



Digitalising the Curriculum: Teachers' Integration of Technological Resources into the CAPS Framework

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Abstract

The rapid development of technological resources has propelled various sectors to adopt digitalised practices. Similarly, the integration of technological resources at the basic education level was rendered inevitable, particularly during the Coronavirus pandemic era and beyond. These technological developments affect curriculum implementation in schools and enhance teaching and learning practices. This qualitative case study explored teachers' integration of technological resources into the curriculum in the Fourth Industrial Revolution era in South African primary schools. The interpretive paradigm was used to provide insights into teachers' integration of technological resources. Three teachers were purposively and conveniently sampled to participate in the study. Data were generated using online one-on-one semi-structured interviews and Zoom Focus Group Discussions. Technological Pedagogical Content Knowledge (TPACK) served as an analytical tool to frame the study. Findings indicate that teachers primarily rely on personal knowledge (personal integration) and social influences (informal integration) when integrating technological resources, rather than on the Department of Basic Education's formal policy guidelines (formal integration). While informal integration is influenced by teachers' technological knowledge and skills gained through social networks, personal integration of technological resources is shaped by each teacher's individual opinions and available opportunities. Conversely, formal integration conforms to institutional policies and structured curriculum requirements. This study recommends that teachers give formal integration of these resources utmost priority because of the ongoing structural limitations, including inadequate professional development, limited infrastructure, and the demands of a curriculum that is content-heavy.

Keywords: Integration, technological resources, curriculum, teachers

Introduction

Driven by the Fourth Industrial Revolution, the Department of Basic Education has prioritised the integration of technological resources into the curriculum. This has compelled both public and private schools to integrate technological resources into the curriculum (Dlamini, 2023). Since teachers are expected to integrate technological resources, this has a direct impact on their ability to stay up to date with the latest developments in this field of education (Mpungose, 2023). Technological resources refer to digital tools, equipment, applications, and platforms used to support and enhance teaching, learning, and administrative tasks in education. The integration of technological resources into the

curriculum has proven difficult in South Africa, where teachers face various obstacles, including a lack of experience, a lack of training, poor infrastructure, and insufficient guidance (Mpungose, 2021). These challenges reveal the need for research studies aimed at exploring effective methods for integrating technological resources into the curriculum by teachers.

At the Digital Summit in South Africa, Cyril Ramaphosa, the president of the Republic of South Africa, hinted that despite the challenges associated with these resources, both public and private schools must use them to meet the nation's demands (Mpungose, 2021). As a result, the Department of Basic Education made it a priority to provide schools with technological resources

like laptops, interactive whiteboards (IWBs), overhead projectors, and software called the South African School Administration and Management System (SA SAMS). These provisions were made due to the potential of technological advancements to improve the implementation of the Curriculum and Assessment Policy Statement (CAPS) in schools (Mthembu, 2018; Muriithi & Masinde, 2016). Further to that, Hoadley and Jansen (2013) and Naidoo (2013) state that the Department of Basic Education (DBE) is working towards finding solutions to address the problem of teachers who do not have access to technological resources by offering technological resources that may be integrated into the curriculum. In addition, it seeks to provide relevant training to teachers who lack digital expertise so that they are prepared to integrate technological resources effectively and meet global educational demands (Olari & Romeike, 2021).

It can be argued that for effective teaching to occur, teachers must include technological resources in the curriculum. However, research shows that these departmental initiatives are insufficient and there is a need for empirical research studies that can recommend interventions facilitative of the integration of technological resources into the curriculum to optimise educational attainments (Sari, 2024). Moreover, local studies (Mthembu, 2018; Mvune, 2020; Mwalongo, 2018) support the notion that integrating technological resources into the curriculum empowers teachers to overcome curricular challenges, thereby enhancing the quality of education and the accessibility and efficiency of their instruction. The above scholars' further agree that although there is a lot of discussion about integrating technology into CAPS, the policy itself provides little clear guidance on how to use technology in teaching and learning. CAPS is still primarily content-driven, which can limit opportunities for meaningful technology use and flexible pedagogical approaches, especially in contexts with limited resources. This study is significant in that it provides recommendations to support the current and future integration of technological resources into the curriculum, and to promote quality and sustainable educational development. This study

aimed to respond to the following research questions:

- i. What technological resources do teachers integrate into the Curriculum and Assessment Policy Statement?
- ii. How do teachers integrate technological resources into the Curriculum and Assessment Policy Statement?

