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The Impact of ICT Adoption in Enhancing Teaching and Learning in Primary Schools of Amathole East District, Eastern Cape

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ABSTRACT
This study examines how information and communication technology (ICT) impacts the schooling environment within the primary sector in South Africa's Eastern Cape Province's Amathole East District. ICT adoption in education can fully modify the ways that instruction and learning are given to students, but it also comes with obstacles, especially in the rural primary schools in the Amathole East District. This research intends to shed light on the current ICT status adoption of Amathole East District's primary schools. Three primary schools were chosen, and three research participants from each school were chosen using the purposive sample technique. Data were gathered through focus groups and in-person interviews. The acquired data were analyzed and presented using a thematic approach. It was revealed as the findings that while teachers were willing to embrace ICTs into teaching and learning and had a good attitude toward technology adoption, they needed the necessary ICT competencies. Furthermore, several challenges and barriers were identified, and these included inadequate ICT infrastructure, a shortage of teacher training in technology integration and a lack of access to ICT tools. The study concludes that teacher training programs be expanded, invest in infrastructure development, and develop a comprehensive ICT policy framework. Taking the research's findings into account, the research offers practical recommendations in enhancing ICT adoption, investing in infrastructure development, expanding teacher development opportunities, to formulating a comprehensive ICT strategy framework so that schools are ready to run virtually in the event of another pandemic related to COVID-19.

KEYWORDS
ICT adoption; primary schools; infrastructure; learning outcomes; teacher training; digital divide.

INTRODUCTION

Information and communication technology (ICT) encompasses a broad range of digital technological advances and tools used for the acquisition, storage, manipulation, and communication of information (Sailer et al, 2021). These include computers, the internet, software applications, interactive whiteboards, and mobile devices (Hodaňová et al, 2020). Using information and communication technology (ICT) in elementary school, particularly within rural underserved contexts, provides valuable insights into the actual impact of ICT integration on teaching methods, and learner outcomes including educational equity (Rana, 2018). A study by Rodríguez-Jiménez et al (2023) examined the result of a comprehensive teacher proficient growth course in a rural Mexican primary school. The program focused on building teachers' ICT skills and infusing technology into their teaching. The findings indicated significant improvements in both teacher readiness and student outcomes. A longitudinal study by Teame et al. (2019) in elementary institutes in rural areas in Ethiopia emphasized role of using ICT in promoting educational equity. The researchers found that the provision of digital resources, including e-books and tablets, reduced disparities in access to quality educational materials and contributed to increased enrolment and attendance among marginalized groups (Ahmad et al., 2021). These empirical studies collectively demonstrate that ICT adoption in primary education, when implemented effectively and accompanied by appropriate teacher training and support, can lead to positive changes in teaching methods, learning outcomes, and educational equity, even in rural and underserved contexts. However, they also underscore the importance of context-specific strategies and the need for comprehensive approaches that consider infrastructure, policy, and pedagogical practices.

The paper explores the role of teacher training and professional development, addressing a key aspect of successful ICT integration in education. It sheds light on the importance of supporting educators in adapting to technological changes. Through its examination of policy frameworks and leadership, the paper contributes to the academic discourse on the governance of ICT adoption in education (Cardno, 2018). It underscores the significance of clear policies and effective leadership in shaping the outcomes of such initiatives. The paper's recommendations for addressing challenges and improving ICT adoption offer practical guidance for educators, policymakers, and stakeholders involved in primary education (Rahmani et al., 2021). This practical orientation enhances its academic importance by translating research findings into actionable steps. In conclusion, this paper's academic importance lies in its contribution to the knowledge base surrounding ICT infusion in primary education, particularly within the unique context of the Amathole East District. Its empirical research, policy recommendations, and focus on educational equity make it a valuable resource for academics, policymakers, and educators concerned with the intersection of technology and education in underserved areas. The statement of the problem that this paper addresses is that information and communication technology adoption (ICT) within primary schooling of Amathole East Region is marked by disparities in access, teacher readiness, pedagogical

transformation, and learning outcomes. These differences make it difficult for the district to integrate ICT in primary education fairly and efficiently. Moreover, there is still a lack of knowledge regarding how ICT adoption affects instructional strategies, student participation, and academic achievement (Luo et al., 2019). The research objectives for this study were to evaluate the Amathole East District's primary schools' present level of ICT adoption and to explore the effects of ICT adoption on the instructional strategies used by teachers in the district's primary schools. The rationale behind identifying these objectives was to identify how ICT Adoption impacts on enhancing teaching and learning pedagogical perspectives.

