



# Preparing pre-service teachers for Generation Alpha: A social innovation perspective



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## Dates:

Received: 13 May 2024  
Accepted: 11 Sept. 2024  
Published: 08 Nov. 2024

## How to cite this article:

Naidoo, S.A. & Dasoo, N.,  
2024, 'Preparing pre-service  
teachers for Generation  
Alpha: A social innovation  
perspective', *African Journal  
of Teacher Education and  
Development* 3(1), a62.  
[https://doi.org/10.4102/  
ajoted.v3i1.62](https://doi.org/10.4102/ajoted.v3i1.62)

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**Background:** This era of exponential technological advancements makes us profoundly aware of the role that education must play to ensure that 'humankind' is not only able to live but thrive in a world challenged by environmental and social issues. Many of our pre-service teachers are digital natives. However, they will have to be taught to become digital integrators in a learning space where technological innovation aligns with social innovation. This calls for teacher education institutions to critically analyse their curriculum design.

**Aim:** This study aims to investigate the extent to which pre-service teachers are prepared to teach Generation Alpha and it also highlights the imperatives for reimagining teacher education curricula for future generations within the context of social innovation.

**Setting:** This study is conducted on fourth-year Bachelor of Education students who attend a private higher education institution and teacher educators based in teacher education institutions in Gauteng, South Africa.

**Methods:** A qualitative case study research strategy is used in this study. Data were collected through focus group interviews and individual interviews. The raw data were analysed through content analysis.

**Results:** The key findings of this study indicate that fourth-year BEd students believe that they are not adequately prepared to teach Generation Alpha learners within the context of social innovation. This belief is validated by teacher educators.

**Conclusion:** Pre-service teachers must be competent in technological innovation, social innovation and global citizenship to enable them to produce learners who are socially, and ethically responsible, as well as emotionally intelligent innovators, leaders and communicators.

**Contribution:** To mobilise and expedite these competencies, teacher education institutions must redesign their pedagogical models and teacher education curricula to align with the educational needs of the future generations.

**Keywords:** posthumanism; technological innovation; social innovation; Generation Alpha; teacher education; critical pedagogy.

## Introduction

In recent years, every sector, discipline and facet of our world has been pervaded by terminology around the Fourth Industrial Revolution (4IR) or Industry 4.0. Xu, David and Kim (2018:90) affirm this by acknowledging that the speed and measure of the changes coming about by the 4IR are not to be ignored because these changes will bring about shifts in power, wealth and the production of exponential knowledge. Only when all sectors of polity and governance are knowledgeable about these changes and the exponential speed at which these changes are occurring, can we ensure that advances in knowledge and technology reach and benefit all (Xu et al. 2018).

The 4IR, a term coined by Klaus Schwab (2016) is described as a world where individuals move between digital domains and the biological world using connected technology to enable and manage their lives (Schwab 2016). Schwab (2016) corroborates both my statements and affirmations by Xu et al. (2018) by asserting that we stand on the brink of a technological revolution that will fundamentally alter how we live, work and relate to one another:

The transformation brought about by this technological revolution, in its scale, scope, and complexity will surpass any transformation humankind has experienced before. At present, we may not be able to fathom how this transformation will unfold; however, the response must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society. (Schwab 2016:1)

Schwab's (2016) assertions make us profoundly aware of the role that education must play to ensure that humankind cannot only live but thrive in this futuristic society and enable future generations. In the last 80 years, generations have evolved from a group of people known as the Baby Boomers, Generation X, Millennials (Generation Y), Generation Z and Generation Alpha from 2011 to 2025. As each generation's interface with technology and engagement with global society grows exponentially (McCrinkle 2014), our education system needs to gear up to cope with the demands of Generation Alpha, who entered the formal schooling space in 2017.

### Statement of the research problem

Many of our pre-service teachers are digital natives, consisting of Millennials and Generation Z. These student teachers are well-positioned to understand the needs of the new generation. However, they must be taught to become digital integrators in the learning space. This calls for teacher education institutions to critically analyse their pedagogical models and curriculum design. In the South African context and elsewhere, with the disparities experienced between well-resourced and under-resourced schools, technological innovation must be aligned with social innovation.

Therefore, the purpose of this study is to investigate the extent to which pre-service teachers are prepared for Generation Alpha from a social innovation perspective. This study proposes a theoretical framework that embeds the theories of posthumanism and critical pedagogy into the design of teacher education programmes. To achieve the purpose of this investigation, the following research questions were posed:

- *What are the views of fourth-year Bachelor of Education Intermediate Phase students regarding their preparedness to teach Generation Alpha learners within the context of social innovation?*
- *What are teacher educators' views concerning fourth-year Bachelor of Education Intermediate Phase students' preparedness to teach Generation Alpha learners within the context of social innovation?*
- *How can a teacher education curriculum be designed to prepare pre-service teachers to teach Generation Alpha learners from a social innovation perspective?*

### Literature review

The generational theory was developed by historians Strauss and Howe (1991). In their generational theory, Strauss and Howe (1991), cited in Troksa (2016:10) argue that generations have patterns and identities that tend to repeat themselves over time. For the first time in history, four generations work and live side-by-side. These working generations span more than 60 years, which include the Baby Boomers, who were born between 1944 and 1964; Generation X was born between 1965 and 1979; Millennials or Generation Y, born between 1980 and 1994 and Generation Z born between 1995 and 2009

(Badillo-Torres, Rodríguez-Abitia & Ortega-Ramírez 2019:3). These generations bring different perspectives into our present society, including work styles, ethics, expectations and experiences that create 'the generation gap', and every 15 to 20 years, a new generation of learners enters classrooms with expectations, skills, behaviours and challenges shaped by their time's unique circumstances (Soto & Lugo 2013; Van Rijmenam 2022). These four generations are also loosely categorised as digital immigrants or digital natives. While digital natives are supposedly the younger generation born in the age of information or the digital age and assumed to be technologically savvy, digital immigrants are those generations who grew up before the digital age and the invention of the Internet. However, these categories should not be considered rigid dichotomies and must be conceptualised on a continuum because some people are more technologically adept than others (Wang, Myers & Sundaram 2013).

