Educational Technologies as Pedagogical Tools: Perspectives From Teachers in Rural Marginalised Secondary Schools in South Africa

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ABSTRACT

One of the recent developments across education priorities in South Africa is the provision of information and communication technologies (ICTs) to schools to achieve the objectives of the country’s National Development Plan (NDP) Agenda 2030. With the current focus on adoption of technology for teaching and learning, it is imperative to fully understand the perceptions and attitudes of teachers towards the use of ICT in their practice. Thus, this study investigated the teachers’ perceptions and attitudes on the use of ICTs for teaching and learning. The findings are based on data collected through semi-structured interviews, journal reflections, and lesson observations. The results reveal that most teachers have positive perceptions towards the use of ICT for teaching and learning. It also indicated that the attitudes of teachers are varied based on the level of ICT training and support that they receive. The results of this research might be foremost to provide clear insights that could be contributing to the effective adoption of technology for teaching and learning.

KEYWORDS
Educational Technologies, Rural Schools, Teacher Perceptions

INTRODUCTION

Information and Communication Technology has become ubiquitous in today’s modern age in almost all aspects of human life. So is the case with the field of education. Modern learners demand novel techniques to understand better the topics taught in the classroom. Jadhav and Takale (2020) assert that in today’s age, chalk and duster are no longer enough in the teaching and learning process. As a result, the traditional chalk and talk method is gradually replaced with educational technologies -aided instructional strategies and tools. Therefore, this compels educators to adopt educational technologies in their practice (Gemiya, 2020; Bordoloi, Das & Das, 2021; Mahmud et al., 2021). In Africa, the African Ministerial Forum has stressed the urgency to accelerate the adoption of educational technologies in education to achieve Africa’s agenda 2063: The Africa We Want. Flagship project number 10 of the 15 projects of the African Union seeks to transform Africa into an e-Society by
2063, and the adoption of educational technologies has been identified as the starting point (African Union, 2020).

In South Africa, the integration of educational technologies in education has ascended the education agenda with the release of the White Paper on e-Education in 2004 (Department of Basic Education, 2004) and the National Development Plan (NDP) 2030 of 2012. Under these policies, the South African government, through the Department of Basic Education (DBE), undertook several initiatives to equip schools with educational technologies and empower teachers to adopt educational technologies in their teaching. Even though the DBE adopted several educational technologies, educational policies and strategies, most teachers in South African schools are still lagging in integrating educational technologies to teach. Mooketsi and Chigona (2014), cited in Padayachee (2017), revealed a disparity between government expectations and teachers’ practices. This observation is documented in the DBE’s Action Plan of 2019 report, where the Department concedes that “educational technologies -enhanced learning has not advanced in South Africa as expected” (DBE, 2015, p. 14). The DBE estimates that a mere 26% of South African teachers are equipped with basic technology skills, with only 7% functioning at an intermediate level of competency (DBE, 2018). Ifinedo and Kankaanranta (2021) further stated that even those teachers who grew up using technology and have access to it are not integrating technology in their practice.

In the Eastern Cape Province of South Africa, predominantly rural, the provincial government has realised the need to integrate educational technologies in its education sector and has undertaken a massive drive to roll out educational technologies to every province’s learner, educator, and school. This was confirmed by Mr Fundile Gade, a member of the Executive Council for Education (MEC), during his 2021/2022 Budget and policy speech in the Provincial legislature. The MEC stated, “Madam Speaker, we continue to advocate for ICT integration. The Department has invested in the ICT roll-out in which 22 000 laptops for educators, 55 000 tablets and 72 000 data Sim cards for learners were procured and distributed to schools” (Eastern Cape Department of Education 2021/22 Budget and Policy Speech, 2021, p.10). Considering these massive investments in educational technologies provisioning to schools and that teachers are expected to utilise these educational technologies, it is imperative to understand the teachers’ perceptions of the educational technologies in their practice. This is because “teachers are an important stakeholder group in any endeavour to integrate educational technologies into schools”, and their perceptions towards any educational educational technologies must be thoroughly investigated and understood before applying any initiative (Li, 2007, p. 376). Research has shown that teachers’ perceptions of educational technologies strongly influence the acceptance of educational technologies and affect whether teachers would integrate educational technologies (or not) into their classrooms. Hence, this study is based on the precept that successful educational technologies integration in teaching and learning must be preceded by an understanding of teachers’ perceptions of educational technologies. The educational technologies tools may remain abandoned or heavily underutilised once supplied to schools without this effort. Therefore, it is the aim of this study to shed some insights as it examine the rural teachers’ perceptions of educational technologies use in their teaching. To foreground the response to the research question, this paper starts by reviewing literature related to the topic and then presents the conceptual framework that guides the study. This follow research methodology, data collection, findings of the research and the discussion of the results. Lastly, the paper presents the conclusion and recommendations.

