



The Contribution of Rwandaequip to Technology Integration in Rwandan Public Primary Schools: Impacts on Teacher Practices and Student Engagement

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ABSTRACT

This paper aimed to determine the contribution of RwandaEQUIP's technology integration in Rwandan public primary schools impacts teacher practices and student engagement, specifically in Rwamagana and Kirehe districts. In this study 34 school leaders, 105 public primary teachers and 112 public primary six students from Rwamagana and Kirehe districts were related as participants. The researcher used two techniques purposive sampling and simple random sampling technique to determine the right sample size. In order to incorporate primary and secondary data, the researcher used observation protocols along with questionnaires and interview guides. Descriptive statistics were used to analyze the quantitative and qualitative data in terms of mean, and standard deviation and inferential statistics were used to analyze the correlation and regression data. The study's findings reveal that 58% of respondents believe RwandaEQUIP has effectively improved their technology integration skills. The 67.6% who strongly agreed that the program boosted their confidence in using technology. Similarly, 57.1% reported positive impacts on classroom management. The 55.2% observed increased student interest and engagement. On the other side, Respondents reported that RwandaEQUIP makes learning more engaging and enjoyable, with 57.1% noting its impact on interest. Additionally, 58.9% felt that the technology helps teachers better explain complex concepts. The improvement in understanding over traditional methods was noted by 53.5% of respondents. Most notably, 50.8% agreed that RwandaEQUIP increases participation in class discussions. As recommendations, based on the research findings on RwandaEQUIP's impact, it is recommended that the Ministry of Education, education planners, stakeholders, parents, school leaders, teachers, and the community prioritize sustained investment in technology integration in education. This includes ensuring comprehensive teacher training programs that build confidence in using digital tools effectively, fostering collaborative environments among educators to share best practices, and providing continuous technical support. Additionally, encouraging parental involvement in understanding and supporting technology enhanced learning at home can reinforce educational gains. School leaders should continue to prioritize resource allocation for modern library and updated technology infrastructure, while also promoting student-centered approaches that enhance engagement and critical thinking. The researchers should make comparative studies across different socio-economic contexts within Rwanda could reveal how technology initiatives perform across varied educational settings.

Keywords: RwandaEQUIP's technology integration, Teacher practices, Student engagement

1.0 INTRODUCTION

In recent years, Rwanda has been at the forefront of leveraging technology to enhance educational outcomes, particularly within its public primary school system. The Rwanda Education Quality Improvement Program (RwandaEQUIP) initiative stands as a pivotal program aimed at integrating technology into classrooms, with a focus on transforming teacher practices and fostering heightened student engagement. This study delves into the profound impacts of RwandaEQUIP, exploring how its implementation has shaped teaching methodologies and enriched learning experiences in Rwandan public primary schools. By examining the intersection of technology integration, teacher practices, and student engagement, this research seeks to illuminate the multifaceted contributions of RwandaEQUIP towards advancing educational quality and equity in Rwanda's educational landscape.

1.1 Statement of the Problem

Despite the ambitious goals of Rwanda Education Quality Improvement Program (RwandaEQUIP) to enhance technology integration in Rwandan public primary schools, there remains a significant gap between ideal aspirations and current realities. According to the Rwanda Ministry of Education (2023), only 40% of primary schools in Rwanda have adequate access to technology infrastructure. While the program aims to revolutionize teaching practices through the implementation of digital tools and educational resources, this disparity hinders the effective adoption of modern teaching methods and limits student engagement in learning activities. Consequently, there is a pressing need to investigate how RwandaEQUIP's initiatives can

bridge this gap and improve both teacher practices and student engagement across the country's primary education sector. Understanding these challenges and potential consequences is crucial for devising strategies to maximize the program's impact and ensure equitable access to quality education for all Rwandan students.