Because the cohort of pre-service teachers is comprised mainly of Generation Y and Z and the teacher educators are from a broader spectrum of Boomers, Generation X and Generation Y, their social behaviours, learning styles and interaction with technology will somewhat affect their teaching strategies. While Baby Boomers may focus on personalised discussions, Generation X may prefer giving independent assignments rather than integrating cooperative learning strategies into their activities. Generation Y may advocate for fast-paced online activities that utilise social media. The Generation Z pre-service teachers, on the other hand, may yearn for more meaningful feedback and prefer to learn in virtual spaces (Baxley 2021; Cilliers 2017; Griggs n.d.).

A critical analysis of the four generations preceding Generation Alpha not only delineates the evolution of generations, drawing contrasts and comparisons of each generation but also illuminates the impact of social phenomena and the technological revolution on these generations. It is, therefore, imperative that while preparing our pre-service teachers to teach Generation Alpha, student teachers, teacher educators, curriculum developers and evaluators of teacher education programmes have a critical understanding of the evolution of generations, particularly generational learning (Astuti et al. 2019; Taylor 2014).

In 2005, social researcher and demographer Mark McCrinkle (2014) coined the term Generation Alpha to identify the group born after Generation Z. He defines this generation as those born from 2010 to 2024. Generation Alpha also known as *Generation Glass*, the *iGeneration* or the *Global Generation*, are the children of Generation X and Generation Y. This generation will be the first of recent generations that will live into the 22nd century, and they will be the most technologically literate generation, thus far (Alcock, Fisher & Zmuda 2018). Like their predecessors, Generation Alpha has peculiar defining traits such as enhanced digital skills and creativity, that have been identified and explored by McCrinkle (2019)

and corroborated by researchers such as Turk (2017), Coetzee (2018) and Culala (2016), who have conducted extensive studies on Generation Alpha.

While Baby Boomers and Generation X are called digital immigrants, Generation Y and Z are labelled digital natives (Hasa 2022) and Generation Alpha are the digital integrators. This emerging generation has integrated technology seamlessly into their lives. For these digital integrators, technology permeates all areas of their lifestyle and relationships, blurring the lines of work and society. Generation Alpha lives in an open-book environment and connects in a borderless world across countries and cultures. They are highly intuitive and confident, unaided users of digital technology and significantly socialised by screen-based devices that are often used to replace a pacifier. These screen-based devices are equivalent to 40% of their total waking hours (McCrindle 2019).

Digital disruption in the way of automation, robotics and the Internet of Things has led to a focus on developing 21st-century skills for lifelong learning in this next generation (McCrindle 2019). Intelligent devices and high-speed data have blurred the boundaries between physical and digital. Growing up through the pandemic, Generation Alphas are more tech-empowered and opinionated than any other generation before them (Xiong 2022). Studies carried out on Generation Alpha conclude that this new generation is most equipped with digital skills and creativity; however, there is still work to be performed in critical thinking and leadership. As the world of work changes, the character qualities of curiosity, adaptability and initiative will help to future-proof this present and future generation (McCrindle 2019).

As technology fulfils all the expectations of Generation Alpha, they are and will be more impatient than other generations, expect their every need to be met, and will be vocal in defending their personal preferences. These empirical findings allude to the assumption that Generation Alpha will put technology above human interaction (Mahesh 2022). They have access to more information, resources and people than any other generation, which is entirely digital. Therefore, this generation communicates through technical tools rather than phone calls, meetings or e-mails (Mahesh 2022). The pervasiveness and prevalence of technology in every facet of Generation Alphas' lives will ultimately determine the way they want to be schooled and how the educational landscape must be reimagined.

In addition to embracing technology to enhance pedagogy and improve learning, schools must also nurture a global outlook so that students can benefit from strong networks formed with international education bodies and train teachers in the latest strategies and teaching techniques (Coetzee 2018). As children come to school with vast, untamed imaginations, naturally curious about their world and wanting to explore, teachers need to continue to nurture them to develop their curiosity and imagination, as well as

teach them how to apply this curiosity creatively and purposefully using technology as a tool. I concur with Coetzee (2018) that even though the future for our learners is unpredictable, teachers can equip our current learners with the skills and tools to think critically, work as a team and enhance their natural curiosity and excitement about learning in this world that will be constantly changing (Coetzee 2018). These unprecedented changes must provoke teachers and teacher education institutions to prepare future generations to align technological innovation with social innovation.

Alden-Rivers et al. (2015) argue that social innovation education enhances the core curriculum by focussing on creative social problem-solving if embedded in any subject area. Social innovation education is underpinned by two learning theories: critical and transformational. Critical learning associated with critical pedagogy uses authentic problem-solving and place-based learning to develop empathy, critical thinking and civic responsibility among students. Transformational learning, on the other hand, challenges and changes an individual's beliefs, attitudes and behaviours through critical reflection and discourse (Alden-Rivers et al. 2015). The social innovation perspective demonstrates that social innovations are likely to positively affect the diffusion of technological innovation. The technological revolution accompanying 4IR achieves its true potential with social innovation (Morrar, Arman & Mousa 2017).

Because the challenge for education is to develop the learners' capacities for social innovation to effect positive social change, the imperative for teacher education institutions must be to equip pre-service teachers with social innovation skills. This should not be perfunctory, but a planned, purposeful endeavour to embed social innovation into the core curriculum for teacher education. Coupled with this embedding of social innovation into the teacher education curriculum, pre-service teachers must be prepared to use the technological savvy that Generation Alpha brings into the education space and teach this new generation how to align technological innovation with social innovation to effect positive environmental and social change (Coetzee 2018; Culala 2016).

Teacher education refers to the policies and procedures designed to equip teachers with the knowledge, attitudes, behaviours and skills required to perform their tasks effectively in the school and classroom (New World Encyclopaedia n.d.). Evidence accumulated over the last two decades suggests that in-service interventions had a limited impact on the professional development of teachers. Understanding this evidence has led to a growing realisation that the most significant opportunity for improving the quality of schooling lies in strengthening initial teacher education (ITE) (Taylor 2023). A founding assumption made by Taylor (2014) in his ITE Research Project was that norms set by regulatory bodies such as the Department of Higher Education and Training (DHET), Council on Higher

Education/Higher Education Quality Committee (CHE/HEQC) and South African Council for Educators (SACE) can, at best, provide a broad framework of formal criteria (number of hours, knowledge fields to be addressed, a mix of modules, etc.), but they can neither specify content nor guarantee quality. Taylor (2014) supports his preceding assumption by stating that experts in the profession best evaluate the quality of professional standards and, therefore, attempts to improve the quality of teacher education must start within the field itself.

