastructure, teacher training, policy synchronization and resources. This mixed-method method facilitated triangulation of the results and enabled the researchers obtain an in-depth view of both teachers' perception and school's approach to ICT integration.

IV. FINDINGS & DISCUSSION

4.1 Opportunities Facilitating ICT Adoption in Secondary Schools

The first objective of this study was to identify opportunities that ease the adoption of Information and Communication Technology adoption in secondary schools within Kibaha District. Teachers and students were asked their perceptions on the use of ICT in teaching and students learning.

Table 1

Teachers' and Students' Perceptions on the Usefulness of ICT

| Respondent Group | ICT Use / Benefit | Frequency (f) | Percentage (%) |
|------------------|---|---------------|----------------|
| Teachers | Facilitates student–teacher interaction | 14 | 93.3 |
| Teachers | Encourages individual learning | 10 | 66.7 |
| Teachers | Enhances critical thinking | 11 | 73.3 |
| Teachers | Improves vocabulary | 7 | 46.7 |
| Teachers | Develops study habits | 9 | 60.0 |
| Students | Makes class more active | 78 | 82 |
| Students | Students enjoy lessons | 80 | 84 |
| Students | Deeper understanding of content | 76 | 80 |
| Students | Helps change behaviour | 65 | 68 |

Note: Percentages for teachers are based on N = 15; percentages for students are based on N = 95.



The results suggest that teachers do consider ICT as very useful in supporting student-teacher interaction (93.3%), enhancing critical thinking (73.3%), and facilitating preparation of student results and promote proper study habits (60%). Additionally, ICT was reported to support searching for teaching notes (86.7%) and sharing of experiences (100%) (Msambwa & Daniel, 2024). Students similarly highlighted ICT as promoting engagement and learning outcomes. For instance, 82% of students reported that ICT makes lessons more active, 84% indicated that lessons are more enjoyable, 80% noted deeper understanding of content, and 68% acknowledged positive changes in learning behaviour. These findings concur with Chuma and Raphael reports (2025), who highlight the ICT role in learner-centred approach of teaching and in active learning during lessons. These results were confirmed by qualitative answers given by headmasters. For example:

“We are in a period of globalization where everything is computerized. Teachers need to learn to use technology to improve teaching.” — Headmaster, School K

“ICT in education brings information closer to the people. Teachers are able to show videos and images using projectors, which help them explain things better— Headmaster, School M

