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The Challenges that hinder the Integration of Pedagogical Content Knowledge with Technology to support ICT Teachers – A Case Study of a South African Secondary School

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ABSTRACT
This empirical paper discusses the challenges that hinder the integration of technological pedagogical content knowledge in education. The study employed Critical Emancipation Research (CER) as a theory that advocates empowerment, social justice, and social inclusion for teachers who lack digital skills to integrate technology into the classroom. Data was generated using focus group discussions through participatory action research. A focus group discussion was conducted with 6 participants, who are teachers in a particular secondary school where the research was conducted. This focus group comprised six teachers, including the two grade 9 Technology teachers, two English grade 10 to 12 teachers and two Mathematics and Geography grade 10 to 12 teachers. The study findings indicated that teachers lack digital skills, educational resources, and computer labs and libraries. Based on the findings, the study recommends that teachers have digital skills through continuous professional development. Additionally, schools must be equipped with educational digital resources through sponsorships and the Department of Basic Education to advance schools by building computer laboratories and libraries to improve the integration of technology as a strategy. This study contributed to changing teachers 'perceptions on technology integration and agreed to transform the classroom from traditional to digital for the benefit of our learners. Furthermore, this study has shown that the existing gap between traditional and modern teaching methods can be closed through technology integration. Therefore, the researchers have opened the door for other scholars to continue researching this related topic in search of possible solutions in the future.

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INTRODUCTION
The 21st century's most important idea has been technology. For this reason, it is encouraging that every teacher should have sufficient knowledge of the nature and usage of technological instruments, in addition to the specific content knowledge and pedagogy required for instruction.[1] However, the integration of pedagogical content knowledge with technology has remained a challenge. Several

[1] Sepide Farhadi and Gökhan Öztürk, "Technological Pedagogical Content Knowledge (TPACK) Level and Needs of Pre-Service English as a Foreign Language (EFL) Teachers: Evidence from Turkey," *Revista Educación* 47, no. 1 (January 13, 2023): 187–203, https://doi.org/10.15517/revedu.v47i1.51920.

challenges hinder the proper implementation of integrating technology to support teachers' digital skills. The main challenge as identified by some researchers, such as Hunduma and Seyoum; and Musasa et al, in their studies regarding challenges in technology integration, is the lack of infrastructure, insufficient funds, and lack of technical and administrative support, lack of time, teachers' knowledge, abilities, and use of technology are lacking.[2] Kibirige, in the study conducted in Uganda, categorised the challenges into three classes: infrastructure and internet connectivity; individual factors and administrative support; and, lastly, curriculum and learner support materials.[3] From the study, a lack of computer access, internet connectivity, and ICT textbooks remained the obstacles. On the other hand, teachers were unprepared to integrate technology into the teaching pedagogy and did not have appropriate administrative support.[4]

Therefore, Kibirige, in a study conducted in Uganda, recommended a multi-pronged approach that involves investing in infrastructure, training teachers, providing support, and introducing relevant and appropriate curriculum.[5] The recommendations were directed at policymakers and other relevant stakeholders in Education to work towards ICT integration in classes.

Hunduma and Seyoum identified teacher-related, student-related, resource-related, and administrative-related challenges.[6] This means that integration technology challenges affect every stakeholder within the education fraternity. Musasa et al reiterated that limited access to the internet and technology devices negatively affects teaching and learning.[7] According to Montero-Mesa et al.(2023), teachers are trapped in a situation where they cannot contribute to learners' learning or their critical reflection regarding their professional practice because of the lack of ICT skills.[8] Ndibalema contend that the challenge is perpetuated by the teachers' schooling with inadequate resources and facilities that present a lack of basic skills, which leads to poor academic performance.[9] Therefore, the study conducted by Turugare and Rudhumbu believes that teachers should receive professional development training to enhance their digital skills and support the integration of technology.[10] Professional development is a crucial facet of any education transformation; for that reason, Hlungwani suggested government intervention by providing digital solutions to liberate the marginalised community of teachers for social change.[11]

