Teacher Education for Transformative Agency

Critical perspectives
on design, content
and pedagogy

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Teaching a new generation: Implications for Curriculum Studies

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Introduction

Embarking on a journey into a new decade, the third within the first century of the third millennium, it becomes imperative to revisit initial teacher education curriculum. Specifically, we should focus on what is needed for a new generation of young people aspiring to become teachers in the twenty-first century, possibly extending into their professional development as in-service teachers. Over the last three decades changes in teaching and learning education demographics, specifically in South Africa, have become evident and relooking *who* we teach, *what* and *how* we teach has become vitally important. Factors indicating demographic changes include socio-economic characteristics of a community or population such as age, sex, race, education level, income level, marital status, occupation, religion, birth rate, death rate, average size of a family, and average age at marriage (Hodgkinson, 2001). During the last decade it also became clear that other factors that could be

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included here are language, disabilities, previous work experiences, political and religious affiliations. Experiences of both lecturers and students in higher education would typically include trends in technology such as the shifts to more online and mobile learning opportunities, increasing student age, students coming from industry and those who are working 35 or more hours a week to pay for education, those who have dependents and/or are single parents (The Tambellini Group, 2018). This chapter will focus on who the new generation is and how I, as the educator, need to change my thinking about teaching and learning in this modern era. Implications are presented for the subject module on Curriculum Studies in the Postgraduate Certificate in Education (PGCE) programme.

Background

Drawing on a range of literature, I reflect on my own teaching practice in the module Curriculum Studies located in the revised PGCE programme implemented in 2018. Further discussion in this chapter will be based on the reflective model of Rolfe, Freshwater and Jasper (2001), using reflective writing to address issues related to curriculum change and what knowledge and pedagogy is of most worth. Rolfe et al.'s (2001) reflective model endeavours to answer three questions: What (is the problem)? So what? and Now what?

Traditional ways of teaching have mostly dominated teaching and learning in this module over the past couple of years. This includes a lecture-centred approach where students are passively involved in learning the module content. It became evident that students were not critically engaged with the topics addressed. The question of why students were struggling to critically engage with content became profound. To answer this question I had to take a new look at the current curriculum of this module to determine its alignment with the demands of the new generation student cohort, what their needs might be and how better to assist their learning experience. I needed to consider who the students are, their backgrounds and characteristics that are obviously different to the student cohort of some years ago. I therefore embarked on this journey of self-reflection to better promote good teaching and effective learning to produce engaged and informed citizen-teachers for a future that is difficult to predict in the current crises of the global pandemic, economic inequality, and major environmental challenges.

The canonical curriculum question: What knowledge is of most worth? posed by Herbert Spencer in the nineteenth century (Broudy, 1982), became the main focus of this reflective reading and writing. What knowledge, and pedagogy

(strategies/methods/approaches) is of most worth for the students enrolled in the PGCE programme, specifically in the Curriculum Studies module, to promote good teaching and learning in higher (tertiary) education, as well as school (primary and secondary) education?

A constructivist approach, according to the early twentieth century philosophers Dewey (1859–1952), Piaget (1896–1980) and Vygotsky (1896–1934) should inform our teaching practices, and this is what was aimed for in this module during the last couple of years. The recent implementation of the new PGCE programme gave an opportunity to revisit these philosophies for contemporary education. I use these social-constructivist philosophies as lenses through which I briefly reflect on my own teaching practice.

Dewey argues that education and learning are social and interactive processes; thus the educational institution itself is a social environment through which social reform can and should take place where students can thrive and where they are allowed to experience and interact with the curriculum. All students therefore should have the opportunity to take part in their own learning. Dewey does not support teaching methods that are static, advocating experiential learning instead (Dewey, 1938). Experiential learning is the process of learning through experience and is more specifically defined as “learning through reflection on doing” (Felicia, 2011:1003). The student has prior knowledge and experiences usually determined by their social and cultural contexts. Students learn by “constructing knowledge out of their own experiences” (Seifert & Sutton, 2009:47).