**BACKGROUND LITERATURE**

Recent literature suggests that for successful integration of educational technologies in teaching and learning processes, that change must begin with teachers and that teachers’ attitudes and perceptions towards educational technologies use must be understood (Glasco, 2020; Monita & Ikhsan, 2020; Zeichner, 2021; Salomey, Danhui & Jingwen, 2021). This is because teachers are a critical species
in the teaching and learning ecosystem. Therefore, their perceptions and attitudes toward educational technologies use are central in integrating educational technologies in teaching and learning.

Semerci and Aydin (2018) conducted a study that examined high school teachers’ attitudes towards educational technologies use in education. Specifically, this study examined whether the teachers’ attitudes significantly differed according to their gender, age, teaching experience, educational technologies experience, educational technology skills and training. The participants consisted of 353 teachers working in different high schools in Ankara. Research results illustrated that teachers have a high positive attitude towards educational technologies use in their classes. Yet, there is no significant difference between teachers’ educational technologies willingness by gender, age, teaching experience, educational technologies experience, skills and training.

Moreover, Hadriana and Safriyanti (2019) explored teacher perceptions and motivations for educational technologies use in Indonesia’s learning activities. The data of this study were collected through a set of questionnaires administered to 616 senior high school teachers. Similar findings were reported by Fitri and Putro (2021) that most of the teachers had a positive perception of integrating educational technologies in their practice.

Nikolopoulou (2020) conducted a study that investigated Greek secondary school teachers’ perceptions of mobile phone and tablet use in classrooms. Data was collected using a questionnaire with open-ended questions administered to 64 teachers of different specialisations. The findings show that the perceived benefits were associated with students’ involvement/motivation and active participation, the interactive-enjoyable lesson, the easy access to information and students’ familiarity with technology. Teachers’ perceived barriers were mainly related to the lack of equipment and schools’ policies regarding mobile technology usage in school settings.

In addition, Taghizadeh and Hasani (2020) did a quantitative study that examined the attitude, knowledge, use, and challenges of English teachers to integrate technological tools into the classrooms in Iran. Survey data were collected from 95 teachers. The study findings revealed that there was a general positive tendency towards the integration of technology into the classrooms. The results also showed that many teachers were not provided with training courses on using technology for teaching; however, they were willing to participate in technology-based professional development programs. The researchers recommended that other researchers carry out more in-depth studies on implementing technological tools in different schooling contexts.

Further, Fitri and Putro (2021) carried out a study that investigated teachers’ perceptions of educational technologies integration for teaching and learning in Indonesia. Guided by a descriptive quantitative research design, the empirical data were collected through an online questionnaire from 126 primary and secondary teachers. The results revealed that most teachers had a positive perception of integrating educational technologies due to its effectiveness. However, it was also reported that lack of internet access, little technical support from schools, and limited knowledge and training in educational technologies discouraged them from using educational technologies.

Furthermore, Zeichner (2021) conducted a qualitative study that examined teachers’ views and perceptions of educational technologies use in the classroom. Data was collected through an online questionnaire administered to 81 teachers from fifteen schools. This study’s findings suggest that teachers’ accounts of appreciation and dissonances with the integration of technology in teaching mirrored similar issues as discussed in the literature above. However, the findings also revealed that some teachers have negative perceptions towards educational technologies use primarily due to inadequate educational technologies and lack of supporting the School Management Teams (SMTs).

