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Quality education

The nexus of human capital development, economic growth and social justice in a South African context

Edited by

Muchativugwa L. Hove & Martha Matashu

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Peer review declaration

The publisher (AOSIS) endorses the South African 'National Scholarly Book Publishers Forum Best Practice for Peer Review of Scholarly Books'. The manuscript was subjected to rigorous two-step peer review prior to publication, with the identities of the reviewers not revealed to the author(s). The reviewers were independent of the publisher and/or authors in question. The reviewers commented positively on the scholarly merits of the manuscript and recommended that the manuscript be published. Where the reviewers recommended revision and/or improvements to the manuscript, the authors responded adequately to such recommendations.

Research Justification

This book presents theoretical, conceptual and empirical insights into the deontological role of education in creating, promoting and sustaining human capital development and economic growth to the ends of attaining social justice in the South African context. Calls to redress socio-economic inequalities and redistribution have become incessant, specifically directed at the need for government and other agents in the field of education to identify measures for the progressive realisation of social justice and socio-economic rights. The constitutional approach to addressing socio-economic rights is therefore limited. This results in the inevitable conclusion that the nexus between quality education, human capital development and economic growth should be closely followed and interrogated to reimagine this imperative for social justice.

The contributors to this book all recognise the fact that the world is increasingly defined by rising complexity and uncertainty. This complexity and uncertainty compel innovative pedagogic practices that recognise schools and universities as crucial sites through which issues of quality, performance and pedagogic strategies are continually reproduced and contested. These complexities and uncertainties take the forms of blended classrooms, critical thinking and versions of epistemic disobedience that tackle, in combination, social justice, equity and redistribution of resources and access to these. The social injustices that South Africa currently faces are complex and daunting to the extent that they transcend the traditional industry and academic discipline boundaries. In transgressing the disciplinary boundaries, we require integrated interdisciplinary thinking, inclusive quality education, new epistemological horizons and informed dialogue. This book, through an economics of education perspective, human capital and economic growth-based theoretical principles, advances the idea that quality education is a precursor for creating conditions that are necessary for promoting social justice.

The complex and multidirectional trajectories in education and educational theory call upon a theorising of intersectionality. This collected work seeks to integrate rigorous quantitative analyses with qualitative studies to theorise the intersections and nexus between human capital development, economic growth and social justice. The book addresses troubling concerns regarding race, ethnicity, gender, sexual orientation, socio-economic status, age and physical abilities.

Part 1 of the book is made up of three chapters that reconceptualise quality education for the ends of social justice. Part 2 is made up of four chapters that are quintessentially empirical. Part 3 provides the last three chapters that are mixed methods developments of models and practical scaffolds.

The target audience of the book would be specialists in the domain of moral theories that guide and assess choices as to what we ought to do (deontic theories) to create, promote and sustain human capital development and economic growth through achieving quality education.

A similarity analysis confirms that the book contains no plagiarism.

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Contents

Part 3: Frameworks for quality education

Abbreviations, Figures and Tables Appearing in the Text and Notes

List of Abbreviations

AC	Alternating Current
AEK	Authority or Expert Knowledge
AF	Argument Frames
AICPA	American Institute of Certified Public Accountants
ANA	Annual National Assessment
ANOVA	Analysis of Variance
ATP	Annual Teaching Plan
CA	Chartered Accountant
CAPS	Curriculum and Assessment Policy Statement
CCM	Classroom Conditions Model
CFA	Confirmatory Factor Analysis
CHE	Council on Higher Education
CIE	Cambridge International Examinations
CK	Certainty Knowledge
CPD	Continuing Professional Development
CPUI	Constructivist Use of ICT
DBE	Department of Basic Education
DHET	Department of Higher Education and Training
DP	Deputy Principal
DSP	Dinaledi Schools Project
EFA	Exploratory Factor Analysis
EFAL	English as a First Additional Language
ELL	English Language Learners
EU	European Union
FET	Further Education and Training
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
GNI	Gross National Income
GNP	Gross National Product
HAI	Historically Advantaged Institutions
HC	Hidden Curriculum

HDI	Historically Disadvantaged Institutions
HED	Higher Education Diploma
HEI	Higher Education Institution
HEQC	Higher Education Quality Committee
HEQF	Higher Education Qualification Framework
HEQSF	Higher Education Qualifications Sub-Framework
HIE	Higher Institutions of Education
HoD	Head of Departments
ICT	Information and Communications Technologies
IFA	Innate or Fixed Ability
IKS	Indigenous Knowledge Systems
IMECS	Internationals Multiconference of Engineers and Computer Scientists
IODSA	Institute of Board Directors South Africa
IS	Instructional Leadership
ITE	Initial Teacher Education
LEP	Learning Effort or Process
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer
LTSM	Learning and Teaching Support Materials
MANCOSA	Management College of South Africa
MBA	Master of Business Administration
MDG	Millennium Development Goals
MPI	Multidimensional Poverty Index
MRTEQ	Minimum Requirements for Teacher Education Qualifications
MST	Mathematics, Science and Technology
NCS	National Curriculum Statement
NDP	National Development Plan
NQF	National Qualifications Framework
NRF	National Research Foundation
NSFAS	National Student Financial Aid Scheme
NWU	North-West University
OBE	Outcomes Based Education
OECD	Organisation for Economic Co-operation and Development
PACCSL	Positive Accounting Classroom Conditions for Successful Learning
PCK	Pedagogical Content Knowledge
PD	Professional Development
PEB	Personal Epistemological Beliefs

PGCE	Post Graduate Certificate Education
PISA	Programme for International Student Assessment
PK	Pedagogical Knowledge
PTD	Primary Teacher Diploma
PUCHE	Potchefstroom University for Christian Higher Education
PUI	Pedagogical Use of ICTs
R&D	Research and Development
RNCS	Revised National Curriculum Statement
ROI	Return on Investment
S&T	Science and Technology
SACE	South African Council of Educators
SCK	Subject Content Knowledge
SD	Standard Deviation
SDG	Sustainable Development Goals
SDL	Self-Directed-Learning
SMK	Subject Matter Knowledge
SMTs	Senior Management Teams
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
StatsSA	Statistics, South Africa
STEAM	Science, Technology, Engineering, Arts, and Mathematics
STEM	Science, Technology, Engineering and Mathematics
TeLRA	Test of e-Learning Related Attitudes
TI	Test Items
TIMSS	Trends in International Mathematics and Science Study
TPUI	Traditional Pedagogical Use of ICT
UK	United Kingdom
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDHR	Universal Declaration of Human Rights
UNDP	United Nations Development Programme
UNESCO	United Nations Scientific and Cultural Organisation
UNISA	University of South Africa
US	United States
VIF	Variance Inflation Factor
WIL	Work-integrated Learning
ZPD	Zone of Proximal Development

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Foreword

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Although the South African Constitution is regarded by many as the most progressive constitution in the world, citizens of this country still struggle to come to terms with issues including race, ethnicity, gender, sexual orientation, socio-economic status, age, physical abilities, religious beliefs, political beliefs or other ideologies. Added to this is the inequality in, and lack of, quality education which continues to deny the majority of South Africans the chance to become valued citizens who contribute to the realisation of the constitutional aspirations.

In this compendium of research chapters, Martha Matashu and Muchativugwa L. Hove collaborate with novice and experienced researchers to focus on the *nexus of quality education and human capital development for economic growth in the quest for social justice in South Africa. The book presents theoretical and conceptual insights into the deontological role for education creating, promoting and sustaining human capital development and economic growth through achieving quality education.* The chapters of this book therefore fall within the domain of moral theories that guide and assess choices as to what we ought to do (deontic theories), in contrast to those which guide and assess what kind of people we are.

The challenges posed by coronavirus disease 2019 (COVID-19) to the education domain once again came to the forefront of the existing disparities and emphasised the necessity to address socio-economic inequalities and redistribution; and have also heightened the urgency to develop the available resources, including human capital, to achieve the goal of social justice (deontic theory). Furthermore, the pandemic highlighted the importance of full and equal economic participation and growth. It is argued that specific reforms such as quality education are a way of addressing sustained human capital development and economic growth. The publication of this book is opportune and will not only contribute to the existing body of knowledge but will raise issues that may lead to new understandings and challenge the ways in which we approach education.

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This book deals with three major themes, namely, Epistemic and Social Justice, Models and the Economics of Quality Education, and Frameworks for Quality Education. The relevance of these themes for South African and international scholars cannot be underestimated. I believe that this book will add value to the discourse on Social Justice and Quality Education.

Introduction

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This book presents theoretical, conceptual and empirical insights into the epistemological role of education in creating, promoting and sustaining human capital development and economic growth to the end of attaining social justice in the South African context. Recent developments in addressing socio-economic inequalities and redistribution have heightened the need for governments to identify measures within the available resources to achieve the progressive realisation of social justice and socio-economic rights. The constitutional approach to addressing socio-economic rights confers specific obligations that the state must fulfil. Despite an enabling legal architecture, there is limited evidence of this legal contribution towards the attainment of social justice. This compels one to arrive at the conclusion that creating an enabling legislative environment alone is inadequate in addressing social and

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economic problems. As a turning point, this scholarly book interrogates the nexus between quality education, human capital development and economic growth to establish how this imperative could be reimagined. This nexus generates the quintessential impetus for social justice.

Quality education extends the functionality and productivity of an individual to creating benefits for both the individual and society. Only quality education has the capacity to contribute meaningfully to economic growth, thereby reducing poverty, unemployment and other socio-economic ills. Endogenous and neoclassical exogenous economic growth theories and human capital theory all identify quality education as a key determinant of economic growth. By extension, economic development that arises from economic growth determines the trajectory for social justice. Social justice stimulates educational outcomes in terms of the knowledge, skills, competencies, attributes and behaviours that students appropriate, thereby shaping the scope and disposition of the human capital required in any society.

The contributors to this book all recognise that the world is increasingly defined by more complexity and uncertainty. This complexity and uncertainty compels innovative pedagogic practices that entail blended classrooms, critical thinking and versions of epistemic disobedience that tackle, in combination, social justice, equity and redistribution of resources and access to these. The social injustices that South Africa currently faces are complex and daunting to the extent that they transcend the traditional industry and academic discipline boundaries. These challenges traverse disciplinary boundaries and therefore, require integrated interdisciplinary thinking, inclusive quality education, new epistemological horizons and informed dialogue. This book, through an economics of education perspective, human capital and economic growth-based theoretical principles, advances the idea that quality education is a precursor for creating conditions that are necessary for promoting social justice. To facilitate such quality education, it is useful to analyse the various educational processes that affect learner attainment in school systems and establishing scientific research-based evidence that strives to resolve these challenges. The chapters in this edited volume therefore seek to democratise knowledge and to develop a global knowledge economy that engages with quality learning.

This book consists of a trinity of interconnected themes:

- Part 1: Epistemic and social justice (three chapters).
- Part 2: Empirical studies of quality educational practices (four chapters).
- Part 3: Frameworks for quality education (three chapters).

In the first three chapters, Martha Matashu and Muchativugwa L. Hove tease out recent developments in pedagogical theory and practice in order to map what emerges as a culturally and politically sustaining pedagogy. The focus in

this part spans the fields of education economics, human capital and the imperative of social justice as countenanced through theoretical, interdisciplinary methodological and research-based initiatives. Martha Matashu explores quality education as being instrumental for the foundational development of human capabilities necessary for economic growth and social justice. Drawing on principles and theories in education, human capital development and economics disciplines, she argues that education facilitates social justice by ensuring the development of each student's intrinsic human capabilities and enabling them to lead productive lives in serving individual needs and those of the society. This second chapter proposes that the nexus between quality education, human capital and economic growth as an alternative approach to achieve social justice requires that there be a palpable intersection of educational processes and practices that accentuate quality education. It examines epistemic disobedience and social justice where the quest for curriculum renewal is linked to relevance in one South African university. As such, the multidimensional nexus perspective explains what it takes to achieve quality education and social justice. The three chapters therefore focus on developing a conceptual grounding for social and epistemic justice for quality in education, arguing that quality education lies at the nexus of social justice, economic and human capital development.