Piaget focuses on human development and how people make sense of the interactions between their own experiences and ideas, and how they are influenced by others (Piaget, 1971). According to Carey, Zaitchik and Bascandziev (2015), Piaget’s work is based on two complementary pillars: constructivism and stage theory. Piaget’s theory of constructivism allows teachers to view students as individual learners who add new concepts to their prior knowledge in order to construct, or build an understanding of subject content for themselves through interactions with others (Henson, 2003) not only in the classroom but also in society. Piaget’s constructivism therefore concerns the emergence of new conceptual content for the individual (Carey et al., 2015), the educator and the student. His stage theory relates to stages of development that we move through as individuals as we gradually acquire the ability of becoming knowledgeable (Huitt & Hummel, 2003). Piaget identified four stages of cognitive development that include the sensorimotor or infancy stage; the pre-operational stage referring to toddlers and early childhood; the

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concrete operational stage that includes elementary and early adolescence, and finally the formal operational stage that refers to adolescence and adults (Huitt & Hummel, 2003). The latter two stages are of greatest relevance to higher education as they include early adolescent-adults.

Vygotsky's (1896–1934) theory of social constructivism emphasises the importance of sociocultural learning; how interactions with adults, more capable peers, and cognitive tools are internalised by learners to form mental constructs through the zone of proximal development (ZPD). The ZPD was originally formulated by Vygotsky as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978:86). According to Berk and Winsler (1995:24), Vygotsky argued that:

[...] a child gets involved in a dialogue with the “knowledgeable other” such as a peer or an adult and gradually, through social interaction and sense-making, develops the ability to solve problems independently and do certain tasks without help. Following Vygotsky, some educators believe that the role of education is to give children experiences that are within their zones of proximal development, thereby encouraging and advancing their individual learning such as skills and strategies.

The ZPD is therefore the space in which the educator can assist the student, knowing their current level of knowledge and learning approach, and help them move further to acquire the knowledge and skills needed for the educational profession they are preparing for.

Understanding students and their ‘demographics’ is thus important for every educator. Students in the PGCE programme graduate from a range of faculties with different specialisation subjects. They thus have different needs, lived experiences and worldviews regarding teaching and learning in their field of expertise. Students also have different learning approaches, e.g. academic vs. non-academic students; those who learn through reading and writing, and those who learn visually or by doing. Students also come from various socio-economic backgrounds which adds to the variety of student goals and needs.

Defining educational demographics could be an empowering experience as this will allow myself as teacher educator to understand the cohort of pre-service teachers for the twenty-first century, and exactly what they want and need from teacher educators in the teaching and learning environment. Changing demographics should encourage educational institutions to rethink their academic offerings to include more diverse course content and delivery

methods, in other words creating flexible learning environments or learning ecosystems that are capable of adapting to the changing teaching and learning aims and student profiles (Nasr & Ouf, 2011; Ouf, Nasr & Helmy, 2010).

In my years of being a teacher educator I have experienced many challenges specifically focused on the 'new generation', the twenty-first century generation, the millennials, Generation-Z or the iGeneration born between 1995 and 2009. More recently Generation-alpha (Gen-alpha) was described by Mark McCrindle (2014), a generational researcher and sociologist. Typically, the term Gen-alpha applies to children born between 2010 and 2025. They are truly the millennial generation, born and shaped fully in the twenty-first century. As Generation-Z (Gen-Z) began sitting their final school exams a year or so ago and then moving into tertiary education, the first Gen-alphas were beginning their schooling careers. A good understanding of these new generations is imperative as they are currently in the education system. Taking a closer look at the two generations currently in our schools and tertiary education institutions is a valuable exercise to determine the characteristics of this cohort of learners and students in our classrooms. Educational institutions will have to start thinking about new curricula, preparing flexible programmes to adapt and prepare according to the young Gen-alphas who are burning with curiosity, intrigued and extremely interested (Fourtané, 2018) in the modern advances and inventions of technology.