According to the researchers’ literature review, research on teacher perceptions towards educational technologies for teaching and learning is very scant in South Africa. Little research has emerged in the literature, particularly for rural schooling contexts. The available research on secondary school teachers’ perceptions of educational technologies use in the classroom is conducted by Chisango, Marongwe, Mtsi and Matyedi (2020). Specifically, Chisango et al. (2020) explored teachers’ perceptions of adopting educational technologies in teaching and learning at
some secondary schools in South Africa. Data was collected through face-to-face interviews and focus group discussions from 3 secondary schools and 5 study participants from each school. The study found that the teachers had a positive attitude towards adopting technologies and were ready to integrate educational technologies in teaching and learning, but they lacked the requisite educational technologies skills. In light of the above, empirical evidence regarding secondary school teachers’ perceptions of educational technologies use in South Africa is still limited, mainly rural schoolteachers’ perceptions. Therefore, a knowledge gap exists on rural secondary teachers’ perceptions of educational technologies use. Thus, more research is needed in this direction. Considering this, the present study sought to contribute to the body of knowledge about rural secondary school teachers’ perceptions of teaching with educational technologies.

THEORETICAL PERSPECTIVES: UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) [REMOVED TA FIELD] [REMOVED TA FIELD]

To best address the research question; What are rural secondary school teachers’ perceptions and attitudes on the use of educational technologies for teaching and learning? The study adapted Venkatesh, Morris, Davis, and Davis’s (2003), Unified Theory of Acceptance and Use of Technology (UTAUT) framework. The UTAUT framework is a combination of various models: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behaviour (TPB), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilisation (MPCU), Innovation Diffusion Theory (IDT) and (Social Cognitive Theory (Venkatesh et al., 2003, p. 425)

The UTAUT framework comprises four determining constructs and four moderators. Venkatesh et al. (2003) perceived the four main constructs; Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC) (Figure 1), to directly influence whether or not a person would accept and use technology (use behaviour). Gender, age, experience, and voluntariness are the moderators that impact the latter (see Figure 1).

Figure 1. Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003, p. 447)
Venkatesh et al. (2003) define Performance Expectancy (PE) as the amount to which a person believes that using educational technologies will assist the latter in enhancing their job performance. For this study, PE was defined as the degree to which rural secondary school teachers perceive that utilising educational technologies in the classroom will enhance teaching and learning. Effort Expectancy (EE), according to (Venkatesh et al., 2003), relates to an individual’s apparent ease of use of educational technologies. In this study, EE was viewed as a rural secondary school teacher’s perceived effortless use of educational technologies for teaching and learning, which might influence his/her intention to use educational technologies. Social Influence (SI) is a person’s opinion on what people who are significant to them think about their use of educational technologies (Venkatesh et al., 2003). SI, in this study, was defined as a rural secondary school teacher’s opinion on what other significant people (such as their principal, Departmental head, learners and colleagues), perceive his/her use of technology to be. In addition, Venkatesh et al. (2003) define Facilitating Conditions (FC) as the level of a person’s perception that administrative and technical infrastructure exists to encourage and support educational technologies usage. In this study, FC was viewed as the degree to which a rural secondary school teacher perceives that experience, skills, knowledge, resources, and support regarding the use of educational technologies exist to support educational technologies use for teaching and learning in his/her school. Finally, the first three constructs (PE, EE, and SI) of the UTAUT framework are theorised to influence Behavioural Intention (BI) (Venkatesh et al., 2003). In this study, BI is the rural secondary school teachers’ intention to use educational technologies for teaching and learning. According to Venkatesh et al. (2003), FC and BI influence (actual) “user behaviour” of technology. The (actual) “user behaviour” is defined in this study as the rural secondary school teacher’s actual use of technology for teaching and learning.

In this study, the UTAUT model was adapted to elicit a deeper understanding and bring to the fore the perceptions and attitudes of rural secondary school teachers towards technology use for teaching and learning. However, it should be noted that the aim of this study was not to see, for example, whether female teachers made more (or less) use of technologies in the classroom than male teachers or whether younger respondents made more (or less) use of technologies in the classroom than older respondents and, therefore, gender and age were also excluded as moderators.

**RESEARCH METHODOLOGY**

This study uses a qualitative case-study research design guided by the interpretive paradigm to understand the teachers’ perceptions and attitudes in teaching with educational technologies. As this study explores teachers’ perceptions and attitudes on the phenomenon of using technologies in teaching and learning, phenomenology offered the most relevant form of methodology (inquiry). This qualitative study is grounded on the precept that all perceptions and attitudes towards technologies are based on an individual teacher experience formed using the technologies in teaching practices. Therefore, the best way of accessing the teacher’s lived experiences was for us as researchers to identify and try to forgo our perceptions, experiences as teacher educators in Higher Education Institution, and listen to the participants’ meanings and perceptions. Subsequently, the research approach of phenomenology that prioritises examining conscious awareness through an investigation of the personal-technology relationship (Simuja & Krauss, 2016; Glasco, 2020) was deemed most appropriate.

