

# FOSTERING THE DEVELOPMENT OF 21<sup>ST</sup> CENTURY COMPETENCIES THROUGH TECHNOLOGY IN YOUNG CHILDREN: PERCEPTIONS OF EARLY CHILDHOOD EDUCATORS

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## Abstract

This study explored early childhood educators' perceptions of technology in facilitating the development of 21<sup>st</sup>-century competencies in young children in South Africa. This study employed a qualitative, exploratory case study design which was informed by two established frameworks: the technological pedagogical content knowledge (TPACK) and the framework for 21<sup>st</sup>-century learning. Data were obtained from four preschool educators in different Early Childhood Development centers in the inner-city of South Africa using classroom observation, field notes, and semi-structured interviews. The collected data were interpreted and categorised into codes using content analysis. Findings reveal that the technology tools used by sampled practitioners include video games, learning applications, and robotics construction kits. It was found that educators integrated these technological tools in the practical lessons using play (game)-based activities. The use of these technology tools assisted educators in fostering 21<sup>st</sup>-century competencies such as creativity, critical thinking, collaboration, communication, and technology literacy in young children. However, educators were concerned that the effective use of these technologies with efficient instructional strategies to promote 21<sup>st</sup>-century learning is constrained by limited access to reliable content, updated soft wares, internet connectivity, level of administrator support, and lack of training. It is recommended in this study that the relevant stakeholders in the early childhood sector encourage educators to attend training and professional development that will enhance their knowledge, practice, and confidence in using technology to transform learning experiences and foster the development of 21<sup>st</sup>-century skills in young children.

**Keywords:** *21<sup>st</sup> century competencies, early childhood development, educational technologies, technological knowledge.*

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## 1. Introduction

21<sup>st</sup> century competencies majorly classified as communication skills, collaborative skills, individual learning approaches, information communication technology, and digital literacy have been in high demand globally to meet the change in societies due to the rapid spread of technology, increasing globalisation and internationalisation (Joynes, Rossignoli & Amonoo-Kuofi, 2019). In South Africa, communication and technology skills are identified as being in demand and are highly valued because they are seen as necessary for the 21st century (Care et al., 2017). Also, the South African Curriculum Assessment Policy Statement (CAPS) place a high emphasis on 21<sup>st</sup>-century skills as learners are expected to identify and solve problems, make decisions using critical and creative thinking, work effectively with others, critically evaluate information and communicate effectively ((Department of Basic Education, 2014). Nevertheless, Voogt and Roblin (2010) claim that technology can assist in the development of these 21st Century Skills, thus, recognizing the value of technology as a tool for developing 21<sup>st</sup>-century competencies in learners.

Research has shown that the use of technologies as productive instructional strategies in early childhood supports young children's ways of thinking and development of competencies required for success when entering the formal school environment and become adaptable in a digital work environment (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher, 2020). However, most early childhood educators seem to lack the skills and knowledge required to facilitate the effective use of technology in developing the 21<sup>st</sup>-century competencies of young children (National Research Council (NRC, 2015). This study sought to explore and understand how early childhood educators use technology to facilitate the

development of 21<sup>st</sup> century competencies in young children in South Africa. The research questions to achieve this objective are “How do South African early childhood educators incorporate technology into their teaching practices?” and “How does the use of these technologies enhance the development of 21<sup>st</sup> century competencies in young children?”

## 2. Theoretical framework

This study is underpinned by the Technological Pedagogical Content Knowledge (TPACK) framework of Mishra and Koehler (2006) and the partnership for 21<sup>st</sup>-century skills (2011). The TPACK framework, which focuses on technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) is a tool for examining the pedagogically sound ways in which educational technology can support educators’ knowledge while keeping pace in the technology, content and pedagogy contexts in their classrooms (Mishra & Koehler, 2006; Kihzoza et al., 2016). This study aimed at exploring educators’ perceptions on the use of technology in facilitating the development of 21<sup>st</sup>-century competencies in young children in South Africa. This study will focus on the Technology knowledge component of the TPACK framework. According to the TPACK framework, TK focuses on educators’ understanding of how to use various technological tools and emerging technologies (computers, tablets, mobile phones, hardware, software, applications, associated information literacy practices, etc.) to instruct and guide students toward a better, more robust understanding of the subject matter (Cox & Graham, 2009; Mishra & Koehler, 2006).

The continuing advancement in technology has changed the way people work, live, play, and learn (Kruger, 2014). The use of technology is becoming an important instructional tool in many schools. Hence, educators should be able to use technology as a catalyst for the development of new competencies required to create playful learning environments, as well as skills that young children will require in future jobs and careers (Joynes et al., 2019). These new competencies are associated with important knowledge, skills, character traits, and work habits such as key subject skills, life, and career skills, media and technology skills, learning and innovation skills also referred to as the 4 Cs: creativity, critical thinking, collaboration, and communication (Partnership for 21st Century Skills, 2011). According to Krishna (2010), technology encourages sharing of thoughts and diversity of thinking that characterizes a 21<sup>st</sup>-century creative knowledge economy. As young children become more technically literate and connected, they are encouraged to think with the future in mind and to confront the issues of our times. Hence, developing 21<sup>st</sup> century skills become a critical component of early childhood education because it will prepare children to continue their education anywhere in the world while also giving them the confidence they need to enter the world of work and civic life. And as such, technology allows educators and students to access a wide range of instructional tools that encourage creativity, critical thinking, communication, and teamwork.