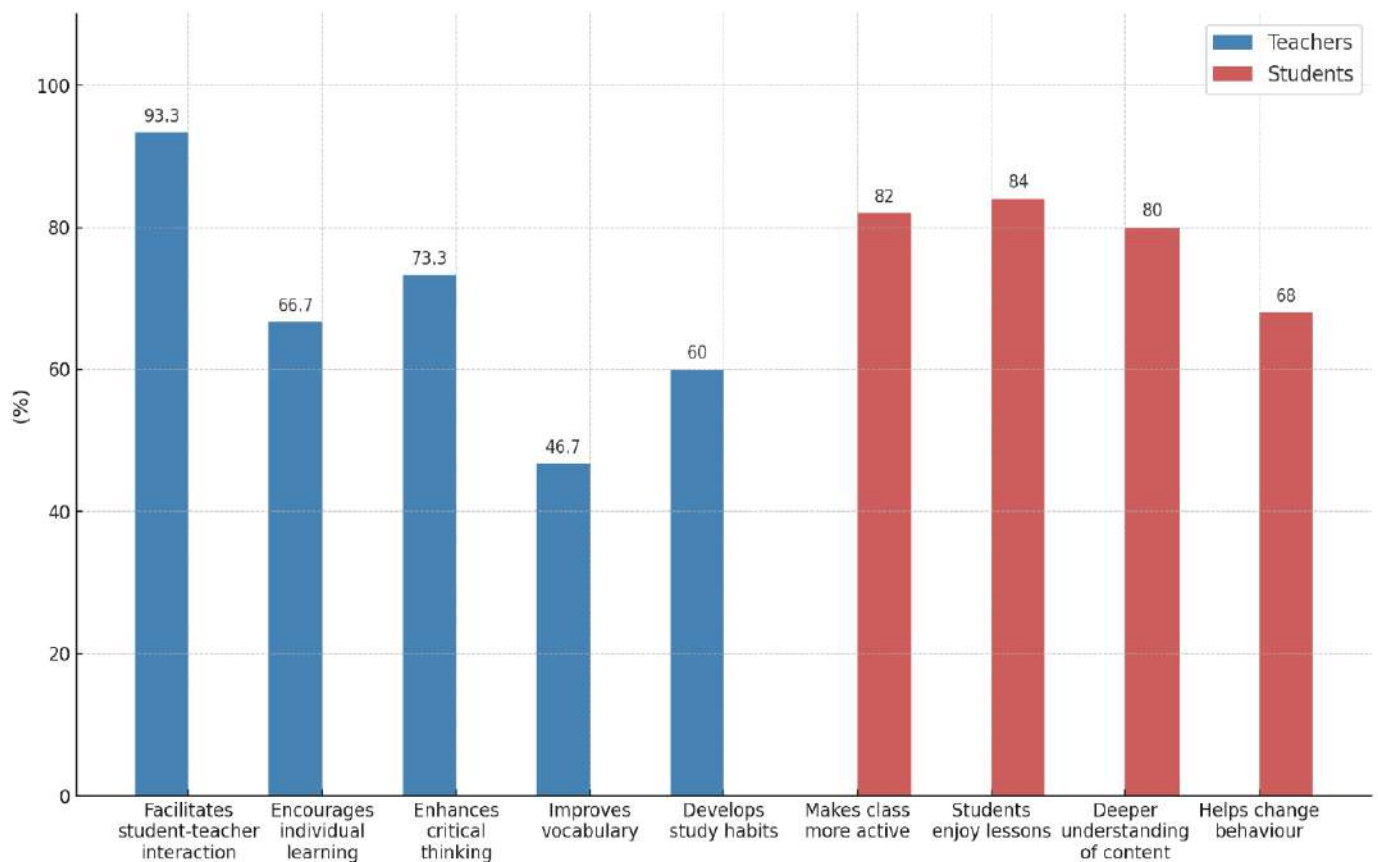


Figure 3
Teachers’ and Students’ Perceptions on the Usefulness of ICT

Figure 3 visually summarizes the perceptions of teachers and students regarding the usefulness of ICT in teaching and learning. Teachers emphasized ICT’s role in facilitating interaction, enhancing critical thinking, and supporting instructional tasks. Students highlighted ICT’s contribution to making lessons more active, enjoyable, and promoting deeper understanding. The figure demonstrates overlapping recognition of ICT benefits by both groups while highlighting the areas of emphasis unique to each stakeholder.

4.2 Strategies for Effective Adoption of ICT in Secondary Schools

The second objective examined strategic approaches employed by schools and stakeholders to enhance ICT integration. Teachers and students suggested strategies to overcome challenges and improve ICT adoption.



Table 2
Teachers’ and Students’ Suggested Strategies for ICT Adoption

| Strategy | Teachers (f) | Teachers (%) | Students (f) | Students (%) |
|---|--------------|--------------|--------------|--------------|
| Provision of funds | 15 | 100 | | |
| Increase number of computers and ICT facilities | 15 | 100 | 95 | 100 |
| Installation of internet service | 15 | 100 | 92 | 96.8 |
| Increase number of ICT textbooks | 13 | 86.7 | 87 | 91. |
| Provision of in-service training for teachers | 15 | 100 | | |
| Extra time for private study | | | 76 | 80 |
| Quality building for computer laboratory | 11 | 73.3 | 90 | 94.7 |

Note: Percentages for teachers are based on N = 15; percentages for students are based on N = 95.

Funding, enough ICT facilities, covering internet access, textbooks, in-service teacher training and improved laboratory infrastructure were all highlighted by teachers and students. These approaches were identified as critical enablers for successful integration of ICT in classrooms.

These findings were corroborated by the headmasters during interviews:

“There is need for funding, infrastructure and teacher training to make ICT work in the classroom. — Headmaster, School K

“Students gain the most from well-equipped laboratories and teachers trained to be creative with ICT tools.” — Headmaster, School M

It suggests that intervention strategies such as teacher training, improvement of infrastructure, resource allocation as well as engagement of stakeholders are critical for successful ICT integration. These results align with the principles of the Technology Acceptance Model (Davis, 1989) and Constructivism (Piaget & Inhelder, 2008), which emphasize that perceived usefulness, ease of use, and learner-centred engagement are fundamental for ICT adoption (Msambwa & Daniel, 2024; Makolo et al., 2025).