For the study to capture the required perceptions and attitudes, we as researchers (phenomenologists) must recognise several assumptions that could inform the research. These include the assumptions that teachers were to be viewed as active and intentional participants in the study who are aware of their intentional use of technologies and who can construct experiences and attitudes towards technologies used in their professional contexts, the choices that they make and their ability to think and reflect on their practices. To understand the participants involved in the study, we were conscious of their contexts, situations, and experiences of being in the world as individuals or collectively with other teachers and learners (Webb & Welsh, 2019).
In general, as researchers, we were also guided by the belief that participants (teachers) involved in the study are active agents in their teaching and lives, simultaneously reacting to and accepting technologies while seeking experiences. Subsequently, teachers, as any other persons, co-constitute meaning as they interact with an experience, possibilities and the limitations of technologies. Therefore, the discussion, interpretation, and investigation of the phenomenon in the study is framed in the experiences of individual teachers. Only once this knowledge was examined the study shifted from the individual to the collective understanding of the nature of the unique experiences from the perspective of its lived qualities (Sonia, 2017; Sacramento, 2019).

To achieve the methodological processes in this study, a suite of qualitative methods such as semi-structured questionnaires, semi-structured interviews and lesson observations needed to be negotiated. While the perspectives and the main intentions of the two methods were readily accessed and acknowledged for the type of knowledge being sought, the breadth of applications was less straightforward. For this interpretive and qualitative study, purposive sampling (Gemiya, 2020) was used as a technique to sample the participants. The semi-structured questionnaires were e-mailed to all seventy-two secondary school teachers that participated in the educational technologies skills training workshop. The participants attended a five-day training workshop on integrating educational technologies in teaching. The researchers organised the training workshop as part of their community engagement initiative initiated by their affiliated university. In response, the researchers thought to take the opportunity of turning the initiative into research that could inform other teachers who are teaching in rural schools and similar schooling contexts. Out of the seventy-two teachers that received the semi-structured questionnaires, fifty-nine responded. It is important to note that the 22 000 laptops were distributed to teachers across the whole province and that for the purpose of this study, only teachers (seventy-two) belonging to a circuit within a district of the province were used. Seven teachers were then purposively selected for the interviews and class-lesson observation. The intention of purposively selecting participants in the study was to gain a deep and clear insight into the issues under investigation (Etikan, Musa & Alkassim, 2016; Bakkalbasioglu, 2020). The selected participants are secondary school teachers from four rural schools in the Joe Gqabi district in South Africa. Table 1 below contains relevant information (biographical data) of the seven purposively sampled teachers.

<table>
<thead>
<tr>
<th>Teacher (Pseudonym)</th>
<th>Age</th>
<th>Gender</th>
<th>Qualification</th>
<th>Number of years teaching in rural secondary school</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>33</td>
<td>Male</td>
<td>BEd Agricultural Sciences</td>
<td>9</td>
</tr>
<tr>
<td>T2</td>
<td>29</td>
<td>Male</td>
<td>BEd Life Sciences</td>
<td>5</td>
</tr>
<tr>
<td>T3</td>
<td>37</td>
<td>Female</td>
<td>BEd Accounting</td>
<td>13</td>
</tr>
<tr>
<td>T4</td>
<td>43</td>
<td>Male</td>
<td>BEd Honours degree in Educational Leadership and Management</td>
<td>19</td>
</tr>
<tr>
<td>T5</td>
<td>39</td>
<td>Female</td>
<td>BEd History &amp; Geography</td>
<td>14</td>
</tr>
<tr>
<td>T6</td>
<td>48</td>
<td>Male</td>
<td>BEd Life Sciences</td>
<td>24</td>
</tr>
<tr>
<td>T7</td>
<td>35</td>
<td>Female</td>
<td>BEd Business Studies and Economics</td>
<td>11</td>
</tr>
</tbody>
</table>
The ethics clearance was sought from the Provincial Department of Education office and our affiliated university. The participants participated in the study voluntarily, and there was no coercion or deception. Participants were also allowed to withdraw at any point. In this research, ethical protocols such as informed consent, confidentiality, anonymity, credibility, and trustworthiness were guaranteed throughout this research.