The second part explores the complex and multidirectional empirical studies that demonstrate quality in educational practice. The four empirical chapters range in scope, disciplinary context and educational levels from primary, secondary and tertiary education. Attaining quality education is necessary for human dignity and the enjoyment of human rights. Using the construct and practice of quality education to address social justice requires enhanced educational practices to promote teaching and learning in schools through scientifically developed solutions. The chapters in this segment present empirical studies on educational practices that could foster attainment of quality education. Empirical evidence from these educational practices interrogates quality education in terms of the development of skills and competencies that contribute to human capital and economic growth. Once human capital and economic growth are achieved, they stimulate economic development, and this in turn catalyses the social justice imperative. Teachers are indexical to the attainment of quality education outcomes as they participate at the sites of negotiation and struggle. As such, Shepherd Mlambo and Patient Rambe, in Chapter 4, conceptualise the effects of personal epistemological beliefs on the pedagogical use of ICTs. Texts and learning materials used in learning could be contested sources of engendering gender biases, prejudices and inequalities thus creating epistemic and social injustices. To clarify the discrimination and exclusion embedded within learning material texts, Muchativugwa L. Hove draws attention to the need for disrupting patriagraphies in the classroom by deconstructing gendered constructions in

South African language texts. Dudu and Samuels investigate the challenges and imperatives in pedagogical content knowledge using the case of Natural Sciences teachers in South Africa. Nothile T. Kunene and Niewoudt write on 'The use of Argument Frames for solving word problems in Mathematics in primary schools'. In the chapter, she argues that supporting primary school children's mathematical knowledge intersects with their language development, in particular the students' understanding of 'argument frames' and how these work in (re)structuring mathematical logic.

The final part in this trinity is devoted to developing of frameworks necessary for the implementation of quality education in schools. The frameworks encompass science, technology, engineering and mathematics (STEM) education, classroom conditions for the promotion of educational quality and instructional educational leadership. The nexus between quality education, human capital and economic growth is interrogated by taking on the concept on intersectionality in significantly practical ways that create and extend conditions that enable students, teachers and policy makers to acquire skills, knowledge and competencies that enhance their productive livelihoods for the greater good of oneself and society and thus social justice in essence.

Part 3 is conveniently placed at the end of this research-based book for the development of frameworks for quality education. Developing educational processes and frameworks for implementing quality education in schools anchors human capital building, economic growth and subsequently realisation of social justice. Understanding quality education from systemic and social justice approaches recognises quality education as context-specific. This section presents conceptual studies that focused on developing frameworks for quality education within the social justice imperative. These frameworks highlight different educational processes, practices and relationships that ultimately promote quality educational outcomes by learners. Such an understanding of micro foundational elements of education inputs, processes and outcomes that exert an impact on learner skills and knowledge has direct influence on the social justice imperative. In this regard, Andrew Mutsvangwa examines the relations between STEM education and economic growth. Petzer and Nel take a shot at the school level, and propose a classroom conditions model that enhances learner attainment of quality educational outcomes in Accounting Education. At the level of school management and leadership, Assan, Matashu and Nwosu submit that education input and process exert influence on the provision of quality education. This final chapter in the edited volume develops a framework for strengthening instructional leadership practices and improved learner attainment in schools.

The chapters assembled here interrogate all the educational principles that flow from those ideals – and all those practices that flow from those principles –

quality education for all, academic freedom, pedagogical pluralism, epistemic diversity and institutional diversification wherein a *humanistic framework* (agency, dignity and development), *ideals* (rights and democracy) *principles* (equity, inclusion and justice) and *practices* (lifelong learning for all and voice) become the critical *terminus ad quem*.

PART 1

Epistemic and social justice

Chapter 1

Quality education: The nexus between human capital development, economic growth and social justice in the South African context

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Synopsis

This chapter advances an interdisciplinary understanding of the nexus between quality education, human capital development, economic growth and social justice in the South African context. The complexity of social and economic challenges in South Africa makes it necessary to adopt an interdisciplinary approach. South Africa faces the complex challenge of

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attaining social justice, whilst experiencing continued low ranking of the quality of education, low human capital development and low economic growth. It is a well-accepted universal fact that social injustice hurts human beings as individuals and society as a whole. Although different theories from varied disciplines such as education, human development and economics recognise education as central to addressing human and economic development, the research is lacking and has not yet dealt with the *nexus* between quality education, human capital development, economic growth and social justice. To address this gap in the epistemic and methodological approaches, an interdisciplinary inquiry was adopted in this research study to analyse the humanistic and naturalistic approaches to education, human capital theory, endogenous and neoclassical theories of economics. This extends our understanding of education whilst questioning the relevance of the existing paradigms. Taking into cognisance the four distinct concepts of (1) quality education, (2) human capital development, an integrated concentric model for improving (3) economic growth and (4) social justice is presented. The model underscores the need for a paradigm shift towards integrated quality education, human development and economic growth based on embedded strategies that address social justice.

Introduction

The need to provide people with a life that is fully human and worthy of human dignity is the primary cause leading to the increased demand for comprehensive approaches addressing social justice. Social justice as a concept has its origins in the United Nations (UN) (1948) which proclaimed the Universal Declaration of Human Rights (UNDHR). This declaration recognises the entitlement to fundamental human rights. This human rights discourse centred on a social justice approach embodies the normative distribution of resources and opportunities for ensuring equality of rights. The UNDHR-based social justice approach recognises the claim to entitlement of fundamental rights as a means for redressing the dimensions of inequalities and injustices. Concerns regarding the persistent increase of inequalities and injustices have been raised calling into question the adequacy of the human rights approach alone in addressing social justice. This chapter advances an interdisciplinary understanding of the nexus between quality education, human capital, economic growth and social justice in the South African context.

The next decade is likely to witness an increase in the demands for social justice. In the 19th century, the concept of social justice was not popular since economies focused on market driven approaches for the production and distribution of resources and wealth (UN Economic and Social Affairs 2006). Despite growing efforts to create awareness about the importance of social justice, the recent evidence suggests a continued and persistent increase in

inequalities worldwide. Recently, the UN (2020) reported that an estimated 80% of the world population lack social protection in terms of living below certain income level, experiencing deprivation of basic public services such as sanitation, water, health and education. This instance of inequity reflects that approximately 6.2 billion of the world population are experiencing some version of social injustice. Whilst the observed trends show efforts to promote social justice have increased, the inequalities on the other hand are rising. There is a conundrum here, which contradicts the intended purposes of the human rights-social justice-based approach. The dichotomous relationship between social justice and economic inequalities raises serious scepticism about the adequacy of a legal theoretical framework alone in addressing social justice as envisaged. What is not yet known is whether the human rights-based approach alone is sufficient to establish social justice.

Unfortunately the increased deprivation in the quality of life prevails even after the 50-year-old declaration of the UN, which had warned nations against the absence of social justice as constituting violation of human rights, dignity and fundamental freedoms, thereby creating a potential risk of undergoing a flawed future marked by chaos, violence and instability. The UN (2006) also advised that social justice was unattainable without the implementation of systematic and strong redistributive policies. Modern societies have seen a huge increase in reliance on the enforcement of enacted legislations that protect and promote social justice as legally prescribed by the human rights legal approach. De Vos et al. (2014) explained that legislations such as formal and substantive justice, and formal and substantive equity are oftentimes enacted and enforceable through promoting redistribution, equal access and participation in opportunities, privileges and resources available in the society for individuals from designated groups. In light of increasing inequalities projected by the UN in 2020, social justice is inevitably a central problem that requires urgent attention both in research and in practice. This chapter identifies and interrogates the nexus between quality education and human capital in resolving social justice in the South African context.

Historical and legal development of social justice

The concepts of social justice can be traced back to the UNDHR (1948). However, it was not until 1969 that it became popular after the UN attested that a social justice approach was required post the Second World War in order to achieve global prosperity. This aspiration led to several consultative meetings held since 1969 by the United Nations Department of Economic and Social Affairs (UNDESA) through to 1995, 2001, 2004 and 2006. The meetings subsequently developed a comprehensive analysis of issues surrounding social justice. The theoretical framework adopted for understanding social

justice was human rights approach. Social justice was understood to create equitable, just and fair distribution and participation through upholding the values and principles of human rights and equality (UN 2006). Different understanding of the concept of social justice exists in literature. For instance, Rawls (1972) defined social justice as the act of balancing competing claims, elaborating on the assertion Walster and Walster (1975) made on social justice in the context of equality as encompassing proportional distribution and allocation of community's resources and materials. Sen (1992, 1999, 2004, 2005) in ground-breaking work on capabilities embedded in the human development approach advocated social justice as a claim to capabilities that enable people to achieve their rights and natural freedoms. Fraser (1997, 2009) primarily focused on social justice in terms of recognition and distribution, arguing that social justice is important in clarifying the inequality or maladministration that requires redress through redistribution. A significant group of scholars have focused on education and social justice (Cazden 2017; Gewirtz 1998). Until today, the concerns about the approaches for addressing social justice have risen phenomenally in literature.

Economic justice is a distributive approach that focuses on creating opportunities for everyone to participate equally in comparison to social justice that merely focuses on ethical and moral distribution (UNDESA 2006). The Organisation for Economic Co-operation and Development (OECD) (2011) explained social justice as commonly understood from a legal framework of a participatory society in the distribution of resources and opportunities. Gewirtz (1998) described distributive justice as the principles through which goods and services are distributed. Whilst the human rights social justice approach brings attention to the fulfilment of universal fundamental human rights, it disregards the possibility that people have capabilities that may directly or indirectly be factored in as means of production to the end of ensuring equality of all rights and freedoms. Social justice based on legal paradigm disregards economic justice as a reality that should take place before social justice. This oversight therefore may lead to a limited meaningful reduction of inequalities. This marginalisation of the economic justice dimension overlooks the productive role that everyone should play in creating and distribution of opportunities.

Literature suggests that quality education may directly or indirectly influence several processes related to attainment of social justice (Hanushek & Woessmann 2020; Lee and Lee 2018). Tickly and Barret (2011) identified the development of individual human capabilities that is gained through quality education as a starting point for the recognition of human rights and freedoms of learners, which is the cornerstone of social justice. According to Uba and Chinonyerem (2017), quality education extends the functionality of an individual in any society and can be a useful strategy for sustainable development. Marginson (2019) explained that educational outcomes attained

by a learner during the education system enable each individual learner to become a productive individual who can equally and freely participate on the labour market and earn an income. It can be inferred that a human rights approach should not overlook the role played by quality education as the foundational basis for the development of human capabilities, enabling individuals to participate and contribute equally to the society.

Overview of empirical evidence on social justice and inequalities globally

Contrary to the expectation that social justice could be addressed by the increased availability of enabling legal and legislative environment that safeguard the distribution and redistribution of resources, it appears inequalities continue to exist amidst such normative distributive measures being in place. Redistributive opportunities and resources are key aspects of social justice. According to the UNDESA (2020) and United Nations Scientific and Cultural Organisation (UNESCO 2020) reports, progress towards achieving the targeted goals is slow, despite many efforts undertaken. The World Bank (2020) report indicated that extreme poverty declined from 10.1% in 2015 to 9.2% in 2017. The implications of this decline are a rise in the percentage of people living in extreme poverty, suggesting persistent social injustice. The UNDHR social justice approach regards poverty as an injustice and inequality because living under poverty deprives individuals of their fundamental human rights and dignity. The World Bank (2020) further reported that, as of 2018, almost 70% of the global poor aged 15 and above have no access to schools or some basic education. The same report also found that about 4 out of 10 people living in poverty were living in rural areas. The World Bank (2020) report further found that women represented most of the poor within the sub-Saharan Africa (SSA). This evidence was applicable to five countries namely, Nigeria, Tanzania, the Democratic Republic of Congo, Ethiopia and Madagascar. This further demonstrated the levels of inequalities and the decline in social justice. Sen (1999) identified circumstances where people have their capabilities hindered by contexts that surround them as hindrances in attainment of social justice, despite these people having the primary means. This indicates that gender disparities, extreme poverty and aggravating inequalities are indeed inhibitors of social justice in SSA.

A report on overcoming poverty and inequality in South Africa by World Bank (2018) showed that the country has undertaken several redistributive measures, investments in education and implemented several fiscal policies targeted at reducing inequalities. However, despite these commendable efforts, South Africa continues to experience challenges of high poverty, unemployment and inequality (World Bank 2018). What is not clear is whether quality education, human capital development and economic growth have a

direct impact on social injustice and the associated inequalities arising as a result. There is need to understand the adequacy of the existing human rights approach in promoting social justice in developing economies such as South Africa where we continue witnessing the dire absence of quality education, human capital development and economic growth.