LITERATURE REVIEW

A growing group of researchers regarding the incorporation of ICT in the classroom (Davis, 1989; Kalimullina et al., 2021; Rogers, 2003; Tarman et al., 2019; Tornatzky & Klein, 1982) conducted studies on the importance of infusing technology in learning. The research looked at two important theoretical problems about the use of ICT in education: (a) the technology acceptance model (TAM) (Davis, 1989) and (b) the diffusion of innovation theory (Rogers, 2003). These conceptual stances present opposing however, complementary insights to the elements that encourage educators to embrace and incorporate ICT as well as other technologies (Al-Emran et al., 2020). These viewpoints obscure significant findings that would not have been possible to make by depending only on one. These models will expand the field of study and deepen the way we comprehend how ICT is adopted and incorporated into instruction and learning by incorporating the knowledge gained from research across disciplines and methodologies. A review of previous literature is an overview of previous written works on a particular topic (Granić and Marangunić, 2019). It is also a style of scholarly writing indicating understanding and knowledge of the scholarly works on the topic (Newhart and Patten, 2023) and includes a critical analysis of the source material. For this investigation, literature that focuses on information and communication technology (ICT) integration in elementary schools, especially in rural and underserved contexts, was evaluated to obtain valuable insights into the real effects of ICT integration in teaching strategies, learning outcomes, as well as educational equity.

Empirical literature

Embracing knowledge and communication technology (ICT) in primary schooling, especially in underprivileged rural settings, offers important insights into the real impacts of ICT integration on instructional strategies, student learning outcomes, and educational fairness. To answer a specific research issue, a systematic literature review looks at past empirical investigations (Snyder, 2019). The popularity of the Technology Adoption Model (TAM) in the field of technology implementation is demonstrated by the large quantity of research that has been done on it (Almajali et al, 2022). Still, a void exists in our awareness of the representative body of scholarly work that backs TAM studies in learning environments (Almogren, 2022). Giving readers a wide summary of recent studies on the application of TAM in education in a variety of user kinds, learning technologies, and learning domains is the main objective of the empirical

literature review (Granić & Marangunić, 2019). The main findings demonstrate that TAM and all its variants provide a dependable framework for assisting in the assessment of different learning approaches (AlHadid & et al, 2022). It has been demonstrated that attitudes about adopting technology for learning are influenced by two essential TAM components: professed utility and usability of use (Chen & Aklikokou, 2020). This article identifies some spaces between present research and recommends more topics of investigation.

The systematic review's findings lay a strong foundation for expanding our knowledge of ICT adoption and provide insight into the application of TAM acceptance studies in educational contexts. Technology for information and communication (ICT) use within Kenyan primary education was the subject of a study by Ngugi & Rigg (2016) that revealed problems with infrastructure, teacher preparation, and access controls. The findings emphasize the necessity of comprehensive ICT integration programs. Wong & Looi's (2011) study investigated mobile device usage in educational settings and other educational settings. It talks about how technology may improve learning outcomes and showcases the possibilities of smooth learning aided by smartphones. The impact of a one-to-one laptop initiative on teaching and learning was assessed by Niederhauser and Lindstrom (2017), who also examined changes in teaching strategies and student learning outcomes. They also shed light on the benefits and challenges of such initiatives. Mtebe & Raphael (2018) investigated perceived obstacles to mobile phone use in open and distance learning in Tanzania. Tondeur & Sinnaeve (2011) investigated primary school teachers' perceptions of ICT integration in the curriculum. These views can be used to frame research throughout the body of current knowledge and provide a basis for interpreting the empirical landscape.