Generation-Z (Gen-Z)

My focus here will be on Gen-Z as this is the generation currently in secondary education and/or attending tertiary education. As educators we need to take cognisance of their characteristics and needs to promote effective learning. McCrindle (2014) identified seven factors that define Gen-Z. These are summarised below as characteristics to consider when preparing for teaching and learning for this student/learner cohort (Brotheim, 2014; McCrindle, 2014; Schneider Associates, 2014).

1. Demographically changed: Gen Z'ers are growing up in rapidly changing times. As a result they are emotionally driven and often rely on their emotions to make decisions.
2. Generationally defined: Gen-Z are the most materially endowed, technologically saturated, globally connected, formally educated generation our world has ever seen.
3. Digital integrators: Using technology from a very young age and seamlessly integrating technology into almost all areas of their lives, they are known as digital integrators and/or screenagers.

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4. Globally focused: Gen-Z is the first generation to be truly global. Not only are music, movies and celebrities global for them as they have been for previous generations, but through technology, globalisation and our culturally diverse times, fashions, foods, online entertainment, social trends, communications and even 'must-watch' YouTube videos and memes are global as never before.
5. Visually engaged: Many students in this emerging generation will opt to watch videos summarising an issue rather than read an article discussing it. They often only participate in what they enjoy as they seek to cater for their personal qualities.
6. Educationally reformed: The average young person is spending more years in formal education than before, with tertiary education rates increasing. For today's students, education is no longer life-stage dependent but a life-long reality. They have a need for co-creating the curriculum to place their own stamp on learning. Learning style is mostly multi-modal and learner-centred; they would rather collaborate than work on their own.
7. Socially defined: More than any other generation, today's youth are extensively connected to and shaped by their peers. However, they often avoid uncomfortable situations or environments, looking for alternatives such as digital escapes. Effective marketing for Gen-Z would ideally be digital social media platforms such as Snapchat, iPhone, Twitter, and Instagram.

Technology is obviously a defining factor for the Gen-Z characteristics, making the Fourth Industrial Revolution (4IR) a reality in modern teaching and learning approaches. The question that researchers such as McCrindle (2014) ask is: How much more tech-intensive can the lives of Gen-alpha members possibly become? Gen-alpha is considered to have the most technologically infused demographic to date (Fourtané, 2018). This upcoming generation is truly the first millennial generation because they are the first generation born into the twenty-first century (Fourtané, 2018; McCrindle, 2014). They might just be the most influential generation of the twenty-first century, being exposed from a young age to digital devices (such as smartphones and tablets, iPhones and iPads) and phone applications that they use quite naturally as educational aids and entertainment tools (Fourtané, 2018; McCrindle, 2014). Gen-alphas, already at a very young age, are very direct and confident about expressing their opinions. They learn by doing. They are not afraid of technology and learn quite efficiently by pressing device buttons with confidence. They are likely to benefit from technology advancements such as Artificial Intelligence (AI), that are not only changing the world but also changing education. Interacting with AI and voice assistants such as 'Siri', 'Alexa' and 'Google Assistant' is simply natural in Gen-alpha households these days (Fourtané, 2018). This upcoming generation will not be able to fathom or imagine life without technology.

Following this understanding of the upcoming generations, it is also crucial to understand the future that young people face. As educators, we need to prepare them to face a yet unknown future (Butler-Adam, 2018).

The fourth industrial revolution

The first industrial revolution was known as the era of the steam engine and spanned 1760 to 1840. The second revolution that made mass production possible started in the late nineteenth century, and the third revolution, the computer era, began in the 1960s. The impact of the advancement of new technologies is profound, and thus the rise of the fourth industrial revolution (4IR) is inevitable (Schwab, 2016).