State of social justice, quality education, human capital and economic growth in the South African context

The concept of social justice is addressed indirectly in the Bill of Rights in the Constitution of the Republic of South Africa, 1996. However, the Constitution sets out the rights of all people in the Republic of South Africa, including the right to equality, the right to dignity and the right to freedom, which entails *ipso facto* social economic rights. Section 26, 27, 29 26(3), 29(1) 2, 27(3) spells out the socio-economic rights in the Constitution as justiciable. The above conceptualisation of social justice in the foregoing context has close similarities to the social and economic constitutional rights dimension. This implies that the judiciary can enforce self-defined duties against the executive and administrative action to safeguard these human rights (De Vos et al., 2014). In South Africa, the interpretation of social economic rights is prescribed by Section 7(2) and Section 39(1) of the Constitution. In terms of the Section 7(2), the state must respect, promote and safeguard the rights in the Bill of Rights; and under Section 39(1), when interpreting the Bill of Rights, a court, tribunal or forum must enforce these rights. Education is a fundamental human right. Section 29(1) of the Constitution provides that everyone has a right to education. However, the legal dimension of social justice does not adequately explain the linkages between social justice and quality education. In addition, the legal perspective does not extend to explain the outcomes of the connections between quality education, social justice and human capital development. Similarly, on the international platform, the OECD (2011) regarded social justice as commonly understood as a framework of rules and guidelines for a participatory society. Whilst the legal framework of social justice emphasises legislative obligations on the state to comply, it overlooks the role of human capabilities as possible alternative resources for ensuring social and economic rights and freedoms.

Whereas the Bill of Rights in the Constitution recognises the rights of all people in the Republic of South Africa, including the right to equality, the right to freedom and the right to social economic rights, the nation continues to be ranked as one of the most unequal country in the world. A World Bank (2019) detailed report on overcoming poverty and inequality established that South Africa is the most unequal country in the world, and this inequality has increased since 1994. South Africa currently recorded a multidimensional

poverty index (MPI) of 39.8%. This is higher than the world standard score of 33.3%. Concisely, the MPI indicates that more than one-third of the South African population lives under deprivation and poverty (United Nations Development Programme [UNDP] 2019). Between 1990 and 2018, the Human Development Index of South Africa increased from 0.625 to 0.705, which is below the average 0.750 for countries that fall within the high human development group (UNDP 2018).

Furthermore, South Africa's income inequality was 57.7% compared to 27.6% of the SSA region (UNDP 2018). Moreover, the World Economic Forum (WEF) (2019) observed that in terms of skills of the current workforce, the country ranked 101 out of 141. The skills of the future workforce ranked 107 out of 141, whilst critical thinking in teaching declined from 78 out of 140 to 95 out of 141. StatsSA (2019) found that even though there is extremely high and rising unemployment, skilled labour is scarce to find in the most skilled and professional sectors. The failure of the public education system partly explains the continued scarcity of relevant skills and competencies. This is because the observed trend contradicts the assumptions commonly held by the UN (2020), the World Bank (2019) and UNESCO (2016) that improved social justice leads to reduced inequalities. For the realisation of the human capital, economic growth and social justice imperative, there is an urgent need to address the many systemic problems that assail education and training inputs, processes and outputs to reduce the mismatch between labour market and society's needs.

The observed dichotomy between various legislations and corresponding social justice issues raises concerns. The absence of social justice may hurt the society, causing harm to the people (UN 1948, 1969, 1995). In a detailed report, the UN 2006 observed that there is no coherent approach designed to achieve social justice. World Bank (2018), based on its comprehensive report on overcoming poverty and inequality in South Africa, verified that fiscal and legislative efforts to reduce poverty have not yet achieved the intended goal. The report established that there are extreme inequalities and unemployment. StatsSA recommended job creation as policy intervention that could lead to quality education that creates the necessary human capital for enhancing productivity. South Africa, over the years, has shown much commitment towards reforming its education system. However, an approach that allows for sequencing of priorities and designing plans of action based on theoretical and empirical insights can only add to the conceptual value of quality education. What is sorely missing is the implementation of the responsive policies. Barro (1996) warned that ineffective policy might lead to contradicting results and further emphasised the need to establish whether conditions are conducive enough to drive the anticipated change.

Perhaps the assumption that social justice can lead to reduction in inequalities was premised on countries that already have quality education, but this is not the reality of many countries. If the conditions that enable

increased social justice led to a decline in inequalities, it means that an insight into context-specific factors that affect social justice is required. The World Bank (2018) reached the conclusion that quality education is a human right and it makes instrumental contributions in addressing poverty, unemployment and income inequalities. This implies that the implementation of education as human rights that leads to social justice should interact with certain economic conditions that enable it to achieve that goal. Indeed, the premise is that quality education generates productivity that fuels economic growth. Such findings from literature suggest that economic growth is necessary for establishing conditions that spur improved welfare. Arguably, research on social justice should be context-specific because understanding of social justice from the perspective of a developed economy could be applicable to developing economies also.

Based on the observed trends from empirical evidence, it appears that the complexity of social justice problems that the law alone is supposed to address is beyond the scope of one discipline. Essentially, the processes involved in the development of knowledge and skills reside in the discipline of education. De Carvalho (1991) elucidated that education provides learners with broad opportunities to discover and develop their inner abilities, potential and capabilities, and develop autonomy, self-confidence, respect for oneself and others. Quality education allows learners to take responsibility and accountability for living a dignified human life and promoting a peaceful society. The low metrics observed in the quality of education suggest the absence of strong and coherent approaches that support human capital and economic development. Arguably, in this respect, the human rights approach alone is not adequate to attain social justice. It appears that the scope of social justice that the legislative and political components strive to redress is beyond the scope of a singular discipline.

Statement of the problem and rationale for the study

It is commonly held that increased social justice measures should lead to reduction of inequalities, thus reflecting an achievement of social justice. Different approaches have been adopted to promote social justice along with the growth in measures to promote social justice, yet there is a serious concern that inequalities continue to be palpable. Studies have found that schools experience different challenges with implementation of social justice (Adkins-Sharif 2020; Knijnik & Luguetti 2020). Hytten and Bettez (2011) argued that although different institutions, educational systems and many other platforms invoked the concept of social justice, it appears there is a limited understanding of what it means. This has contributed to a hiatus in reconceptualising social justice. Hytten and Bettez (2011) concluded that there is some confusion

about social justice and subsequently such misconceptions hinder implementation of social justice initiatives.

Humanistic and naturalistic education theories, together with human capital endogenous growth theories and neoclassical growth theory, all dispense the idea that economic development may provide a possible explanation to the layered meanings of social justice. Recent studies suggest that education is perceived as a driver for poverty reduction, promoting equity, fairness and social justice, and moreover a precondition for creating human capital and economic growth that speak to the notions of social justice (Hanif & Arshed 2016). Findings from cross-country studies by Hanushek and Woessmann (2020) found that taken together, the cognitive knowledge and skills learnt from sites of learning enhance productivity of the labour force and enhance economic growth, which in turn leads to economic development. Hanushek and Woessmann (2020) concluded that it is the quality of competencies and skills attained from education systems that explain the variations observed in different economies. On its own, economic development inaugurates discussions and practices connected to social justice such as redistribution of income, access to employment and poverty reduction (Hanif & Arshed 2016; Uba & Chinonyerem 2017). This means that to ensure that every child has the opportunity to experience quality education, it is necessary to address disparities in income distribution, employment and poverty in the long run. The economics of education approach seems to explain logically why a country as whole can create conditions that promote reduction of inequalities and subsequently achieve social justice.

It appears that South Africa continues to use the human rights-based education approach to interrogate and address issues related to social justice. Ozoemena (2010) described social justice as involving the implementation of dignified treatment of all people and groups, as well as equal access to services, availability of services and opportunities for development. There are several aspects of social justice that seem to be linked to the connection between quality education, human capital and economic growth. Literature suggests quality education influences social justice through its direct influence on human capital and economic growth. Quality education equips learners with basic knowledge and skills that unlock their productive potentials and capacities (Njoku & Onyegbula 2017). The neoclassical economic growth theory asserts the assumption that improved labour force skills increase productivity and economic development that matters in benchmarking the standards of living for the citizens. The key problem with literature is that knowledge on quality education, human capital and economic growth is growing in silos, fragmented into different disciplines and thus failing to give an integrated comprehensive insight into aspects connected to social justice. This raises a question how does the nexus between quality education, human capital and economic growth lead to the achievement of social justice.

Understanding the nexus between human capital development, economic growth and quality education is important; this nexus may provide a basis for creating conditions that promote and sustain social justice both in the short and the long run.

Theoretical frameworks underpinning social justice

This study is guided by the question: how the nexus between quality education, human capital and economic growth leads to the achievement of social justice. As such, this study extends the capabilities approach through the endogenous economic growth, human capital theory, naturalistic education and humanistic education theories together with the UNDHR, through the lens of the utilitarian and egalitarian linkages between education, human capital, economic growth and social justice. The concept of social justice is predominantly understood from the human rights legal theoretical framework. Human rights law has its origin in international law. This legal framing has its origins in the UN-UNDHR Bill of Rights of 1948, and the other subsequent UN proclamations that pursued global peace and prosperity through the recognition of human rights. The UNDESA (2006) conceptualised the framework of social justice from the human rights approach focused on distributive justice. This strand of legal theory focuses on placing an obligation on the state and government to enact legislation that promotes and protects human rights as fundamental rights. The human rights approach legitimises equal participation through redistributive justice such as formal and substantive justice as well as formal and substantive equality (De Vos et al. 2014).

Within the framework of human rights, social justice seeks to promote respect for the human dignity of every human, and their inalienable rights to equal treatment, fair and just participation in the distribution of wealth, resources and opportunities in the society. It is evident that social justice was conceptualised through legal centralism and positivist jurisprudential theories that position social justice as a right that is justiciable and legally enforceable. Rautenbach (2018) criticised the dominant legal frameworks based only on law as a discipline, arguing that they suffer from potential epistemological monologues. The legal human rights approach assumes that a linear relationship exists between an increase in human rights and social justice, neglecting the individual capabilities that may influence the attainment of such rights and freedoms. The legal human rights approach focusing on a pursuit of social justice through distributive approach has obviously neglected the component of economic justice.

The human rights-based approach, although it conceived the entitlement to claim rights as central to social justice, disregarded the recognition of human being as agents with capabilities to achieve well-being and freedoms

based on their functionalities and abilities. Combining the human rights approach, Nussbaum (1997, 2002, 2007, 2011) and Sen (1990, 1994, 1997, 2004, 2005) proposed the capabilities approach in which they advocated social justice as constitutive of both rights and capabilities. Sen (1990), in the capabilities approach, held the position that social justice identified rights as entitlement to capabilities that correlate to dignities that should be identified, safeguarded and fulfilled by freedoms. Therefore, it can be deduced that, the basic reliance on human rights only comprises the possibilities of converting individual human capabilities into productive capacities to the end of enhancing their economic and social freedoms. The capability approach rejects arguments that emphasise human development as a normative claim to well-being. Sen (1999) and Nussbaum (2002) argued that capacities approach complements the human rights perspective by advocating for governments and institutions to put in place legislation, policies and support providing conditions that enable people to pursue their abilities and functionalities. Sen (1999) further argued that capabilities are primary moral imperatives and substantive freedoms that should be understood in the space of people's abilities and functioning of human beings. Nussbaum (2002) emphasised the importance of creating laws, institutions and enabling environments that offer all citizens the critical capabilities and functionalities of attaining social justice.

Formulating integrated approaches ensures that all people have an equal opportunity and means to do what they can do for the attainment of social justice. Sen (1990) cautioned that social justice approach aimed at the amelioration of humankind by the state should not lead to threatening and ignorance of individual liberties. Fraser (1998) asserted that social justice, inasmuch as it brings to bear redistribution of claims, should ensure justifiable distribution of resources. This entails that the pursuit of social justice should not be detrimental to the rights and capabilities of the others. Sen (1990) is therefore quite on point in propounding that there is a dual responsibility in terms of human beings considered as the means through which production and prosperity can be obtained, and people as the ultimate concern for the production as the means to enrich these lives. This suggests that with equitable access to the same opportunities, resources and means, people should be in position to use their capabilities and abilities to benefit themselves and their societies.

The UNDESA (2006) explains that although the concept of social justice privileges the distribution of the fruits of economic growth, nonetheless, its theoretical framework considers economic justice as a separate component from social justice. The UNDESA (2006:14) defined economic justice as the existence of opportunities for meaningful work and employment, and the dispensation of fair rewards for the productive activities of individuals. In this instance, economic justice is essentially treated here as an aspect of social justice.

The omission of economic justice is one of the major shortcomings in the human capital-driven economic development paradigm. It is a serious oversight on the part of a human rights-based social justice approach. Nevertheless, the human rights perspective only focuses on social justice by signalling entitlement to the universal fundamental rights as a statutory obligation. When rights are imposed only through universal claims, overlooking the dimension of economic justice, there is bound to be some challenges in addressing inequalities and achieving social justice.