DATA COLLECTION AND ANALYSIS

Prior to responding to the semi-structured questionnaire and semi-structured interviews, all participants voluntarily signed the consent form and read the purpose of the study. The participants were also informed of their right to choose not to respond to any formulated questions. The data collection instruments were designed to capture data that could respond to the following question: What are the perceptions and attitudes of rural secondary school teachers on using educational technologies for teaching and learning? The researchers aimed to explore the perspectives of rural secondary school teachers on educational technologies use in teaching and learning after attending educational technologies skills training and receiving technology devices. In addition, the researchers examined teachers’ attitudes towards technology use in the classroom.

The semi-structured questionnaires were e-mailed to the participants as researchers could not afford to personally reach all participants as the teachers stay in different areas within the district. In addition, the researchers developed a questionnaire that was not too long, but that would capture all the themes that were important for answering the research question. All seven teachers purposively selected for the interviews were interviewed. The semi-structured interview questions were e-mailed to the participants prior to the interview. In addition, the researchers developed a set of interview questions that are open-ended, semi-structured, and that would capture all the themes that were important for answering the research question. The interviews were conducted face to face with all Covid-19 pandemic protocols observed and audio recorded for transcription purposes. In order to mitigate the power imbalances and to build rapport and trust (Grinyer & Thomas, 2012; Brinkmann & Kvale, 2015), during interviews, teachers (participants) were given authority and confidence by making them aware that the researchers were going to learn from their experiences before carrying out the interviews. In addition, the researchers arranged that the interviews take place at a date and time convenient for both participants and the researchers. We also gathered data through non-participant observation. This means that we were present in the classrooms but not interacting or participating (Stake, 2010). To minimise the constraints that can be associated with observations, we utilised carefully designed observation guides to capture all the pertinent issues for this study. Further, the observation sessions were scheduled in advance to ensure the availability of the participants. The observation method was useful as it allowed us to gauge participants’ feelings about using educational technologies from their speech, gestures, and facial expressions.

The data analysis procedure included the researchers’ use of a thematic analysis approach, which identifies, organises, analyses, and reports patterns/themes within data (Zammit, 2020). Although the researchers involved distinct processes such as transcription, organisation, coding, analysis and interpretation, the process was not linear or systematic but complex, iterative, and reflexive. For example, the interpretation and analysis were started during interviews as suggestions of themes and possible codes started to emerge. The recorded interviews were transcribed using Microsoft Word software. The transcribed texts were then analysed using NVivo, a version 22 data analysis tool. NVivo is a versatile, robust, and credible tool for collecting, organising and analysing varied qualitative data types (Phillips & Lu, 2018; Elliott-Mainwaring, 2021). Each transcribed text was loaded onto NVivo and then analysed by grouping each participant’s responses into categories or themes. The participants’ responses were coded to the corresponding themes. The coding process involved each relevant text to a relevant theme. Using an inductive data analysis approach (MacMillan & Schumacher, 2006), the emerging pattern of themes became the source of the study findings.
FINDINGS OF THE STUDY

The findings of this study are presented per the teachers’ attitudes and perceptions on the use of educational technologies for teaching and learning. The findings comprise the views of rural secondary school teachers mainly. All the teachers involved in the study used technology given by the Department of Education or personal technology in their practices. These views were examined specifically considering the rise of educational technologies in education and the level of readiness or not of the teachers to adopt educational technologies. The tendency of teacher pseudonymity was consistently observed throughout the study to comply with the ethical requirements and ensure the anonymity and confidentiality of the participants. Data for this study was mainly drawn from semi-structured questionnaires, semi-structured interviews, and class observations. Table 2 below shows teacher responses that were extracted from the semi-structured questionnaire.

Table 2. Extracted from Questionnaire, Section C, Q.1: Perceptions and attitudes of teachers on use of educational technologies for teaching and learning.

