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## Assessing the integration and impact of information and communication technology in education: South African private secondary schools in KwaZulu-Natal

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### Abstract

As the Fourth Industrial Revolution progresses, the effects of transformation in information and communication technology (ICT) have influenced all spheres of life. These changes have necessitated pedagogical transformation in the modern classroom. Many countries have, therefore, moved from traditional approaches in education to a 21st-century learning (21CL) framework with ICT being a necessary and critical facet thereof. In the research reported on here I aimed to determine how South African private secondary schools in KwaZulu-Natal use ICT in their pedagogy. The research purpose juxtaposes the findings of this research with global methods used in ICT and education. This research is underpinned by the positivist and interpretivist paradigms, and the conceptual framework of 21st-century skills. A mixed methods research approach was adopted and the research strategy was a case study. This study reveals that South African private secondary schools are in the initial stages of ICT implementation. Some of their ICT practices are aligned with global trends, while others differ. ICT lessons were more formalised in the junior grades but were found lacking in the senior grades. Schools' ICT teams were understaffed and not adequately trained, and school leaders were not actively using ICT.

**Keywords:** 21st-century learning; Fourth Industrial Revolution; information and communication technology

### Introduction

The world is rapidly advancing through the Fourth Industrial Revolution towards a rapidly emerging potential fifth (Maphosa, Duba & Jita, 2020; Yahaya & Bolaji, 2023). The period between the last two successive industrial revolutions is much less than between the previous industrial revolutions (Hines & Lynch, 2019). This is an indication that the rate at which the world is changing has increased exponentially over the last few decades. The coronavirus disease (COVID-19 pandemic) has expedited change in the global landscape of digital transformation and technology.

The significant global changes brought about by ICT developments and COVID-19 have caused many governments around the world to acknowledge that the traditional content-based educational methodologies of the past do not contain the knowledge, skills, or practices to adequately prepare learners for life in the 21st century. Consequently, these governments have, using ICT, embarked on transforming their educational systems to be more aligned with the principles of 21CL (Gómez-Fernández & Mediavilla, 2022; Ramli, Majid & Badyalina, 2020).

21CL is student centred and focuses on the application of knowledge in new and different situations, rather than only the memorisation of content knowledge through repetition (Bedir, 2019; Zagouras, Egarchou, Skiniotis & Fountana, 2022). The 21CL framework traditionally focused on cognitive competencies used in the teaching and learning of mathematics and science but has expanded to include competencies from the affective domain (Barrot, 2019; Foluso, Oludipe, Badru & Olajumoke, 2023). These competencies include creativity, critical and innovative thinking, social and emotional intelligence, global citizenship, cross-cultural skills, self-management, lifelong learning, ethics, collaboration and information skills (Foluso et al., 2023). The change towards the 21CL paradigm, through ICT, is considered as a necessary transformation to survive the current rapid and drastic global reforms (Al-Mamary, 2022; Literat, 2021).

Many governments have already changed their educational systems to become more ICT-driven through 21CL (Gómez-Fernández & Mediavilla, 2022; Hines & Lynch, 2019). Others are in the process of transforming their education systems to make 21CL through ICT a reality, in the hope of producing learners who are fully functional, capable and effective global citizens, by empowering them with 21st-century competencies (Claro, Salinas, Cabello-Hutt, San Martín, Preiss, Valenzuela & Jara, 2018; Maphosa, 2021). Many African governments, such as South Africa, Ghana and Nigeria, have conceded that the drastic social, economic and digital changes that have occurred globally, have necessitated changes in the educational sphere (Agormedah, Henaku, Ayite & Ansah, 2020; Ogbonnaya, Awoniyi & Matabane, 2020).

South Africa has many different types of schools – private, semi-private and public schools (Ramrathan, 2021). Private schools have been in existence in South Africa since colonial times, often with churches playing a major role in their development (Pretorius, 2019). Some of the 25 private secondary schools from KwaZulu-Natal that participated in this study date back to the late 1800s, while others have been in existence for fewer than 20 years. The different schools in South Africa vary in economic status and range from being exceptionally affluent to penurious (Pather & Booij, 2020).

Therefore, the use of ICT in South African schools is different and implemented in varied stages, depending on the context. However, there is evidence that South Africa is in the process of introducing 21CL in

some schools using ICT, but research in KwaZulu-Natal and South Africa is limited (Pillay, 2021). Legislation by the South African Government from 1996 to 2015 has outlined the need for ICT and 21CL, as well as frameworks for the transformation process. However, public and private schools in South Africa operate very differently regarding the pace of enactment.

Public schools tend to adhere to the timeline and transformation process provided by the government, whereas private schools work more independently (Pillay, 2021). Private schools are usually further ahead of public schools in the change to 21CL using ICT, because they have more resources at their disposal with less bureaucratic financial access protocols than public schools (Foluso et al., 2023; Ramrathan, 2021). The disparity in available resources between private and public schools is further amplified with widespread corruption in the Department of Education and at school level (Ramrathan, 2021). The onset of COVID-19 highlighted inequalities in education with many public schools lacking the resources to deliver education during lockdown periods, while most private schools moved into the digital educational space because of adequate resources (Mudaly & Mudaly, 2021). Government schools also moved into the digital space but not at the same pace and not to the same extent as private schools (Chisango & Marongwe, 2021; Foluso et al., 2023). The focus in this study was thus on private secondary schools. KwaZulu-Natal was chosen as the location for the study because of the limited research on private schools in the province.

Private schools in KwaZulu-Natal, and the rest of South Africa, receive most of their income from learner school fees. They are managed as businesses, with profit margins taking priority in most instances. Therefore, there is a high degree of accountability regarding the expenditure of school finances, resulting in these schools' finances being managed well (Naidoo, 2019). To remain attractive to prospective learners, and parents of prospective learners, private schools spend a substantial amount of their finances on procuring ICT resources.