Admittedly, Nussbaum (2007) presented arguments to emphasise that the capability approach perceives social justice as constitutive of the rights, entitlements to capabilities, material preconditions and government action taken to fulfil these obligations. Considered together, the principle underlying economic justice and human capabilities approach holds the belief of giving people the opportunity to develop, use their capabilities and receive reward. The reward provides means that enable an individual to address different dimensions of social and economic justice such as poverty, hunger and other deprivations. Sen (1994) identified deprivation in income and resources as a major source that is linked to poverty, hunger and other freedoms that are associated with quality of life. Sen (1994) pointed out that although deprivation arises from other sources, it is important to use the capabilities approach to determine the conditions that inhibit people functioning to their full abilities.

There is a considerable literature that shows that skills and knowledge accumulated by individuals from the education system enhance people's productivity which in turn promotes economic growth and subsequently economic development (Diebolt & Hippe 2019; Mohamed et al. 2021; Neeliah & Seetanah 2016). Research on human capital has focused on the role of education in promoting economic growth rather than examining the impact of quality education, human capital and economic growth on social justice. The human capital theory seems to suggest that quality education has the capacity to impart skills and knowledge that enhance the people's production abilities, thereby enabling them to benefit from earning an income (Romer 1989). Given the multidimensional complexity of social justice, this study argues that the human rights-based approach alone is insufficient to understand social justice. Building on an understanding of egalitarian and utilitarian philosophy, this study proposes to extend the human rights approach to incorporate the nexus of quality education, human capital and economic growth as the primary means to social justice.

Human rights-based social justice approach in South Africa

The Bill of Rights enshrines the rights of all people in the Republic in South Africa, and has put in measurable steps to adapt the human rights approach

to address social justice. Whilst, South Africa is an upper-middle-income economy, the findings from the World Bank (2018) reveal that poverty, unemployment and inequalities continue to be the major challenges facing the country. Again, despite being an upper-income economy, South Africa has been experiencing shrinking economic growth (World Bank 2018). This suggests that the human rights social justice-based approach alone in the absence of quality education, human capital development and economic growth cannot lead to reduction in inequalities. This remains a relevant question in the context of South Africa as an upper-middle-income economy faced with persistent inequalities, unemployment and poverty. This study builds upon the UNDHR human rights social justice paradigm and extends it to incorporate quality education, human capital, economic growth and social justice.

Legislation fulfils, protects and promotes social justice. However, without factoring in human capabilities to enhance productive capacities of the economy a mere focus on distribution of social justice might be insufficient. Nussbaum (2011) cautioned that in the capabilities approach, whilst capabilities are regarded as entitlements to rights, the realisation of social justices and consequences should not become threats or violations of other rights and freedoms of the individual, and those of the others. In the same light, Sen (1999) modified Aristotle and Kant to postulate that differences in geographical spaces and context create conditions that may impede the realisation of human capabilities and functionalities. Government and institutional support first and foremost address conditions that are barriers to human development in pursuit of social justice. Unlike capabilities approaches of Nussbaum (2017) and Sen (1999) that focus on conditions and capacities, this study focuses on the connection between quality education, human capital and economic growth as an alternative approach to addressing social justice.

Philosophical rationale

Raymon and Holloway (2011) suggested that the research paradigm consists of three philosophical aspects namely: ontology, epistemology and methodology. The concept of social justice emerged as an international development agenda seeking to unlock human potential to lead to global prosperity and peace (UNDESA 2006). An inquiry into the philosophical and ideological rationale, purposes and interpretation that underpins the concept of social justice is necessary for the sake of promoting an understanding of this aspect. It is important to establish the paradigm because the philosophical and ideological view that informs how one interprets the world and creates knowledge is shaped by our knowledge and experiences.

Research paradigm and methodology have implications on the observed findings and meanings generated from it, and the use it will be put to in

particular to guide policy and practices. Research on economics of education is growing in silos and broadening our understanding of specifically one or two aspects of social justice. For instance, Lee and Lee (2018) focused on using a conceptual analysis on human capital development in Asia. Hanushek and Woessmann (2020) used panel data analysis to examine the effect of quality education on economic growth in developed countries. Discipline-specific studies broaden our understanding in fragmented ways with limited focus on creating a comprehensive understanding of the issue from the perspective of the different disciplines involved. Hence to address the gap in literature, this chapter follows Platonic rationalism to identify the essence of social justice. Therefore, based on idealism and rationalism as epistemological perspectives, this study followed an interdisciplinary conceptual analysis approach. An interdisciplinary approach involves a shift in the way knowledge is created from the traditional disciplinary segmentation approaches towards cross-boundary and integrated conversations (Karanika-Murray & Wiesemes 2009). An interdisciplinary research raises critical awareness that contributes to improved understanding of interdisciplinary theory and practices that are related to social justice.

The ontological assumption of this study is based on examining the knowledge about quality education as it is connected to human capital and economic growth. Taken together, this allows for a holistic axiomatic basis for achieving social justice. Matashu (2016:84) pointed out that 'idealism seeks to establish the logical reason for the existence of the observed phenomenon'. Raymon and Holloway (2011) explained the importance of ontology in the formulation of an understanding of the state of being with regards to human existence and social reality. A radical humanist paradigm assumes that knowledge about systems is developed by understanding the intentions of those who created the systems (Burrell & Morgan 1979). A radical humanist paradigm helps us to understand that social justice is a construct and experience that augments human development and ultimately culminating in global prosperity and peace (UN 2020). This assertion is questionable in a context where an increase in promoting social justice generates increased inequalities. The inconsistencies between expected outcomes of social justice and the empirically observed outcomes provide grounds for further inquiry into the possibility of quality education creating economic conditions that promote social justice and reduce inequalities.

Linkages between social justice, quality education and economic development

The UNDESA (2006), whilst conceptualising social justice, separated economic development from economic justice and this has impeded conceptualising the two as directly interrelated. Countries in the world are classified by gross

national income (GNI) per capita which is a key indicator of the level of economic development. Based on a set threshold levels of GNI per capita, the World Bank groups countries into high-income, upper middle-income, lower middle-income and low-income countries. The UN World Economic Situation and Prospects 2014 Report classifies low-income countries as those with less than $1035 GNI per capita, lower middle-income countries as those between $1036 and $4085; upper middle-income countries as those between $4086 and $12 615, and those with incomes of more than $12 615 as high-income countries. These observations indicate that economic justice as reflected by their gross domestic product (GDP) per capita differs across countries. Sen (1997) identified the distribution of income and resources as an instrumental mean that correlates to the achievement of freedoms and other acceptable qualities of life. This finding indicates that economic justice has linkages with social justice.

This reality is however different in the developing economies that are currently lagging in establishing basic economic development conditions necessary for social justice to thrive. The developing economies categories consist of lower middle-income countries and most countries in Africa including South Africa that falls under this category. The low-income levels are reflective of one of the sources of deprivations, inequalities and injustice prevalent in most developing countries. The Department of Economic and Social Affairs (2019) reported that the least developing countries are identified based on human assets criterion, involving a composite index (the human assets index) and indicators such as school enrolment (gross secondary school enrolment ratio) and literacy (adult literacy ratio). A country is categorised on the basis of a three-year average estimates of the GNI per capita, with an upper threshold of $1025 considered as a possible case of being added to the list, and a lower threshold of $1230 regarded as a possible case for a country being placed into another income category level. Africa for many years has continued to have largest number of least developed or low-income countries. Economic vulnerability criterion is the second criterion that is also considered; this measure is a composite index (the economic vulnerability index). Judging by the basis of classification, it can be deduced that the least developed countries or developing countries are characterised by low GDP per capita, high levels of poverty and are subject to high economic vulnerability. This suggests that social justice has different levels of actualisation and realisation depending on whether a country is a developed or developing economy. Developed economies are generally characterised by quality education, highly developed human capital that is innovative and advanced in technology; and all these facets culminate into higher economic growth as reflected in the GDP.

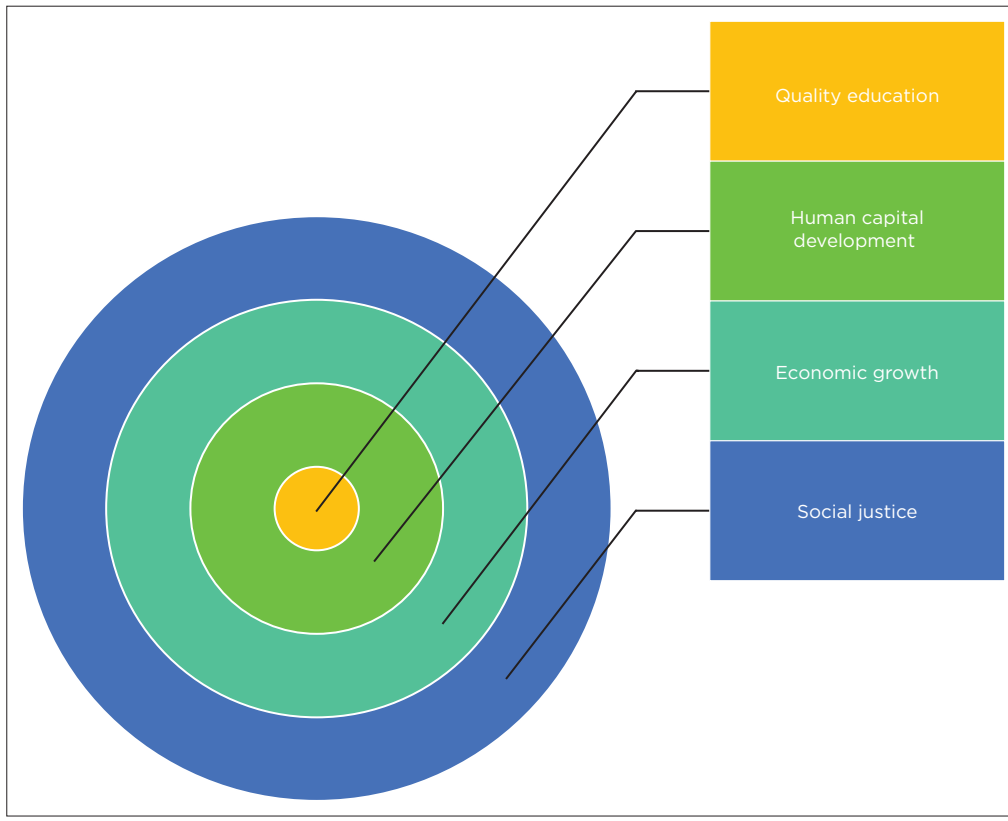
Seeing the gap in economic justice dimension across countries, this study extends both the capabilities and human rights approach by integrating the

connections between quality education, human capital and economic growth as an alternative approach to addressing social justice. Unlike the capabilities approach, the human capital and endogenous economic growth theory sees the utilisation of human capabilities as a key input for production that can be distributed and enjoyed in the society. The measurement of products produced by all the people in nations is specifically measured by the gross national product (GNP), GDP, GDP per capita and GNP per capita (Becker 1992; Lucas 2015; Schultz 1960, 1961). This indicates that human capital is a major determinant of economic growth. The human capital theory asserts that quality education determines the functionality of people within a nation in terms of their productivity and subsequent economic growth (Mankiw, Romer & Weil 1992). The endogenous economic growth combined with human capital contributes to addressing social justice by focusing on the production and fair distribution of resources and opportunities. Within the capability approach, Sen (1990) warned against the extreme utilitarianism approach that focuses on unequal accumulation of wealth and income but disregards the interpersonal distribution of such resources.

Evidence from literature convinces us that quality education determines social justice. Quality education facilitates the development of human capital that in turn promotes economic growth and redistribution of income (Castelló-Climent & Doménech 2021). Sen (1990) further argued that a space where it is impossible to improve the wellness of the ones deprived of substantive freedom without the possibility of decreasing the utility of those who have accumulated more might arise. Akinlo and Oyeleke (2020) found that the relationship between human capital and economic growth human capital enables and equips individuals with skills on which the level of economic growth of the country depends. This indicates to the snowball effect that economic growth determines the standard of living of citizens in a nation. It may be inferred that if the economic development level of a country has a direct influence on the attainment of social justice, then it follows that economic development should exist first before an increase in social justice and the reduction in inequalities could be witnessed. The following section presents the emerging framework explaining the connections between quality education, human capital and economic growth, as a means to social injustice.