## 3. Methodology

Since the study aimed at exploring early childhood educators’ perceptions on the use of technology in facilitating the development of 21<sup>st</sup>-century competencies in young children, we employed case study research methods (Creswell, 2014). Our study involved four preschool educators in three Early childhood Development centers located in the inner-city of South Africa. In this study, three ECD centers were selected because of the availability of resources. The data in this study was collected through observations, field notes, and individual semi-structured interviews. The choice to use multiple data collection methods afforded us the opportunity to review and analyze lesson observations; and then tailor the individual interview protocol to make further clarifications and follow-up on significant responses and observations (Corbin & Strauss, 2015). Data collected from participants were coded and categorized through content analysis (Williams & Moser, 2019).

Table 1. Biographic Information of participants.

<i>School</i>	<i>Participants (Teacher)</i>	<i>Age</i>	<i>Qualification</i>	<i>Teaching experience (Years)</i>
S1	T1	32	Diploma in Grade R teaching	9
	T2	40	Diploma in Primary education	10
S2	T3	37	Diploma in Office Administration	13
S3	T4	53	National Diploma in Educare (N6)	20

## 4. Findings

The findings of the present study were classified into three categories that emerged from the data and representative examples of educators' answers for each of the themes are given. These categories are technology tools and integration strategies employed by early childhood educators, development of 21<sup>st</sup> century competencies using technology, challenges in using technology in the early childhood classroom.

### 4.1. Technology tools and integration strategies employed by early childhood educators

During the interview, educators indicated that they usually have specific times during the day and week when children are allowed to use technology in their classrooms. In addition, educators mentioned that they use technologies such as video games, learning applications, robotics, and construction kits to enhance their teaching activities. For instance, T2 said *"We have a room with this interactive whiteboard, speakers, and a computer already installed. Luckily, there are some interactive video games such as Khan Academy Kids that have been downloaded on it which makes it easy to engage the children in counting, matching, and ordering numbers using Smartboard. Children are always happy that they can touch the board and see things move in the direction they press. And one thing I like about these interactive video games is that one can access them either by downloading them directly from the web or downloading the application and sometimes the school also try to purchase some of the software programs for teaching"*. The type of technology used was also identified when T1 mentioned that she gives them building kits and dolls, so the children imagine what they want to build and the character of what they are building/imitating. In addition, T4 indicated that she went for a program where she was introduced to how a simple programmable robot called Bee-Bot works, and ever since then, she has been personally using it with the children in her class to teach them the concept of counting forward and backward in mathematics. More so, T3 explained how she uses media technology in her class when she said *"In this school, the Grade R educators are provided with an iPad that contains some colour learning applications for kids. So, what I do in my class is divide the children into groups of 5 and each group will work on the app on different days, but the concept must be completed within the week. The app allows children to learn what different colours look like, their names, and common objects from their environment that have this colour. The app also gives children the opportunity to learn how to draw and create their own pictures"*. However, classroom observations revealed that the use of these technologies improved educators' ability to promote a playful learning experience for their students. This was evident in all of the classrooms where educators were observed structuring the children's learning around the prescribed topic (a theme that was taught) without removing all control from the children's hands.

### 4.2. Development of 21<sup>st</sup> century competencies through technology

Evidence from the interview and classroom observation showed that the use of technology help to facilitate the development of 21<sup>st</sup>-century competencies such as creativity, problem-solving, critical thinking, collaboration, communication, and technology literacy in young children. For example, this was observed when Teacher 1 said *"We teach transportation as one of the prescribed themes in the curriculum. So, what I do is that after explaining the definition of transportation and the various modes of transportation. I also allow them to provide me with examples and state their characteristics. Then I have them participate in a class activity that is similar to a team project in which each team constructs different vehicles using the building kit (blocks) and tell me what they are used for and how they work. Sometimes, I take pictures of what each group has constructed and try to bring up a discussion in the class. So you realise that it becomes very easy for them to solve problems and I believe that working in a team helps them develop their collaborative skills while also encouraging them to be creative and that discussion aspect is to help them communicate their thoughts and ideas."* This remark reveals that the use of building with blocks provides opportunities for creative play experience and also enhances children's interaction with each other, creativity, and collaboration skills. This was also noted during the classroom observation when children individually created a model and gathered in groups to explain what they have created and its importance. Furthermore, Teacher 1's perception of the use of technology as a tool in enhancing the development of collaboration and communication skills in young children was also emphasised by Teacher 4 when she mentioned that when using Bee-Bot in her class, the children socially interact, communicate and engage with other. *"To them, they are playing but to me, they are learning from one another without even knowing and they were even providing answers to some of the questions asked, I mean solving problems without difficulty"*. Teacher 3 mentioned that using the learning apps is an additional resource for enhancing children's imagination, creativity and also developing their visual-spatial skills. Further explanation on how the use of technology enhances the development of 21<sup>st</sup>-century skills revealed that only one of the educators integrated an aspect of technology/digital literacy in her classroom. This was observed when Teacher 4 said *"apart from teaching them how to identify different parts of a computer and using the word*