The focus of this research was on private secondary schools to determine how ICT was integrated and to assess its impact in the change to 21CL. This study provides in-depth information about the use of ICT in education globally. The objectives of the study included investigating how ICT was integrated, the factors which facilitated the integration, and the challenges which hindered it.

#### Literature Review

The more intensive use of ICT by teachers in the classroom began as early as the 1980s in proactive countries, while other countries initiated the process towards the end of the 1990s, or during the

early 2000s (Marlatt, 2019; Yahaya & Bolaji, 2023).

The use of ICT, in the form of digital literacy and digital learning, has revolutionised the teaching and learning process (Foluso et al., 2023; Maphosa et al., 2020). Digital literacy refers to the technological theory and practices, as well as the mental, social, and emotional skills that individuals must possess to successfully use ICT (Claro et al., 2018), while digital learning refers to the actual process of learning content and skills, and using digital devices and platforms (Varghese, Vate-U-Lan & John, 2019).

The National Education Policy Act of 1996 formed the initial basis for the introduction of ICT into education (Republic of South Africa [RSA], 1996). The subsequent White Paper 7 on e-education: *Transforming Learning and Teaching through Information and Communication Technologies (ICTs)* (Department of Education [DoE], 2004) describes the South African ICT landscape in education and provides a framework for the transformation process. This legislation was followed by other government initiatives such as the *Implementation Strategy for Electronic Education (e-education) in South Africa 2013–2025* (2013), the *National Integrated ICT Policy Green Paper* (Department of Communications, 2014), *Policy Dialogue on ICT in Education* (2014), *Operation Phakisa* (2014), and the *Action Plan to 2019: Towards the Realisation of Schooling 2030* (Department of Basic Education, RSA, 2015).

#### *The need for information and communication technology in education*

The ICT developments in the Fourth Industrial Revolution have been rapid and significant (Al-Mamary, 2022). Classroom lessons, textbooks and educational resources are rapidly becoming more electronic, and, in turn, teaching and learning spaces are more technology-based (Agormedah et al., 2020; Maphosa, 2021).

Innovations in ICT have completely changed the way that people communicate, teach and learn, which has resulted in all individuals being required to be technologically skilled (Ajmain, Hehsan & Mohamad, 2019; Rahmi, Aisyah & Amrina, 2023). Generation-Z and Generation-A learners have also vastly different social environments, characteristics, skills, mindsets, and opportunities, compared to previous generations (Mathew, 2018). These learners, therefore, require revolutionised educational approaches, curricula, models and theories (Shanmugam & Balakrishnan, 2019; Zagouras et al., 2022). It follows that future employment opportunities are also becoming progressively more digitally orientated (Maphosa et al., 2020).

Advancements in ICT topics have streamlined educational processes in some countries and

enabled 21CL in schools (Lomos, Luyten & Tieck, 2023; Maphosa, 2021). These advancements can meet some of the new educational needs (Al-Mamary, 2022; Claro et al., 2018). Since ICT is making online content delivery more personal, and online assessment methods more effective, it is considered one of the major methods of current and future teaching and learning (Foluso et al., 2023; Mathew, 2018).

#### *Factors that facilitate the use of information and communication technology*

One of the crucial factors that determines the successful adoption of ICT in schools is a knowledgeable, well-trained and skilled school leadership team (Ajmain et al., 2019; Lomos et al., 2023). This team can review all elements related to the change process, and then strategise, execute and evaluate the implementation of ICT (Howard, O'Brien, Kay & O'Rourke, 2019).

One of the other common factors in the successful implementation of ICT in different countries is the acceptance and adoption of a holistic system-thinking approach to its introduction (Bai & Song, 2018; Lomos et al., 2023). Positive mindsets and attitudes of learners and teachers should accompany this holistic approach towards the comprehensive incorporation of ICT into innovative pedagogical development (Al-Mamary, 2022; Pather & Booi, 2020).

The introduction of ICT has been successful because the foundation of its implementation has been on pedagogical improvement, informed through empirical research, and not merely on the use of one or two random technological innovations (Patrick, Abiolu & Abiolu, 2021; Yahaya & Bolaji, 2023).

Some countries that have successfully incorporated ICT in schools have also adopted a centralised-decentralised approach, whereby individual schools are given greater autonomy to contextualise their introduction in their respective schools. However, all schools are still bound by central, key directives which are legislated by the various governments (Hines & Lynch, 2019; Varghese et al., 2019).

The teaching of computer science as a compulsory subject at the beginning of primary school is recommended to facilitate the use of ICT (Mayfield & Hester, 2018). The teaching of coding, programming and computational thinking is also recommended (Mayfield & Hester, 2018; Nouri, Zhang, Mannila & Norén, 2020).

Another factor that has facilitated the use of ICT is that teachers have begun to view ICT, frequently used by learners, as an opportunity to augment learning rather than considering it as a distraction to learning in classrooms (Cheng, 2017; Rahmi et al., 2023). Teachers are consistently using more developed interactive, dynamic applications

and platforms (Ogbonnaya et al., 2020; Varghese et al., 2019). Gamification has also proved to be an especially effective tool in increasing student engagement and academic performance (Lay & Osman, 2018).

Effective and interactive electronic textbooks have become more accessible, and teachers tend to use them more frequently and efficiently to maximise their contribution to the pedagogical process (Al-Mamary, 2022; Chiu, 2017).

Hultén and Larsson (2018), as well as Zagouras et al. (2022) explain that teachers have introduced and enacted the concept of the flipped classroom as a form of blended learning more frequently in recent years, whereby most of the research and content learning for the lesson takes place outside the classroom, either individually or in groups using ICT. This learning is reinforced, extended and intensified through collaborative group activities and teacher input in the classroom.