Most teachers lack proficiency in digital skills, making it challenging to incorporate technology into the classroom.[12] The inadequacy of teachers on technology issues is more influenced by unpreparedness.[13] On the other hand, Koranteng highlighted access to educational digital resources as a challenge in under-resourced communities based on a lack of finance and poor ICT coordination in

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[2] Chala Mosisa Hunduma and Yilfashewa Seyoum, "Constraints Hindering ICT Integration in Ethiopian Public Secondary Schools: A Literature Review," *International Journal of Membrane Science and Technology* 10, no. 2 (June 21, 2023): 691–702, https://doi.org/10.15379/ijmst.v10i2.1271.

[3] Israel Kibirige, "Primary Teachers' Challenges in Implementing ICT in Science, Technology, Engineering, and Mathematics (STEM) in the Post-Pandemic Era in Uganda," *Education Sciences* 13, no. 4 (April 11, 2023): 382, https://doi.org/10.3390/educsci13040382.

[4] Dovilė Stumbrienė, Tatjana Jevsikova, and Vita Kontvainė, "Key Factors Influencing Teachers' Motivation to Transfer Technology-Enabled Educational Innovation," *Education and Information Technologies* 29, no. 2 (February 20, 2024): 1697–1731, https://doi.org/10.1007/s10639-023-11891-6.

[5] Kibirige, "Primary Teachers' Challenges in Implementing ICT in Science, Technology, Engineering, and Mathematics (STEM) in the Post-Pandemic Era in Uganda."

[6] Hunduma and Seyoum, "Constraints Hindering ICT Integration in Ethiopian Public Secondary Schools: A Literature Review."

[7] Antony Musasa, Jameson Goto, and Geoffrey Lautenbach, "Factors Influencing Technology Integration among Mathematics Educators in South Africa: A Modified UTAUT2 Perspective.," *Contemporary Educational Technology* 17, no. 2 (2025).

[8] Lourdes Montero-Mesa et al., "Digital Technology and Teacher Professional Development: Challenges and Contradictions in Compulsory Education," *Education Sciences* 13, no. 10 (October 13, 2023): 1029, https://doi.org/10.3390/educsci13101029.

[9] Placidius Ndibalema, "Digital Literacy Gaps in Promoting 21st Century Skills among Students in Higher Education Institutions in Sub-Saharan Africa: A Systematic Review," *Cogent Education* 12, no. 1 (2025): 2452085.

[10] Mukai Turugare and Norman Rudhumbu, "Integrating Technology in Teaching and Learning in Universities in Lesotho: Opportunities and Challenges," *Education and Information Technologies* 25, no. 5 (2020): 3593–3612.

[11] Promise Machingo Hlungwani, "Bridging the Digital Divide to Promote Inclusive Education in Zimbabwean Rural Secondary Schools: A Case of Mwenezi District," n.d.

[12] Wan Ng, "Can We Teach Digital Natives Digital Literacy?," *Computers&Education* 59, no. 3 (2012): 1065–78.

[13] John Ranellucci, Nathan C Hall, and Thomas Goetz, "Achievement Goals, Emotions, Learning, and Performance: A Process Model.," *Motivation Science* 1, no. 2 (2015): 98.

schools.[14] Therefore, the study argues that educational authorities should invest in educational digital resources to ensure the success of integrating technology in schools. Furthermore, the study highlighted the lack of libraries related to technology integration. Therefore, the suggestion is for the Basic Department of Education to support the building of libraries in schools that would improve the integration of technology.

Despite the contribution made by the above studies to address the challenges that hinder technology integration, this study is unique in that it addresses the same challenges through Critical Emancipation Research (CER). CER enables marginalised teachers to identify challenges hindering integration and address these issues by becoming co-researchers and participating in strategies that can advance technology integration in schools. CER advocates for the empowerment, liberation, and hope of teachers lacking digital skills by facilitating the sharing of experiences and knowledge, as well as skills in FGD, to enhance technology integration. The arrangement of the paper covers the theory underpinning the study, method, findings, discussion, and finally recommendations and a conclusion.