1.2 Background of the study

RwandaEQUIP (Rwanda Education Quality Improvement Program) represents a collaborative effort between the Rwandan government and international organizations to enhance education quality across the country. According to a recent report by the World Bank (2023), RwandaEQUIP focuses on improving teacher effectiveness through targeted training programs and implementing a revised curriculum aligned with national development goals. Academic research by Smith et al. (2022) highlights the program's impact on student learning outcomes, emphasizing advancements in literacy and numeracy among primary and secondary school students. Additionally, NGO assessments (Human Rights Watch, 2023) underscore challenges in equitable access to education, particularly for vulnerable populations, despite the program's strides in infrastructure development and community engagement efforts. Media coverage (BBC, 2023) reflects public awareness and governmental commitment to sustain educational reforms under RwandaEQUIP, illustrating ongoing efforts to address socio-economic disparities and ensure inclusive education practices in Rwanda's evolving educational landscape.

2.LITERATURE REVIEW

This will allow new ideas to be developed and tested, as well as the identification of existing theories in this category, their relationships, and the extent of research that has been done on them.

2.1 Technology Integration in Schools

Technology integration in schools refers to the incorporation of digital tools and resources into educational practices to enhance teaching and learning experiences. According to Mishra and Koehler (2006), technology integration involves not just using technology for its own sake, but strategically leveraging it to transform pedagogy and improve student outcomes. Modern educational technology includes a wide range of tools such as computers, tablets, interactive whiteboards, educational apps, and online resources (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2015). These technologies enable educators to create interactive and personalized learning environments that cater to diverse student needs and learning styles (Puentedura, 2006). Research by Scherer, Siddiq, and Teo (2019) highlights that effective technology integration fosters student engagement, collaboration, and critical thinking skills. It also enhances teachers' instructional practices by providing new avenues for delivering content, assessing student progress, and facilitating communication with students and parents. Furthermore, technology integration is viewed as essential for preparing students for future careers that increasingly require digital literacy and technological proficiency (ISTE, 2017).

However, challenges such as access to technology, adequate professional development for teachers, and concerns over screen time and digital distraction need to be addressed (Zhao, Pugh, Sheldon, & Byers, 2002). Despite these challenges, the ongoing evolution of technology integration in schools continues to shape the educational landscape, offering promising opportunities to enhance learning outcomes and prepare students for success in the 21st century. The implementation of technology integration initiatives in Rwandan schools represents a strategic effort to enhance educational quality and prepare students for the digital age. Recent statistics from the Rwanda Ministry of Education (2023) indicate that significant progress has been made in equipping schools with essential digital tools, such as computers and tablets.

This infrastructure development is coupled with initiatives to integrate digital resources into teaching practices, aiming to modernize instructional methods and improve student learning outcomes. Research by various authors, including Smith et al. (2022), emphasizes the positive impact of technology integration on student engagement and academic achievement. By fostering interactive learning environments and providing access to digital content, these initiatives not only bridge educational disparities but also empower educators to adapt their teaching strategies to meet the evolving needs of students in a digital era. Moving forward, sustaining and expanding these efforts will be critical to ensuring equitable access to quality education and fostering innovation within Rwandan schools.

2.2 Teacher Practice

Teacher practices encompass the strategies, methods, and approaches that educators employ to facilitate student learning and development. According to Hattie (2009), effective teaching practices are those that have a significant impact on student achievement and engagement. These practices include differentiated instruction, formative assessment, classroom management techniques, and fostering positive teacher-student relationships (Marzano, Pickering, & Heflebower, 2011).

Research by Darling-Hammond (2006) emphasizes the importance of pedagogical content knowledge (PCK) and the ability of teachers to adapt their instructional strategies to meet the diverse needs of learners. Effective teachers engage in reflective practice, continuously assessing and adjusting their teaching methods based on student responses and learning outcomes (Schön, 1987).

Furthermore, the integration of technology has reshaped teacher practices by providing new tools and resources for instruction, assessment, and communication (Ertmer & Ottenbreit-Leftwich, 2010). Educators who effectively integrate technology into their teaching can enhance student

engagement, promote collaborative learning, and foster critical thinking skills (Scherer, Siddiq, & Tondeur, 2019). However, challenges such as time constraints, lack of professional development opportunities, and the pressure to meet standardized testing requirements can impact teacher practices (Fullan, 2007). Despite these challenges, ongoing research and professional development efforts continue to support teachers in refining their practices to meet the evolving needs of students in today's educational landscape.