Technological resources integrated into the curriculum

Technological resources are defined as materials that can be used as tools and machines to solve problems in real life (Dlamini, 2023). According to Zewe (2023), technological resources include worldviews, ideologies, theories, and methods (ideological-ware resources), computers, tablets, DVDs, Microsoft PowerPoint, spreadsheets, YouTube, and Twitter (software resources) used for instruction. These tools, which include wikis, video conferencing, e-learning environments, and web 2.0 tools, have effectively aided teaching and learning in educational practices worldwide. Ramorola (2014) argues that technology is a driving force behind change in the education sector because it offers a clear break and a shift in perspective that suggests different approaches. Technological resources have shifted teaching and learning from a traditional approach to a diverse range of learning activities that include opportunities for learners to gain knowledge. Based on the definitions above, this study looks at technological resources as any tools that can be integrated into the curriculum to ensure it is implemented effectively.

Integration of technological resources

The concept of integration has been defined in various ways and is often used interchangeably with the term "use," referring to the process by which teachers combine separate components into a unified system or enhance participation through the coordination of diverse resources (Cassidy, 1982; Duffield, 1997; Earle, 1994; Booth, 1992; Cakir, 2012; Haedicke et al., 2011; Heyberi, 2013; Kumar, 2018). From the above definitions, one could argue that, in the context of education, integration involves including every necessary component into the

teaching and learning process with a view to better pupil participation in the classroom. This study promotes the integration of technological resources in schools based on three schools of thought: formal, informal, and personal integration, as discussed below.

Formal integration of technological resources

Mhlongo et al. (2023) argue that teachers need to be driven by formal integration during the teaching and learning process to allow for technological resources to be formally integrated into the curriculum. Mlilo (2019) and Mpungose (2023) observe that teaching while formally integrating technological resources follows organised curricula prescriptions. In the case of South Africa, the CAPS curriculum determines the content (selection), how it is taught (structure), and the duration of teaching and learning (time) (Simhadri & Swamy, 2023). Ghimire et al. (2024) purport that numerous technological resources, such as IWB, laptops, tablets, cellphones, and electronic books, are integrated into the formal curriculum, and teachers must engage with curriculum policies to integrate these resources accordingly. However, to integrate these technological resources as prescribed, teachers must possess the relevant content, pedagogical, and technological knowledge.

Lim and Khine (2006) point out that appropriate formal integration of technological resources into the curriculum is lacking due to many contextual factors. The above assertion is supported by recent studies (Dlamini, 2023; Zewe, 2023), which indicate that various contextual factors, such as insufficient supervision by departmental heads and a lack of technological resources, contribute to inadequate formal integration of technology into the curriculum. Mwalongo (2018) argues that CAPS stipulates the technological resources to be integrated into the curriculum, but is silent about the techniques to be used when teachers integrate the stipulated technological resources. Kumar (2018) concurs with the above findings and reveals that the policy upon which teachers depend does not offer detailed user guides on how to integrate the technological resources stipulated. This leads to ambiguity and teachers' reluctance to integrate

technological resources. Formal integration of technological resources is not enough when implemented in isolation, and can be enriched with informal integration.

Informal integration of technological resources

According to Makumane and Khoza (2020), teachers at the informal integration level learn informal knowledge and technological skills from their social communities, and social experiences are shaped by informal integration. Thus, through exchanging ideas and knowledge, teachers in informal integration gain knowledge from one another. Through informal integration, which occurs in a social context, teachers can connect to share knowledge about integrating technology into the curriculum (Dlamini, 2023). This implies that teachers must collaborate and share ideas in order to integrate technological resources. Recent studies (Nguyen et al., 2023; Sari, 2024) show that teachers can successfully integrate technology into the curriculum when they welcome the exchange of ideas influenced by informal integration.