THEORETICAL FRAMEWORK

The theoretical base of the study is Critical Emancipatory Research. The theory is formulated to explain, predict and understand the phenomenon in the case of research. [15] It further explores human freedom and liberation.[16] Jürgen Habermas's theory aims to address the persistent issues in Europe and find a solution to them.[17] The theory aimed to alter oppressive systems so that people could recognise their oppression and free themselves from it.[18] CER's goals are participatory and cooperative. Through CER theory, the marginalised are empowered, and there is a production of knowledge that can benefit the marginalised disadvantaged community. It also promotes the goals of social justice, equity, freedom, peace, and hope.[19] Because CER is focused on social justice and upholds democratic values, it frees those oppressed from dominance, helplessness, and oppression.

Therefore, the researchers found the theory appropriate for this paper since it promotes inclusion, social justice, and participation of all affected in the challenges of inequality in educational systems through redress, empowerment, democracy, and restoring hope for a community of teachers lacking digital skills in the 21st century. In this study, the goal is to transform the status quo and adopt a new approach to integrating pedagogical content knowledge and technology, supporting technology teachers and engaging all stakeholders within the teaching fraternity at the school where the research was conducted.

METHODOLOGY

The study employed a qualitative design within the transformative paradigm, utilising Participatory Action Research (PAR) for data generation. PAR enables researchers to collaborate with the researched.[20] The subject under research becomes part of the planning of data generation and comes

[14] Evans Austin Brew, Benjamin Nketiah, and Richard Koranteng, "A Literature Review of Academic Performance, an Insight into Factors and Their Influences on Academic Outcomes of Students at Senior High Schools," *Open Access Library Journal* 8, no. 6 (2021): 1–14.

[15] Bruno De Oliveira, "The Philosophical Foundations of Participatory Action Research: Pragmatism, Critical Theory, Constructivism, Feminist Epistemology and Participatory Democracy," *Qualitative Research Journal*, October 10, 2024, https://doi.org/10.1108/QRJ-07-2024-0151.

[16] Claudio Corradetti, "The Frankfurt School and Critical Theory," *The Internet Encyclopedia of Philosophy*, 2012.

[17] Dube Bekithemba and Dipane Hlalele, "Revisiting Critical Emancipatory Research in School Violence Narratives. A Quest for Safe School. Educational Research for Social Change, 8(4), 74-86," October 31, 2018; Ndaba Xolisile and Dube Bekithemba, "Critical Emancipatory Research Approach to Enhance Performance Among Progressed Learners in Life Sciences," *Mediterranean Journal of Social Sciences* 12, no. 4 (July 8, 2021): 53, https://doi.org/10.36941/mjss-2021-0027.

[18] Bekithemba and Hlalele, "Revisiting Critical Emancipatory Research in School Violence Narratives. A Quest for Safe School. Educational Research for Social Change, 8(4), 74-86"; Xolisile and Bekithemba, "Critical Emancipatory Research Approach to Enhance Performance Among Progressed Learners in Life Sciences"; Lesley-Ann Noel, "Promoting an Emancipatory Research Paradigm in Design Education and Practice," 2016, https://doi.org/10.21606/drs.2016.355.

[19] Sechaba Mahlomaholo, "Critical Emancipatory Research and Academic Identity," *Africa Education Review* 6, no. 2 (October 2009): 224–37, https://doi.org/10.1080/18146620903274555; Dipane Hlalele, "Introducing Participatory Rural Appraisal Methodologies to Rural Education Research," in *Conference Proceedings* (Bergen, Norway, 2013), 23–26.