The use of ICT is, furthermore, positively influenced by the effective development and training of teachers, regarding the theory and skills underpinning ICT pedagogy (Gómez-Fernández & Mediavilla, 2022; Maphosa, 2021). Cheng (2017) proposes a three-stage ICT staff development programme. The first stage involves basic ICT training for all teachers, the second stage involves more specific training which is departmentally aligned, and the third stage involves higher-order and in-depth training to develop ICT expertise. Additionally, Subekti (2020) advises that ICT training for teachers should include digital literacy and learning, and should focus on the domains in the technology, pedagogy and content knowledge (TPACK) model, or the domains of the substitution, augmentation, modification and redefinition (SAMR) model. These models allow for teachers to be comprehensively and systematically trained in different aspects of ICT integration in education.

#### *Positive outcomes of information and communication technology in education*

ICT has led to increased learner preparation outside the classroom, more allocated time for classroom activities, improved learner participation in the classroom, and an increase in scores achieved in assessment (Lawrence & Fakuade, 2021; Rahmi et al., 2023). ICT also encourages energetic learner-centred learning which has resulted in improved levels of commitment and performance (Shanmugam & Balakrishnan, 2019; Yahaya & Bolaji, 2023).

Marlatt (2019) affirms that ICT, one of the critical components of 21CL, enhances the teaching and learning process. Additionally, the speed at which ICT enables information to be relayed between the different educational stakeholders streamlines the entire process of teaching and learning (Rahmi et al., 2023; Shanmugam &

Balakrishnan, 2019). ICT has also empowered collaborative learning, pedagogical research, discoveries, and advancement (Ajmain et al., 2019).

As a result of developments in ICT, a greater number of learners have access to education in a time where surplus finances are extremely limited. These developments also provide digital platforms, which facilitate cross-curricular learning and increased collaboration (Dutta & Hazra, 2023; Hines & Lynch, 2019). Furthermore, learners are being taught ICT from a young age and these skills are being reinforced at every stage of their development (García-Peñalvo & Mendes, 2018).

#### *Challenges to the implementation of ICT in education*

Some teachers tend to not use ICT in their teaching because research on the positive outcomes of ICT in education, is relatively limited (McGuire, 2018). Research is limited because ICT has only significantly changed the educational systems of many countries since around 1995 (Maphosa, 2021; Mathew, 2018).

Another challenge includes the responsible, ethical and legal use of ICT by learners in the school environment, as issues such as cyberbullying and the use of sexually explicit material have become more prominent (Crawford, 2017).

Due to the rapid advancements in ICT, schools have encountered other challenges, which

include the provision of equal access to ICT to all learners, the dissemination of the digital culture to parents and the wider society, storing and sharing of information, access and security of information, and long-term planning (Cheng, 2017; Dutta & Hazra, 2023).

Other obstacles to the use of ICT, especially on the African continent, are the lack of funding, facilities, resources and effective teacher training (Dutta & Hazra, 2023; Ogbonnaya et al., 2020). These are sometimes due to financial, socio-economic, or political factors (Ramli et al., 2020).

Teachers are continuously busy with content delivery, assessment, administration, and discipline issues, which limits their time to engage with innovative educational ICT (Agormedah et al., 2020). Kokare and Strautins (2018) explain that teachers should be provided with adequate resources and formally granted sufficient time to research and experiment with the effective use of ICT.

Concerns regarding the use of ICT reducing personal interaction and negatively impacting the social skills of learners have been raised (Literat, 2021; Zagouras et al., 2022). These authors propose the concept of blended learning as a possible solution but more research on its validity is required. The critical facets of ICT are illustrated in Figure 1.



**Figure 1** Critical facets of ICT

## Methodology

This study is underpinned by the positivist and interpretivist paradigms (Gamage, 2025). This is because a mixed method research methodology was used in which quantitative and qualitative data were collected to fully achieve the objectives of the study (Gamage, 2025).

It was necessary to gather numerical data from the online questionnaires to investigate the extent of exposure of schools to ICT. This data were then used to select schools for qualitative data collection. The qualitative data, from the individual and focus group interviews, were necessary to determine in-depth views and opinions. The mixed method research design for this study was an explanatory sequentially mixed methods design (Haynes-Brown, 2025).

A case study was selected as a research strategy because of its suitability to qualitatively investigate the central theme of ICT use in private secondary schools in KwaZulu-Natal. A multiple case study design was used because school leaders from different private schools were included in the research using questionnaires, semi-structured interviews and focus group interviews to collect data.

Fifty-five private secondary schools were identified in KwaZulu-Natal using a DoE online database. The physical addresses and telephone numbers of the 55 private secondary schools, together with the electronic mail (email) addresses of the school principals or their personal assistants, were documented for use in this study. Each school was then contacted telephonically, and the details of the research were explained to either the principal or another staff member. Information about the study and permission letters were then emailed to the schools. Twenty-five of the 55 private secondary schools in KwaZulu-Natal confirmed their participation in the research study by returning the letter of consent.

The population in this research study included school leaders from all 55 private secondary schools, which included principals, deputy principals and subject heads. Online questionnaires, in a cross-sectional survey, were sent to the leadership teams of the 25 participating private secondary schools in KwaZulu-Natal. The online questionnaires comprised mostly questions requiring quantitative answers, where respondents had to select from a range of specified alternatives. The questionnaire also contained a limited number of open-ended qualitative questions. The quantitative data were used to select the sample of the study from the population.

Purposeful sampling was used to select five secondary schools where the school leadership was expected to participate in individual semi-structured interviews. Focus group interviews were also conducted with the subject heads of different departments. All interviews were recorded and transcribed.