<table>
<thead>
<tr>
<th>Name of Teacher (Pseudonym)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
<th>T7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Educational technologies are disruptive when teaching</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>2. Educational technologies make teaching effective</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Uncertain</td>
<td>Strongly agree</td>
<td>Strongly disagree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>3. Educational technologies promote learner to learner interaction</td>
<td>Agree</td>
<td>Agree</td>
<td>Uncertain</td>
<td>Agree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>4. Educational technologies help in improving learner performance</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Uncertain</td>
<td>Agree</td>
<td>Uncertain</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>5. Use of educational technologies in teaching and learning can improve learners’ critical thinking</td>
<td>Agree</td>
<td>Agree</td>
<td>Uncertain</td>
<td>Agree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>6. Knowing how to use educational technologies by teachers is a good skill</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>7. Educational technologies reduce the teachers’ administration burden</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Strongly disagree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>8. Educational technologies-assisted instruction is more effective than the traditional method of instruction.</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Uncertain</td>
<td>Agree</td>
<td>Strongly disagree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

Table 2 continued on next page
The questionnaire sought to generate information about the teachers’ perceptions and attitudes towards educational technologies use for teaching and learning. To get reliable data, teachers were asked to respond on a five-point scale, from (i) Strongly Disagree, (ii) Disagree, (iii) Uncertain, (iv) Agree to (v) Strongly Agree. The results from the questionnaire above, most teachers (71%) perceive that educational technologies are not disruptive. The teachers believe that the technologies make their job more effective (PE) and reduce the administration burden of teachers, thus increasing their effort expectancy (EE) in using educational technologies for teaching and learning. When it comes to the teachers’ BI, most teachers perceive that they would integrate educational technologies into their teaching. An analysis of the teachers’ perceptions and attitudes on the use of educational technologies gave rise to two themes. These are indicated in table 3 below.

Table 3. Perceptions and attitudes on the use of educational technologies for teaching and learning

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Educational technologies enhance teaching and learning</td>
</tr>
<tr>
<td>2</td>
<td>Educational technologies constrain teaching and learning</td>
</tr>
</tbody>
</table>
EDUCATIONAL TECHNOLOGIES ENHANCE TEACHING AND LEARNING

This study found that most of the teachers had positive perceptions and attitudes towards using educational technologies for teaching and learning. Most teachers strongly perceive that educational technologies make teaching effective and enhance their job (PE). Educational technology-assisted instruction is more effective and makes it easier to teach difficult concepts (EE) than the traditional method of instruction. They also agreed, though not strongly, that knowing how to use educational technologies by teachers is a good skill and that using educational technologies in teaching is enjoyable. These findings confirm the findings of Fitri and Putro (2021), who found that most teachers had a positive perception of educational technologies integration due to its ease of use. In addition, most of the teachers perceive that educational technologies promote learner to learner interaction, help in improving learner performance, engage learners’ attention and motivate them, and arouse learner curiosity in the learning process. Most of the teachers in this study perceived educational technologies to be very useful both for teachers and learners and some of the reasons the teachers pointed out were that: educational technologies motivates learners and encourages them to love the subject, enhances their level of understanding (PE), as well as a reducing teaching time and workload of the teacher (EE). T7, for example, mentioned:

"I use educational technologies to teach abstract concepts in Business Studies and Economics and thereby enhance my learners’ level of understanding. Using educational technologies helps me provide a visual form of teaching, and pedagogies become more varied, and I find this to increase interests".

Similarly, T2 fully agreed that educational technologies perfectly fit in his Mathematics lessons. "Educational technologies fit quite well with subjects like Life Sciences, and I find a huge difference in using educational technology-aided instruction as compared to traditional chalk and talk method of teaching, especially when I use GEOGEBRA software to enhance visualisations of the maths concepts".

This is consistent with a study conducted by Bordoloi et al. (2021), who found that teachers perceive that educational technologies increase their learners’ self-confidence in class activities. In this study, Only T3 and T4 were uncertain that educational technologies could arouse learner curiosity in the learning process. The teachers who agreed that educational technologies enhance teaching and learning did not respond to the questionnaire’s comments section to further explain their responses.

EDUCATIONAL TECHNOLOGIES CONSTRAIN TEACHING AND LEARNING

Some teachers perceived educational technologies as a constraint. Various reasons (FC) for this perception were provided, and this included lack of time, disruption caused by educational technology gadgets during lesson time, inadequate training, and lack of support by school management teams (SMT).