4IR is “characterized by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres” (Schwab, 2016:7) bringing about societal transformation (Eiser, Mayet & Johnson, 2019). According to these authors 4IR simultaneously brings great opportunities and serious risks. Opportunities typically include new technologies that process information faster, drive economic growth and empower individuals, sparking entrepreneurship and improving the health system. At the same time, these new technologies pose serious risks, particularly from the perspectives of cybercrimes, leaked personal information, unemployment and inequality (Eiser et al., 2019; Schwab, 2016).

The world-renowned economist Klaus Schwab (2016:7), founder and executive chairman of the World Economic Forum, focuses on the opportunities and explains that: “We have an opportunity to shape the fourth industrial revolution, which will fundamentally alter how we live and work”. This statement by Schwab poses challenges for society to understand and shape this new technological revolution, but what exactly is this revolution, and why does it matter, especially for [South] Africa? Technology is fast growing and the use of computers and mechanically operated devices (machines) are increasing day-by-day, doing the work that humans used to do. However, the human factor cannot be neglected in this industry, as human intelligence will always have an input in the advancement of technology. Schwab (2016:114) calls for leaders and citizens to:

[...] together shape a future that works for all by putting people first, empowering them and constantly reminding ourselves that all of these new technologies are first and foremost tools made by people for people.

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People in all communities need to acquire the skills to implement, manage and work with new technology, as well as becoming problem-solvers. New technologies can create new jobs, but technology can also nullify and replace existing jobs. A newfound need to upskill and re-skill employees to ensure they remain relevant in the workplace is important according to Eiser et al. (2019). Lifelong learning becomes essential for all, irrespective of age. This is especially important in light of Statistics South Africa's 2019 report on the high levels of unemployment in the country (Eiser et al., 2019; Statistics South Africa, 2019).

This challenge of upskilling and re-skilling is one to which educators will have to answer (Butler-Adam, 2018) as it has implications for teaching and learning, and more importantly for curriculum design and implementation. It is not only about AI and robotic tutors (Butler-Adam, 2018), but success as an informed citizen. Being an employee in the era of 4IR begs an understanding of how the world of technology operates. Johnson (in Eiser et al., 2019) makes it clear in his alarming statement that education in pre-school through to post-graduate education needs to be re-imagined. The education programme in SA must therefore incorporate emerging skills requirements with a particular emphasis placed on lifelong learning.

We, as educational practitioners in the twenty-first century, are therefore encouraged to re-curriculate educational curricula to adhere to the needs and wants of our pre-service teachers. Training is needed to secure competent newly qualified teachers for the future and simultaneously encourage life-long learning. The burning question of previous centuries remains: What knowledge is of most worth? Since the beginning of formal schooling, this famous question has kept educators occupied in pondering what knowledge [and curricula] are of most value.

Harvey (2017), a senior researcher in Natural Resource Governance (Africa) at the South African Institute of International Affairs, argues that policymakers, academics and companies must understand why all these advances matter and what should be done about them. He believes that AI and 3-D printing pose further challenges for industry and education, and asks the question: How do we prepare our young people of today for this future? The answer lies in "technologically informed pedagogic practices" that bring about informed, responsible and life-long learning citizens (Waghid, Waghid & Waghid, 2019:4), who expand their technological knowledge and skill-sets in preparation for the demands of 4IR and the twenty-first century curriculum.

Policy

Teacher education policies have been reformulated, as set out in the Government Gazette of 19 February 2015 (DHET, 2015), and are currently being, or have already been, implemented by various national higher education institutions. This reformulation involves the rethinking and restructuring of teacher education programmes such as the Postgraduate Certificate in Education (PGCE) and the Bachelor of Education (BEd) degree in either the Foundation, Intermediate or Senior Phases. Adaptations must align with the national qualifications framework developed by the Department of Higher Education and Training (DHET) including a policy on *Minimum Requirements for Teacher Education Qualifications* (MRTEQ) (DHET, 2015:8).