*interface, I also try to let them know the dangers of using technology and the precautions they need to take....something like how to be safe while using the internet and how to identify contents that are not good when accessing YouTube".* Evidence from the classroom observation and educators' responses further showed that kind of activities educators implemented were play-based activities that support inquiry learning, increase students' interaction levels and innovation, inspire curiosity, confidence, creativity, and continuity.

### **4.3. Challenges in using technology in the early childhood classroom**

It was evident from the interpretation of interview responses that all participants believe that using technology as a facilitating tool in early childhood settings helps to encourage young children to learn in various ways and also aids the development of basic 21<sup>st</sup>-century competencies. However, participants expressed concern about the effective use of these technologies in promoting 21<sup>st</sup>-century learning in young children. Participants cite problems with limited access to reliable content, updated software, internet connectivity, level of administrator support, and lack of training as challenges associated with the effective integration of technologies in the respective early childhood classrooms. For example, T2 said *"Hmm...there are some days that I just get sick of this technology thing...especially when there is no internet access and when updating software. Those technical glitches are just a different frustration on their own. And the most annoying thing is that you can do an update now and all of a sudden you just realise that everything has wiped out...the children's work and mine...So I start again when I feel like"*. The issue of internet connectivity and administrator support was also emphasised by T3 when she said *"they just give me the iPad, I have to download most of the app myself. And I sometimes find it stressful doing this because there is no regular support from the centre on the purchase of data and even when I buy data you realise that some of the good and reliable content that can be used for teaching with the app is not free.* This was an issue was noted during the classroom observation in T3's classroom when she was unable to use the iPad for teaching for the first 30 minutes due to an inconsistent internet connection. Additionally, all the educators indicated that though they have little experience in the use of technology, they need adequate training programs that can help them to better connect these technologies with the content outlined in the prescribed curriculum and to how the children are learning.

## **5. Discussion and conclusion**

TPACK is the basis of good teaching with technology and requires an understanding of a number of separate but interrelated aspects of teaching such as the representation of concepts using technologies; teaching techniques that use technology to teach content; knowledge of the concepts which are difficult to learn and how technology can be used to assist young children with developing a conceptual understanding of these concepts; knowledge of young children's prior knowledge (conceptions and misconceptions) and how technology can be used to address misconceptions where relevant. Findings revealed that all the educators demonstrated a good level of technological knowledge and technological pedagogical knowledge domain of the TPACK framework. According to the findings of this study, all participants used available technology to improve young children's participation and learning with peers. According to the findings of this study, teachers were observed using the available technology to enhance children's ability to manipulate objects, participate in daily educational activities through active play, communicate and interact with others. According to the National Association for the Education of Young Children (NAEYC, 2012), It is believed that the use of technology tools helps to connect on-screen and offscreen activities with an emphasis on co-viewing and co-participation between adults and children and children and their peers, in order to bring them together for a shared experience, rather than keeping them apart. Thus, participants in this study were able to use the available technology in an active and engaging way to improve young children's participation and learning with peers.

While participants revealed that the use of technology itself has unique features that are beneficial to the development of 21<sup>st</sup>-century learning competencies in young children if used appropriately (Beschoner & Hutchison, 2013), they all mentioned a lack of professional training on how to use available technologies to teach the prescribed curriculum as a major concern that is central to the process of understanding the integration of technology into early childhood education. Thus, Early childhood educators need guidance to make informed decisions about how to support learning through technology and interactive media, which technology and media tools are appropriate, when to integrate technology and media into an early childhood setting, how to use these tools to enhance communication with young children, and how to support digital and media literacy for children (NAEYC, 2012:10). In conclusion, the research findings were limited by the inherent limitations of the sample size since only four ECD educators from three different schools participated. Since the results of the study do not represent all of the ECD centres in South Africa, the results of this study cannot be generalised beyond the centres that participated

in this study. However, the findings may be of use in providing novice ECD educators with effective models to integrate technology into their teaching and learning styles. However, to further encourage the use of technology in early childhood development within the South African context, findings from this study suggest that relevant stakeholders in the early childhood sector should encourage educators to continuously attend training and professional development that will enhance their knowledge, practice, and confidence in using technology to transform learning experiences and foster the development of 21<sup>st</sup> century skills in young children.

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