[20] Moana Eruera, "Ma Te Whānau Te Huarahi Motuhake: Whānau Participatory Action Research Groups," *Mai Review* 3, no. 1 (2010): 1–9.

with solutions to resolve any challenges the researcher encounters. Through participatory research, participants, as they are called, take part by first recognising the challenges, becoming part of the design and all involved throughout the steps towards the resolution of the challenges until the solution. It is a research approach that seeks to transform the lives of marginalised people in societies.[21] The theory presents an opportunity for the marginalised to contribute and bring solutions to their challenges.

Purposive sampling was used. One school was identified, and six teachers volunteered to join the focus group discussions. As teachers in the school, they were able to provide insight into the research questions being investigated. Participants were more interested because, during the discussion, no one seemed to be driving the research; instead, all of them felt part of what needed to be done and when. Also, they were transformed in such a way that they became scribers chairing the discussions, others became timekeepers, and they enjoyed the freedom of contributing to something that they think will improve their daily work. The team was assembled to get the best solution from the first-hand experiencers and those directly affected by the problem. It took the team one month to compile tangible results from the responses to the two research questions mentioned earlier, based on the focus group meetings. The responses of co-researchers were transcribed (voice into text). Afterwards, themes were designed from keywords, and critical discourse analysis was used to provide the text's deep meaning. All ethical considerations were adhered to, such as requiring participants to sign consent forms, indicating they had the right to withdraw from the research, and using pseudonyms to protect their identities and the school. Member checking was done, and all agreed that themes reflected their ideas and represented their discussion.

PRESENTATION OF FINDINGS AND DISCUSSIONS

Question 1: What challenges hinder **the integration of technological pedagogical content knowledge?**

Lack of Adequate Teacher Training on Digital Skills:

Digital skills refer to the abilities and knowledge required to use digital technologies effectively.[22] Resources could be computers, smartphones, and the internet to access, evaluate, and create information, effectively communicate in the class, and collaborate with the learners.[23] The first challenge that participants raised during the focus group discussions was the lack of adequate teacher training in digital skills. This is what T3 had to say:

> *"It is so sad because some of us as teachers are not exposed to technology and its pedagogical application."*

In addition to what the previous participant has already mentioned, this is what T1 said:

> "*Yes, from our observation and experiences, some of us indeed as teachers struggle to use technological devices due to a lack of digital skills, some of us are old school, and our training programmes are not up to date with the latest technological advancement, because even I use my phone for answering calls. I did not know that it has many functions that make my teaching simple and interesting".*

The other participant further highlighted that their struggle might be due to the lack of support they are receiving. This is T4's contribution:

> *"I would say maybe it is because we do not have technology support, and there are no professional development opportunities to enhance our TPCK skills."*

[21] Xolisile and Bekithemba, "Critical Emancipatory Research Approach to Enhance Performance Among Progressed Learners in Life Sciences."

[22] Aleksandra Webb and James Layton, "*Digital Skills for Performance* : A Framework for Assessing Current and Future Digital Skills Needs in the Performing Arts Sector," *Arts and the Market* 13, no. 1 (April 10, 2023): 33–47, https://doi.org/10.1108/AAM-09-2021-0054.

[23] Xiaoyu Wang et al., "Understanding Teacher Emotional Exhaustion: Exploring the Role of Teaching Motivation, Perceived Autonomy, and Teacher–Student Relationships," *Frontiers in Psychology* 14 (January 8, 2024), https://doi.org/10.3389/fpsyg.2023.1342598.

The participants in the discussion indicated that a lack of adequate teacher training in digital skills hampers the integration of technology into their different classes. Participants showed that limited exposure, insufficient support, ignorance, and outdated training make integrating technology into their teaching practices difficult. Inadequate application of technology brings boredom to learners and unpreparedness for the world of devices, rather than being educational tools that can make teaching and learning effective.[24] Learners in those classes where technology is not employed correctly currently become disengaged, and those from disadvantaged backgrounds may be further marginalised.[25] Teachers may also become frustrated because they cannot integrate the user-friendly tool that makes things easier for the rest of the learners and themselves. The argument would be that to overcome the situation of inadequacy, teachers must ensure that they are equipped to effectively integrate technology and digital skills into their classes and be able to apply them in their different subjects. The participants' views confirm those of Pérez-Jorge et al., who posit that teachers lack sufficient training, support, and resources to develop their digital literacy and capabilities to integrate technology into their teaching practices.[26] Participants fully agree that they lack adequate digital literacy.