According to this policy, the PGCE programme has a primary purpose of offering entry-level, initial professional preparation for undergraduate degree/diploma holders who wish to develop focused knowledge and skills as classroom teachers. Together with specialisation knowledge, practical skills and workplace experience in varying contexts, it needs to provide a well-rounded education that equips graduates with the required educational theory and methodology to demonstrate competence and responsibility as academically and professionally qualified beginner teachers. A set of minimum competences are required of newly qualified teachers as set out in Appendix C of the MRTEQ document (DHET, 2015:62). These competences correlate with the institutional graduate attributes (Stellenbosch University, 2012) (Table 4.1) that endeavour to provide knowledgeable, critically engaged, responsible, life-long learners as informed and competent leaders and citizens in their communities. It is therefore envisaged to equip beginner teachers to make a positive impact in improving the quality of education in our country.

The new PGCE programme at Stellenbosch University is underpinned by Productive Pedagogies, a framework for reflecting on teaching and learning that aims at improving students' intellectual reasoning and that makes teaching and learning more connected to a student's everyday life. The framework also addresses concerns about equity and student support (Lingard, Hayes & Mills, 2003). It affords educators the opportunity to invest in the different types of knowledge that underpin teaching and teaching practices, and the theory and practice. Critical thinking becomes of the utmost importance while encapsulating all the knowledge, skills and competences in the notion of integrated/mixed and applied knowledge.

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Table 4.1 Institutional graduate attributes related to novice teacher competence

INSTITUTIONAL GRADUATE ATTRIBUTES (Stellenbosch University, 2012)	NEWLY QUALIFIED TEACHERS' COMPETENCE (DHET, 2015:62)
Have a sound subject knowledge base	... must have sound subject knowledge
Demonstrate the ability to think and reflect critically	... must know how to teach their subject(s) and how to select the content in accordance with both subject and learner needs
Have a holistic worldview	... must know who their learners are and how they learn; they must understand their individual needs and tailor their teaching accordingly
Demonstrate the ability to function optimally in a team context	... must know how to communicate effectively in general, as well as in relation to their subject(s), in order to mediate learning
Demonstrate responsible citizenship (active citizenship)	... must have highly developed literacy, numeracy and Information Technology (IT) skills
Demonstrate an appreciation for diversity (in its broadest sense) and make a contribution towards the development of these contexts	... must be knowledgeable about the school curriculum and be able to unpack its specialised content
Demonstrate leadership	... must understand diversity in the South African context in order to teach in a manner that includes all learners
Have a commitment towards life-long learning	... must be able to manage classrooms effectively across diverse contexts in order to ensure a conducive learning environment
Take the responsibility to make a contribution towards the development of human potential	... must be able to assess learners in reliable and varied ways, as well as being able to use the results of assessment to improve teaching and learning
	... must have a positive work ethic, reflect critically on their own practice, in theoretically informed ways

Criticality or critical thinking is one of the most desirable and important core outcomes of higher education (Facione, 1990; Lederer, 2007:525) in order for students to acquire deep knowledge and an understanding of the curriculum

with which they engage. Critical thinking has also been described as the essence of education (Facione, 1990) and has a central role in teaching and learning (McPeck, 1981).

At tertiary level, critical thinking is essential to meet assessment criteria (Elander, Harrington, Norton, Robinson & Reddy, 2006). It is also associated with employability and academic achievement of graduating students (Halx & Reybold, 2005). Dwyer, Hogan and Stewart (2014) suggest that graduates with critical thinking skills have enhanced ability to draw sound conclusions and make informed decisions, which enhances innovation in the workplace and society (Davies, 2006). However, many students struggle to understand critical thinking. They lack confidence in being critical; are unsure of how to develop critical thinking skills and struggle to demonstrate criticality in their assessments (Elander et al., 2006).

Critical thinking is complex and not easily defined. Facione (1990:3) alludes to expert consensus from the American Philosophical Associations' committee on Pre-College Philosophy that defined critical thinking as: "Purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based". This definition captures the "complex, multifaceted nature of critical thinking", which may explain the difficulties students have with understanding the concept and principle of being critical (Facione, 1990:2).