On lack of time, for example, T7 commented that:

"In most cases, it takes me much time to prepare a lesson to teach using educational technologies, and I do not have that time. I must browse the internet from one website to another and sometimes do not get relevant content for the level of my learners. After that, I must prepare PowerPoint slides. However, I do things very quickly with my teacher’s guide and textbook, giving me time to mark and rest. Since I prepare for my lessons at home, using textbooks gives me time to attend to my family matters”.

Further, T4 added that:

"Each time I go to class I carry my laptop and data projector and connect before the lesson starts. This takes me at least 15 minutes to set up and about 10 minutes to disconnect at the end of the lesson. This means that out of a 45-minute period I have, I would be left with only 20 minutes of teaching and learning time which is not enough".
On the other hand, other teachers indicated that the use of educational technologies is disruptive when teaching. For example, T3 commented that:

“I foresee a drop in pass rate this year due to the tablets given to learners. I have noticed that my learners do not concentrate on the educational uses of tablets but focus on entertaining themselves, taking photographs, downloading, and playing music and movies. They (learners) are over-excited because this is the first time that most of them are seeing and using tablets”.

Likewise, T3, T5 added that:

“The misuse of educational technologies gadgets by some learners in class disrupts the learners and the teacher. Sometimes the learners shoot pictures of teachers and post them on social media, making fun of the teachers. It happened to me. Another time I was busy teaching, and this learner was busy taking pictures of me, and I was so disrupted”.

On inadequate educational technologies training (FC), all the teachers agreed that this is a great challenge for them. This confirms the findings of Fitri and Putro (2021), Ngoungouo (2017), and Taghizadeh and Hasani (2020). In this study, the challenge of inadequate training was brought to light by the following statements:

“To me lack of training is a big challenge. We went for training on using the smartboard for teaching, but the training was not sufficient. We were only trained on how to open and close the smartboard. I do not know how to use the smartboard; I do not use it in class because I do not want to embarrass myself in front of my learners” (T6).

Furthermore, T5 elaborated:

“I recently participated in a training where we were trained on how to use an application called Snappify, which is installed in the tablets provided to learners by the Eastern Cape Department of Education. We were only introduced to how to create an account and to log into the app. I only realised later that there are many functions of the app that I do not know and that I cannot use the app for teaching. As a result, I am continuing to use the chalk and textbook”.

On limited support from the SMT (FC), the common response centred around the funding regime for educational technologies in the schools. The teachers revealed that far less priority was given to the procurement and maintenance of educational technologies tools in the schools. The teachers further revealed that the school management also does not implement school-based educational technologies teacher development training (SI). The following statements highlighted these areas of limited support:

“I am grateful to the Department of education for rolling out laptops and tablets to us. However, most of those tools are now not in working order due to a lack of maintenance. Our school management has never purchased antivirus software for our laptops, and when we ask, they simply say those things are too expensive. Moreover, some of the laptops and tablets have been stolen because the school never ensured their safety by procuring safes and burglar bars”. (T1).

Sharing a similar view was T2, who had this to say:

“The SMT of my school does not allocate enough funds to the running of educational technologies adoption, and as a result, the whole process is failing. I think the SMT lacks an appreciation of the importance of embracing educational technologies, which is why they do not prioritise educational technologies in school. They have also never arranged an internal workshop where they can invite an educational technologies specialist to teach us some of the latest trends in using educational technologies for teaching”.

**DISCUSSION**

The findings of this study on the perceptions and attitudes of science teachers on the use of educational technologies for teaching and learning are encouraging. Most of the teachers believe that educational technologies enhance teaching and learning (PE). This can be seen in the teachers’ responses from the questionnaire extract, where T1, T2, T4, and T6 all agreed that: Educational technologies make teaching effective; Educational technologies help in improving learner performance; Educational
technologies promote learner to learner interaction; Educational technologies help in improving learner performance; use of educational technologies in teaching and learning can improve learners’ critical thinking; knowing how to use educational technologies by teachers is a good skill; Educational technologies reduce the teachers’ administration burden; and that educational technology-assisted instruction is more effective than the traditional method of instruction. These perceptions also emerged from the interview responses where T7, for example, mentioned:

“I use educational technologies to teach abstract concepts in Life Sciences and enhance my learners’ level of understanding. Using educational technologies helps me provide a visual form of teaching, and pedagogies become more varied, and I find this to increase interests”.