Ntombela (2020) claims that in the informal integration of technological resources, teachers can use social media platforms such as WhatsApp, Facebook, and Instagram in teaching and learning. Makumane and Mpungose (2022) conducted a qualitative case study that revealed that the use of WhatsApp assisted teachers in communicating and relaying academic instructions to learners during the coronavirus pandemic. Some studies were conducted recently to provide evidence of the usefulness of social media integration into the curriculum to enhance teaching and learning, especially during unprecedented times (Sari, 2024; Zewe, 2023; Zhou et al., 2020). Nonetheless, a case study conducted by Mkhonto and Mubangizi (2024) shared some challenges with the informal integration of technological resources in teaching and learning, where teachers lack the necessary skills or confidence to effectively integrate technology into their teaching. As a result, teachers may rely on personal integration of technological resources into the curriculum that advocates continuous professional development and training programmes, as discussed further below.

Personal integration of technological resources

Khoza and Fomunyam (2020) define the personal integration of technological resources as a way that fits teachers' teaching style with what their learners need. Cussó-Calabuig and Farran (2018) concur with Koehler, Mishra, and Cain (2013) that personal integration of technological resources is based on individual teacher choices and preferences as informed by the curriculum. Moreover, personal integration also provides flexibility for both formal and informal integration of technological resources. (Ramorola, 2014; Reed, 2017; Mbhele, 2018). Nguyen et al. (2023), Ramorola (2014), and Reed (2017) assert that teachers, being social beings, construct their state of formal reality through their integration of technological resources, which is linked to individual subjectivity. In other words, personal integration of technological resources is a combination of formal and informal technological resources as determined by individual teachers in different school contexts.

A qualitative interpretive case study was conducted by Mthembu (2018) on the integration of computer technology into the CAPS school curriculum. The study concluded that personally integrating technological resources into the curriculum helped teachers develop essential digital literacy skills, including the ability to critically evaluate online information and integrate technological resources effectively. Although there is much research conducted on the integration of technological resources into the curriculum, there is a dearth of studies exploring the integration of technological resources according to three levels of understanding (Formal, Informal, and Personal). This study, thus, promotes a comprehensive integration of technological resources into the curriculum based on formal, informal, and personal integrations.

Theoretical framework

Building on Shulman's (1986) ideas of content and pedagogy knowledge (CPK), Mishra and Koehler (2006) developed the Technological Pedagogical and Content Knowledge (TPACK) framework, initially introducing it as Technological Pedagogical Content Knowledge (TPCK). They later updated it to TPACK in 2006,

after considering that this framework is useful in any process that aims to integrate different technological resources. The TPACK framework is founded on three core knowledge domains: content knowledge, pedagogical knowledge, and technological knowledge. Accordingly, the formal, informal, and personal levels of integration represent practical applications of the TPACK framework in educational contexts. According to TPACK, when these three domains come together, teachers can create and present content in ways that are both pedagogically sound and technologically appropriate. Figure 1 illustrates the TPACK framework knowledge domains for the integration of technological resources into curriculum.

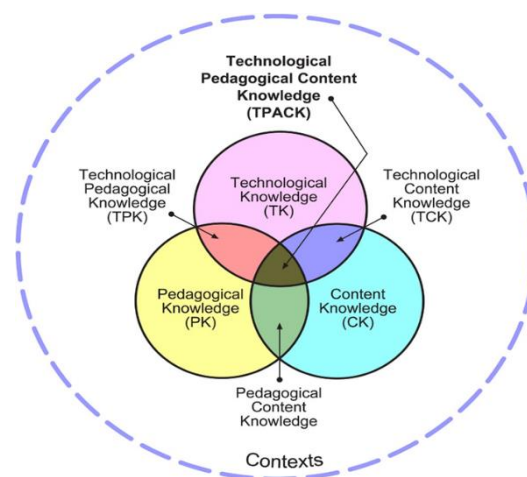


Figure 1: The TPACK Framework and its Knowledge Components (<http://tpack.org>, 2012, reproduced by permission of the publisher)