The core challenge, therefore, is to develop a flexible curriculum that addresses the question of what knowledge and pedagogies are of most worth. At the same time, the needs of new generation students must be considered within the policy framework so that critical thinkers graduate from the system. Such a curriculum should be informed by appropriate philosophies, policy and the underpinning framework in order to support good teaching and learning that facilitate local adaptations and ownership of the curriculum (Barab & Luehmann, 2003). Taking ownership of teaching and learning to educate for enhanced learning becomes imperative. Ownership of teaching and learning means becoming a scholar of teaching and learning who can address the myriad of expectations of an appropriate curriculum and necessary change.

What are the challenges for the Curriculum Studies module?

All three philosophers, Dewey, Piaget and Vygotsky, emphasised that students do not come to class as blank canvases: they all have prior knowledge and lived experiences. Students must be afforded opportunities to blend prior knowledge with new knowledge and experiences through collaboration with peers and older adult experts. In this way, a student will be able to progress from individual learning to collaborative learning.

Although an attempt has been made to follow a student-centred, constructivist approach according to early twentieth century philosophers, it seems that students are still struggling to engage with subject content and thus not critically engaged in their own teaching and learning. Implementing the new PGCE programme necessitates a fresh take on the presentation of the Curriculum Studies module, as this module forms a core component in initial teacher education and training comprising current educational debates on curriculum design and development. The teaching and learning activities (TLAs) include student readings from relevant literature, lecture sessions, interactive class discussions where critical debate is encouraged, assignments and formal tests.

Specific topics related to curriculum in the South African context were shared amongst three staff members, each an expert in his/her own field. To break the cycle of a traditional way of teaching, the colleagues collaborated in creating critical engagement opportunities to assist students in understanding a variety of current curriculum debates. These topics include:

- ◀ Contemporary curriculum theories and their influence on teaching and learning.
- ◀ What is curriculum? – including the perennial question: What knowledge is of most worth?
- ◀ Why is the curriculum such a contentious subject?
- ◀ Why is curriculum change so difficult?
- ◀ What does government expect from teachers with respect to the curriculum?
- ◀ How do you know the curriculum made a difference?
- ◀ What do creative teachers do with a prescribed curriculum?
- ◀ Curriculum design, development and implementation.
- ◀ Teacher involvement in curriculum development/curriculum agents.
- ◀ Teaching strategies/methods.

Initially the TLAs seemed equally do-able and/or difficult, but assessment results indicated a very different outcome. Anecdotal evidence based on personal experiences in the classroom and through assessing assignments and tests, alluded to student teachers' lack of criticality. They struggled to critically engage with literature provided and to apply it as problem-solvers to current and burning curriculum debates. This was evident from the non-interactive class discussions that resulted from pre-service teachers being unprepared for these lectures. They did not engage with the literature prior to the lectures, failing to give a valid representation of their [supposedly] learned knowledge. Individual tasks and group assignments showed a lack of critical thinking as student teachers did not incorporate their own views and experiences linked to the readings provided for the assessment tasks. Answers given in assessment tasks were superficial and simple with little evidence of deep and critical engagement with the content. Students are not involved in dialogue with the "knowledgeable other" (Vygotsky, 1978:86), the educator. In the current social environment of learning where we deal with large numbers of students, they should be able to develop the ability to critically engage with curriculum issues and solve problems independently. I was therefore not able to present the course that I had planned as it became clear that my perceptions are different from those of the students, and this gap can be hard to overcome (Audley, 2018). Assisting students to move forward in their own understanding of curriculum and curriculum debates during lectures, and advancing their individual learning, becomes a challenging task. Audley (2018) is of the opinion that student pedagogical partners can provide unique scaffolding to assist educators to teach in ways that are in line with our students' experiences and needs.