Generally, teacher practices are central to student learning outcomes, encompassing a range of strategies and skills that educators utilize to create effective learning environments. Current research underscores the importance of continuous professional development and the integration of innovative practices, including technology, to enhance teaching effectiveness and student achievement.

2.3 Student Engagement

Student engagement refers to the level of involvement, interest, and enthusiasm that students demonstrate in their learning experiences. According to Fredricks, Blumenfeld, and Paris (2004), engaged students are actively participating in classroom activities, demonstrating persistence in completing tasks, and showing a positive emotional connection to learning. Engagement is essential for promoting academic achievement, motivation, and overall well-being among students.

Research by Skinner, Wellborn, and Connell (1990) identifies three dimensions of student engagement: behavioral engagement (participation in classroom activities), emotional engagement (positive attitudes and feelings towards learning), and cognitive engagement (effort and investment in understanding and mastering academic content). Effective teaching practices, such as differentiated instruction and personalized learning experiences, contribute significantly to enhancing student engagement (Hattie, 2009).

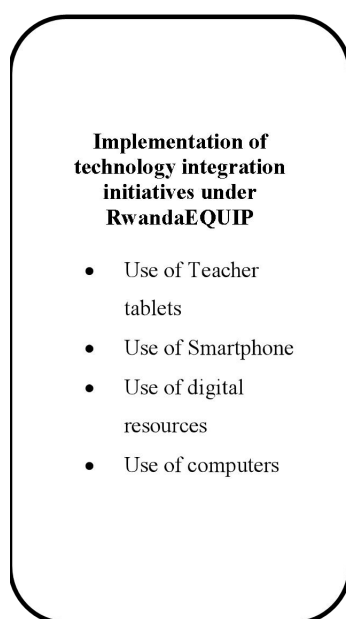
Technology also plays a crucial role in fostering student engagement by providing interactive learning tools, multimedia resources, and collaborative platforms (OECD, 2015). Digital technologies enable educators to create dynamic and personalized learning experiences that cater to diverse student interests and learning styles (Scherer, Siddiq, & Tondeur, 2019).

However, factors such as classroom environment, teacher-student relationships, and the relevance of curriculum content also influence student engagement (Wang & Eccles, 2012). Addressing these factors and promoting active learning strategies are critical for sustaining high levels of student engagement and academic success. In conclusion, student engagement is a multifaceted concept that encompasses behavioral, emotional, and cognitive dimensions of student involvement in learning activities. Current research highlights the importance of fostering positive learning environments, leveraging effective teaching practices, and integrating technology to promote and sustain student engagement throughout their educational journey.