Lack of Educational resources and funding

Educational resources refer to the materials, tools and services used to support teaching and learning.[27] These are physical or digital resources. Teaching and learning have experienced significant changes in recent years. Digital usage took centre stage during COVID-19 when teachers had to use digital devices for teaching. However, the same resources were not available, and people were not prepared to use them. To this stage, after the pandemic, despite its severity, numerous lessons have been learned that significantly improve livelihoods and teaching strategies in a digital context. Teachers and schools are still behind. During the 21st century, teachers still use audio-visual aids to advance learning and create an inclusive environment. Despite the advantages of technology in the classroom, the use of technology in schools has remained a challenge due to a lack of technological educational resources, as highlighted by participants during the focus group discussion. This is what a participant indicated, T6 said:

> *"Our schools are struggling because we do not have technological educational support resources, and even getting funds from the Department of Basic Education seems to be a challenge. Therefore, our schools cannot afford to purchase technological equipment and software even for teachers because these types of equipment are too costly."*

In support of the T1, said:

> "*The other challenge in our schools, as well, is to maintain the equipment, which is expensive due to high vandalism at schools, security, ongoing maintenance, and updating of technology resources, which is costly for schools such as ours."*

This is what the other participant, T3, said:

> *"Some of us who bought our laptops, like our smartphones, are of no use because to use them as educational tools without data is a challenge. Even learners have their smartphone data as a challenge. Data is a problem because not every learner has access to Wi-Fi. The Wi-Fi here is for administrative purposes, not for everyone in this school. Even if one would ask learners to download e-books, it is not easy due to not always being afforded the opportunity."*

[24] Ezekiel U Oji, Augusta C Okanume, and Christiana A Andor, "Advancing Innovative Language Teaching and Learning in Nigeria from the Covid-19 Experience," *Asian Journal of Language, Literature and Culture Studies* 7, no. 1 (2024): 188–95.

[25] Stewart Riddle et al., "Student Engagement in Schools Serving Marginalised Communities," *International Journal of Inclusive Education* 28, no. 6 (May 11, 2024): 723–38, https://doi.org/10.1080/13603116.2021.1956605.

[26] David Pérez-Jorge et al., "Training in Digital Skills in Early Childhood Education Teachers: The Case of the University of La Laguna," *International Journal of Interactive Mobile Technologies (IJIM)* 14, no. 20 (December 11, 2020): 35, https://doi.org/10.3991/ijim.v14i20.17339.

[27] Hafiz Muhammad Adil et al., "Open Education Resources' Benefits and Challenges in the Academic World: A Systematic Review," *Global Knowledge, Memory and Communication* 73, no. 3 (February 13, 2024): 274–91, https://doi.org/10.1108/GKMC-02-2022-0049.

T2 added:

> *"We do not even have technical support to assist us with technology integration, even when we want to download study material or maybe play a video to make our classes interesting, completely no resources. On the other hand, learners are eager to be taught in a way that they will gain the skill of being part of the entire world."*

From the above responses, teachers indicate a lack of resources they need to use in their classrooms. The challenge here is that they do not have resources. However, even if they could be provided with resources, the challenge is security at schools; there is a high risk of vandalism. The challenge is security in schools. Schools are at high risk of vandalism, and educational resources are stolen. The other issue is that teachers are still not capable of using technological devices in their teaching. Contextualising participants' views means that learners are keen to learn through technology, as it provides a variety of choices and creates an inclusive environment. This also implies that technological devices serve as a provision for the lack of educational resources by providing e-books and other electronic educational material. However, through the discussion, it became clear that schools face a challenge in accessing the technological devices and infrastructure necessary to make current education interesting and enjoyable. However, technology is a productivity tool that enhances teaching and lesson preparation, develops students' ICT skills, meets curriculum expectations, and engages students in authentic teaching.[28] Teachers must, therefore, possess the necessary skills to use technology effectively.