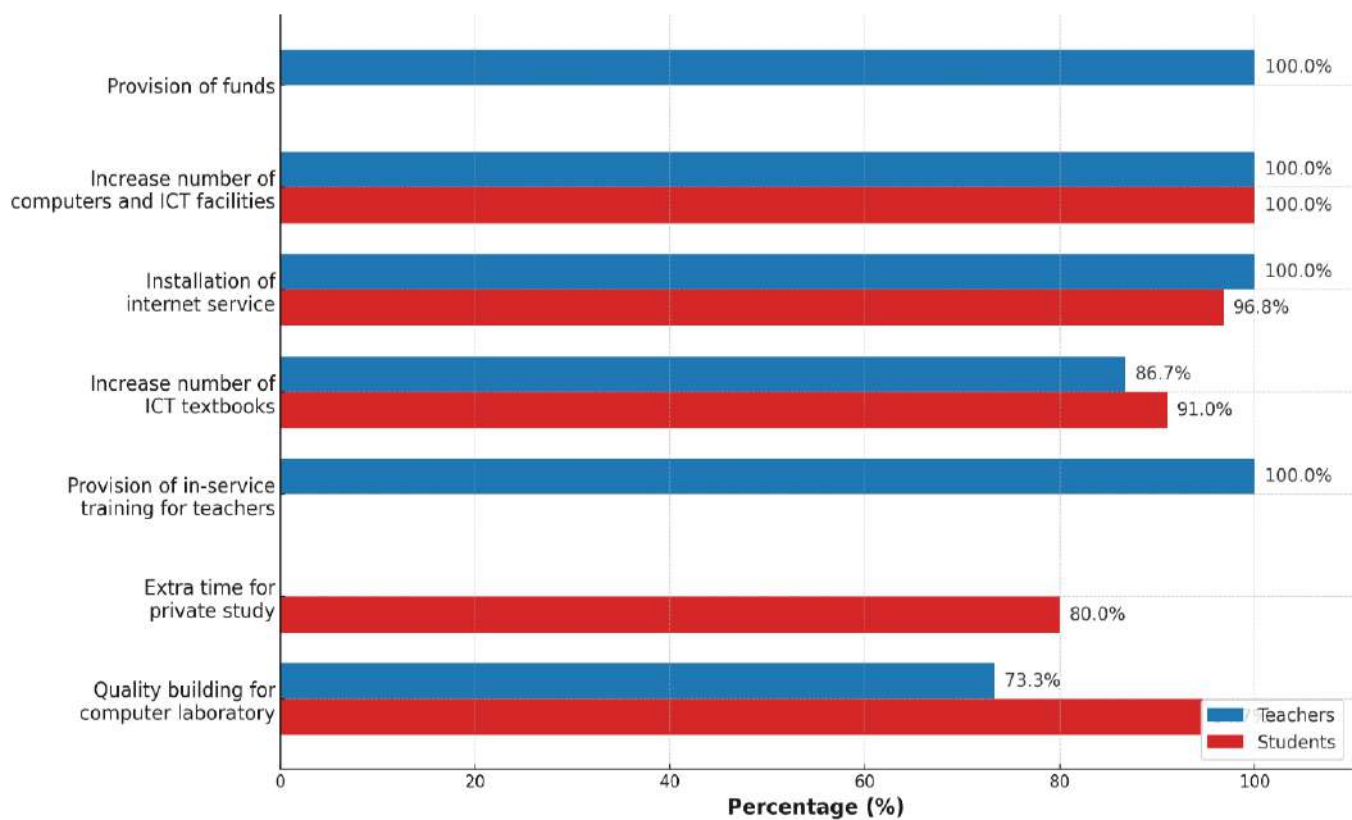


Figure 4
Recommended Strategies for Effective ICT Adoption

Figure 4 visually presents recommendations from teachers and students on effective strategies in the use of ICT. Teachers emphasized funding, provision of ICT facilities, internet access and in-service training whereas students highlighted the need for additional computers/expansion of the schools' network, extra time for private study and more



text books. Human resource and infrastructure development were identified by both groups as being key to the integration of ICT in secondary schools.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The research answered questions regarding the opportunities and strategies to achieve successful integration of ICT in secondary schools in Kibaha District, Tanzania, thereby meeting the objectives above. On Objective one good practice that emerged from the themes resulted in a number of benefits for ICT integration: better student teacher relationship, changes in curriculum design and delivery, quality preparation of lessons and effective instruction delivery as well as improved content understanding enhanced student involvement and learning motivation. These experiences illustrate ICT's pedagogical potential for supervising teachers and trainees. For Objective 2 the study identified critical interventions that were necessary to attain these opportunities, such as provision of sufficient financial resources, a good ICT infrastructure, reliable internet linkages, ongoing in-service teacher training and establishment of fully resourced computer laboratories. The results show that the strategies establish conducive environment needed for meaningful use of ICT in teaching and learning. The synthesis of the opportunities and strategies presented provides a tangible pathway to ICT integration where institutional support allows for teacher adoption of ICT tools which supports the use of learner-centred approaches as well as learners' levels of engagement in learning. This model is consistent with the Constructivism theory and TAM, both of which give prominence to active learning and perceived usefulness of ICT to be significant elements for adoption. Despite these positive outcomes, limited numbers of ICT staff and lack of support from school leadership, government and others remain perennial challenges to sustained ICT integration. In general, the research suggests the value of aligning school policies, resource provision, and teacher competence to strengthen ICT implementation and ultimately improve teaching quality and student academic achievement.

5.2 Recommendations

It is recommended that in-service teachers' professional development and in service training programs should be conducted to enhance teacher competency in ICTs tools and pedagogical utilization. Provisions of enough computers, projectors, internet facilities and computer laboratories for effective ICT adoption should be made by schools even as governments and stakeholders are to make budget allocation for ICT resources, maintenance and teacher training so as to stabilize technology integration. School leadership ought to come up with strategies for promoting the use of ICT mobilizing communities and NGOs to contribute in terms of resources and experts. Finally, teachers should integrate ICT in ways that support interactive and collaborative learning, enhancing students' understanding, engagement, and critical thinking skills. Applying these suggestions will improve the practical and strategic aspects of ICT integration in Tanzanian primary schools, providing an environment that facilitates innovative and efficient teaching and learning.

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