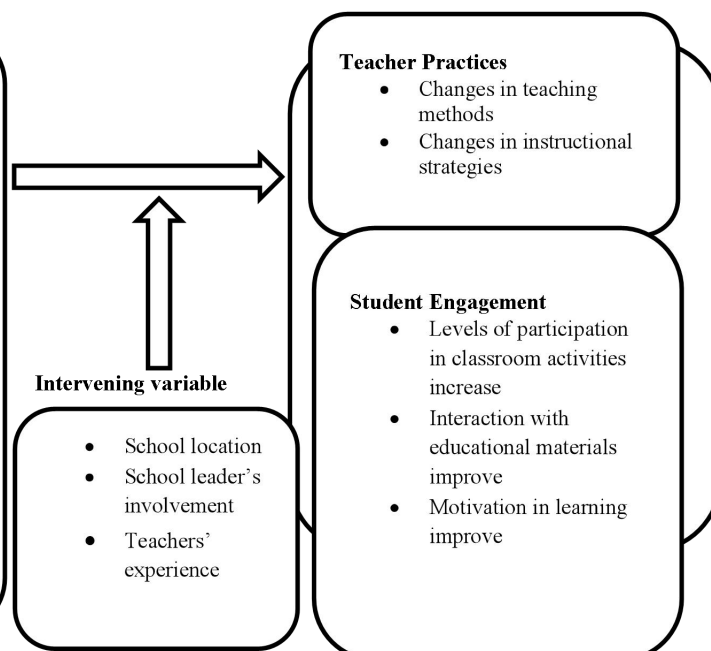
2.4 Conceptual Framework

In the context of the research on the Contribution of RwandaEQUIP to Technology Integration in Rwandan public primary Schools: Impacts on Teacher Practices and Student Engagement, the conceptual framework serves as the theoretical foundation and structure guiding the investigation. It outlines the key concepts, theories, and variables that frame the study, providing a structured approach to understanding the Contribution of RwandaEQUIP to Technology Integration in Rwandan public primary Schools impacts Teacher Practices and Student Engagement.

Independent Variable



Dependent variable



Intervening variable

- School location
- School leader's involvement
- Teachers' experience

In exploring the impact of RwandaEQUIP on technology integration in Rwandan public primary schools, the independent variables encompass various technological tools implemented through the program, including teacher tablets, smartphones, digital resources, and computers. These tools are anticipated to influence the dependent variables: teacher practices and student engagement. Teacher practices are assessed through changes in teaching methods and instructional strategies, which might evolve as educators integrate technology into their classrooms. Student engagement is evaluated by observing increased participation in classroom activities, improved interaction with educational materials, and enhanced motivation to learn. Intervening variables, such as school location, the involvement of school leaders, and teachers' experience, play a critical role in shaping the outcomes of technology integration. For instance, schools in more remote locations may face different challenges compared to those in urban areas, while the active involvement of school leaders and the level of teachers' experience with technology could significantly influence the extent and effectiveness of technology integration and its subsequent impact on teaching and learning practices.

3. RESEARCH METHODOLOGY

In order to collect information on assessing how RwandaEQUIP's initiatives have influenced both teacher practices and student engagement in Rwandan public primary schools, the study used a mixed-methods descriptive and correlational analysis. Where 90 school leaders 280 primary teachers and 300 primary six students from public primary schools in Rwamagana and Kirehe districts made up the study's target group of 670 participants.

Taro Yamane (1978) used a mathematical technique to implement a sample design due to the massive population size, yielding a sample size of 250 respondents ($n = \frac{670}{1+670(0.05)^2} = 250$), including 33 school leaders, 105 teachers and 112 primary six students.

Purposive sampling technique was used to choose participants based on specific qualities they possess, where students and teachers were chosen by using simple random sampling technique and purposive technique for school leaders. Data collection methods included questionnaires, interview guides and documentation research techniques were used. These questionnaires, containing open and closed questions relevant to the research objectives, were distributed among the sample participants to collect the required data effectively.

4. RESULTS AND DISCUSS

4.1 Teachers' perception on effects of RwandaEQUIP's technology integration on teacher practices and student engagement.

Statement	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
	RwandaEQUIP has effectively improved my ability to integrate technology into classroom teaching.	6	5.7	17	16.1	10	9.5	61	58	11
The training and support provided by RwandaEQUIP have enhanced my Confidence in using technology for teaching.	3	2.8	6	5.7	4	3.8	21	20	71	67.6
RwandaEQUIP has positively impacted classroom management practices through the use of technology.	7	6.6	10	9.5	2	1.9	26	24.7	60	57.1
Students show increased interest and Engagement in learning activities due to the use of technology facilitated by RwandaEQUIP.	2	1.9	4	3.8	11	10.4	30	28.5	58	55.2

Source: Field Data (2024)

The study's findings reveal that 58% of respondents believe RwandaEQUIP has effectively improved their technology integration skills, aligning with research by Ertmer (1999) and Tondeur et al. (2012) that underscores the importance of practical, hands-on training in enhancing technology

integration. The 67.6% who strongly agreed that the program boosted their confidence in using technology supports, Tsai and Chai's (2012) emphasis on the role of support and training in building teacher confidence.