So, what does this tell us about our scholarship of teaching and learning? Is our teaching practice conducive to the training of an effective new generation of teachers for the new decade/millennium and the unknown future? These questions point to a need to re-imagine the current teaching and learning taking place in the Curriculum Studies module. Re-imagining curriculum necessarily brings about changes to the curriculum design and development. This therefore necessitates the lecturer or facilitator becoming an agent of curriculum change, and becoming a scholar of teaching and learning. Change is not easy or merely accepted (Audley, 2018; Miller-Young et al., 2017) as humans resist change in many instances. Therefore leadership is crucial in changing the direction of teaching and learning for future generations. As a leader and scholar of teaching and learning, I need to review current practices by critically challenging and transforming perceptions and [world] view on what effective and excellent teaching encompass.

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Being a change agent means to make a difference in the training provided for the new generation, the new teachers of the future. These changes need to inform continuing professional development, not only for students but also for educators. Investing in a scholarship of teaching and learning could ensure effective changes take place (Miller-Young et al., 2017) and, in turn, inform good teaching that narrows the gap between the differences, that is, in the various learning styles/strategies, demographics and needs of students (Biggs, 2012). Drawing on Lewin's (1952) model of change, it becomes clear that certain worldviews need to be changed: *unfreeze*, *change* and then *re-freeze*. Some learned perceptions need to be deconstructed (*unfreeze*) before an intervention with new sets of knowledge, skills and pedagogies, and thus change, can be attempted. Opportunity arises within every new lecture and every new student to make a change drawing on in-course and out-of-course experiences (Quinn et al., 2012). In-course changes could be afforded by means of collaboration: between colleagues (also from other higher education institutions) and students. Out-of-course changes could draw on prior knowledge and experiences/expertise from both educators and students/learners.

Now that a critical understanding of the future generation and current student cohort has been established, the challenge of change needs to be addressed. There is a dire need to identify what subject content/knowledge is of most worth. What is most relevant and conducive to student learning? Scholarship of teaching and learning seems key as it leads to effective change and affords capacity to influence others [educators and students] to work towards a common goal or set of goals (Miller-Young et al., 2017). Becoming a scholar means to be a leader; a leader who can provide the necessary tools for successful change to occur. A leader in curriculum change, pedagogy and methods can adapt his/her subject curriculum to address the needs of diverse students in the classroom. Change can happen in any context and at any level. It can occur in any classroom, lecture, educational institution, grade, study year or post level. It depends on a leader in the field critically considering new ways of thinking, doing and engaging with teaching and learning. To make these changes happen and stick (*freeze*) a good leader should weave the value of teaching and learning scholarship into the educational institution by applying leadership activities and actions to advance teaching and learning (Miller-Young et al., 2017).

In addition to corporate leaders, educators, schools, government officials and parents must re-think education and how to prepare the next generation to overcome the challenges enabled by ever-increasing technological change (Marr, 2019). Primary schools, secondary schools and tertiary institutions

of education need to consider how to adjust to the new world, the 4IR, as learners and students will need to be educated very differently than in the past decades. According to Marr (2019), technologies are disrupting every industry across the world at unprecedented speed, and some of the changes already happening include automation, AI, big data, augmented reality and the Internet. Marr (2019) argues that young people need to be prepared to engage in a world alongside smart machines, and suggests eight domains of action to address the challenge of preparing for the future and for careers still unknown. Marr's¹ (2019) domains are summarised below and include:

- ✦ The purpose of education needs to be redefined in order to support students in developing knowledge and skillsets that enable them to do basically everything in future.
- ✦ Improving science, technology, engineering and mathematics (STEM) education across various disciplines as everyone will need to be technically skilled, and have an understanding of the values and ethics of the new technology they engage with.
- ✦ Education systems should assist in the development of human potential, e.g. creativity, imagination, critical thinking, social interaction and physical dexterity, so that they are equipped to work alongside the machine rather than compete with it.
- ✦ Education should become a lifelong endeavour to prepare for the yet unknown future in 4IR, thus continuing with structured education beyond school or tertiary education.
- ✦ Re-think teacher education and training to support teachers in becoming facilitators, assisting students to facilitate their own learning and lines of inquiry that include technologies such as AI and robotics.
- ✦ Adapting undergraduate and postgraduate qualifications to become more focused on 4IR, affording students the opportunity to learn topics beyond their core curriculum.
- ✦ Providing learning spaces in education that will enable students to be creators of their own learning, to practice their curiosity and problem-solving skills, and help them make sense of their lived world through hands-on experiences.
- ✦ Teaching and learning philosophies of educators and educational institutions need to be reconsidered to take into account the need of international demands such as the languages of emerging markets in 4IR.