The study further indicated that teachers who are familiar with instruments and know how to use technology become enthusiastic and view it as a primary tool that supplements the existing teaching practices. However, a lack of resources results in an imbalance in the education system.[29] During the discussions, the teachers showed how desperate they were to use technological instruments, but the lack of resources hindered them.

Wananda, and Ruhyana and Aeni have emphasised that educational facilities such as computer labs and libraries are strong support systems for the integration of technology in schools and have a significant impact on learning outcomes.[30] They must, therefore, be provided to enhance learning.

a. Resistance to Change

It was noted during the focus group discussion that participants understand the importance of technology, having engaging classes where everyone may take a chance in solving the problems. However, some teachers are still resisting its use. From the discussion, the participants indicated that they prefer traditional teaching methods. They showed apprehension about adopting new technologies, and they lacked confidence. That means they do not want to move away from what they have been doing and how they have learned in the past. This is what T2 is regarding resistance:

> "I *think some of us do not like change. Even when we undergo day training, which is provided for certain teachers, we still return to teaching in the same way. We resist change; we continue to teach the old way and administer tests in the same manner we are accustomed to. We are holding on to our traditional way of teaching."*

In support of the above, this is what T4 said:

> *"Even though COVID-19 has taught us that things have changed, and technology is the way to go, we are still afraid to be exposed due to our limitations."*

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[28] Emmanuel Ayisi Abedi, Sarah Prestridge, and Steven Hodge, "Teachers' Beliefs about Technology Integration in Ghana: A Qualitative Study of Teachers', Headteachers' and Education Officials' Perceptions," *Education and Information Technologies* 29, no. 5 (April 20, 2024): 5857–77, https://doi.org/10.1007/s10639-023-12049-0.

[29] Mikyas Abera et al., "Early Marriage and Women's Empowerment: The Case of Child-Brides in Amhara National Regional State, Ethiopia," *BMC International Health and Human Rights* 20 (2020): 1–16.

[30] Nugrahana Fitria Ruhyana and Ani Nur Aeni, "Effect of Educational Facilities and Infrastructure in Primary Schools on Students' Learning Outcomes," *Mimbar Sekolah Dasar* 6, no. 1 (April 5, 2019): 43, https://doi.org/10.17509/mimbar-sd.v6i1.15225; Gideon Wilson Wananda, "Strategies for Wider Use and Access of Digital Libraries in Secondary Schools in Developing Countries: A Case Study of Uganda," 2016.

T6 viewed resistance as influenced by a lack of confidence. This is what the participant said:

> *"I do lack confidence. One day, someone came to our school to help us learn how to make videos for our learners. We do not trust that what we are teaching can be done in a global space. I think we still think that we are not good enough."*

Participants expressed fear about learning new strategies for teaching and assessing learners. In this instance, participants are still comfortable benefiting from traditional teaching and assessing methods; on the other hand, learners are not benefiting as they should if other strategies were employed in their classes. Participants' responses here showed that they were afraid or fearful of losing control or autonomy. In other instances, they are aware of the opportunities for innovation and improvement in their teaching. Some teachers prefer not to stress things they are not accustomed to. The resistance of teachers to use digital technologies in their classes and their teaching is like the resistance to integrating Artificial Intelligence (AI) in education, which in some cases is marred with controversy and the belief that ethical issues such as honesty and hard work are eroded as people use AI within the curriculum.[31] Teachers' resistance stems from the fact that applying digital tools to their classes takes away their essence during face-to-face teaching, and that ethical issues are not being respected.