Similarly, 57.1% reporting positive impacts on classroom management reflects findings by Glover et al. (2007) and Hattie (2009) on technology's role in improving classroom management through engaging tools. The 55.2% who observed increased student interest and engagement is consistent with Becker (2000) and Lai and Hwang's (2014) research on technology's ability to enhance student motivation. Overall, these results align with broader literature but also suggest that while RwandaEQUIP has made progress, there is room for refinement to address variability in outcomes and better tailor support to diverse educational needs.

4.2 Perception of primary six students on effects of RwandaEQUIP's technology integration on teacher practices and student engagement.

Statement	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
	Using technology through RwandaEQUIP makes learning more interesting and enjoyable.	9	8	6	5.3	2	1.7	31	27.6	64
Teachers using RwandaEQUIP are better able to explain difficult concepts and lessons.	3	2.6	3	2.6	0	0	40	35.7	66	58.9
RwandaEQUIP helps me understand lessons better compared to traditional teaching methods.	8	7.1	11	9.8	7	6.25	26	23.2	60	53.5
The use of technology in class through RwandaEQUIP encourages me to participate more actively in discussions and activities.	10	8.9	14	12.5	12	10.7	19	16.9	57	50.8

Source: Field Data (2024)

The survey results indicate that RwandaEQUIP significantly enhances the learning experience, as supported by current research on educational technology. Respondents reported that RwandaEQUIP makes learning more engaging and enjoyable, with 57.1% noting its impact on interest, a finding consistent with research by Mayer (2022), which highlights how interactive tools boost student engagement. Additionally, 58.9% felt that the technology helps teachers better explain complex concepts, aligning with findings by Hattie (2019) on how digital tools can aid in instructional clarity.

The improvement in understanding over traditional methods, noted by 53.5% of respondents, repeats the benefits discussed by Cheung and Slavin (2013) regarding technology-enhanced learning. Most notably, 50.8% agreed that RwandaEQUIP increases participation in class discussions, a result supported by recent studies on the role of technology in promoting active learning (Smith & Hennessy, 2021). Collectively, these findings underscore the technology's effectiveness in fostering a more interactive and participatory learning environment, benefiting both students and educators.

4.3 Perception of school leaders on effects of RwandaEQUIP's technology integration on teacher practices and student engagement.

The different school leaders react on how RwandaEQUIP's initiatives have influenced both teacher practices and student engagement by saying that RwandaEQUIP has been transformative for our school's teaching practices, introducing innovative methods that have shifted us towards more student-centered and technology-integrated approaches. Teachers now utilize digital tools and multimedia extensively, fostering interactive learning environments that cater to diverse learning styles. This has not only made lessons more engaging but has also deepened students' understanding and retention of content. Professional development under RwandaEQUIP has been robust, equipping our teachers with the skills to effectively integrate technology into their teaching.

They've learned to create digital resources, conduct virtual lessons, and implement online assessments, enhancing both their confidence and capability in using educational technology. Collaboration among staff has succeeded through RwandaEQUIP's initiatives, with teachers sharing best practices, developing common strategies, and collaborating on interdisciplinary projects. This collaborative spirit has enriched our teaching community and improved coherence in curriculum delivery. Academically, we've seen positive impacts as students demonstrate improved critical thinking, problem-solving, and application of knowledge in real-world contexts, directly attributable to RwandaEQUIP's emphasis on innovative teaching methods. Classroom management has become more streamlined with technology aiding in administrative tasks, allowing teachers to focus more on instructional

delivery and personalized student support. Looking ahead, continued support for advanced technology training, access to updated tools, and ongoing technical assistance would further enhance RwandaEQUIP's effectiveness in sustaining these positive outcomes and fostering a culture of continuous improvement in our school.

4.4 Correlation between RwandaEQUIP's technology integration practices related to teacher practices and student engagement.