Astuti et al. (2019) argue that to prepare learners to face the 21st century, there is a need for teachers who can inspire the learning process. Astuti et al. (2019) substantiate this argument by explaining that the 21st-century generation has the characteristics of multitasking, multimedia and online information searching. To prepare for the 21st century, both pre-service and in-service teachers require several skills, including digital literacy, agile thinking, interpersonal and communication skills and global awareness. To develop these skills, teachers are expected to foster learning environments that promote higher-order thinking skills (Astuti et al. 2019).

Fisher and Fisher (2019) argue that Generation Alphas are already in our classrooms, and teachers are still working to get where they should have been a decade ago. Teachers are preparing for Generation Alpha while still considering Generation Z's needs and using Generation X's resources and Baby Boomer's content. Their pedagogical practices must align with Generation Alpha's needs. Teachers must care about their students' current world and the world they will graduate into. In partnership with existing instructional practices, this creates a contemporary curriculum that includes Generation Alpha's needs and the teacher's responsibilities (Fisher & Fisher 2019).

## Theoretical framework

This article analyses the importance of preparing pre-service teachers to teach Generation Alpha, within the context of social innovation, through the lens of posthumanism and critical pedagogy. The justification for analysing the importance of preparing pre-service teachers to teach Generation Alpha within the context of social innovation through the lens of posthumanism and critical pedagogy lies in how these two worldviews underpin both unrivalled environmental and social issues. While critical pedagogy is seen as an agent of empowerment, social emancipation (Freire 1970) and social transformation (Giroux 1985), posthumanism involves us in making an ontological shift from understanding the human as an individuated entity separate from and observant of the world and its (human and non-human) inhabitants, to one which is inextricably connected to the world and only conceivable as emergent with and through it (Bayne 2018). Therefore, the theory of critical pedagogy and posthumanism inextricably intertwines the need for technological innovation to be aligned with

social innovation in preparing pre-service teachers to teach Generation Alpha.

In a world where change is inevitable, Howlett (2018:17) posits that 'education faces a tenuous future, straddling a growing divide between a no-longer-relevant past and an uncertain future, a future that calls into question the future of humanity altogether'. Hierarchical structures promote human exceptionalism and instrumentalism, leading to most educational research being anthropocentric and speciesist as it reserves the centre of the universe and any conversation about it to humans (Kruger 2016). Leibowitz and Naidoo (2017) concur with the speciesist approach to education by arguing that a problem that constrains us from considering the current environmental and social crisis from a creative and enabling perspective is the dominant humanist ontology within which we tend to frame our teaching and learning practices and our research approach.

Posthuman pedagogy provides a new perspective for us to work to understand the learning that happens through students' relationship with technology and the natural world. Research studies indicate that posthuman pedagogy is interested in human technology and human-nature relations (Yan, Litts & Na 2020). Yan et al. (2020) further add that the pedagogy practice that embraces posthuman ideas should give more room to the notion that children are knowledge producers rather than just knowledge consumers. Highlighting research by Murriss (2017) and Chiew (2018), Yan et al. (2020) contend that this perspective does not mean overemphasising a student-centred approach. Instead, it intends to direct our attention to other beings and entities on our planet. In this way, it can offer alternatives to student-centred pedagogy that represents the current individualistic culture and help to focus on the interconnectedness of the possible entities in learning (Yan et al. 2020). The job of teachers and all humans is to support learners in becoming part of the world, facilitating their full participation. In a posthumanism classroom, because the teacher is neither a guide, instructor, facilitator, socialiser or protector, a re-evaluation of the teacher's role is essential (Blaikie, Daigle & Vasseur 2020). Blaikie et al. (2020) are advocates for the notion of flipping the classroom as a posthumanism approach to education but emphasise that the teacher-learner relations must be recalibrated so that they are neither hierarchical nor potentially oppressive to enable pedagogy to be seen as a co-created journey of discovery, rather than simple content delivery.

The pioneer of critical pedagogy, Freire (1970) has developed this broad field of theory and practice, originating from the modernist perspective of Freirean pedagogy, postcolonial discourse and postmodernism. Freire (1970) asserted that we should:

[E]mpower classroom participants to critically reflect upon the social and historical conditions that give rise to social inequalities and to question the status quo that keeps them subjugated or marginalized. (Pishghadam & Meidani 2012:4)

Shor (2012), cited in Pishghadam and Meidani (2012:4) supports Freire's (1970) assertion by adding that critical pedagogy is an empowering education that relates 'personal growth to public life by developing strong skills, academic knowledge, habits of inquiry and critical curiosity about society, power inequality and change'.

Aliakbari and Faraji (2011) acknowledge that critical pedagogy requires a change of role of teachers and learners. According to Freire's approach, the educator is a problem poser to learners. Freire believes that teachers should be involved in continuously reconstructing their path of curiosity, opening the doors to learning habits that benefit everyone in the classroom (Aliakbari & Faraji 2011).

Drawing from research conducted by advocates of critical pedagogy, Aliakbari and Faraji (2011) conclude that teachers who practice critical pedagogy are critically reflective, eliciting their opinions about the curriculum being taught by their learners. Teachers who are critical pedagogues engage in learner-centred teaching, and although they are the authority on the subject matter, they are open to relating and interacting with the learners' experiences. While learners and teachers engage in questioning knowledge, the teacher helps learners identify how to move forward critically in their practice (Aliakbari & Faraji 2011).

## Research methods and design

This study employs a qualitative research methodology bolstered by research paradigms, research designs and research methods such as sampling, data collection tools and data analysis methods. A case study design suits this study because a case study is an in-depth exploration from multiple perspectives of the complexity and uniqueness of policy, institution, programme or system in a 'real life' situation (Simons 2009). This case study involved an in-depth analysis of the Bachelor of Education programme for intermediate-phase teaching in a specific teacher education institution.

I analysed views and explored expectations of the participants using both a posthumanist approach drawing from the philosophy of posthumanism and a humanistic, interpretative approach guided by the philosophy of critical pedagogy to collect 'thick descriptive' data to investigate how pre-service teachers are being prepared to teach Generation Alpha learners from a social innovation perspective (Jackson, Drummond & Camara 2007).