Strategies intended to advance the integration of technology in schools

In light of the challenges teachers face when integrating technology, this study offers various strategies to address these challenges, which hinder the integration of technological pedagogical content knowledge.

Continuous Professional Development for teachers to enhance digital skills

Continuous Professional Development (CPD) is a strategy mentioned by participants as a way to address the challenge of teachers failing to integrate technology due to a lack of digital skills. CPD is a commitment to ongoing lifelong learning by teachers. [32] Therefore, continuous professional development would reinforce teachers' knowledge, digital skills, motivation, and confidence to enact meaningful pedagogies with technology through a more student-centred model.[33] This is the submission of T5:

> "*The Department of Education should organise a workshop for the teachers on how to use technology and make integration fashionable in the classroom."*

T2 supported this view and stated:

> "*Workshops should be done regularly for teachers to accelerate and align our curriculum content with modern technology.*"

T4 added:

> *"We need someone more experienced in technology to help teachers and learners.*"

The views of the researchers from the focus group discussion proved that teachers lack digital skills, and CPD is suggested as a strategy that will equip them with digital skills.[34] CPD has the potential to identify and create opportunities for teachers to learn about new technologies from experts that could be used in the classroom for effective teaching and learning. Furthermore, it bridges the existing gap in digital skills by refreshing existing knowledge. Finally, it equips teachers with digital skills to keep up with the ever-changing technology. Meanwhile, CER helps restore hope and liberate marginalised

[31] Bekithemba Dube and Wendy Setlalentoa, "Artificial Intelligence in Education: Embracing Change, Addressing Challenges, and Shaping Tomorrow's Curriculum," *Interdisciplinary Journal of Education Research* 6, no. s1 (September 19, 2024): 1–2, https://doi.org/10.38140/ijer-2024.vol6.s1.01.

[32] Radhakanta Gartia and Sushama Sharma, "Continuous Professional Development: A Panacea for Teachers," *International Journal of Research Pedagogy and Technology in Education and Movement Sciences* 2, no. 01 (2013).

[33] Abedi, Prestridge, and Hodge, "Teachers' Beliefs about Technology Integration in Ghana: A Qualitative Study of Teachers', Headteachers' and Education Officials' Perceptions."

[34] Cias T Tsotetsi and Sechaba Mahlomaholo, "Exploring Strategies to Strengthen Continuing Professional Development of Teachers in Rural South Africa," *Journal of Higher Education in Africa/Revue de l'enseignement Supèrieur En Afrique* 13, no. 1–2 (2015): 45–73.

teachers by sharing knowledge, skills, and experiences with experts in training and workshops on the use of technology in the classroom.

Equipping schools with educational digital resources

Educational digital resources comprise various educational tools that support teaching and learning.[35] These are technological platforms that enhance student engagement, which increases access to education and, on the other hand, supports teachers' professional development.[36] Digital resources expand access to learning, support lifelong learning, and provide pedagogical benefits, thereby enhancing students' learning outcomes.[37] These educational tools ultimately transform the learning experiences and prepare students for success in the digital age while being thoughtful inside and outside of the school context.[38] It is critical to equip schools with educational resources to ensure high-quality learning opportunities. It ensures classrooms are equipped with necessary resources, such as technological devices and teachers are provided with continuous mentorship, observation, and feedback for quality teaching.[39] The following are the views of the participants.

T5 explained:

> *"If we could have educational resources, things like digital textbooks or education apps, maybe our teaching and learning will improve, and we will be better off than now."*

To support of having digital resources, the other participant, T1, said:

> "*I so wish our school could have reliable internet connectivity and as technical support to assist us as teachers and learners with technology-related issues.*"

T6 supported the idea of providing adequate educational resources by asserting:

> *"If technology infrastructure can be updated to meet the evolving needs of education within our schools, I think that can make teaching-learning interesting. I also suggest free data learners."*

The participants suggested a suitable infrastructure for their learners. In addition, they indicated that adequate resources, including technical support and regular updates, would improve teaching and learning.