The Statistical Package for the Social Sciences (SPSS) was used to analyse the quantitative data from the online questionnaires. Descriptive and inferential statistical analyses were undertaken. The chi-square goodness-of-fit-test and the binomial *t*-test were used for the inferential statistical analysis. These tests were used to determine whether the actual data distribution differed significantly from the expected distribution. The qualitative data from the questionnaires were collated and analysed. Thematic analysis was used to identify patterns, trends and themes from the data from the individual and focus group interviews.

Reliability, validity and trustworthiness, as well as ethical protocols were ensured during the research process. The data from the online questionnaires, individual and focus group interviews were triangulated to formulate recommendations and conclusions.

## Results and Discussion

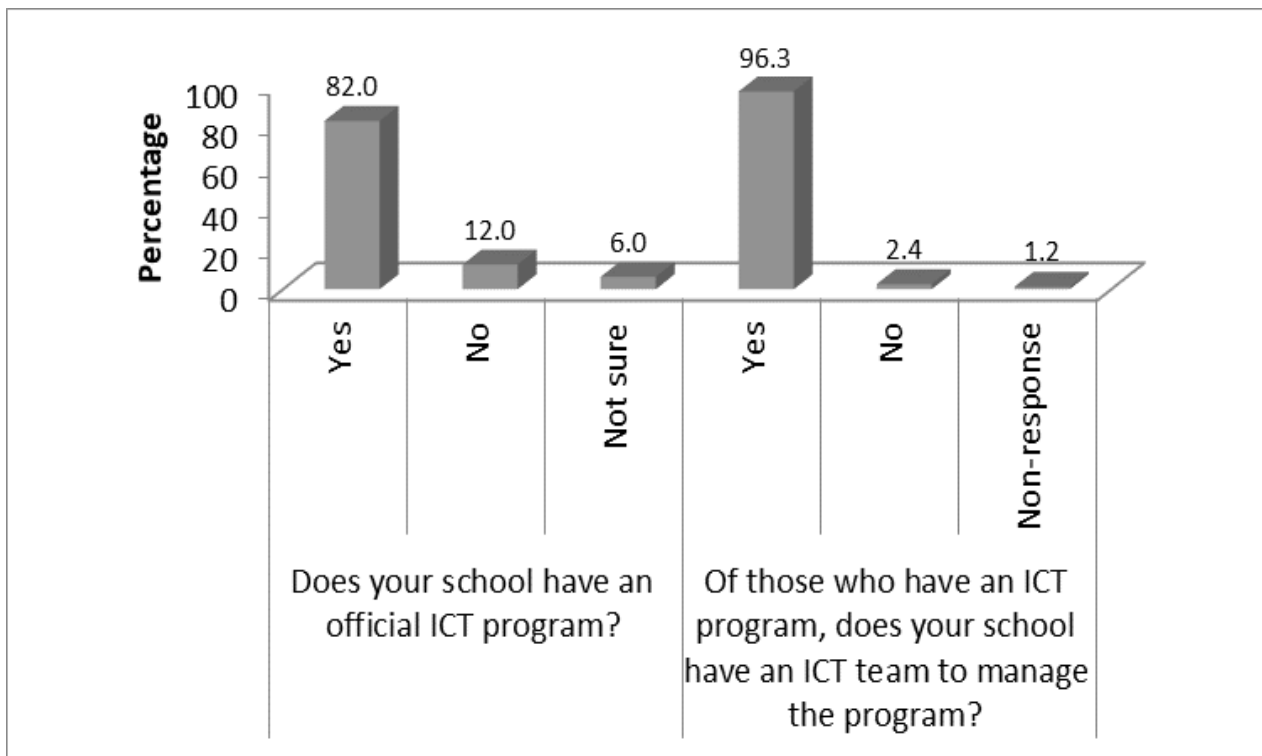
In the online questionnaire, school leaders were asked questions regarding the use of ICT in their schools. Questions in qualitative format were posed to school leaders during the individual semi-structured and focus group interviews.

### Response Rates and Demographic Profiles

Twenty-five of the 55 private secondary schools (45% of the research group) in KwaZulu-Natal participated in the study. The response rate for the online questionnaire and the interviews was 100%. The percentage of participation and the response rates were high, and this increased the validity and trustworthiness of the findings. One hundred school leaders from 25 private secondary schools in KwaZulu-Natal completed the questionnaire. Fifteen school leaders participated in the individual interviews and 21 school leaders in the focus group interviews.

### *Theme 1: Information and communication technology programmes as curricular subjects, led by official teams*

Figure 2 shows that 82% of the participating schools had ICT programmes, and 96.3% of those schools had an ICT team to manage it.



**Figure 2** Schools with ICT programmes and an ICT team

All the participants in the individual interviews and the focus group interviews, indicated that their schools had ICT programmes. The participant responses in the interviews further revealed that these programmes formed part of the school curriculum, in the form of computer, media science, computer applications technology (CAT), ICT, information technology (IT), or technology lessons. This is substantiated by the following response: “*IT and CAT are optional subjects that are taught in the FET [Further Education and Training] for us, but in terms of a curriculum that is followed in Grade 8 and 9, it is through media science*” (Deputy Principal 2 [DP2]).

It is difficult to manage an additional, standalone, ICT programme concurrently with the normal academic programme of a school. This is because of time and staffing constraints within the school. It is easier to structure and formalise an ICT programme as part of the academic programme and school timetable. This is why most schools, including the participating schools, adopted a combined strategy of implementation. The qualitative data from the interviews provided further in-depth information regarding the ICT programmes. The responses in the individual and focus group interviews revealed that the ICT programmes were offered and formalised as timetabled subjects more in the junior grades. The reason for this is to teach junior learners the necessary ICT skills required in the higher grades. The only ICT lessons evident for Grades 10 to 12

were CAT and IT as optional subjects: “*I suppose it starts in Grade 8 and 9 where they have to take technology as a subject ... [t]o learn basic skills ... [f]rom that point forward, there isn't a formal programme in the school*” (DP4).