The target population for this study emanated from the research questions of the study. It consisted of teacher educators and fourth-year Bachelor of Education students. Forty BEd students were involved in the focus group interviews, each consisting of 8–12 participants from a population of 60 students. From a population of 20 teacher educators in an independent tertiary institution, seven were selected and interviewed individually for this case study. As postulated by Fox (2009), individual interviews provided

detailed information about the meaning of an event, situation or social context to each participant in a setting.

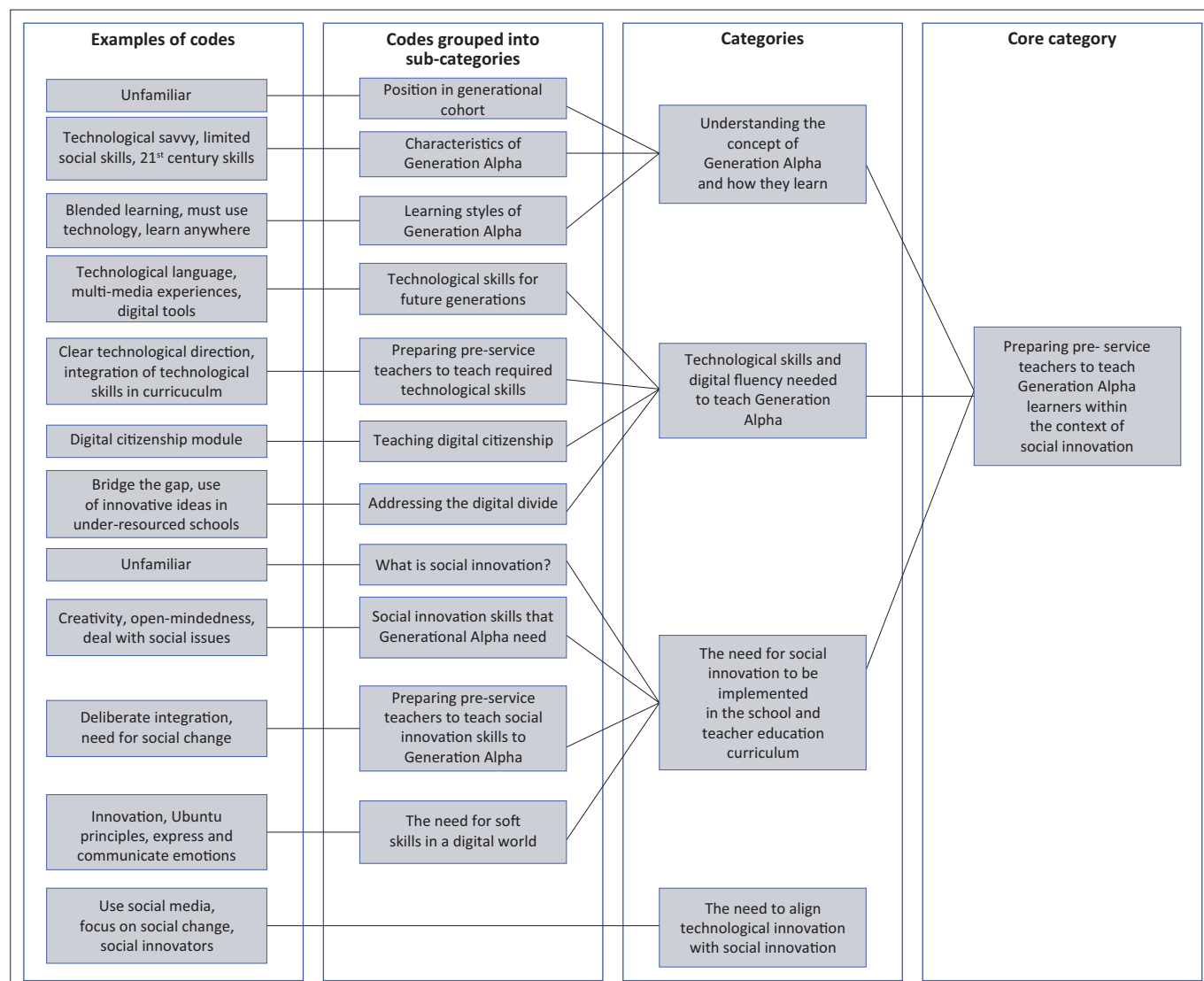
Three of the seven teacher educators interviewed were also course material developers from the institution. Two of the teacher educators were also curriculum evaluators. Input from material developers and curriculum evaluators helped to gain greater insight into the design and content of the teacher education programmes. The seven teacher educators selected for this study were labelled TE1–TE7. The purposeful sampling of teacher educators ensured a well-informed, diverse perspective to answer the following research questions: How can a teacher education curriculum be designed to prepare pre-service teachers to teach Generation Alpha learners from a social innovation perspective, and what are the views of teacher educators concerning fourth-year BEd (Intermediate-phase) students' preparedness to teach Generation Alpha learners within the context of social innovation?

A purposive sampling method was used to determine the focus groups because this method of sampling allows for the study of cases that yield rich data. Focus group interviews provoked collective viewpoints from Bachelor of Education (BEd) students and encouraged debate and discussion to solidify meanings that underpinned their views (Merriam 1998). I also assumed that the fourth-year students would be more knowledgeable about their institution's teacher education landscape than students in the lesser years of study and, therefore, would communicate informed views. The focus group interviews with BEd students provided cogent data to answer the research questions: How can a teacher education curriculum be designed to prepare pre-service teachers to teach Generation Alpha learners from a social innovation perspective, and what are the views of fourth-year BEd (Intermediate-phase) students concerning their preparedness to teach Generation Alpha learners within the context of social innovation?

A directed content analysis approach was used in this study. The initial coding started with a theory and relevant research findings. As illustrated in Figure 1, codes from the open coding process were compared to create subcategories. Subcategories were developed into categories higher in abstraction, describing the key principles in preparing pre-service teachers to teach Generation Alpha (Zhang & Wildemuth 2009). These categories are understanding the concept of Generation Alpha and how they learn, the technological skills and digital fluency needed to teach Generation Alpha, the need for social innovation to be implemented in the school and teacher education curriculum and the need to align technological innovation with social innovation to prepare pre-service teachers to teach Generation Alpha.