Theoretical literature

Numerous breakthroughs are studied using Rogers' (2003) diffusion of innovation theory, which has been applied in hundreds of research within the fields of education, business, economics., social sciences, health as well and farming. One of the most well-known ideas for examining information technology adoption and comprehending how technological advances propagate both within and between groups. Rogers (2003) defined innovation as an idea, activity, or item that educators see as novel. So, while an invention such as ICT can produce hesitation within the thoughts of teachers (for example, concerning its anticipated significance on the effectiveness of schooling), it can also present a chance for teachers to lessen hesitation (for example, regarding the capacity to improve teaching and learning). The latter kind of possible doubt reduction reflects the potential effectiveness of ICT in addressing the perceived needs or issues of teachers. According to Rahmani et al. (2021), an innovation's characteristics as experienced by a particular person inside a social system have an impact on how quickly it is adopted. He defined five innovation characteristics-relative benefit, compatibility, complexity, observability, and trialability may influence the adoption or acceptance of an idea. ICT adoption and integration into teaching are influenced by user characteristics, content features,

technological concerns, and organizational capabilities, according to Stockdill and Morehouse (1992).

Furthermore, a plethora of further studies have indicated that organizational attributes and attitudes regarding technology also influence the extent to which educators incorporate ICT into their teaching (Kent & Giles, 2017; Lim & Chai, 2008). When analyzing ICT in teaching and learning, Secundo, Ndou, Vecchio, and De Pascale (2020) advised individual schools and their environment including infrastructure be taken into account. Numerous diffusion studies have investigated how an innovation's characteristics and adoption relate to one another. According to Albirini's (2006) research, teacher's attitudes regarding computers and computer qualities were substantially associated. The study emphasized the significance of computing characteristics in ICT adoption and incorporation in the classroom. Positive correlations exist between teachers' views about computers and their level of computer experience. According to ˇCreˇsnar et al. (2022) teachers who possess greater computer skills are more likely to have positive attitudes toward computers. According to Ball, Huang, Rikard, and Cotton (2019), encouraging computer integration in the classroom will depend on student attitudes about computers. Woodrow (1992) asserts that instructors must adopt a pro-innovation mindset for changes to educational practices to be successful. issues with access restrictions, teacher preparation, and infrastructure Teachers' attitudes toward computers.

METHODOLOGICAL DESIGN

This study adopts a qualitative research approach to investigate the effect of information and communication technology (ICT) implementation on education within the Amathole East District of Eastern Cape Province, South Africa. Qualitative methods are well-suited for gaining in-depth insights into the experiences and perceptions of stakeholders in the context of ICT integration in education (Mogavi et al, 2023). The study uses exploratory and descriptive research methods and focuses on the elements that affect teachers' use of ICT in teaching and learning. Nine teachers were interviewed in semi-structured interviews about their views regarding the use of ICT in education and to accomplish research paper objectives. The study employed a qualitative technique to give a thorough description and was conceptualized within the framework of the grounded theory method to explain the elements that affect or prevent adoption and integration in the teaching and learning process (Hays & McKibben, 2021).

Population and Sampling

Population

Research's inferences weren't based on data from a population, but rather on an analysis of the teachers who were questioned (Rubin, 2020). An interpretive study's objective is to provide revelations or comprehension regarding ICT infusion and implementation for educational purposes, not to draw general conclusions about the teachers under investigation (Lawrence & Tar, 2018). Readers can decide whether the research is transferable by reading a detailed, in-depth discussion of the situation (Merriam, 1988; Schreier, 2018). The explanation of the

variables influencing or impeding implementing and incorporating ICT into instruction has advanced significantly because of this study. The study has added to the amount of knowledge already known about technology use in the classroom generally as well as ICT in education specifically.