Quality education: The nexus between human capital, economic growth and social justice concentric framework

Figure 1.1 shows the concentric circles depicting the nexus between quality education, human capital, economic growth and social justice. The fundamental idea behind the concentric framework proposed in Figure 1.1 is that social justice may be conceived as an outcome of the connections between quality



Source: Courtesy of the Study (2020).

FIGURE: 1.1: Quality education: The nexus of human capital, economic growth and social justice concentric framework.

education, human capital and economic growth. In this framework, quality education is recognised as the centre that resonates with the creation of human capital and economic growth and in turn leads to economic growth that ultimately determines social justice. The premise is that quality education is the primary means and ends through which social justice can be attained through enhanced human capabilities and the resultant economic growth. This view builds upon human capabilities approach in which Sen (1990) regarded human beings as agents, beneficiaries and adjudicators of progress; and they are directly and indirectly the primary means of all production. The concentric framework suggests that the linkages between quality education, human capital, economic growth and social justice are both causal and constitutive; therefore, these aspects are assumed to reinforce each other. If social justice is constituted of redistribution of resources and opportunities, it is important that the maximisation of the sum of individual capacities to provide for the good of oneself and those of others is not overlooked. Education provides opportunities to enhance individual functional capabilities

for economic participation and promoting the attainment of substantive freedoms.

The concentric framework operates on the conviction that social justice is an outcome of quality education. Quality education creates and sustains conditions that enable the systemic elimination of social and economic inequalities through economic development. At the core of the model, education is the sine qua non for social justice, and therefore this should take precedence over the other dimensions. According to Booyse and Du Plessis (2018), skills are acquired either formally or informally, and the formal purpose of education is to equip learners with knowledge, skills, competence and other attributes depending on the educational goals of the country. A quality education nexus between human capital development, economic growth and social justice approach proposes that quality education is an antecedent of human capital and economic growth that should take place before social justice is achieved. This implies that a standalone human rights approach to social justice is insufficient; an alternative approach to social justice that ensures that all human beings are endowed with a set of conditions that would guarantee equal liberties is imperative. Nussbaum (1997) conceived social justice as a recognition of human capabilities and human rights through institutional support. All these enhance the functionalities of human being. Recognition of human capabilities enhances individual participation in the distribution of social and economic opportunities and resources to the end of attaining social justice.

The role of quality education in fostering social justice through human capital and economic growth is supported by the humanistic education approach. The humanistic education assists learners to actualise their own identities and enhance possibilities for the future (De Carvalho 1991). If treated with dignity and significant human care, each human being has the capacity for self-understanding and initiating the critical change in their psychological maturation (De Carvalho 1991). The development of humanistic educational values and capabilities depends on inputs such as the teacher, learner, content, teaching and learning strategies, and the learning environment. These are garnered through several educational processes at the national and school level such as educational curriculum outcomes, teacher pedagogical competencies, quality of assessment and instructional leadership as well as outcomes attained. Akmal and Mariyat (2017) found that the humanistic education approach adopted by teachers has a considerable impact on the development of cognitive skills such as intellectual abilities, mastery of knowledge, thinking ability and affective aspects. These entail attitudes, values and self-control. Labour constitutes the human capital's productive knowledge and skills that can be acquired through the education systems. These are human capabilities and functionalities in terms of the skills, knowledge and competences that individuals accrue from the education and

constitute human capital (Anoruo & Elike 2015; Awel 2013; Maneejuk & Yamaka 2021; Romer 1989). The humanistic and naturalistic approach has highlighted education as central to providing conditions that develop the abilities and capabilities of learners to become who they truly are. The enriching of human capabilities for all individuals correlates to several dimensions of social justice.

The neoclassical economics theory, endogenous economics theory, humanistic education theory, behavioural theory and the UNDHR human rights legal perspective provide the principles underlying the concentric conceptual framework. In the endogenous economic theory, education is recognised as the major determinant of economic growth. Romer (1989), in a neoclassical economics growth model, specified change in economic growth as:

$$Dy = F(y, y^*) \qquad \text{[Eqn 1.1]}$$

where *F* presents a function of, *y* is the growth rate, *Dy* is the change in the rate of *y,* that is, the rate of change of economic growth, *y** represents the long-run change in the rate of economic growth. *y** is determined by government policy and characteristics of the population such as human capital development and education policy.

Romer (1989) found that *Dy*, the change in the economic growth, rises with the ratio of physical and human capital. The endogenous economic growth theory asserts that individual and collective human capabilities contribute to productivity. The endogenous economic growth reinforces the production function that was developed by Charles Cobb and Paul Douglas in 1928. The Cobb-Douglas production model specified economic growth as P *(L, K) = bLa Kb,* indicating that economic growth is a function of inputs such as labour, physical capital and human capital. This means that changes in labour, human capital and physical capital are major components that explain the changes observed in productivity. Changes in efficiency in the labour and human capital are attributed to the calibre of knowledge and skills attained by the individuals from the education systems (Hanushek & Woessmann 2020). Labour constitutes the human capital's aggregated productive knowledge and skills that can be acquired through the education systems. Improved productivity in any economy is dependent on the skills and knowledge possessed by the labour force and these have a direct influence on productivity.

Human capital consists of the knowledge and skills accumulated through education and working experience embedded in the individuals. These are transferrable to productivity in the different industries through the labour market. Schultz' (1961) findings verified that an increase in national output has been largely because of human capital compared to non-human capital such as increase in number of hours worked, land or physical and monetary capital. Human capital affects economic growth through its influence on innovation, adaptability to technology, research development and dissemination (Lee and

Lee 2018). Romer (1989) pursued this further and specified an equation of economic growth estimated as Q = $F(A,[E.P\lambda]K,X)$. In this equation, education λ represented the residual factor that explained the greater portion of the change in economic growth despite the increase in physical productive factors and E.P is the number of hours worked. Romer (1989) identified physical skills, educational skills acquired in primary and secondary schools as well as scientific talent acquired in postsecondary school as key determinants of economic growth in any economy. Mankiw et al. (1992) extended the endogenous economic growth by identifying human capital as a factor that promotes the accumulation of capital and the advancement in technology, and improves labour productivity and economic growth. On combining the endogenous economic growth theory with human capital theory, this results in the conclusion that education is a driver for economic growth. The resultant understanding does not extend to explain the linkages between economic growth and social justice. As such, this prompts further investigation into the connection between quality education, human capital, economic growth and social justice.

Nexus between quality education, human capital, economic growth and social justice

Education enhances the skills and knowledge of the labour force leading to an increase in productivity that further translates into economic growth as posited by the neoclassical theory (Hanushek & Woessmann 2020; Romer 1996). Lee and Lee (2018) explained that improved workers' education and skills advance human capital, which in turn determines productivity and income in any economy. Quality of education received by the workforce promotes human capital and economic development, which in principle are key factors in determining income distribution, employment and poverty levels in any economy. Education can increase human capital inherent in the labour force, which increases labour productivity and thus transforming into growth towards output and overall economic development as posited by the neoclassical theory (Hanushek & Woessmann 2020). Improving quality education entails undertaking measures to review the educational outcomes and curriculum policy to focus on providing quality education that produces skills that match the demands of the job market as well as addresses gaps in the scarce skills. Such quality education outcomes should focus on integrating and developing knowledge and skills that address inequalities such as unemployment and poverty in a bid to achieve social justice. Curriculum policy and educational processes aligned to the economic growth and development needs of the economy are necessary for the hope of addressing social justice.

Education may enhance the innovation capacity of the economy, and the adoption and development of technology (Hanushek & Woessmann 2020;

Lee and Lee 2018). Improving human capital through education contributes to social justice by enabling everyone with the requisite labour skills to participate in the labour market (Tickly & Barret 2011). Given that economic justice leads to the creation of employment opportunities and access to resources, education policy should consider prioritising the promotion of economic justice as precursor of social justice. The implication on policy is that more action is required to improve the skills acquired by learners in the education system, thereby enhancing the possibilities of all learners to have access participation in the opportunities to the best of their abilities thus leading to social justice.

Tikly and Barret (2011) maintained that quality education equips learners with the capabilities and abilities that enhance economic productivity, promote sustainable livelihoods, contribute to peaceful and democratic societies and enhance individual well-being. The humanistic education paradigm views the primary goal and value of education as facilitating learning that enables a person to change within enabling psychological health and growth towards self-actualisation in the context of their environment (De Carvalho 1991). Central to the humanistic theory is the focus on learners' emotional welling and their personal worth as individual human beings. In this way, humanistic education contributes to the alleviation of inequalities in developing learners' cognitive and affective capacities, autonomy and abilities to make decisions, and take control of their lives in the future rather than merely providing them with access to learning.

According to Hayes (2009), the naturalistic education theory posits that human being have three intelligences, namely spiritual, existential and naturalistic intelligence. The purpose of education is to provide a teaching and learning environment that affords the fullest development of these human intelligences. Hayes (2009:1076) referred to Gardner (1999:33–34), who defined intelligence as 'a bio-psychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value to a culture'. This view suggests that learners are provided with an opportunity to discover their potential abilities through the different teaching and learning approaches adopted by educators in the classroom.

Human capital

World Bank (2018) findings show that the human capital approach to quality education plays an instrumental role in addressing inequalities such as poverty, unemployment and income inequalities, and generates productivity that fuels economic growth. Theories such as the humanistic and natural theories explain the role of education in human development. The humanistic theory seeks to ensure that when treated with dignity and significant human care, each human being has the capacity for self-understanding and to initiate change in their

psychological universe (De Carvalho 1991). The naturalistic education approach regards learners as individuals who are born with multiple intelligences that could be nurtured through education. Hayes (2009:1076) explained that intelligences are potentialities presumably neural ones that may or may not be activated depending upon the values of a particular culture, the opportunities available in that culture and the personal decisions made by individuals and/or their families, schoolteachers and others. Grasha (1990) reached the conclusion that the learning styles of individual learners have an influence on learner outcomes. A comprehensive discussion of factors that influence learner attainment is beyond the scope of this chapter. However, what is important is that the processes involved in developing human capital rely on several education approaches and systems as well as conditions and contextual factors. Drawing on the constructs of capabilities approach as advocated by Nussbaum (2007), it can be argued that it is impossible to target to improve human capital without first looking into the efficacy of the education system.

The education policy based on quality education is premised on optimising the economics of education by ensuring that all available productive talent becomes educated (Marginson 2019). The optimisation of potential relates to activation and development of human abilities. Improved production is associated with growth in income and employment opportunities, and these aspects are instrumental in addressing poverty. Within the economics of the labour market, the skills possessed by the individual as a unit of labour should be commensurate with the earnings offered (Marginson 2019). Focus on providing quality education should be the basis for streamlining education skills into a national human capital development need of the society to promote economic growth, address disparities and inequalities. An important perspective emerges from Nussbaum (2002) who argued that human abilities place a moral claim that should be developed to the end of enabling the individual's equal participation in the production and distribution of resources and opportunities. Nussbaum's (2002) analysis identified institutions and government as major players in creating conditions that enhance or hinder the capabilities and functionalities of the people. The capability approach understands capability as the first step towards attaining social justice. The concentric approach therefore extends the human capabilities and social justice approach proposed by Nussbaum (1997, 2002) and Sen (2005) to build human capital with the capabilities to address social and economic inequalities. One such condition should be that identifying and giving priority to subject areas and knowledge in disciplines where there is a shortage of critical skills such as Science, Technology, Natural Sciences, Engineering, Mathematics and Accounting. Investing in subject disciplines that provide critical skills could contribute to the development of an envisaged robust national human capital base which may provide the necessary productive abilities to stimulate and sustain economic growth of the country.

Acquisition of skills through the education system is influenced by the teaching strategies and dynamics used by the educator as well as the classroom environment that they create. Khatib, Sarem and Hamidi (2013) explained that in the humanistic approach, the classroom is integral in promoting instructional activities and this has a significant influence on the development and holistic growth of the learner. Khatib et al. (2013) described classroom conditions that promote humanistic education as characterised by a concentration of positive rather negative ambience, activities that enable learners to appreciate themselves and value others, a community of learning and a sense of belonging. In such a classroom, the teacher plays the role of facilitator and the focus is on learner-centred teaching and learning strategies. This humanistic approach views the purpose of education as nurturing the learner's self-actualisation and fulfilment of their full potential (De Carvalho 1991). Arguably, the humanistic approach recognises quality education as an instrument for allowing an individual access to participate in social and economic activities through development of the their intrinsic worth and full potential. Hayes (2009) explained that understanding naturalistic education entails teaching strategies designed to create an environment where multiple intelligences are enhanced. This indicates that an understanding of the nexus between quality education, human capital and economic growth is required to create conditions that promote social justice. Educational policies in South Africa should therefore focus on providing quality education for all to address social justice-related inequalities.