## Ethical considerations

Ethical clearance to conduct this study was obtained from the Independent Institute of Education (reference no.: R.15474)



Source: Adapted from Danielsson, L., Bertilsson, M., Holmgren, K. & Hensing, G., 2017, 'Working in dissonance: Experiences of work instability in workers with common mental disorders', *BMC Public Health* 17(1), 1–11. <https://doi.org/10.1186/s12889-017-4388-3>

**FIGURE 1:** Schematic presentation of examples of 17 codes, sub-categories and categories.

and the University of Johannesburg, Faculty of Education Research Ethics Committee (reference no.: Sem 2-2020-075).

In conducting this research, I adhered to ethical measures and considerations by ensuring that permission and ethical clearance for this study were obtained from both the institutions concerned. Written consent was obtained from the parents or guardians of intermediate-phase learners. A letter was sent to all selected participants seeking their permission to participate in the study. The purpose of the research was disclosed to all participants. Confidentiality was maintained through respect for the participant's anonymity and secure storage of data. Respect for the participant's anonymity was maintained through the utilisation of pseudo names, for example, focus groups were labelled FG1, FG2 and FG3, while teacher educators were labelled TE1 to TE7. Integrity was promoted by being honest, fair and objective. There were no foreseeable risks for the participant, the questions were not a test of competence, and there were no correct or incorrect answers (this aims to

protect the dignity of participants) (Creswell 2003). I accepted accountability for the research and acted responsibly. Participants were not coerced into participating in this research and they were free to withdraw at any stage of the process without penalty or victimisation. I complied with institutional, national and provincial laws, regulations and professional standards governing research conduct. *Protection of Personal Information Act, 2013* (POPIA) provisions were ensured when collecting, storing and analysing data. The private tertiary institution and participants involved in the study were informed that on completion of the study, a summarised report of the key findings would be made available to them (McMillan & Schumacher 2010).

## Results

In response to the research question, what are the views of fourth-year BEd students and teacher educators concerning their preparedness to teach Generation Alpha learners within the context of social innovation, students believed that they

were not adequately prepared to teach Generation Alpha learners about social innovation. They lacked sophisticated technical skills and exposure to digital tools that will be pervasive in the lives of Generation Alpha and will need to be honed at the classroom level. The concept of social innovation was foreign to them, and the teacher education curriculum does not teach them how to integrate social innovation skills in their lesson plans, preparation and delivery. Therefore, they will be unable to teach the next generation to use social innovation to affect social and environmental change. Teacher educators' views corroborated the views of the fourth-year BEd students. Teacher educators confirmed that pre-service teachers lacked the required digital and social innovation skills that this emerging generation must learn to effect seismic social and environmental changes in the future. These views asserted by both BEd students and teacher educators support the theory of both posthumanism and critical pedagogy because they echo the ideas of learner empowerment and cyberspace that would support a free and liberating exchange of knowledge and address the digital divide that will enable learners to thrive in a material and technological environment.

The following are selected and summarised responses obtained from the raw data.

The majority of the BEd students thought that Generation Alpha would be 'technologically savvy' and 'technologically advanced'. FG3 believed that Generation Alpha will 'adapt a lot faster to new technologies' and will be 'reliant on technology'. There was also the prediction (FG1) that Generation Alpha will 'lead new changes in technology'. Generation Alpha was described by FG3 and FG2 as being 'curious, open-minded and more optimistic and receptive towards education'. Students in FG1 believed that Generation Alpha would demonstrate 21st-century skills, stating that:

'[T]hey will be more advanced. Teaching and learning are a lot more open, not just writing on board. A lot more tech. The four skills? Creativity, collaboration, communication and critical thinking.' (FG1)

Students in FG2 and FG4 thought that this new generation 'will have limited social interaction'. One student in FG3 made a profound statement: 'I don't think there's gonna be much personality'.

In response to the research question, what are teacher educators' views concerning fourth-year Bachelor of Education Intermediate Phase students' preparedness to teach Generation Alpha learners within the context of social innovation, teacher educators characterised Generation Alpha as a generation that must be 'stimulated constantly' (TE1), as having 'poor communication and interpersonal skills' (TE2) and requiring 'instant gratification' (TE4). Generation Alpha was also described by TE5 as being 'adept with technology' because they were 'born into a world rife

with technology'. Therefore, Generation Alpha is 'skilled in using different technological devices and platforms'. TE3 reiterated the other teacher educators' responses by offering the following insight:

'They've been exposed to a lot of technology growing up, especially now during the pandemic, being exposed to things like iPads and laptops. I think they are more introverted. They're not used to interacting with others. They should be used to different, um, devices, use of different platforms, technological platforms. Used to online learning, joining online classes.' (TE3)

'The fact that they are technology-based, they don't know about being outside. More focused on just staying in a classroom or a home-based environment and just getting the content over their laptop, being able to learn anywhere from a laptop. They prefer having classes a bit shorter than they are cause um, some kids have like a low concentration span.' (FG2)

'We need to have education curriculums that are flexible and change to keep up with people's needs. Dynamic curriculums in line with technological progress.' (TE7)

Information Communication Technology Integration in the Classroom (ICTC) are somewhat beneficial for present-day teaching because this module exposes students to skills such as creating PowerPoint presentations and online teaching but does not prepare teachers to acquire skills to teach future generations in classrooms. Curriculum Assessment Policy Statement (CAPS) 'does not align with the use of technology' (FG4). 'Limited exposure to teach effectively with technology' (TE3); therefore, pre-service teachers were 'not adequately trained to engage with technology' (TE4), and there was 'limited integration of digital skills and use of technological devices in the teacher education curriculum' (TE7).