Sampling

Given the diversity of stakeholders and the desire to capture a range of experiences and perspectives, a purposive and stratified sampling approach was employed (Campbell et al, 2020). The district is an interesting place to research the effects of ICT adoption in primary education because of its distinctive rural and historically underprivileged background. Within the selected schools, teachers were purposively selected to participate in interviews (Suri, 2011). Three primary schools were chosen, and three research participants from each school were chosen using the purposive sample technique (Brener et al, 2016). The sample size consisted of nine educators (three males and six females). Every participant has taught for four to ten years at a minimum. They oversaw teaching natural science and mathematics classes that prepare students for the future. Data were gathered through focus groups and in-person interviews. The acquired data were analyzed and presented using a thematic approach.

Research instruments

The researchers considered semi-structured interviews as the most effective technique for obtaining data as they were more interested in understanding the participant's specific perspective regarding the ICT implementation in the classroom (McGrath et al, 2019). Semi-structured interviews offer the advantage of allowing interviews to be focused while also allowing the researchers to explore any pertinent idea that may occur (Adeoye-Olatunde and Olenik, 2021). To validate the data collection instrument used, skills development clarity-seeking questions were raised as initial prompts (Adam et al, 2013). Interviews that are semi-structured served as the primary info-gathering tool for this investigation. The participants were given an interview schedule to complete to collect data. The interview schedule has the benefit of allowing participants to respond in writing to clarify their comprehension of the issue under consideration (Roberts, 2020). This gives individuals a chance to express their opinions in a relaxed setting. The researchers had to consider every response to ensure that no queries remained unresponded. Since the query for the consultation was focused on ICT adoption in teaching and learning, impartiality was ensured as opposed to possessing a leading nature, but no assumptions were drawn from the respondents' responses. (Makena et al, 2022). That can assist researchers in comprehending ICT adoption on education within Amathole East District schools in the Eastern Cape, South Africa.

Data collection procedure

When asked to take part in the study, four out of the six teachers who were approached said yes. Emails with letters asking for a one-hour interview were sent to these teachers. It was made clear what the study's objectives and methodology were, and confidentiality was guaranteed. The question types that were asked by the researchers from participants were open-ended

questions (Hammer & Wildavsky, 2018). The interview gave researchers a thorough knowledge of the fundamental concerns crucial to the study, such as what influences or impedes teachers' decisions to infuse online learning in teaching pedagogies (Almaiah et al, 2020). Content analysis was used to gather data, this made it easy to identify similarities and relations in responses given by participants (Krippendorff, 2018). The intended period to undertake the study was four months but this could not be achieved as both the interviewers and the interviewees were employees in various institutions of learning. As responses were recorded and transcribed, identical responses were grouped to form categories and themes (Sjödin, et al., 2020). Findings that have been discussed in the preceding sections emanate from the identified themes.

Data treatment and analysis

Data treatment and qualitative research analysis involve a systematic process that includes organizing, coding, interpreting, and drawing conclusions from qualitative data (Linneberg & Korsgaard, 2019). The researcher ensured that his analysis respects the ethical principles of confidentiality and informed consent. The researcher wrote the findings using quotations and examples from the data to illustrate key points. Results were presented in a coherent narrative embedded within the research objectives (Poucher et al, 2020). The researcher ensured that all identifiable information was deleted or anonymized before reviewing the transcripts for correctness and completeness. The researcher sought input from colleagues to validate his analysis and interpretations (Rose & Johnson, 2020).

FINDINGS AND DISCUSSIONS

Teachers as participants awesomely articulated their thoughts, dispositions, attitudes, and perceptions about ICT adoption in teaching and learning. Through their comments, the participants acknowledged several favourable perceptions. These perceptions centred on the following issues:

- Inadequate ICT infrastructure
- Shortage of teacher training in technology integration and
- Lack of access to ICT tools.

FINDINGS

Participants voiced out their perceptions about the status core of ICT infrastructure. Participants acknowledged several challenges through their comments. Their comments centred around issues of accessibility (Inadequate ICT infrastructure).

Inadequate ICT infrastructure

Teachers expressed their pleasure and admiration for the personal laptops that were issued for each teacher in 2017. However, the participants acknowledged several challenges ICT infrastructure. During the interviews, one teacher stated that:

"I can easily obtain current information because I am computer literate, but occasionally the internet is unavailable. I don't use computers when teaching Natural Science because they are limited, and our students don't know how to use one."