Economic growth

According to the neoclassical theory, productivity of the labour force is associated with levels of economic growth experienced in an economy (Barro 1996). Hanushek and Woessmann (2020) in a cross-country study of 50 countries for the period from 1960 to 2000 found that economic growth is strongly affected by the knowledge capital of the workers. They further articulated that quality of education is measured on an outcome basis or a cognitive skill, and this has powerful economic effects (Hanushek & Woessmann 2020). This implies that economic growth is dependent on the capacities and quality of educational outcomes attained from the education system. Lee and Lee (2018) explained that improved welfare of the citizens is dependent on the economic productivity of the country. This suggests that quality education has the capacity to contribute meaningfully to economic growth thereby reducing poverty, unemployment and other social-economic ills. It can be argued that social justice is an outcome of the conditions created by the presence or absence of economic growth. It follows that if economic growth is a function of skills possessed by the labour force who are involved directly in the production activity, then social justice is directly or indirectly dependent on the knowledge and skills that are obtained from the education system. A concentric approach towards addressing social justice focuses on identifying

marginalised, excluded and vulnerable social groups, and taking strategic action to provide quality education to all. This entails focused investment on quality education to equip learners with capabilities to participate in economic production activities. Measures that focus on addressing gender and geographic disparities should take into account inclusive economic growth-driven strategies.

Social justice

Hytten and Bettez (2011) elucidated that central to the frames of thinking of the distributive justice notion approach to addressing social justice are the questions of distribution (how we most equitably allocate resources and rewards); issue of recognition (how we create conditions where all people's productive potentials are unlocked); opportunities (how we ensure a level participation), and/or outcomes (how we make certain that successes are fairly distributed in relation to populations). Tickly and Barret (2011) pointed out that this human capital approach, by identifying individual human capabilities as the starting point of human capacities, recognises the human rights and freedoms of learners are fundamental elements of social justice. The use of a concentric framework allows identification of quality education as foundation for the collective conversion of human capabilities and abilities into productive human capital force that contributes to economic growth that is directly linked to reduction of social injustice and inequalities.

The human capital theory embeds the deeper development process that may lead to human capital and economic development, where all are driven by the social justice imperative. Human capital 'refers to the productive capacities of human beings as income-producing agents in an economy' (Hornbeck & Salamon 1991:3, cited in Baptise 2001). Arguably, social justice is entrenched in the human capital processes of recognising and enabling the development of everyone as part of the collective society. Human capabilities promote human freedoms (Parkinson & Kester 2017). Olaniya and Okeminde (2008) emphasised that only quality education has the capacity to contribute meaningfully to economic growth thereby reducing poverty, unemployment and other social economic ills. Since the distribution of income and wealth is key to determining the level of injustices and inequalities such as poverty, unemployment and poor standards of living, therefore there is reason to believe that the connection between quality education, human capital and economic growth is an important starting point for addressing social justice. There is growing empirical evidence that education facilitates the development of human capital which determines the long-term economic growth and economic development patterns observed across the globe (Atiq-ur-Rehman et al. 2020; Tang, Sun & Yang 2021; Siddiqui & Rehman 2017). Improved economic growth leads to economic development, which in turn has direct

and indirect linkages with distribution of income, wealth, resources and well-being of the nation. Fainstein (2001) advocated social justice as constituting elements of sustainable development. This suggests that there are causal links between quality education, human capital and economic growth that influence the attainment of social justice. The concentric framework recognises quality education as the foundation for promoting social justice.

Conclusion

This chapter advanced an understanding on the nexus between quality education, human capital and social justice as an alternative approach for understanding conditions necessary for attaining social justice. The study developed and recommended a quality education nexus between human capital, economic growth and social justice framework. The framework provides a concentric approach towards social justice, assuming that quality education, human capital and economic growth are preconditions that should exist first before increased social justice that eliminates social inequalities. Based on the model, the chapter concludes that in addition to the human rights legislative framework, policy should concentrate on promoting quality education that stimulates human capital and economic growth to the end of attaining social justice both in the short and the long run. Quality education is an antecedent for creating conditions necessary for the development of human capital, which may stimulate economic growth and social justice. The nexus approach holds that quality education, human capital and economic growth within a country has a significant influence on social justice. The concentric framework may thus assist policy makers to understand planning that prioritises policy action that creates conditions for reducing social and economic inequalities. Given the multidimensional complexity of the concept of social justice, this leads to the conclusion that interdisciplinary research approaches that promote dialogue and develop debates, broaden an understanding of the connection between quality education, human capital and economic growth, and their combined effect on social justice.

Chapter 2

Epistemic disobedience and social justice: Quests for curriculum renewal and relevance in one South African university

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Synopsis

Much of African scholarship imports and follows, sometimes blindly, analytical paradigms, perspectives and preoccupations of scholarship in North America and Western Europe. The extent to which university curricula and knowledge are based on western epistemologies challenges the bane of independence, creativity and relevance in a South Africa context. In much the same way, curriculum analysis, design, development, implementation, evaluation and reform in African universities often take cue from western practices without full

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examination of issues of context, relevance and the problem-solving acumen that should be the singular signposts in the quest for a relevant epistemology. Africa has experienced widening inequalities and poverty prompting new ways of thinking and knowledge to address social and economic injustices. In pursuit of understanding the connections between quality education and social justice this chapter interrogates epistemic justice in the curriculum and its relevance in a university in South Africa. It examines the contested terrain of curriculum renewal and relevance in a South African university that has successfully merged three previously distinct university establishments into a monolithic teaching and research entity, specifically privileging languages education and professional studies. The chapter further explores the rationale, content and skills, methodological steps and assessment in English for Teaching second year module as a case in point, endorsed by the Council on Higher Education (CHE) and Minimum Requirements for Teacher Education Qualifications (MRTEQ): three focal areas in order to generate conversations on curriculum renewal and relevance, especially in view of the analytic paradigmatic imperatives for innovative curricula and research productivity.

Introduction

United States International University-Africa (USIU-Africa) Vice-Chancellor Professor Paul Zeleza, in an interview with *University World News*, said African universities must strive to overcome the severe capacity challenges they face if Africa anticipates achieving its development goals. These goals are expressed succinctly in the Africa Union Agenda 2063 and they are framed to prioritise several social justice-related challenges such as incomes, creation of decent jobs, alleviation of poverty, inequality and promote inclusive and sustainable economic growth through a united political will of regional and continental coordination. The prevalence of these social shortcomings begs an epistemological quest that traces the materiality of knowledge in relation to its distribution and accessibility in the society, which in turn must inform the distribution of resources in pursuit of social justice. This chapter therefore questions the purpose of universities as Higher Institutions of Education (HIE) in society given the persistent inequalities and poverty levels that threaten the well-being of the country at large (United Nations Development Programme 2019). Following the social justice and epistemic access imperatives that inform the Sabertooth curriculum discussed later in this chapter, we understand the rationale behind Zeleza's (2019) call that:

> Universities need to be better resourced, improve institutional access, equity and accountability, become more innovative in their curricula, teaching and learning, produce employable graduates, raise research productivity and conduct research that addresses the continent's pressing challenges, and establish more robust engagements with the public and private sectors, civil society and international partners. (p. 3)

According to Zeleza (2019), challenges in higher education have been on the rise in the past couple of years, both locally and globally, but six aspects require serious attention.

The first is institutional supply. Despite the rapid growth of higher education institutions and enrolments, Africa still has the world's lowest share of universities (8.9%) and the lowest enrolment rate (13% compared to the world average of 38%), and there are few universities on the continent that are offering quality education. South Africa has 26 universities, and the amalgamated institution is ranked fifth amongst these, with the University of Cape Town occupying the envied first position. Despite some of its top universities being highly ranked, South Africa has remained a country with the highest inequalities that risk peace, justice and stability with a 50% student dropout rate across the 26 universities. The multidimensional inequalities witnessed in South Africa are manifestations of the violation of human dignity, epistemic justice and future possibilities (Sen 1999). The depth of multidimensional inequalities prompts this quest for social justice in pursuit of equal access to economic and social benefits. South Africa, as a country experiencing widening inequality, needs to seriously interrogate the challenges in curriculum renewal and relevance in one South African university as an approach that might be used to produce an archive of epistemic resources that contribute to sustainable promotion and the development of social justice through its higher education institutions. Whereas there is a high premium on academic success that in turn implies the setting and achievement of curriculum goals, there is a lot more involved than achieving success; there is the futuristic need of living a significant fruitful life in South Africa.

Addressing the complex social dynamics in this terrain requires new approaches for the creation, acquisition, organisation and dissemination of knowledge in a knowledge economy. South Africa is an upper-middle-income country in the world, but it remains the country with maximum inequalities. Ironically, South Africa comparatively has the most highly ranked universities on the African continent.

The map discussed further shows the extent and depth of multidimensional poverty in South Africa according to provincial demarcations. Durational poverty, likelihood of entry into poverty, exit from poverty and poverty inequality circumstances are all integrated in this map, showing that multidimensional poverty is an impediment to social and epistemic justice. If multidimensional poverty is therefore applied to the research and curriculum offerings at the one amalgamated university, it becomes clear that economic development is encumbered. We contend that money-metric poverty, national poverty, spatial disaggregation of urban and rural areas with no attention on the dynamism of responsive research only postpone the urgency of recalibrating the curriculum in so far as addressing circumstantial poverty

analysis is concerned (Baker & Schuler 2004) and this does not uncover the actual level of poverty and the poverty cycles experienced by households and in the South African economy.

Mapping multidimensional poverty in South Africa

StatsSA (2018) acknowledges that in 2011 (Figure 2.1), the government's National Development Plan (NDP) was principally designed to ensure pro-poor economic growth strategies in South Africa. The NDP maintains that a decent standard of living can be realised through a multi-prolonged strategy that critically identifies elements involved, such as employment opportunities, acquisition of quality education and skills, including adequate nutrition amongst

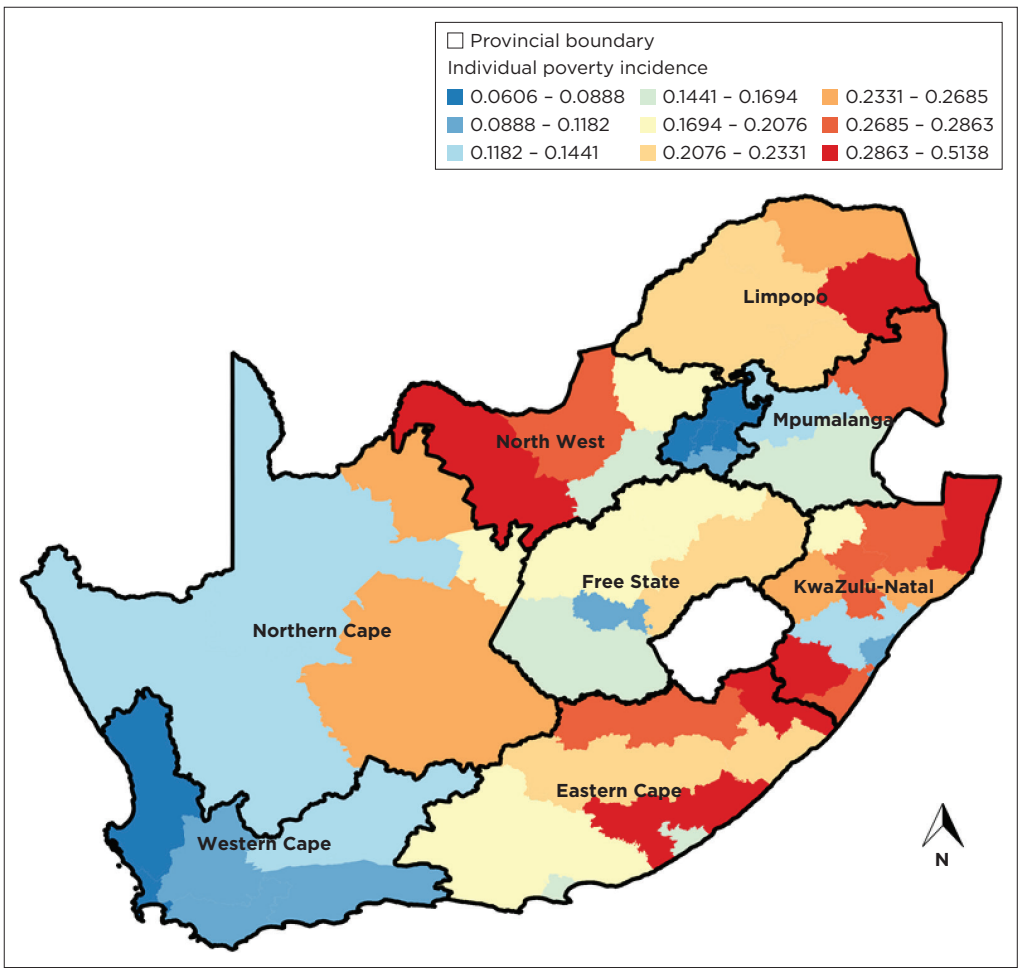

Figure 2.1: Mapping multidimensional poverty in South Africa within provincial boundaries.

a host of other complexities. The overarching goal of the NDP is thus expressly the reduction of poverty and inequality by 2030. Additionally, the NDP highlights programmes and projects that ought to be supported in order to promote building infrastructure that is attached to job creation, fast-tracking service delivery and creation of business opportunities. We specifically select here the thrust in the NDP to provide quality education as a mandatory undertaking.