All teacher educators interviewed agreed that pre-service teachers were not adequately prepared to teach digital skills to future generations. Teacher educators responded to the question by asserting that pre-service teachers were prepared to teach digital skills 'at an incidental level' (TE4), and 'technological skills are not effectively embedded into the curriculum' (TE7). Teacher educators also indicated that BEd students had 'some exposure to learning platforms' and 'basic technological skills to navigate platforms' (TE5). However, 'advanced technological skills such as the use of multi-media, coding, robotics, AR and VR are not integrated into the curriculum' (TE5):

'I don't think that we are adequately training them to engage enough with technology or implementation of technology in classrooms.' (TE1)

FG1 and FG3 expressed the following concerns:

'We're not taught digital citizenship, like how do we teach the children not to bully others on social media. I think it's more like expected than what they actually teach us.' (FG1)

'I think it's needed because we're moving into a more digital time. I think it is going to soon become a basic educational need. An example would be cyberbullying; We're not really taught how to deal with certain things on the internet.' (FG3)

The teacher educators interviewed believed that digital citizenship was not part of the formal teacher education curriculum. TE1 affirmed this sentiment by stating that digital citizenship is:

‘Not explicitly part of the teacher education curriculum. The curriculum does not prepare pre-service teachers to teach digital citizenship. It is important that digital citizenship is part of the curriculum, especially due to exposure to social media and its implications.’ (TE1)

Teacher educators supported the BEd students’ views about being inadequately prepared to address the digital divide by adding the following:

‘Lockdown has taught us the importance of firstly technology for education, and then it’s also highlighted the digital divide and the impact that that can have on education.’ (TE6)

‘Students are exposed to resourced and under-resourced schools but not formally prepared how to address the digital divide or technological disparities.’ (TE1)

‘I think we still assume that everyone has access. We ask the students to go to underprivileged schools and sometimes when they lesson plan, we assume that every student or schools have the facilities, our institution also they need to think about how to address the digital divide.’ (TE4)

In response to the research question, how can a teacher education curriculum be designed to prepare pre-service teachers to teach Generation Alpha learners from a social innovation perspective, there was a consensus among teacher educators that Generation Alpha must acquire social innovation skills. The social innovation skills that teacher educators identified are ‘leadership skills’, ‘communication skills’, ‘selflessness’, ‘awareness of social and digital divides’, ‘problem-solving’, and ‘humanity, inclusivity, and diversity’. TE5 stated that there must be ‘more emphasis on humanity and a focus on what it means to be human’, while TE4 argued for the inclusion of ‘diversity and inclusivity’.

The following transcription clarifies the opinion of the BEd students concerning the importance for Generation Alpha to acquire valuable soft skills:

‘Nowadays Generation Alpha doesn’t know how to share, doesn’t know compassion for others. But when it comes to the social world, they are very introverted, and they are very secluded. But then as teachers, we should teach them more about empathy and caring about each other and also recognizing other people’s viewpoints. They are going to go into the working world they have to tolerate other co-workers in a way. We need to enforce Ubuntu.’ (FG3)

Students in Focus group 4 agreed that:

‘[M]odules such as Multicultural Education and Inclusive Education address some of the skills mentioned but the programme as a whole does not prepare us adequately to teach social innovation skills to learners in schools.’ (FG4)

FG4 further affirmed that ‘how they are prepared to teach by the institution is different to what happens in schools’.

TE5 asserted that ‘technology can be used to bring about social change and therefore must be included in the teacher education curriculum’. TE3 stated this was ‘an effective way to bring about social change’. While TE7 offered this profound statement:

‘Technology must become a vehicle through which I navigate my life and my interactions with other people. Teacher education curriculums must create opportunities and spaces for this to happen.’ (TE7)

## Discussion

Van Rijmenam (2022) reminds us that every 15–20 years, a new generation of learners enters classrooms with expectations, skills, behaviours and challenges shaped by their time’s unique circumstances. They bring a fresh perspective and an updated focus on adapting education to their needs (Van Rijmenam 2022). Empirical findings in this study confirm that BEd students and teacher educators agree that it is essential for the future of teaching and learning that pre-service teachers and teacher educators have a coherent conceptual knowledge of preceding and succeeding generation cohorts. An understanding of generation cohorts and how Generation Alpha compares to other generations, mainly concerning personality traits and preference of learning styles or modes of learning have provoked teacher educators and pre-service teachers who participated in the study to question the relevance of the current teacher education curriculum and urge teacher education institutions to adapt the existing curriculum to align with the needs of Generation Alpha. A Generation Alpha teacher must know that Generation Alpha is the most racially and ethnically diverse generation yet and is expected to be the most formally educated, digitally literate, longest-living and globally connected. BEd students unanimously agree that they must understand the expectations, needs and challenges of Generation Alpha to create optimal learning spaces for them (Van Rijmenam 2022).

According to pre-service teachers, it is equally important to understand generational cohorts and the position that Generation Alpha occupies within them. They also acknowledged the necessity of being knowledgeable about how worldviews have influenced educational philosophy over the last six decades. Generation Alpha, the most ethnically diverse and globally connected generation, will undoubtedly shift from a humanistic worldview to a posthumanist one. This paradigm shift pushes the agenda for pre-service teachers to learn to teach in a non-anthropocentric manner where the human individual is inextricably connected to the technological and material world (Blaikie et al. 2020; McCrindle 2020).

McCrindle and Fell (2020) corroborate the teacher educators’ and students’ views about Generation Alpha being adept with and reliant on technology by contending that Generation Alpha’s reality has been dominated by rapid technology innovation. They are part of a worldwide experiment in



which screens have been placed in front of them as pacifiers, entertainment or educational aids since they were born. Intelligent devices and high-speed data have blurred the boundaries between physical and digital. Growing up through the pandemic, Generation Alphas are more tech-empowered and opinionated than any other generation before them. A total of 60% of parents confirm that their Generation Alpha children spend a reasonable amount of time on devices (Xiong 2022).

However, teacher educators who participated in the study agree with Mahesh's (2022) assertion that technology fulfils all the expectations of Generation Alpha; therefore, they are more impatient than other generations, expect their every need to be met and will be vocal in defending their personal preferences. As alluded to by BEd students and teacher educators, Generation Alpha will put technology above human interaction. They have access to more information, resources and people than any other generation, which is entirely digital. Therefore, this generation communicates through technical tools rather than phone calls, meetings or e-mails (Mahesh 2022). Despite the pervasiveness of technology, Generation Alpha is and will be family-focussed, climate advocates and passionate about inclusivity (Nuttal 2022).