Content Knowledge

Content knowledge (CK) refers to the understanding of specific subject matter to be taught or mastered, encompassing key facts, concepts, and processes within a particular field (Shulman, 1986). Zuma (2020) defines CK as the quantity and structure of knowledge the teacher holds about their teaching subject. This knowledge about the teaching subject focuses on the prescribed content, facts, theories, and ideas that are formally integrated into a curriculum (Mlaba, 2020). Thus, CK outlines existing theories, ideas, and organisational frameworks that address the

needs of any school subject (Ng et al., 2021). In this study, CK unpacks teachers' understanding of the prescribed curriculum content as they are viewed as specialists in their respective subjects (Nani, 2019). Content knowledge aligns with the formal integration of technological resources, as teachers have to integrate these technologies as prescribed by the official curriculum.

Pedagogical knowledge

Mishra and Koehler (2006) note that Pedagogical Knowledge (PK) involves the representation and organisation of concepts, the use of teaching strategies, an understanding of what makes concepts challenging or easy to learn, an awareness of learners' prior knowledge, and the application of theories of knowledge within specific contexts. Cox and Graham (2009), highlight that PK contains strategies for controlling the classroom, exchange of knowledge with learners, reaching out to parents, and encouraging learners, among many other areas. Therefore, PK is in line with the personal integration of technological resources as it is driven by the teachers' selection of the strategies and resources to use when teaching (Mishra & Koehler, 2006; Schmidt et al., 2009). Thus, teachers need to make careful and appropriate decisions when integrating technological resources into their teaching. Pedagogical Knowledge is useful in terms of discovering strategies that teachers can use when teaching with technological resources (Mpungose, 2021).

Technological Knowledge

Technological knowledge (TK) encompasses a wide variety of tools and technologies, ranging from traditional ones like pencils, paper, chalk, and chalkboards, to modern digital technologies such as the internet, computer simulations, interactive whiteboards, discussion forums, and software applications (Khoza & Govender, 2009). Oke (2020) believes that TK is about learning how to use interactive whiteboards, PowerPoint, multimedia, and more sophisticated technologies like digital videos and the internet. It is valuable for teachers as it provides guidance on effectively incorporating technological resources into the classroom to enhance their teaching practices (Mkhonto & Mubangizi, 2024). The TK

requires teachers to become facilitators in the process of executing informal activities, integrating technological resources to achieve the lesson outcomes. Technological knowledge aligns with the informal integration of technological resources as teachers have to integrate numerous technologies (WhatsApp, Facebook, Instagram, and TikTok) in informal activities such as homework and classwork (Mishra & Warr, 2021).

Methods

Research approach, design and paradigm

This qualitative case study explores the manner in which three teachers in the 4IR era integrated technology into the curriculum. To gather comprehensive data about the phenomenon (integration), this study is structured as a qualitative case study. Creswell (2017) defines qualitative research as any study that looks into how a person understands and interprets particular experiences. A case study is an in-depth analysis of a single case, which could be a person or an institution (Ramnarain & Hlatswayo, 2018). The interpretivist methodological paradigm is used in this study. It seeks to comprehend and explain how teachers make sense of their own worlds and their unique practices of integrating technological devices into the curriculum, rather than making predictions about what they do (Creswell, 2017).

Sampling methods

Christiansen et al. (2010) define sampling as the technique by which the researcher selects the population and the location. According to Cohen et al. (2013), sampling is a part of analysis, and the researcher's choice of sample is influenced by the study's methodology and data-generation methods. Purposive sampling was used in selecting three teachers in one school from the Pinetown district. Sampling is useful for selecting a specific group with specific, unique qualities (Creswell, 2017; Ramrathan, 2017). In the case of this study, participants were selected because they were integrating technological resources into the curriculum. Creswell (2017) reveals that convenience sampling enables researchers to select a more manageable number of readily available study participants. Convenience sampling was utilised to choose three teachers who

were readily available to participate in the study. The researcher conveniently chose only teachers who worked in the Pinetown district where the

researcher resides. Refer to Table 1.1 below for participants' profiles.