Al-Mamary (2022), as well as Lawrence and Fakuade (2021), explain that the rapid ICT developments have resulted in many countries initiating ICT programmes and ICT teams to manage them in schools. The data show that private schools in KwaZulu-Natal have followed global trends and have also initiated ICT programmes with ICT teams to manage them. However, these ICT programmes were focused more on introductory lessons in the junior grades to provide the learners with basic ICT theory and skills. Contrary to this approach, Lomos et al. (2023) and Varghese et al. (2019) explain that the successful implementation of ICT has been through a holistic system-wide approach. This includes developing structured ICT lessons for all the grades in the school and not just focusing on specific ones, like the junior grades.

This holistic approach not only focuses on the teaching of basic ICT knowledge and skills but on all aspects of the change process necessary to successfully infuse ICT into education for pedagogical improvement (Bai & Song, 2018; Yahaya & Bolaji, 2023). These aspects include planning, infrastructure, training, evaluation and feedback during the implementation process (Cheng, 2017). The research findings did not reveal any organisation, planning or monitoring of the

ICT implementation and utilisation process beyond the allocation of ICT lessons within the school timetable. The successful formalisation of ICT lessons was characterised by a much more planned, extensive and focused approach, which extends beyond the ICT approaches adopted by the participating schools.

The qualitative data support the quantitative findings in that private secondary schools in KwaZulu-Natal administered ICT programmes and had ICT teams to manage them. Using qualitative research methods I was able to probe more deeply. The results revealed that the teams who managed the ICT programmes were small, and that extra manpower was needed to effectively manage the ICT teams in larger private schools. The responses below substantiate these views.

*I think the responsibilities of the team are really many ... Possibly our team could be bigger... this is one area where we need to grow at least another staff member (Principal 3 [P3]).*

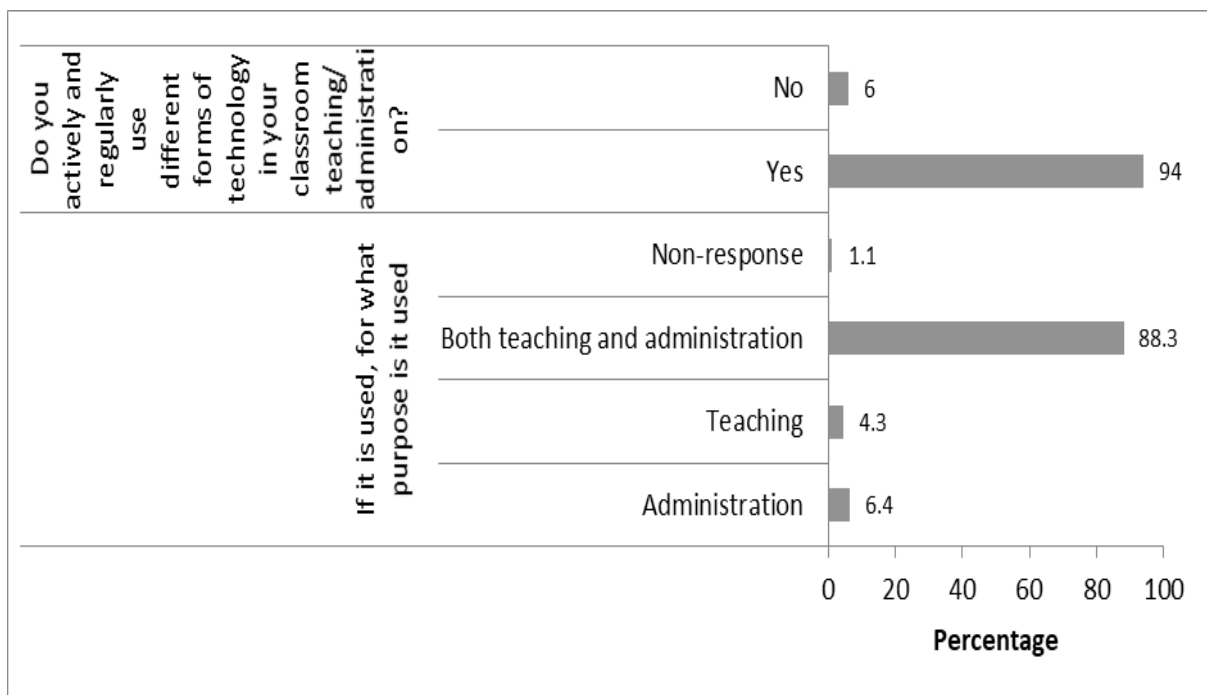
*Essentially, we do have technical support with [Name] and [Name] as the ICT integrator but, we*

*definitely are short staffed, in that sphere (DP2).*

Dutta and Hazra (2023), as well as Maphosa (2021), assert that the training and development of teachers and ICT teams is crucial in the effective implementation of ICT. Ogbonnaya et al. (2020) add that an ICT team must comprise sufficient skilled and trained individuals to manage the needs of the respective schools. However, it is important to note that private and public schools operate within budgets and sometimes ICT teams and ICT training are downsized (Nouri et al., 2020; Pather & Booi, 2020).

**Theme 2: Passive versus active use of information and communication technology by staff**

The active use of ICT refers to teachers using a variety of ICT devices and applications during their lesson preparation, teaching and assessment to develop higher-order learning. Figure 3 shows that 94% of school leaders regularly and actively used ICT in their classes, of which 88.3% used it for teaching and administration.