The empirical and literature findings based on the characteristics of Generation Alpha indicate that this generation will challenge anthropocentric thinking that promotes human interests at the expense of the interests or well-being of other species or the environment. The BEd students and teacher educators support the views presented by McCrindle and Fell (2020) and Blaikie et al. (2020) about how intelligent devices and pervasive technologies have blurred the boundaries between their physical and digital worlds. Generation Alphas are more likely to regard humans as the embodiment of the extended technological world, thus embracing the philosophical worldview of posthumanism. Being more opinionated and globally connected through technology, they will be more exposed to and aware of both social and environmental issues, dispelling the dominant humanist ontology, which limits how we think about the world and the role that we as humans play in this post-anthropocentric space (Blaikie et al. 2020; McCrindle 2020).

Generation Alpha needs changes and a new approach to education at all levels. Teacher educators and BEd students believe that schools must prepare to receive Generation Alpha by creating curricula that require intensive learning and are flexible enough to adapt and change quickly according to the curious minds of young Alphas (Mohan 2021). Sridhar (2022) affirms that teacher training programmes are no longer old-school and can adapt to offering teachers tech-enabled platforms with personalised dashboards and intuitive goal setting. Teacher training programmes can also include a peer-to-peer platform to interact with teachers from other schools and integration with government information

systems for better communication about developments and trends in teaching. Therefore, teacher training programmes must be backed by a full-fledged learning management system (LMS) to enhance their value and help teachers get on board with modern-day tech-enhanced teaching and learning (Sridhar 2022). However, Sridhar (2022) emphasises that more needs to be done to fully support teachers and be in lockstep with the global evolution of teacher training programmes. This, according to teacher educators and BEd students is both applicable and relevant to teacher education programmes in South Africa.

However, empirical findings indicate that the re-imagined teacher education programme must extend beyond tech-enabled platforms to include posthumanism pedagogy that will develop pre-service teachers relationally, enabling them to reframe relationships between scholars, teachers and learners, consider the material and physical learning environments in which knowledge is co-created; and embrace the need to move towards post-disciplinary conceptions of curriculum and knowledge creation (Blaikie et al. 2020). These relationally enabled pre-service teachers will be able to expose learners to a post-disciplinary curriculum that is transgressive and capable of operating outside the disciplinary limitations. This type of curriculum will include ways to handle the complexities brought on by technological enhancements, ecological and environmental changes, globalising forces that disrupt human and non-human divides and the reality of living in an ever more entangled, posthuman world (Bayley & Bayley 2018). This entangled posthuman world would embrace Freire's (2016) problem-posing strategy. This problem-posing strategy helps students engage in orderly thinking, looking for a better solution for any problem.

The education department at Royal Melbourne Institute of Technology (RMIT) University (2023) asserts that technology is no longer a motivating factor but a must in learning and teaching. Royal Melbourne Institute of Technology University (2023) advocates for connectedness, collaboration and co-creation in the teaching and learning space, using the blended approach, where classrooms coexist as physical spaces and online. This approach to learning flips the current learning model. It enables learners to grasp concepts and knowledge at home, engage in collaborative learning and apply their knowledge to real-life issues in the classroom. Education in the future must demonstrate how technology can be used to the learners' advantage and enable future generations to address issues that stem from the use of technology (RMIT University 2023). Therefore, it is fundamental that teacher education institutions align technological innovation with social innovation as part of the teacher education curriculum.

The BEd students and teacher educators affirmed literature findings about digital skills becoming a right for every student. The praxis of critical digital pedagogy, an approach

to teaching and learning predicated on fostering agency and empowering learners, has become increasingly important in educational spheres. Critical digital pedagogy translates critical pedagogy to the digital space (Smith 2020). It emphasises the importance of being critical in the use of technology and advocates for virtual platforms to be used to promote interaction and the free exchange of knowledge that inspires innovation and change. Furthermore, considering the exponential rate of technological and ecological change expanding as it is, posthuman pedagogy provides a new perspective for us to work to understand the learning that happens through students' relationship with technology and the natural world (Blaikie et al. 2020).

The views of BEd students and teacher educators support previous literature recorded by Sridhar (2022) that there is a consensus that educators have to keep pace with the rapidly changing landscape. Teachers must continuously learn and develop their skills to teach today's digitally native young learners. Teacher education institutions cognizant of this change are realising that pre-service teachers need more than just a degree; instead, they need continuous peer support, lifelong learning and an environment that is a simulation of real classrooms so that they can prepare the skills that are needed to teach effectively (Sridhar 2022). Digital natives are embracing the concept of Education 4.0, which is becoming the norm in 21st-century classrooms. Therefore, teacher education programmes must integrate Education 4.0 into the curriculum. Joshi (2022) describes Education 4.0 as a learning technique connected with the 4IR and focusses on transforming the future of education through advanced technology and automation. Smart technology, artificial intelligence and robotics are part of this industrial revolution that affects our daily lives (Joshi 2022). Joshi (2022) asserts that universities must prepare their students for a world in which cyber-physical systems are ubiquitous across all industries if they are to continue producing successful graduates. This entails incorporating technology into the curriculum, altering the learning process, and leveraging technology to enhance the teacher education experience.

The BEd students and teacher educators agreed with Van Rijmenam (2022) who affirmed the need for digital citizenship by adding that although new technologies will shape Generation Alpha's lives, experiences, attitudes and expectations as they grow up, they will fail to understand how to behave in the digital realm and be responsible digital citizens. Research conducted by Gudmundsdottir et al. (2020) indicates that to prepare student teachers for the digital age, it is necessary to ensure that they are responsible online. Initial teacher education must ensure that pre-service teachers are competent in aspects of privacy, cyberbullying and online content evaluation.

Because posthumanism is inherently ethical, it supports the need for digital citizenship. Posthumanism aims to produce a more just educational system and society. It recognises the agency and importance of analysing the technologically

mediated material world and our connections and interactions with it (Strom & Porfilio 2019). Pre-service teachers who are developed to be critical pedagogues will promote digital citizenship in their classrooms by assisting learners in how to move forward critically when using technology. As a key tenant of critical pedagogy is learner empowerment, it includes addressing the digital divide and enabling learners to thrive in a technological environment. Technology can produce creative spaces for the marginalised, who otherwise would not have any channel to make their voices heard. As critical pedagogy puts much emphasis on dialogical approaches to teaching, cyberspace can provide both teachers and students with the correct platform to engage in dialogues synchronously or asynchronously (Gitlin & Ingerski 2018 cited in Masood & Haque 2021).