Identical response from SC-T1, SC-T2 said:

"No, I don't use computers in teaching or learning because there aren't many of them and I don't know how to teach with them."

From the comments given above, SC-T3 had a different perspective:

"*Yes, I use computers because, in my previous school, I taught Computer Application Technology to the two classes that take CAT.*" *Here, there is an issue with the internet, and occasionally there is no electricity.* "

The schools under research had low-quality online learning gadgets, in this case, computers. The study findings revealed that some of the teaching staff had limited ICT proficiency skills, further than that, glitches of internet connectivity hindered the teaching and learning process.

Regarding the availability of ICT equipment at their schools to use in the classroom, the responses were as follows.

SB-T2 made the following observation:

"If *this school had adequate computers, I would surely utilize them to teach because they are convenient. Work would be done on the platform, and students may learn independently. We do not have enough computers at our school. We only have 20 computers, and there are more than 450 students*."

SC-T1 agreed with SB-T1 in this regard.

"*They are too few, making it difficult to employ them even if one wanted to."*

The response from SA-T3 was comparable to the responses supplied by the other interviewed teachers identified from the other two schools, as they shared their views about the problem identified:

"Computers at our school are not sufficient for the entire student body, even students cannot access the computers because they are very few. We are unable to use them until this current number of computers is increased."

The answers provided above showed that ICT infrastructure, including computers, was lacking and that students could not access computers.

Shortage of teacher training in technology integration

About the knowledge and abilities to incorporate technology into teaching and learning, different responses were given:

"With my limited computer skills, how am I expected to infuse technology when conducting lessons?"

SC-T3 responded to the inquiry.

"My students might never trust me again if I make the incorrect decision."

Differently, SB-T2 said,

"No, I don't have the skills." I don't know how to use a computer, and I'm too old to learn. Anyway, I can't worry myself because I'm about to retire. "

The reaction from SA-T2 was different from that of SB-T2 and SC-T3:

I am computer savvy and can teach using computers, the only issue I have is that there aren't many computers at our school, so I can't utilize them.

The answers given above suggest that while some teachers were computer-competent, some weren't. The use of computers in teaching and learning terrified many who had little computer literacy.

Lack of access to ICT tools

Regarding the usefulness and access to ICT gadgets, the participants gave a myriad of comments.

What do you think about the role that ICT tools play in teaching and learning?

Regarding the role that ICT plays, SA-T2 stated:

"With my long service of teaching for about the past twenty-two years, I have managed effective past percentages without utilising computers, and I feel at ease with that strategy."

The responses provided above indicate that while some teachers were computer-savvy, some were not.

SB-T3 had a similar outlook to SA-T3. Many people with minimal computer literacy were intimidated by using computers in teaching and learning.

In contrast to the viewpoint, SA-T3 stated that:

"Technology is helpful, and we photocopy and have the school clerk type our assessments. Although computers are useful, we don't utilize them around here because there aren't many of them and some of us lack the necessary abilities. Since computers are a relatively new invention and have never been used in education, it can be challenging to determine exactly what advantages they will bring to the classroom."

According to the answers given above, some teachers were aware of the advantages of employing technology in teaching and learning and would be willing to do so. Others chose not to use them because they thought they would be disruptive in the classroom.

SA-T3 expressed his opinion and made the following suggestion:

In response to the question, SA-T3 made the following suggestion*:*

"I believe that we should receive computer training and be provided with computers to utilize in our classrooms daily ".

In agreement with SA-T3, SC-T2 stated that*:*

"For us to use computers, we should be trained, along with our students, and additional computers should be purchased for us."

The same as above, SB-T5 expressed his support for computer literacy training for all of us:

"I am computer proficient, but I have no actual idea how to use technology to teach. I occasionally run into issues while conducting research for my notes online, and nobody is around

to assist. The CAT teacher occasionally helps me, but he also has his classes, so we don't always get assistance when we do."

Considering the above-given responses, one can deduce that infrastructure challenges had an impact on the use of computers by most teachers and learners.