Table 1.1 Participants' Details

Participants' Details	Schools	Qualification	Specialisation Phase
Teachers 1	King Zwelithini Primary School	BA + PGCE	Foundation
Teachers 2	Albin Primary School	B Ed	Intermediate
Teachers 3	Sicelulwazi Primary School	B Ed	Senior

Data generation methods

Three online methods were employed in the study's data generation procedure. These included semi-structured one-on-one Skype interviews, Zoom focus groups, and an emailed reflective exercise. Through the reflective activity, participants were able to write their experiences of integrating technology into the curriculum. Each participant took part in a 35-minute interview comprising open-ended questions, designed to elicit in-depth insights into their integration of technological resources (Cohen et al., 2013). This ensured that participants responded freely and that there was room for follow-up questions.

Trustworthiness

Guba and Lincoln (1994) state that to make a qualitative study trustworthy, the researcher needs to focus on issues of confirmability, dependability, credibility, and transferability. To ensure the credibility of findings, data from semi-structured interviews were transcribed for analysis. The transcripts were then shared with participants to verify if they correctly represented their experiences (confirmability). Dependability was maintained by presenting the study's findings in detail, using direct quotes from participants. The study's concepts and findings were thoroughly explained and discussed to allow readers to apply the results to their contexts (transferability).

Ethical issues

Full ethical clearance was first obtained from the Ethical Guidance Committee of the University of KwaZulu-Natal. Thereafter,

informed consent and permission to conduct the study were obtained from the Department of Basic Education (DBE), the participating schools, and the individual participants. The names of the participating schools and teachers were not revealed because of ethical considerations. Teachers' anonymity was ensured by using codes such as Teacher 1, Teacher 2, and Teacher 3 instead of their real names. In this way, confidentiality was guaranteed for the participants.

Limitations of the study

The limitations refer to factors that might impact the data generation process and the overall study, thereby imposing certain constraints (Hodkinson & Hodkinson, 2001). One of the limitations of this study was that it was small-scale research and thus, its findings were contextual not generalisable. However, the aim of the study was not to generalise findings, but to generate insights that readers can transfer findings to their own applicable contexts.

Data analysis method

Thematic analysis, which Cohen et al. (2013) support as a method for data analysis that methodically finds, arranges, and provides insight into the patterns of meaning across the generated data, was employed in this study. The data and literature revealed three themes: formal, informal, and personal integration of technological resources.

Results

The findings of the study were thematically presented according to the following

themes: Formal, Personal, and Informal Integration of Technological Resources

Theme 1: Formal integration of technological resources

Formal curriculum integration is based on a planned and prescribed curriculum (Peter, 2019). This implies that since teachers are driven by the prescribed curriculum, they ought to integrate technological resources. The results of this study show that participants' university training had equipped them with operational knowledge of technological resources. The participants, however, also found it difficult to integrate technological resources into the prescribed curriculum. Teacher 3 stated that:

Teacher 3 *“My teaching qualification has taught me how to use technological resources, but not to integrate them into the prescribed curriculum. I have a computer certificate, so I am mindful of how to use these resources, and when I get confused, a colleague helps me out”*.

The data excerpt from Teacher 3 demonstrates that they knew how to use technological resources because they had computer training courses from their university. Their teaching qualification also provided Teacher 3 with skills on using technological resources, but it had not specifically trained the teacher on how to integrate these resources into the curriculum. Teacher 3's experience suggests a gap between technological proficiency and curriculum integration. The lack of skills to integrate technological resources undermined the goal of the DBE, which is to teach while integrating technological resources as stipulated in the CAPS policy document (Nani, 2019). Moreover, when Teacher 3 was probed on how they make means to integrate technological resources into their teaching, they responded: *“A colleague also helps me when I get confused”*. This reveals that when teachers struggled to integrate technologies in their teaching, they relied on their co-workers who were well-versed in integrating technological resources. This highlights the importance of having a professional community to provide support in areas where one may lack expertise.