Proponents of social innovation (Srinivasa 2018; Surikova, Oganisjana & Grinberga-Zalite 2015; Unceta, Guerra & Barandiaran 2021) support teacher educators' and students' views about the need for social innovation to be integrated into the teacher education programme. Srinivasa (2018) proffers that in a knowledge society, academia may have the most important role in developing, testing and disseminating social innovation skills. Unceta et al. (2021) add that the 21st century has seen universities questioning their role and transforming and changing their traditional functions. In addition to carrying out their two classic missions (education and scientific research), universities are developing a third key mission: a commitment to society. Universities must play, firstly, a crucial role in conducting research for a better understanding of multi-faceted social problems; secondly, they must play an essential role in teaching and building capacities to face these challenges; and finally, they must be changemakers by making innovations, which should be at the service of the needs of communities (Unceta et al. 2021). However, it is imperative to observe that 'communities' are no longer seen as separate from the physical and technological worlds. As humans are entangled in a material and technological world, social innovators and changemakers must have a post-humanistic outlook when researching solutions for global issues.

Surikova et al. (2015) further add that education for social innovation relates to developing the skills, competencies, attitudes, personality traits and abilities needed to make social innovations come true. Surikova et al.'s (2015) research indicates that education and social innovation are interrelated. Education institutions are important as social innovation actors, drivers and facilitators to support social innovation and realise training courses, study programmes and learning networks for potential social innovators. Education, with its source of human and non-human entities and social and technological capital, creates an appropriate context for developing social innovation. As social innovation requires learning and institutional capacity to learn, learning regions and learning institutions are critical elements in the social innovation processes (Surikova et al. 2015). These literature findings corroborate empirical findings and foreground the

importance of preparing pre-service teachers to teach Generation Alpha social innovation skills. Posthumanism proposes a move towards holistic systems thinking when designing learning experiences in teaching and learning that embeds social innovation. Embedding social innovation into the teacher education curriculum calls for re-imagining a curriculum that goes beyond disciplines to a much more radical approach that is not discipline-centric but rather holistic. This will address the complex problems we face today, and only modes of thinking that acknowledge, remove and bridge disciplinary divides and operate beyond them will offer workable possibilities (Surikova et al. 2015).

There is concern about whether the fast growth in technological development and digitisation is positively influencing individuals and society. When considering how technological progress can be exploited to solve society's problems, we must also view technological innovations from a social perspective (Morrar et al. 2017). Raja (2021) clarifies the alignment of technological innovation with social innovation by proffering that 4IR technologies present us with a myriad of opportunities for social services and environmental changes. Social innovators are tackling some of the world's greatest threats with 4IR tools, such as transforming mental healthcare to providing a billion people with a digital identity. Social innovators are embracing the power of disruptive technologies to better solve the world's significant challenges (Raja 2021). Pre-service teachers must learn how to develop social innovators who can use technology to find solutions for environmental and social issues. The purpose of education should not only focus on individual gain or address inequalities and power struggles among humans. Instead, education should teach individuals how to live in harmony with both the physical and material worlds, while also addressing the power struggles and inequalities created between themselves and these worlds (Blaikie et al. 2020).

## Conclusion and recommendations

Young people are less likely to invest their time and energy in better education if it seems irrelevant to the demands of the real world (McCrindle 2019; Schleicher 2020). The teacher education curriculum must be re-designed to purposefully reflect an understanding of Generation Alpha and how they learn, underpinned by 21st-century learning theories such as posthumanism and critical pedagogy that align with new ways of relating to the material and human world. Further to the re-designing of the teacher education curriculum at an institutional level, policy documents drawn up by National Educational Departments such as the DHET that inform and guide teacher education programmes must be periodically reviewed and evolve for a changing world.

Teacher education institutions must research ways to design innovative teaching and learning environments by integrating pedagogy technology as the central focus. This research must explore how and where digital citizenship and the digital divide can be purposefully and formally embedded

in the teacher education curriculum. In preparing pre-service teachers to teach Generation Alpha, we cannot redesign the teacher education curriculum on the assumption that there is equity concerning digital accessibility and digital literacy. The theory of critical digital pedagogy must be infused into the teacher education curriculum because critical digital pedagogy translates critical pedagogy into the digital space and supports the development of socially just curricula that address areas of digital citizenship and digital disparities.

De Sousa (2021) endorses the imperative for social innovation in education by declaring that in present times, we face grave risks to the future of humanity and the living planet itself; therefore, we must urgently reinvent education to help us address common challenges. This act of reimagining means working together to create shared and interdependent futures. The new social contract for education will unite humanity around collective endeavours and provide the knowledge and innovation needed to shape sustainable and peaceful futures for all anchored in social, economic and environmental justice. This social contract must champion the role played by teachers (De Sousa 2021). Based on this endorsement by UNESCO (2021) and De Sousa (2021) and the empirical and literature findings of this study, social innovation in education can no longer be ignored by educational institutions.

Findings from this study confirm that young people are committed to creating positive social and environmental change. This study also affirms that technology must be an enabler for this positive change. While the corporate world is leading in aligning technological innovation with social innovation, education still needs to embrace the emerging field of digital social innovation. Digital innovation has a strong social impact and encourages people to examine how to apply innovative technology to address societal problems (Hamburg, Vladut & O'Brien 2017). For schools to embrace digital social innovations, teacher education institutions must be the drivers of this initiative. Pre-service teachers must be the agents for the alignment of technological innovation with social innovation. Through this alignment, the next generation can be taught to adopt a critical, non-anthropocentric view of the world. This worldview will provoke succeeding generations to use technology responsibly to solve environmental, economic and social issues plaguing our planet.

## Acknowledgements

This article is based on the author's thesis entitled 'Preparing pre-service teachers for Generation Alpha: a social innovation perspective' towards the degree of Philosophiae Doctor in Education, Faculty of Education at the University of Johannesburg, South Africa, in 2023 under the supervision of Dr Nazreen Dasoo.

## Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

## Authors' contributions

S.A.N. conceptualised and wrote the article and N.D. acted as supervisor.

## Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

## Data availability

The data that support the findings of this study are available from the corresponding author, S.A.N., upon reasonable request.

## Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. It does not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this article's results, findings and content.

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