Additional difficulties included the fact that both students and teachers lacked digital literacy; teachers' beliefs that they could instruct without technology since it was a waste of time; and the perception of ICTs as disruptive in the classroom as some students would be on social media, such as when in class, use Tiktok, WhatsApp, and other social media. The teachers claimed that they needed instruction in computer literacy and how to incorporate technology into teaching and learning.

Responses outlined by the three focus groups when interviews were conducted were somehow similar and related. Most schools as perceived by several teachers had challenges around the use of computer learning as explained by the School C group:

"It is a waste of time to use computers at this school or even at other nearby institutions. The students cannot operate the computers. We can use computers, but we are unsure of how to effectively use them to teach various subjects. You know what, because of the poverty in the area, parents cannot afford to buy tablets and smartphones for their kids. We only have laptops in the lab; unlike tablets, students cannot take them home. There are no tablets in our school. Technology-based education is a non-starter. Although we have computers in the lab, students were never taught how to use them. There are so few computers, and students are constantly crowded in the lab. They cannot be taught computer skills since doing so would prevent us from completing the curriculum. Thus, it is easiest to simply teach them conventionally. There are too many students and not enough computers. Because of the size of our classes, the amount of work, marking, and other obligations, we are unable to help students acquire computer skills."

The focus group discussions expanded on the issues brought up by the interviewees by mentioning the difficulty in integrating technology and the subject matter, the lack of suitable computers (learner-computer ratio), and the severe workload as additional difficulties. Other difficulties included a lack of time because teachers would have to finish the curriculum quickly and some schools did not have tablets, which allow students to access instruction at anytime and anyplace.

DISCUSSION OF FINDINGS

Inadequate ICT infrastructure

As per the findings of the study in line with the inadequacy of ICT infrastructure, the only group of learners advantaged to be imparted with computer literacy skills were those learners enrolled for Computer Application Technology (CAT). This reported digital divide in schools and among learners and teachers is equated to non-exposure in technology learning for most users. As argued by Makena and Mpahla (2022) one of the underlying challenges is the geographical location as most schools are situated in rurally disadvantaged societies, additionally, this

situation raises some alarm bells as computer literacy skills are regarded essential for this Fourth Industrial era and digitalisation.

A shortage of teacher training in technology integration

Lack of training has been noted in the literature as a barrier to the efficient use and integration of ICT in classroom practice (Albirini, 2006; Balanskat et al., 2007; Schoepp, 2005). One of the reasons why teachers do not routinely use computers in their classes is a lack of proper training (Hashemi & Kew, 2021). To properly use and integrate ICT to enhance students' learning, teachers must complete professional development. Teachers must receive training on utilizing and integrating technology if they are to do so successfully in their classrooms. Since the 1980s, researchers have utilized the Technology Acceptance Model (TAM) (Davis, 1989) to describe how users adopt new technology. For teachers to properly use and integrate ICT to enhance students' learning, professional development is required. Teachers must receive training on how to use and integrate technology into their lessons to be capable of doing so. The outcome of the case demonstrates the lack of training programs for teachers on how to use ICT to streamline their instruction and help pupils learn more effectively. According to several studies, ICT-related training programs help teachers become more proficient in using computers (Esfijani & Zamani, 2020), change their attitudes toward computers (Papagiannidis & Marikyan, 2022) restructure their approach to using technology in the classroom, and recognize the value of new technology tools for student learning.

Lack of access to ICT resources

Lack of access to resources has been identified in earlier research (Balanskat et al., 2007; Mumtaz, 2000; Pelgrum, 2001; Schoep, 2005) as a barrier preventing teachers from integrating ICT into education, particularly into teaching and learning. The case study's conclusion demonstrates how access to technology is a barrier to using and integrating ICT in teaching and learning. Many teachers lack access to technical resources like projectors and smart whiteboards, which can be used in the classroom to provide visual examples (Winter et al, 2021). In many courses in poor nations, there is difficulty with access to knowledge and assistance for using and integrating ICT.

A very significant issue for teachers in Amathole East, according to teacher perceptions, in the schools where they are working there is a dire need for computers and internet connection, both of which are crucial for teaching and learning.