The perceptions of these teachers towards the use of educational technologies for teaching are consistent with the findings of Nikolopoulou (2020), Taghizadeh and Hasani (2020), Monita and Ikhsan (2020), Boadu (2021), who reported positive teacher attitudes toward the use of technology for teaching.

On the other hand, however, it emerged that although most teachers demonstrated positive perceptions of using technology for teaching, some, such as T3 and T5, had different perceptions. These teachers were of the view that educational technologies are disruptive when teaching. This attitude explains why both T3 and T5 disagree with the view that educational technology-assisted instruction is more effective than the traditional method of instruction. The teachers believe that educational technologies have no positive effect on teaching and learning. Similar findings were reported by Ngoungou (2017), that some teachers still believe that educational technology-enhanced instruction is not more effective than the traditional chalk and talk instruction. In addition to the perception that educational technologies disrupt teaching and learning, this study found that inadequate training of teachers on educational technologies use for teaching and learning and lack of support by SMTs largely contribute to the perception that the use of educational technologies constrains teaching and learning. Therefore, this study recommends that the teachers be provided with ongoing training and support on using the educational technologies for teaching and learning.

On the other hand, lesson observations were carried out on seven participants to compare the comments by the teachers highlighted during interviews. This enabled the researchers to cross-validate the findings and develop relevant recommendations. The observation of lessons highlighted that although most educators have positive attitudes towards educational technologies use for teaching and learning, the actual classroom use of educational technologies tools is insignificant. In most instances, teachers were struggling to operate some of the available technologies in the classroom, such as projectors, printers, searching for information on the internet etc., and were supported by learners to resolve technical challenges. This is similar to the findings of Sikhakhane et al. (2021), who examined teachers’ perspectives on using the computer as a tool for teaching and learning in KwaZulu Natal. However, like Rice (2021), this study suggests that because teachers demonstrated willingness (BI) to adopt educational technologies in teaching and learning, constant ongoing technical support regarding educational technologies integration is obviously needed.

CONCLUSION

This study revealed that most teachers who participated in the educational technologies skills training have positive perceptions of using educational technologies for teaching and learning. The teachers were of the perception that using educational technologies enhances the quality of their teaching and improves learning outcomes for their learners. The results also show that inadequate training on integrating educational technologies in teaching and learning, and lack of ongoing technical support negatively impact technology adoption for teaching and learning. Further, the results suggest that fully understanding teachers’ perceptions is crucial to successfully integrate educational technologies.

Based on the presented findings from the study, we recommend that educational technologies skills training for teachers in rural secondary schools should not only cover the use of specific technologies
rather the frameworks for integration in teaching and learning. It is also essential that integrating educational technologies in teaching in the rural secondary should focus on learner-centred education and promote learners as users of technologies in the classroom.

RESEARCH IMPLICATIONS

This study has theoretically contributed to the existing literature on teachers’ perceptions and attitudes toward educational technologies use. Thus, the study would be pretty significant from a teacher’s professional development point of view. The government, through the department of education can determine teachers’ perceptions and attitudes towards educational technologies use and the support rural schoolteachers need to integrate educational technologies in their teaching effectively.

LIMITATIONS

This paper presents rural secondary school teachers’ perceptions and attitudes towards educational technologies use for teaching and learning. Nevertheless, there were some limitations: First, time constraints were one of the major impediments in this study. There was minimal time to conduct the study due to the schools’ lockdown rules. Second, the findings of this case study are only applicable to the context of the cases studied and cannot be generalised to a larger context. The study used seventy-two participants who might not have provided a more expansive view of teachers’ perceptions of the phenomenon of using educational technologies.

FUTURE STUDIES

Based on the presented findings from this study, we suggest a further in-depth. Such a study should adopt a more robust theoretical and methodological approach and attempt to capture teachers’ perceptions on a large scale, that is, from more than one district. Notably, it would be interesting to investigate how perceptions toward educational technologies integration differ (or not) depending on the various factors such as age, gender, qualification, or subject specialisation. The current study sample is the teacher participants working in different rural schools. The sample can be used to investigate learners’ perceptions of educational technologies.

CONFLICT OF INTEREST

The authors of this publication declare there is no conflict of interest.

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