**Figure 3** The use of ICT by staff

The qualitative data reveal that fewer staff members were actively engaged with ICT. This is verified by the following participant responses:

*If I had to put it into categories, I would say that 30 to 40% are actively on board with technology ...*

*But I would say 10 to 15% are adamant that it's not going to work (P3).*

*I would say 20% of our staff do that, maybe even 30 (actively use ICT) (ICT2).*

Agormedah et al. (2020), and Mathew (2018), mention that ICT should not be underutilised

simply as a source of information but should be extensively incorporated into pedagogy, especially 21CL. Foluso et al. (2023) and Ogbonnaya et al. (2020) affirm that the delivery of digital content has proven to be ineffective unless it is properly integrated into the pedagogical practice. ICT can revolutionise the teaching and learning process by creating classroom contexts in which learners take ownership of their learning and higher-order cognitive processes, which then facilitates effective learning (McGuire, 2018).

The quantitative data show that 51% of the respondents used online assessments. The qualitative analysis reveals that fewer school leaders and teachers used online assessment: “Some of the subjects do ... but it’s definitely something that is not the norm. They are generally more informal assessments” (DP3).

The following response also reveals that online assessment was commonly used for easy revision or fun exercises: “It’s not all of it by any means. I would say it’s only like 10 to 15% of what they do in fact. It’s generally like basic multiple-choice questions” (ICT2).

Agormedah et al. (2020) suggest that one of the possible reasons for the limited use of online assessment is that school leaders and teachers are still compelled to use traditional, written and content-based assessment for reporting and promotion purposes. Another possible reason is that school leaders and teachers are overburdened with teaching responsibilities and do not have the additional time to experiment with innovative ICT pedagogy (Dutta & Hazra, 2023; Kokare & Strautins, 2018), as one participant indicated: “There are times when teachers just feel that they have so much else to do. Apart from using it as a teaching aid for e-books [electronic books], they don’t have enough time to do much more on it” (DP1).

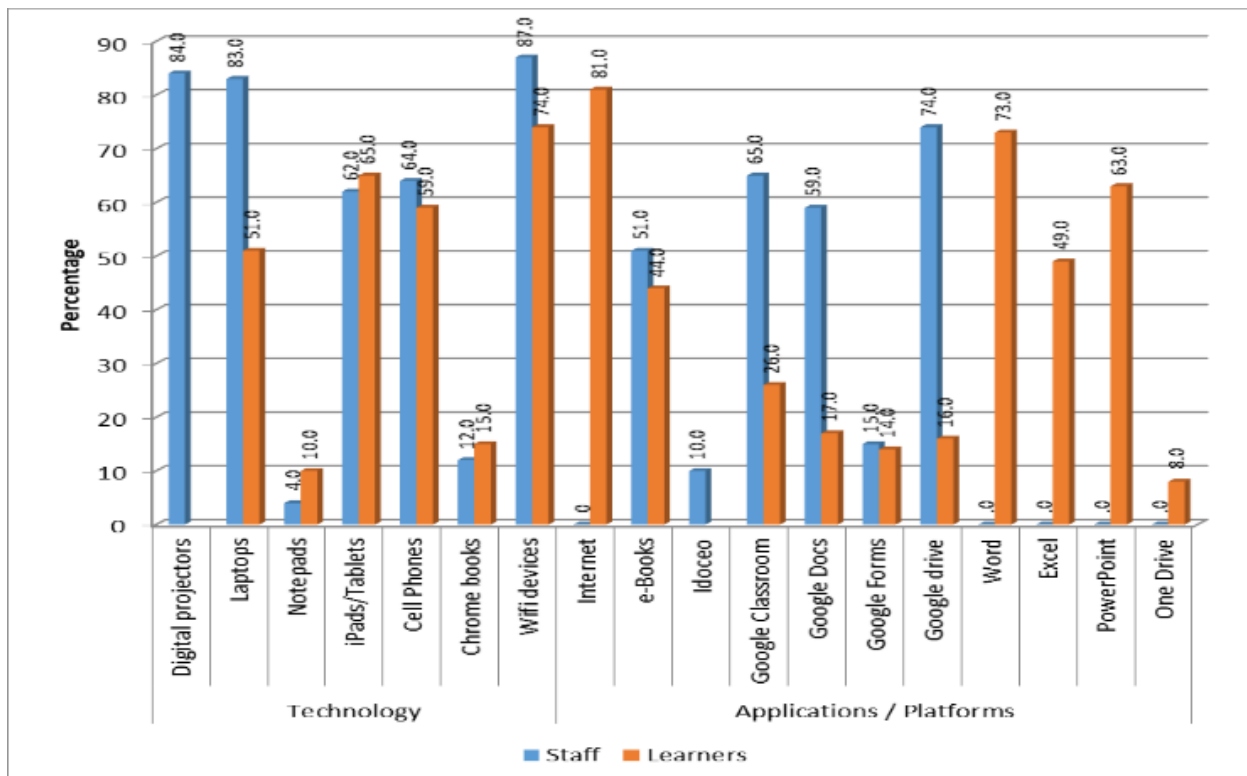
Another response indicated that some school leaders and teachers were opposed to any sort of

change and were not unwilling to experiment with new forms of assessment: “One of the roadblocks that we encountered in implementing technology in the classroom, is teachers are inherently resistant to change ... especially when the change involves technology” (ICT3).

McGuire (2018) indicates that some educational studies reveal that school leaders and teachers are used to their routines and resistant to any change in their known contexts. Mathew (2018) further suggests that research on the positive outcomes of ICT in education is relatively recent and limited compared to research on more traditional educational practices. This has resulted in school leaders and teachers being cautious and less amenable to experimenting with ICT applications in the classroom (Hines & Lynch, 2019; Maphosa, 2021).