Dewey² said that: "If we teach today's students as we taught yesterday's, we rob them of tomorrow". I concur and strongly believe that these areas of action can be beneficial in preparing tertiary education students for tomorrow, the technological age.

1 Marr (2019) at <https://bit.ly/3n9G1qK>

2 John Dewey Quotes at <https://bit.ly/36i3Uwn>

Conclusion

After considering the various levels of knowledge needed for effective and efficient teaching and learning in an attempt to answer the perennial curriculum question – What knowledge is of most worth for future generations in the new millennium? – there is clearly an argument to invest in the scholarship of teaching and learning to bring about much needed change in curriculum.

In our rapidly developing technological age where the Internet, virtual reality and AI change daily life, it becomes crucial to revisit the teaching and learning (curriculum) of teacher education, not only in schools but also at the level of higher education. It is also true that to develop curriculum, consideration should be given to existing praxis. Students and educators, and universities and schools, need to develop specific qualities, skills and understanding regarding their disciplines and beyond in order to prepare the new generations as “agents of social good in an unknown future” (Bowden et al., 2000:1). GenZ and Gen-alpha are the first generations to spend their entire adolescence in the age of technology and in the social media domain where they construct their own knowledge about knowledge and education.

To summarise the discussion in this chapter regarding the new generation, new millennium and what curriculum is of most worth in these times, the following key concepts were highlighted. The twentieth century philosophers Dewey, Piaget and Vygotsky refer to learning through experience and prior knowledge, social interactions, adult guidance and collaboration. Students follow stages of development to construct their own learning through problem-solving skills, problem-based and inquiry-based learning with the necessary support from the educator. The graduate attributes and novice teacher competences strongly point to the development of human potential through team-work [collaboration], communication and leadership, in order to become responsible, literate and skilled citizens, culminating in the notion of life-long learning, one of the collective roles of an educator (DHET, 2015). The framework of Productive Pedagogies strongly invests in critical thinking and criticality, deep knowledge and intellectual quality, connectedness to curriculum, active citizenship, academic engagement and self-regulation. Marr’s eight domains for action (2019) strongly relate to most, if not all, of the requirements needed to be considered for curriculum change in preparation for the future. These include the development of new mind-sets where human curiosity and creativity culminate in construction of their own learning. They learn about topics beyond the core, acquiring new skills such as critical thinking skills to solve problems, and collaboration and interaction with a

variety of intelligences. Individuals need to be able to unlearn [unfreeze], change/intervene and re-learn [refreeze] to become the life-long learners needed to progress into an unknown future.

“Education is our passport to the future, for tomorrow belongs to the people who prepare for it today” (anon). As educators, it is our responsibility to work towards an improved curriculum and educational system (Beierling, 2014) as “we cannot expect to meaningfully participate in the transformation of the nation and its educational institutions if we fail to authentically participate in the constitution and transformation of ourselves and our work” (Pinar, 1994:74 in Beierling, 2014).

The *Method of Currere* (Pinar, 1975) is fundamental for understanding the meaning of curriculum development. The meaning of *currere*, to ‘run the racecourse’, is still relevant for scholars and educators of curriculum entering the twenty-first century. Its transformational work empowers us with the agency and the momentum required to bring about much needed transformation for modern teaching and learning (Beierling, 2014). As curriculum change agents and scholars of teaching and learning in the twenty-first century embarking on preparing the new generation for an unknown future, it might become possible to establish what knowledge is of most worth if we engage with, and revisit the notion of *currere*, to run the modern race.

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