Concerning theme one, Teacher 1 said, *“We try to make an effort to go to the computer*

room to write formal tests and assignments, but we face several challenges. Some students are not yet proficient in using computers, and we also have a limited number of computers available to use for formal activities.”

Teacher 2 concurred with this assertion, saying, *“As I speak, half of my class are doing math examinations on our tablets to develop their cognitive levels, the other half is waiting outside because of limited tablets.”*

Teacher 2 integrates technological resources into the curriculum for the purposes of implementing assessments. However, the teacher faces the challenge of a lack of digital literacy within the student population group. Further to this, the challenge in the integration of technological resources into the curriculum is aggravated by the inadequate technological resources available in schools. This inadequacy of resources is reflected upon by Teacher 1 who stated that: *“and we also have a limited number of computers available to use for formal activities”*. The limited resources for formal activities is a cause for concern as resource constraints potentially lead to logistical issues, such as all learners not being able to use technological resources simultaneously, delays in completing assessment tasks, and discipline issues. When *“the other half is waiting outside because of limited tablets.”* As articulated by Teacher 2, learners can make noise, disrupting the teaching and learning process.

Theme 2: Personal integration of technological resources

Teachers integrate technological resources based on their strengths and weaknesses within the school setting. Teachers perceive technological resources as attractive or engaging for learners. Technology is seen as a tool that enhances learners' interest or motivation in learning (Nguyen et al., 2023). The participants' responses reflect the notion that technological resources have a positive impact on learner engagement. The participating teachers believed these resources made learning more interactive, dynamic, or enjoyable.

Teacher 3 said, *“I find these technological resources more appealing to learners. Technology*

is a better way for capturing their attention because older approaches don't seem to work for these learners."

Teacher 1 shared a similar view, emphasising that technology drew learners' attention during teaching and learning: *"Based on my personal teaching experience, I've noticed that students learn better when technology is involved. The practical aspect is important because you can teach the whole lesson, but students might not fully understand. They enjoy visuals and colourful materials, so I'm experimenting with new technologies to make lessons more engaging"*.

Similarly, Teacher 2 also said, *"I have observed personally that learners enjoy learning with technology. They like pictures, so I am trying new ways to make my lessons interesting, and technology offers that."*

The participants' responses revealed that they integrated technological resources because learners were already exposed to various technological resources. They personally strongly believed that these resources captured learners' attention during teaching and learning. Teacher 3 stated that *"Technology is a better way for capturing their attention,"* indicating that technology enhanced the effectiveness of the educational process. Participants expressed confidence in using these tools, with Teacher 1 noting that, *"I've noticed that students learn better when technology is involved"* Their prior teaching experiences helped them recognise the benefits of using technology and being confident in its application. These findings imply that the integration of technological resources in schools plays a crucial role in engaging learners who are motivated by a genuine interest in technology.

Theme 3: Informal integration of technological resources

Informal integration emerged from the generated data as the third theme. Participants integrate technological resources using their social experience from their communities. Thus, informal integration of technological resources is driven by informally shared information through software resources such as WhatsApp, Facebook, and Short Message Service. Participants informally integrated into their teaching a range of

technological tools, including soft copies (digital documents), Google, newspapers, magazines, radios, projectors, cell phones, and a laptop. This variety indicates a complex approach to teaching, integrating different media to enhance the educational experience. Teacher 1 attested that:

Usually, when I am teaching English, I use soft copies, Google, newspapers, magazines, radios, projectors and cell phones, and my laptop. There are a lot of software I use to ensure that teaching is effective. We also have tablets with different application software, but due to the overcrowding of the classroom, we are not able to use tablets. We also communicate with our learners and other teachers using WhatsApp due to COVID-19.