### *Theme 3: The different forms and platforms of information and communication technology used by school leaders and learners*

Figure 4 shows the data for the different forms and platforms of ICT used by school leaders and learners. The first graph in Figure 4 for each device or application indicates the usage by school leaders, and the second graph indicates the usage by learners. The results indicate that school leaders and learners used a wide variety of ICT devices and platforms.



**Figure 4** Different forms and platforms of ICT used by school leaders and learners

The qualitative data also reveals that many school leaders used a wide range of software, which included Google Drive and Google Classroom. The hardware and software that school leaders used were mostly from the Google and Microsoft companies. When triangulated, the datasets were mutually inclusive. This is shown in the following response: “*Digital projectors, laptops, iPads, cell phones, e-books, Wi-Fi, some people use notepads. Internet, e-books, Idoceo, Google Classroom, Google Docs, Google Forms [used by school leaders]*” (P2).

The quantitative data also reveal that most learners used a variety of ICT hardware and software from Google and Microsoft. Some of the ICT hardware included Wi-Fi devices, iPads/tablets, laptops and cell phones. Some of the ICT software were Google Classroom, Google Drive, Word, PowerPoint and Excel. The qualitative data again support the quantitative data. The interviewees’ responses reveal that learners used a wide variety of ICT hardware and software: “*Laptops, notepads, iPads/tablets and cell phones, the whole range. And the internet, Google Forms, Google Classroom, Google Docs, Word, Excel, PowerPoint. Practically all of those [used by learners]*” (P5).

The wide range of ICT use by school leaders and learners in private schools is because private schools usually have sufficient financial resources. Parents of learners at these schools are usually wealthy and have access to funds for equipment and training. The data are important because it indicates that private secondary schools in KwaZulu-Natal are actively implementing and using ICT. Foluso et al. (2023), and Varghese et al. (2019) confirm that school leaders and teachers are changing their mindsets towards ICT and social

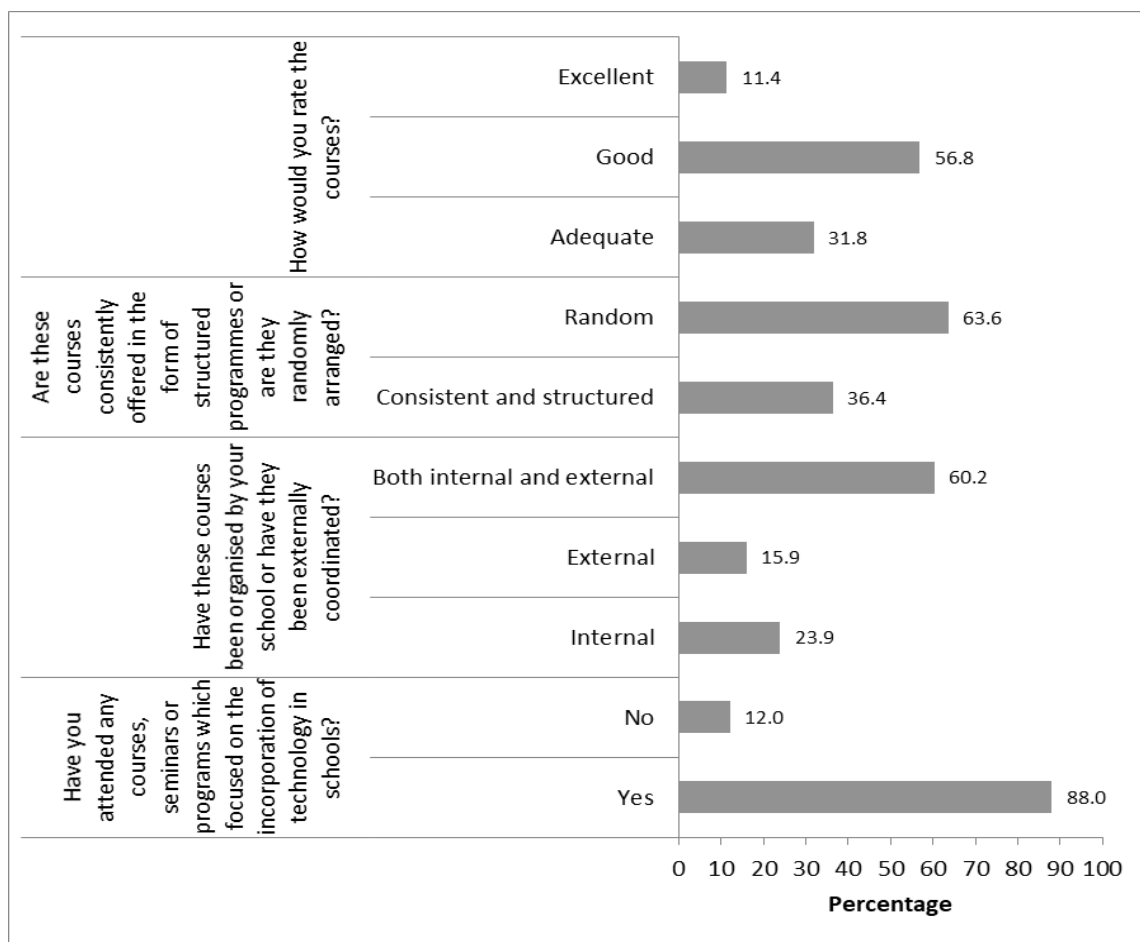
media and are using ICT more confidently and frequently in their teaching. Ajmain et al. (2019) and Marlatt (2019) further assert that learners are using ICT more in their everyday lives than ever before, and as a result, they are engaging more in digital learning.