Whereas the university rankings have their own historical and contested meanings, the amalgamated university prides itself in producing employable graduates and for its engagement with research and therefore contributing to new horizons of knowledge production, a claim that is in stark contrast to what the map shown earlier depicts.

Secondly, there are resource challenges evident in insufficient and declining public funding, severe deficits of physical and electronic resources and poor maintenance of existing infrastructure. African universities suffer from overreliance on tuition fees paid by students as their core source of income to run their programmes and from limited diversification-cum-distribution of resources. The three sites that were merged, Alpha, Beta and Omega acceded to the amalgamation from a politically driven imperative but they were vastly different in terms of resources, cultural capital and racial equity templates for employment, admissions and the preparedness for research and innovation.

Thirdly, many African countries suffer from shortages of qualified staff and insufficient teaching and learning facilities where the massification drive (Hove 2018; Msila 2017) has witnessed lecture halls hosting more than 400 students per lecture. The subject group Professional Studies at the amalgamated university, for instance, holds classes for all year groups in Philosophy and Psychology for Education with numbers exceeding 450 students at each of the three sites of delivery. This is further complicated by some underqualified staff being coerced by a new regime of publication metrics to gain full tenure and promotion which they often get through publishing in little known if not predatory journals.

Fourthly, many universities suffer from poor institutional governance, which is engendered by politicised leadership appointments and political meddling, lack of leadership development opportunities, prevalence of cultures of institutional authoritarianism and corruption, and excessive interventions by often understaffed regulatory agencies. These challenges hinder universities from effectively implementing core business of relevant, context-specific teaching and purposeful learning as intended; learning that should stem the trajectory of poverty.

Fifthly, African universities suffer from unequal internationalisation. The continent is not a major player in the lucrative international student market; more African students study abroad as compared to foreign students studying

in Africa. At this one amalgamated university that has fused a historically privileged site, a historically disadvantaged site and one that lies in between, there is a palpable disproportion between local and international students, and this is more pronounced in the profiles of postgraduate students enrolled at the institution.

There is also the age-old problem of intellectual dependence and epistemic extraversion rooted in the histories of colonial and postcolonial dependence. Much of African scholarship imports and follows, sometimes blindly, analytical paradigms, perspectives and preoccupations of scholarship in North America and Western Europe. Ramose (2002) cautions against continued consumption of scientific and intellectual archives from borrowed cultures as these often lead to the failure to create the thinking and philosophy that is needed to address African problems in research and tackling the challenges of poverty. Ramose (2002) further cautions that appropriation and consumption have undesired consequences of perpetuating the gross violation of human dignity. In the absence of grounded epistemological quests in the university curricula, the research undertaken might unintentionally be creating knowledge lacking relevance to the realities and contextual challenges that exist in Africa. Such an epistemological misfit might lead to universities producing graduates whose skills and competences are not applicable to the needs of South African society. Although this assumption might be partial, there is evidence in the work of Zeleza (2019:5) that there are numerous reports that 'university graduates suffer from high levels of unemployment and under-employment, sometimes higher than for primary and secondary education graduates'.

In light of the complex social-economic inequalities faced in the South African context, this chapter argues that an epistemological quest for social and epistemic justice could be developed in South African universities by revisiting, redesigning and reformulating their curriculum and enhancing quality education for the students they enrol. It entails that if South African universities are to make a meaningful contribution in addressing the menace of multidimensional inequality; then they should equally tackle the insufficient and declining public funding, the severe deficits of physical and electronic Fourth Industrial Revolution (4IR) resources and poor maintenance of existing infrastructure towards curriculum renewal.

This chapter therefore strives to engage with these six facets relating to the epistemological quests, specifically the purpose of the university as an institution of higher learning with focus on curriculum renewal and relevance and research, in one South African university. Enacting the curriculum and research are always culturally, socially and ideologically inflected, specifically when it includes the tensions generated by a quest for internationalisation, the material and ideological apparatuses of the knowledge economy (Hove 2018).

Research questions

This study responds to broad, discrete, but interrelated questions connected to challenges in epistemic justice, curriculum renewal and relevance: How could an unsettling and disruptive alternative to social justice be embedded in curriculum renewal for relevance in one South African university? In redesigning the university curriculum, what meanings are attached to perceptions of students as fee-paying customers of higher education?

How does the amalgamated university prepare students to be in the physical and virtual classroom whilst at the same time thinking beyond these spaces? In what ways do the practices of knowledge construction and dissemination contribute to the public good and critical dialogues relative to gender violence, multidimensional inequalities and epistemic rights? We are asking here how epistemic disobedience affords students the freedoms and apparatuses to voice and contribute towards a transformed curriculum where they reimagine their identities and histories without being pressurised to conform to the demands of an exploitative and extractive market economy.

Should the university be a critical or an entrepreneurial institution? Should it ask unsettling and disruptive questions, or should it serve government industrial policy and the business product development imperative?

What knowledge is valued and disseminated, and who directs disciplinary research agendas in the amalgamated university?

Methodology

We draw on a social realist approach in this research (Archer 1995, 1996), which considers events and experiences in the social world as context-bound. The curricula in question emerge from the dynamic and complex interplay of structures, cultures and agents, many of which may not be readily visible to those involved in such events or affected by such experiences. Structures, in social realism, refer to institutions, systems, positions and roles. Aronowitz and Giroux (1993:105) assert that 'the concept of resistance' entails a purposeful and instructive function of critiquing domination. Added to the critique of domination, resistance ought to provide opportunities for self-reflection and struggle. Such self-reflection and struggle are meant to be actualised in social and self-emancipation, according to these social realist critics. Cultures refer to values, ideas, theories, beliefs and perceptions (Archer 1995; Harley 2017). Agency refers to the ability to take action in one's own interest, and it is quite a central construct in resistance theories. The social world is understood to come into being through the complex interplay of oppositional resistance on the one hand, and transformative resistance on the other (Giroux 1997; Solorzano & Bernal 2001). Stroud and Kerfoot (2020) are therefore on point in appreciating and privileging the seminal observation

that Santos (2014) makes on the importance of the everyday struggle against colonialism – against the inequities and unjustness of the capitalist modes of existence which is a decolonial epistemological event, where a plurality of alternative, complex and competing voices emerge on the back of politics for social change. Agency then ensues through the cultivation of an individual and 'collective consciousness based on a critique of social inequalities' (Bajaj 2018:3), belief in one's present or future.

Struggle needs to be acknowledged by an invested community of actors, and be part of an emerging sociality, communion or an alternative citizenship. Identifying how each of these domains enables or constrains an event, such as the circuits and curricula designed for the dissemination of knowledge in public universities in South Africa, means moving beyond assumptions of simple causal relationships.

With some of the most prominent universities on the African continent, and globally (QS 2018), South Africa remains one of the most unequal societies (World Bank 2018). Besides the fact that in 2020, a third of students enrolled in the amalgamated university are first-time, first-generation entrants, these students frequently perform traditionally conceived adult roles and responsibilities. Many of them are students orphaned as a result of AIDS, rampant crime and now the COVID-19 pandemic, taking care of their siblings whilst at the same studying not to become academics but to earn an income that should support siblings and relatives. These students often halt their tertiary education to take on work and caring responsibilities, often acting as heads of households (UNICEF 2006:iv). Students taking on adult roles is a phenomenon that also occurs in affluent countries, but this reality is very stark in South Africa. Thus, the interest in students' participation rights, well-being and flourishing is by no means limited to this global South university. The country's history of apartheid, and the current political and economic context (Beresford 2016; Maluleke 2018), has placed public universities at the intersection of historic inequalities and conflicting epistemic imperatives. The Department of Higher Education and the funding institution called the National Student Financial Aid Scheme (NSFAS) have to negotiate economic austerity that is at the same time cognisant of the national commitment to social justice (Swartz et al. 2019). In hindsight, and specifically because of the uneven allocation of resources on the basis of apartheid hierarchisation, South Africa's historically advantaged institutions (HAIs) remain dominant players in research, digital innovation and market-led growth. In contrast, those historically disadvantaged institutions (HDIs) cannot compete equally (Ntshoe 2004). This chapter shows how the unequal distribution of financial and symbolic capital influences the multiple curricular, governance and epistemic challenges experienced in merging three sites into one higher education institution (HEI) in South African higher education. Campus Alpha would be

classified as HAI, the Beta would be in-between, whilst the Omega Campus would be HDI.

Distinct sites and specific curricula

The amalgamation of the Alpha campus, the Beta Campus and the Omega campus into one monolithic rebranded entity was politically sanctioned in 2016. The following two years were spent on the redesign of administrative and human resources organograms, followed by the academic reorganisation into eight faculties. At a strategic planning conference called *One Team, Building our Future Together* in 2019, the Faculty of Education Sciences strove to accomplish the following goals:

A shared understanding of the FE's current internal environment, including the Faculty Integrated Teaching and Learning Plan, the FE's Research and Innovation Plan and the FE's Administrative Plan.

A shared understanding of the FE's external strategic context within which it has to perform, specifically the rebranded university as a part of the education sector, working within a global environment, replete with all the political, economic, social, technological, environmental and legislative architecture.

The participants were aligned to the rebranded university strategy and 2019 Annual Performance Plan. They designed and ratified a five-year vision or preferred future for the FE aligned to the rebranded university Strategy, owned and supported by a critical mass of leaders in the FE. The vision was envisaged as one that 'bestows a sui generis, immanent aura of sacredness on South Africa's and the academy's highest ranking values – human dignity, human rights, freedom, justice, tolerance, equity and respect for pluralism'. Strategic goals were designed and refined to achieve this vision of the amalgamated university The curricular offerings of the Faculty of Education Sciences were to be harmonised, with school directors and staff solely in charge of selecting, developing and calibrating specific curriculum offerings within the multiple disciplines in teacher education. This ambitious project is suffused with the economic, entrepreneurial and epistemic imperatives as highlighted in the DVC's communique at the commencement of the 2019 academic year.

The amalgamated university's strategy statement is (Balfour 2019):

> [*T*]o transform and position the university as a unitary institution of superior academic excellence with a commitment to social justice. What are we doing? We are transforming the University. How are we doing it? We are positioning ourselves as a unitary institution. Why are we doing this? *We are committed to academic excellence and social justice in our academic project. Excellence and social justice are integrated concepts*. (p. 1; [*author's added emphasis*])

In this strategic statement, the amalgamated university expressly states that all efforts are geared to supporting student success and the extent to which this university nurtures both the academic and administrative staff to ensure future success. Although not explicitly stated as such, we infer the capabilities approach to development inscribed in Shen (1993) where futures are integrated through synergy of systems support in the three areas of the university core business (teaching and learning; research and community engagement) as well as entrepreneurial administration.