Teacher 2 shared that, *"In our school, we have computers with software applications, but not enough for our learners. So, we share links with learners to watch videos."*

Teacher 3 pointed out that, *"I am currently teaching social sciences, so in case I give them an assignment, we use computers to search for information."*

Data from Teacher 1 indicates an approach to teaching English highlighting an effective blend of traditional (newspapers, magazines) and modern (Google, projectors, tablets) technologies to support their teaching. Integrating social communication platforms like WhatsApp shows flexibility and adaptability, especially in response to the COVID-19 pandemic. However, the challenge of overcrowded classrooms limits the full potential of some technological resources, particularly tablets, which are not used as much due to space. Data from Teacher 2 reflects a situation in which the school is striving to integrate technological resources into the learning process, but faces challenges due to insufficient resources. Thus, the school has adapted by sharing video links, which can help support learners' learning and promote engagement with digital content. Teacher 3 reveals the use of technology that supports independent searches for information, which can be a powerful tool for fostering critical thinking and information literacy in the Social Sciences subject. However, the success of this method depends on learners'

ability to navigate the vast information available and on the teacher's ability to provide proper guidance in using online resources effectively.

Discussion

Sari (2024) argues that integrating technological resources into the curriculum can work well in primary schools when teachers support learners' academic motivation while encouraging independent learning, even when learners have access to Facebook, WhatsApp, and TikTok at home. According to Mpungose (2023), this type of technological resource integration can trigger positive feelings like happiness, confidence, and involvement, which may make the integration of technological resources more successful and exciting. The findings from this study reveal that teachers have a solid foundational understanding of their subject matter, having gained this knowledge through their university education. However, the study found that higher education curricula does not adequately prepare teachers to integrate technology into their lessons. Thus, teachers understand content knowledge, but they are unable to integrate technological resources into their lessons. The gap between content knowledge and technological resource integration suggests that the Department of Basic Education should provide teachers with training in both content areas and technology integration to ensure that learners have the necessary skills, like data literacy and coding, to meet the demand of the country (Makumane & Khoza, 2020). The fact that Teacher 3 needs assistance from other colleagues suggests that efforts to close the gap between content knowledge and the integration of technological resources are a necessity. Additionally, the study found that teachers are conscious of the technological resources that are being integrated into the curriculum in response to changes in the field of education. The study further indicates that teachers find it difficult to integrate these technological resources in a way that complements and improves the curriculum. This indicates an absence of technological knowledge on their part, especially with regard to how technology can be strategically integrated into teaching methods (Dlamini, 2023; Zewe, 2023). More to this, teachers find it more difficult to make effective use of technology in the classroom during curriculum implementation owing to the shortage

of technological resources (Mpungose, 2020). The study observes that teachers recognise the potential of technology to enhance participation among pupils and establish exciting learning environments. This indicates that they have a solid understanding of pedagogy because they acknowledge the importance of integrating technology to promote active learning (Paul, 2019). Teachers' adaptability in integrating new technological resources with traditional methods of instruction is demonstrated by their informal integration. However, the difficulty in methodically integrating technology into the formal curriculum is that there are not enough pedagogical approaches created especially for technology-enhanced learning. Teachers may be proficient in using technology, but not always in ways that complement successful teaching methods.

Conclusion

The study's findings highlight the connections between the themes and the formal, informal, and personal integration of technology into the curriculum. Teachers revealed that, despite receiving operational knowledge to use technological resources from the university, they encounter significant difficulties when integrating these resources during curriculum implementation. This highlights the need for focused professional development that fills this gap. Teachers' reliance on one another for assistance in the integration of technological resources necessitates the formation of collaborative partnerships for the successful integration of technology into the curriculum. Additionally, social interaction-driven informal integration demonstrated teachers' dedication to raising learners' engagement across a range of platforms. Educational implications from the study are that comprehensive training programmes should focus, not only on operational skills but also on pedagogical strategies for effective technology integration into the curriculum, thereby fostering a supportive environment that enhances both teaching and learning in the digital era. Additionally, resolving resource constraints and encouraging teamwork can result in a more dynamic and equitable educational environment, which will ultimately benefit both teachers and learners.

Disclosures

Data Availability: The data presented in this study are available on request from the authors.

Conflict of interest: The authors declare that they have no conflict of interest.

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