Although the quantitative and qualitative results indicate the extensive use of ICT hardware and software, the participant responses from the individual and focus group interviews did not indicate any strategic ICT plan designed for pedagogical improvement. The wide range of ICT devices, applications and platforms used by individual schools is evidence of the lack of holistic and long-term planning. The lack of proper planning for ICT implementation is substantiated in the following response: “*They are quite happy using whatever platform ... but they are happy using Moodle [Modular Object-Oriented Dynamic Learning Environment] or Google Classroom*” (ICT 4).

Ajmain et al. (2019) and Patrick et al. (2021) indicate that ICT can be successfully implemented in education if based on empirical research for pedagogical advancement, and not simply on one or two ICT innovations. The responses also suggest a lack of communication between stakeholders regarding the use of ICT.

#### *Theme 4: Information and communication technology training attended by school leaders*

Figure 5 shows that 88% of respondents attended some sort of ICT development and 56.8% of these respondents rated this training as “good”, which in the context of this study, refers to whether school leaders regarded the training as relevant and practical.



**Figure 5** ICT training attended by school leaders

Table 1 shows the respondents' suggestions to make the training and development more effective. The respondents indicated that the sessions should be more regular, specific and interactive.

**Table 1** Suggestions to improve ICT training

Applications/Platforms	%
Training should be more regular	54%
Training must be subject specific	23%
Training should be interactive	11%
Not applicable	12%

The qualitative data yielded similar results indicating that many school leaders attended ICT training. Principals, deputy principals, and ICT heads attended external and internal training and development sessions, while the subject heads attended training that was mostly internally organised by the school. The ICT heads were exposed to the most extensive training:

*Yes, I have been to the ISASA [Independent Schools Association of Southern Africa] workshops where they speak about it ... external and I have been to internal ones with a member of the ICT team ... more random ... I think that they are effective. (P3) Many, [ICT courses], some have been more effective than others. Most of them were internal*

*and some that I have engaged with have been external (ICT3).*

Some of the suggestions to make the ICT training and development more effective, included creating school policies which outline the ICT needs, objectives and implementation strategies. A further suggestion was to make the training more appropriate by increasing the relevancy and practicality of the roles of school leaders.

Al-Mamary (2022), as well as Hultén and Larsson (2018), affirm that effective ICT training and development for school leaders and teachers is a crucial component of ICT use in schools. Ogbonnaya et al. (2020) and Yahaya and Bolaji (2023) confirm that effective and sustainable ICT use in schools is not possible without well-trained school leaders and teachers. A three-stage ICT development programme used in Singapore proved extremely successful in this regard (Cheng, 2017). The first two stages were compulsory, and the third stage was optional. Many countries have also adopted a centralised-decentralised approach to the implementation of ICT (Cheng, 2017; Hines & Lynch, 2019).

The triangulated qualitative data support and verify most of the quantitative results regarding

ICT use enabling a deeper analysis of the results. The triangulation of both datasets with information from the literature led to many important aspects being identified as potential components in the use of ICT.

### Conclusion and Recommendations

The research findings show that ICT lessons were more formalised in the junior grades but lacked this focus in the senior grades. A more holistic approach would improve the rate at which ICT is adopted, and how effectively learners use ICT. To enhance their ICT programmes, schools should adopt this holistic approach by providing ICT lessons across the board in all grades. The research findings indicate that private secondary schools were not using subjects, such as computer science, programming, coding, computational thinking, and digital literacy to facilitate the implementation and use of ICT. These subjects have proven to be effective in developing learners' theoretical and practical knowledge of ICT. It is, therefore, recommended that schools use these subjects in their ICT programmes.

The research findings also indicate that in the planning of ICT programmes by private secondary schools in KwaZulu-Natal, time was not allocated for ICT lessons in the timetable. This was evident by schools using a variety of disconnected computer hardware and software, the lack of a detailed ICT curriculum, and the absence of assessment strategies and feedback mechanisms. Yet, a more planned approach, which focuses on pedagogical advancement, has yielded better adoption and sustainable results in ICT programmes. Schools should, therefore, engage in the planning of more intricate long-term ICT goals which are aligned under a vision.

The study reveals that the ICT teams of schools were understaffed and not adequately trained. The effective training of adequate ICT teams is deemed a critical factor in the adoption and implementation of ICT. Private secondary schools in KwaZulu-Natal should invest heavily in the training and development of their ICT teams to ensure sustainable success of their ICT programmes. The training that was provided to school ICT teams was introductory, not planned well, lacked practical components, and was not developmental or strategic. Schools could use the three-stage model of ICT development for pedagogical enhancement which has been successfully used by other countries. Schools can also adopt, or adapt, the TPACK or SAMR models for ICT development and assessment of school leaders.

The research findings reveal that school leaders were not actively using ICT. Time constraints for experimentation, resistance to change, and the use of written and content-based

assessment were some of the reasons to explain the passive use of ICT. Private secondary schools should, therefore, provide a more conducive learning environment in line with the Fourth Industrial Revolution. This can be achieved by enabling more time for school leaders to experiment with innovations during the school day, providing information/discussion sessions to relieve the stress of change, and embarking on further digital assessment which may be used for reporting purposes.

Finally, it is recommended that private secondary schools in KwaZulu-Natal incorporate the different components of ICT, represented in Figure 1, into their ICT programmes to ensure maximum implementation, use and sustainable success.

### Notes

- i. This article is based on the doctoral thesis of Michael Dean Edmund Naidoo.
- ii. Published under a Creative Commons Attribution Licence.
- iii. DATES: Received: 23 October 2023; Revised: 2 July 2025; Accepted: 13 October 2025; Published: 28 February 2026.

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