In line with the essence of the availability of effective teaching and learning online resources, Omodan and Makena (2023) contend that ICT integration in all subjects underpinning the prescribed curriculum across all education bends not only capacitate both teachers and learners; but also, is an added advantage towards employability for lifelong learning. Therefore, it becomes crucial that those officials acting as managers in schools are faced with the huge task of motivating and mentoring all teachers and learners for improved academic attainment.

For ICT to be considered functional the is a need for schools to have easy access to reliable and relevant ICT infrastructure. These include, but are not limited to, hardware and software that needs adoption and integration.

CONCLUSION

This research aimed to provide insights into the status of ICT adoption in Amathole East District's primary schools. This study has made significant contributions to the field of education, particularly in the context of primary schools within the Amathole East District. We now have a better picture of how widely ICT usage has spread throughout elementary schools thanks to this study. Evaluating the degree of ICT integration, it has provided insight into these schools' existing technology environment. The study has provided insightful information about how the deployment of ICT has affected instructional strategies. It has demonstrated how technology can improve educational tactics by looking at shifts in pedagogical approaches. The impact of ICT adoption on student learning outcomes has been brought to light by this study.

The favourable impacts of technology integration on learning attainment have been established by examining changes in academic performance and student engagement. Key obstacles and hurdles in the adoption process of ICT have been discovered by the research. It has identified problems with teacher preparation, infrastructure, and resource limitations and provided methods to overcome them. Practical suggestions for improving ICT adoption in elementary schools have been offered by this study. It has helped educators, administrators, and legislators create successful implementation plans by providing them with doable actions.

In addition to adding to our understanding of ICT adoption in primary school, our research has helped stakeholders in the Amathole East District and other comparable educational environments make important decisions about how best to use technology to enhance teaching and learning outcomes. The study found that there are significant differences in the use of ICT in primary schools in the Amathole East District. Some schools have fully embraced technology, while others are only beginning to integrate it. The study discovered that the use of ICT has significantly altered instructional strategies. Instructors said that more engaging and student-centered instruction was produced because of integrating interactive digital materials and web resources into their sessions. It has not been easy to generalize the study findings as some limitations were encountered during this inquiry because of the limited number of participants that were used in this study. Moreover, the study only used a qualitative research approach and if a mixed method approach were used, other dimensions from the participant responses could have been registered, which is believed to also have an impact on how the study findings would be articulated, analyzed, and interpreted.

Recommendations

For educational institutions, administrators, policymakers, and other stakeholders, the practical and managerial implications of this study on the impact of ICT adoption in primary schools within the Amathole East District are profound. Teachers should be supported and encouraged

by their schools when they incorporate ICT tools into their lesson plans. This process can be aided by access to educational technology resources and professional development programs. Improved teaching strategies can result in more interesting and productive lessons, which will improve the learning opportunities for students. Schools ought to keep spending money on curriculum-aligned instructional software and digital resources. Effective use of these technologies is something that teachers should be taught in. Higher student accomplishment and more learner confidence can be attributed to improved learning outcomes, especially in topics like math and science.

Developing and maintaining ICT infrastructure should be a top priority for school districts and organizations. This entails maintaining dependable internet connectivity and routinely upgrading gear and software. To maintain ICT projects and avoid disruptions in teaching and learning, infrastructural concerns must be addressed. To create thorough ICT policy frameworks that direct the incorporation of technology in elementary schools, educational authorities should work together. Issues like digital literacy and equal access should be covered by these policies.

Clearly defined policies can act as a guide for decision-makers, guaranteeing that ICT projects complement more general educational objectives. Administrators, districts, and schools should set aside funds for ICT-integrated teacher training programs. They should set aside money for the purchase and upkeep of IT infrastructure. Allocating resources wisely guarantees that schools have the resources, expertise, and assistance they need to successfully implement ICT initiatives. Create and execute teacher preparation programs that provide teachers the knowledge, abilities, and self-assurance to successfully incorporate ICT into their lessons. Teachers with training are more likely to use technology in ways that improve student learning.

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