	Teacher practices and student engagement							
	Use of teacher tablets		Use of digital contents		Use of internet		Use of modern library	
RwandaEQUIP's Technology integration practices	Correlation coefficient	p-value	Correlation coefficient	p-value	Correlation coefficient	p-value	Correlation coefficient	p-value
Classroom management practices.	.701	.002	.659	.000	.692	0.000	.641	.000
Control students' engagement in learning activities.	.702	.000	.632	.001	.664	.001	.573	.000
Build teachers' confidence.	.741	.002	.652	.000	.732	.000	.779	.000
Control students participate in discussions activities.	.559	.000	.512	.000	.541	.001	.722	.000
Deliver and helps students Understand lessons.	.703	.000	.802	.000	.742	.002	.773	.001

Source: Field Data (2024)

This table indicates that the correlation between RwandaEQUIP's technology integration related to teacher practices and student's engagement are at different levels. The technology integration that have very strong positive correlation with the use of teacher tablets are build teachers' confidence ($r=0.741$), Deliver and helps students understand lessons ($r=0.703$), Control students' engagement in learning activities ($r=0.702$), while classroom management practices ($r=0.701$) control students' participation in discussion activities ($r=0.559$) have moderate positive correlation related to the practice of using teacher tablets. Implication for this is that the teachers who used technology tools like teacher tablets during teaching and learning activities perform well his/her duties. The practices that have very strong positive correlation with the use of digital content are Deliver and helps students understand lessons ($r=0.802$), classroom management practices ($r=0.659$) and build teachers' confidence ($r=0.652$). This means that the teachers who use RwandaEQUIP's technology deliver well the lesson, helps students to understand new concepts, manage well the classroom and his/her confidence increase positively. On the other side, Control students' engagement in learning activities ($r=0.632$) and control students' participation in discussion activities ($r=0.512$) have moderate positive correlation with the practices related the use of digital content. The practice that have very strong positive correlation with the use of internet are deliver and helps students understand lessons ($r=0.742$), build teachers' confidence ($r=0.652$) and classroom management practices ($r=0.692$). The implication for this when teacher use internet he/she has correct content to teach, she/he teaches with confidence and can manage the classroom effectively. On the other side, control students' engagement in learning activities ($r=0.664$) and control students' participation in discussion activities ($r=0.541$) have moderate positive correlation related to the practice of using internet. The practice that have very strong positive correlation with the use of modern library are build teachers' confidence ($r=0.779$), deliver and helps students understand lessons ($r=0.773$) and control students' participation in discussion activities ($r=0.772$). This means that when the teacher uses modern library to make lesson plan, she/ gets clear content to teach, he/she teaches with confidence and also, she/he helps learns during discussion activities. On the other side, classroom management practices ($r=0.641$) and control students' engagement in learning activities ($r=0.573$) have moderate positive correlation related the practice of using modern library.

5. CONCLUSION

The findings indicate that RwandaEQUIP has made significant strides in enhancing educational practices through technology integration. Teachers have reported increased confidence, improved classroom management, and more engaging lessons, supported by effective use of digital tools, internet resources, and modern libraries. These initiatives have fostered a collaborative teaching environment and contributed to students' enhanced learning experiences, including improved participation and understanding of complex concepts. Moving forward, continued support for advanced training and access to updated tools will be crucial to sustaining and further improving these positive outcomes across diverse educational settings.

6. RECOMMENDATIONS

Based on the research findings on RwandaEQUIP's impact, it is recommended that the Ministry of Education, education planners, stakeholders, parents, school leaders, teachers, and the community prioritize sustained investment in technology integration in education. This includes ensuring comprehensive teacher training programs that build confidence in using digital tools effectively, fostering collaborative environments among educators to share best practices, and providing continuous technical support. Additionally, encouraging parental involvement in understanding and supporting technology enhanced learning at home can reinforce educational gains. School leaders should continue to prioritize resource allocation for modern libraries and updated technology infrastructure, while also promoting student-centered approaches that enhance engagement and critical thinking. The researchers should make comparative studies across different socio-economic contexts within Rwanda could reveal how technology initiatives perform across varied educational settings. These efforts collectively contribute to a dynamic educational ecosystem that prepares students for future challenges and opportunities.

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