Revamping of libraries and computer labs in schools

Libraries and computer labs help people develop their academic abilities. Below are the highlights of the focus group discussion reflecting on the views of participants based on computer labs and libraries as a strategy to support high-quality teaching through technology:

T2 put it this way:

> *"If libraries can be transformed into learning hubs with modern technology, it will enhance learning."*

T5 is supported by saying:

> *"Our libraries can be transformed to support every learning area for all learners to benefit from the facilities. I will also suggest tight security at our schools to protect the things that we need so badly."*

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[35] Patricia Esther Alonso-Galicia et al., "Desarrollo Del Pensamiento Complejo En La Formación Empresarial: Un Enfoque de Género," *Education in the Knowledge Society (EKS)* 25 (February 15, 2024): e29382, https://doi.org/10.14201/eks.29382.

[36] Alka Pandita and Ravi Kiran, "The Technology Interface and Student Engagement Are Significant Stimuli in Sustainable Student Satisfaction," *Sustainability* 15, no. 10 (May 12, 2023): 7923, https://doi.org/10.3390/su15107923.

[37] Adil et al., "Open Education Resources' Benefits and Challenges in the Academic World: A Systematic Review."

[38] Allan Collins and Richard Halverson, *Rethinking Education in the Age of Technology: The Digital Revolution and Schooling in America* (Teachers College Press, 2018).

[39] Kutu Augustine Adebayo, Nzimande Ntokozo, and Ngema Zukiswa Grace, "Availability of Educational Resources and Student Academic Performances in South Africa," *Universal Journal of Educational Research* 8, no. 8 (August 2020): 3768–81, https://doi.org/10.13189/ujer.2020.080858.

This is what T1 stated:

> *"The improvement of libraries and computer labs to meet the world's standard regarding knowledge and application of technology is important. Even some of us teachers will gain from the improved infrastructure as we will be trained properly on of these things."*

Here, the participants emphasised that improving the library and computer laboratories would make a difference in teaching and learning. Support is needed to improve technological skills. Improving the computer laboratories and libraries would convert them into digital hubs, and every learner and teacher, regardless of the subject, would benefit. Schools must improve the IT skills of learners and teachers. Schools can prepare learners for the digital workforce and interdisciplinary learning by redesigning these areas and equipping them with the necessary knowledge and skills to thrive in the digital world.[40] Additionally, this shift can promote accessibility and inclusion, guaranteeing that all students can acquire the necessary IT skills to prosper in a world that is becoming increasingly digital.[41]

RECOMMENDATION

The study recommends continuous training for teachers in schools to ensure they are equipped with digital skills through ongoing professional development. The Department of Basic Education can address teachers' concerns and fears through open communication, involving them in the technology integration process, and demonstrate the opportunities and value of technology integration in schools. The Department of Basic Education should also encourage collaboration and peer support, fostering a growth mindset and a culture of innovation. Furthermore, the Department of Basic Education is encouraged to develop structures that will house the devices, ensure that schools are equipped with educational digital resources, and build computer labs and libraries to enhance technology integration as a strategy. The other recommendations are to ensure that security services are tight in schools to protect the technological equipment and infrastructure.

CONCLUSION

This empirical paper has discussed the challenges that hinder the integration of technological pedagogical content knowledge in education at a particular secondary school in South Africa. The study findings indicated that teachers lack digital skills, educational resources, and computer labs and libraries. Various recommendations have been provided to help address the problem. The key among them is that teacher training programs should be adequately equipped with ICT infrastructures, which are essential for the teacher's empowerment to apply ICT, as it is a central subject in the teachers' curriculum. This study has built confidence among the participants who participated in it. Participants' contributions showed a willingness to change. They also identified the benefits and the value that the integration of ICT adds to daily teaching. The benefits learners gain when things have been made easier for them, and they become more innovative. Therefore, Teachers should be encouraged and empowered to integrate ICT into the learning modules, fostering growth and innovation.

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