Policy framework and contextualisation

This section presents a policy framework that informs this chapter and also clarifies its context and foundations. In South Africa, higher education is based on and regulated by the *Higher Education Act*, no. 101 of 1997. In addition to regulating higher education, the act also governs the establishment and operation of the CHE and funding and functioning of higher education institutions. It also makes possible the registration of private higher education institutions. The CHE is tasked with the responsibility of advising the minister of the Department of Higher Education and Training (DHET) with the view to promoting quality. Another of its duties is to liaise with higher education institutions. The act also empowers the minister to establish, merge and close higher education institutions after a process of consultation. It also authorises higher education institutions to appoint chancellors, and to establish institutions such as council, senate, principal and vice principal, a student representative council and institutional forums. Higher education institutions are partly funded by the DHET, the NSFAS and by themselves through fees, donations and investments. The funding policy is determined by the minister but the accounting records submitted yearly to the minister are kept by the CHE. Each higher education institution sets its own admission policy (DOE 1997:1–53)

While the *Higher Education Act* regulates and establishes institutions, higher education policy in South Africa is overseen by the CHE. The CHE collaborates with other institutions in its formulation of policies that govern higher education. One of the important policy statements formulated by CHE is the Higher Education Qualifications Sub-Framework (HEQSF). The HEQSF is a sub-frame of the National Qualifications Framework (NQF). The NQF is a tool for the classification, registration, publication and articulation of South African qualifications promulgated by Act 67 of 2008. The NQF is overseen by the South African Qualifications Authority established through the Act of 1995. Consequently, the HEQSF, which is overseen by the CHE, is an integral part of the NQF used to classify, register, publish and articulate quality-assured higher education national qualifications. It outlines level descriptors, main qualification types and their descriptors and standards for specific qualifications. The NQF is composed of 10 levels. The HESQF is an important factor in the development of

the higher education curriculum in South Africa by virtue of being part of the NQF. It is a tool which ensures common parameters and criteria for the design of qualifications, establishes comparable qualifications within the system and encourages diversity and innovation. However, it allows higher education institutions a broad latitude to conceptualise and design their programmes. This is despite the fact that it applies to all higher education programmes and qualifications. It integrates all higher education qualifications into the NQF and provides an opportunity for standard development and quality assurance. The articulation possibilities it adds endow the system with flexibility (Booyse & Du Plessis 2018:64–65; Government Gazette no. 38116 2014:1–18).

Although the policy on HESQF also deals with higher education qualification descriptors somewhat broadly, the policy document on MRTEQ (DHET 2013) is the best source for comprehensive information on teacher education in South Africa. The MRTEQ was first promulgated in 2011 based on the Higher Education Qualification Framework (HEQF) and was revised and republished in 2015. Basically, the MRTEQ provides a foundation for the construction of core Initial Teacher Education (ITE) and continuing professional development (CPD) programmes (Government Gazette No. 38487 2015:5–6). It provides guidance on the following matters regarding teacher education programmes:

- It gives specific guidelines on minimum requirements for the development of learning programmes.
- It indicates the types of learning related to acquisition of knowledge for teaching.
- It specifies regulations regarding practical and work-integrated learning (WIL).
- Department of Higher Education and Training uses it to evaluate teacher qualifications submitted by both public and private institutions.
- The CHE and HEQC (Higher Education Quality Committee) use it to inform their teacher education accreditation and quality assurance.
- It encourages teacher education to address challenges of education in the country (funding, access, equity, comparability and portability).
- It provides for articulation between teacher education qualifications and for teachers holding historical qualifications.
- It identifies three teacher qualification pathways that is teaching and learning, management and leadership and educational planning, research and/or policy development (Booyse and Du Plessis 2018:68–69; Government Gazette No. 38487 2015:7–9).

The two last documents are rich sources of information regarding criteria that could be utilised to evaluate a university teacher education programme. There are certain standards that need to be met by every teacher education programme. For instance, the policy on the HEQSF requires that teacher education qualifications be offered within comparable parameters on qualifications within the system. However, it also encourages diversity and

innovation. It specifies higher education qualification types and their descriptors. Descriptors are critical because they state the purpose of each qualification and explain how it relates to other qualifications across the programme. A 'Level Descriptor' is a statement describing learning achievement at a particular level of the NQF. Over and above this, the policy describes exit competences of the HEQSF qualifications related to the NQF levels. The amalgamated university's landscape exhibits variable judgments of students' legitimate agency, demanding a re-examination of the relationships between students' competencies, freedoms and well-being. There is no doubt that university students are simultaneously in the processes of being and becoming and that this compels a balancing of their interests as vulnerable beings and as competent, competitive and active agents in their academic lives and those of others. The university, as a tertiary space in which many students develop, research and get enculturated into the academy, plays a fundamental role in framing how this balance between protection and participation is enacted.

The MRTEQ lays down the minimum allocation and distribution of credits. It specifies that teacher education must involve disciplinary, pedagogical, practical, fundamental and situational learnings. It offers direct and specific regulations in terms of liaison, research, supervision and mentoring of practical and WIL.

In this subsequent segment of the chapter, we first question the principles of the B.Ed. curriculum renewal policies mentioned earlier. We question their relevance, efficacy and practicability to addressing equity and social justice as social demands in the democratic participation in modern South African society. We also pose questions specifically on the relationship between the required exit level competences and the types of learning, on the one hand, and the learning programmes, on the other, in light of the university's mandate of teaching, research and community engagement. We operationalise this segment on the recognition that research on curriculum decolonisation and student voice has not been given much attention in higher education for the purposes of transforming the curriculum (Gambrell 2016; Urban & Kujinga 2017; The Manifesto 2016). While there is consensus on the importance and the legitimacy of decolonising the curriculum and 'student voice' in ensuring that change takes place in 'challenging injustices and fostering social development, the questions that have not been fully explored in literature are how universities respond to these calls' (Mayaba, Ralarala & Angu 2018), and how student voice could enable HEIs to respond to the epistemic quests for relevance, equity and social justice. Higher Education Institutions such as the amalgamated university in this study have a critical role to play in educating students for 'democratic public life' (Walker 2002:44). The HEIs have a prerogative to produce holistic graduates. These graduates are expected to exhibit their academic skills as mastered from the university's Alpha, Beta and Omega sites of delivery and equally engage in public life and social justice issues. Giroux (2002:8) argues: 'Education is a crucial site where students gain

public voice and come to grips with their own power as individuals and social agents'. He further asserts that students need to critically engage with knowledge that addresses issues of power, culture and history.

The point advanced by Giroux (2002) is taken up by Ralarala, Angu and Mayaba (2018) who succinctly argue the following point on curriculum relevance, research practices and social (in)justice issues:

> Increasingly, university curricula and pedagogical practices are harnessed to a market-based view of the world that conceptualises the good life largely as pursuit of wealth and material consumption within a highly competitive market-based system [...] Today, higher education is drifting further away from its [...] mandate to train critical thinkers and socially conscious citizens who can question the rationality of Western epistemic traditions in African universities. Despite years of commitment to the transformation of higher education in post-apartheid South Africa or broadly in postcolonial Africa, what we imagine today as African universities are in fact European universities in Africa that constantly dismiss and decentre the intellectual values of indigenous people. (p. 4)

In this instance, the scholars argue for a capability approach that allows this contribution to expand the evaluative space for understanding the role of education in promoting the flourishing of students enrolled in the amalgamated university (Drèze & Sen 2013). Such an approach goes beyond an outcomes-based understanding of tertiary education in this case, and schooling in general, focusing rather on the processes whereby students flourish and the opportunities that the curriculum and schooling offer students to be and to become what they value and to what they aspire through epistemic justice. It is this capability approach that therefore provides relevant guidelines for alternative education policies that put the students at the centre stage of curriculum renewal for relevance.

These questions are directly connected to those that Heather Jacklin and Peter Vale (2009) ask:

> As apartheid ended, why did the South African academy shift from critique to subservience? Why have common-sense explanations of the social world of South Africans replaced searching questions? Why are conversations on social [*justice*] issues in South Africa controlled by technology, management and, until their recent collapse, the idea of markets? *Why has serious thought in the new South Africa become an indecent activity?*. (p. 7; [*author's added emphasis*])

Let us take a closer look at the curriculum and identify the implications for this one university after the amalgamation.

The curriculum is a selection from culture(s) (Kerr 1987). For Ralph Tyler (1932/1949) and Hilda Taba (1968), the curriculum consists of conscious intentions commonly described in plans of study and other formal documents – a blueprint – of what is expected or intended to take place. The following four questions must be answered in any design that claims to be definitive of the curriculum, according to Tyler (1949): the educational purposes that the

school seeks to attain; the educational experiences that schools ought to provide in order to attain the said purposes; how these experiences should be effectively organised and finally, how evaluation could ascertain that the defined purposes are attained.

For Lawrence Stenhouse (1975) and Kelly (1996), the curriculum does not only include the planned content but it also consists of the teaching, evaluation methods, syllabi and textbooks. There have been perennial arguments on what constitutes the curriculum: the teaching and learning of important issues, the subjects that get taught in schools, those subjects that are most useful for living in contemporary society, all the experiences learners are exposed to in schools, the questioning of authority and the search for complex views of humanity.

The planned curriculum (overt, explicit and official) is always juxtaposed against the transactional curriculum (what gets taught and received; how it is taught) and these two happen in the overbearing gravitas of the hidden curriculum (null curriculum, what is not taught but surreptitiously gets the most significant recognition; the overarching shadow of examinations in all that gets taught … what does not appear in the examination never gets taught). The hidden curriculum (HC) refers to the values, dispositions, social and behavioural expectations that bring rewards in schools for students. The education process has been prolonged from preparatory school through high school to college and beyond. Education used to be an option for upward social mobility; now it is a requirement for social and economic survival.

Old segmentations of elite versus mass education, private versus public education and the traditional disciplines of the sciences, liberal arts and professional schools have differentiated into far complex structures. Computer-assisted learning, the 4IR, for-profit universities and private research are all messy configurations.

The *HC* emphasises learning to wait patiently, exercising restraint, trying, completing tasks, cooperating, showing allegiance to authority, neatness and punctuality, courtesy and conformity. Schools perform a specific central function of socialising students (Dürkheim 1960); education perpetuates and reinforces the homogeneity that collective life demands (Consensus theory). Herbert Marcuse (1960) Bowles and Gintis (1976) propose the correspondence theory – the school evinces a direct relationship between norms of the school and the maintenance of the capitalist system. Formal and hidden curricula reproduce the social relations necessary to maintain capitalism: competition and evaluation, hierarchies, bureaucratic authority, compliance, fragmented and alienated nature of work. As we argued earlier, what is most urgent at this juncture in the South African university and the academy is equity and accountability, innovative curricula, teaching and learning that is responsive to the social justice imperative and raising

research productivity through the conduct of research that addresses the continent's pressing challenges and multidimensional poverty. Embedded in the form, content and organisation of the classroom and the evaluation of students is a message system that conditions students to adopt traits of punctuality, docility, cleanliness, high grades and conformity. Differentiated schools transmit different messages: accomplishment or failure, different role models from predecessors, different ambitions and differently accessing futures.

The Sabertooth curriculum[1]

Curriculum developers and implementers are perennially concerned that the inauguration of digital technologies and 4IR requires dramatic and complex change and adaptation to the curriculum and to the teaching and learning approaches used in schools to educate this generation of 'digital natives' or the 'net and cyber-tooth generation' (Higgins 2014:1). The construction and reconfiguration of knowledge, and an understanding of the diversity of cultural perspectives and values, all seem to compel a view that education should also fit local contexts in a global world. In the same argument advanced by Sen (2009) on agency and flourishing, such curriculum offerings must meet the specific needs of students in diverse cultures. In one of the most enduring satires on the curriculum, *The Sabertooth Curriculum,* attributed to Professor J. Abner Peddiwell and Howard Benjamin describes the three fundamentals taught to school-going children in a fictitious Palaeolithic curriculum. These timeless fundamentals were:

1. Fish-grabbing-with-the-bare-hands.
2. Horse-clubbing.
3. Sabertooth-tiger-scaring-with-fire.

A dramatic change in climatic conditions (as the one we are experiencing now under the siege of AIDS and COVID-19!) in the Pleistocene epoch led to the extinction of the Sabertooth tigers and the arrival of bears; rivers silted up, making the water too muddy to see the fish and the horses migrated, and were replaced by swifter antelope. Following this cataclysmic change, the younger and more innovative members of the Palaeolithic ethnicity proposed that children should now be taught the skills of net-making (to catch fish), snare-setting (to trap antelope) and pit-digging to protect them from the bears (who were not so afraid of fire). It is instructive to quote at length from the satire in order to demonstrate the apprehension of change, especially the

1. Peddiwell, J.A., 1939, *The Saber-tooth curriculum*, adapated from Benjamin, H.R.W., Saber-tooth Curriculum, including *Other lectures in the history of paleolithic education*, McGraw-Hill, New York, viewed 20 July 2021, from https://www.google.com/search?client=firefox-b-d&q=Sabertooth+Curriculum.

resistance often encountered in curriculum redesign, revision and extension (Benjamin 1939):

> These smart fish, hiding in the muddy water under the newly deposited glacial boulders, eluded the hands of the most expertly trained fish grabbers. Those tribesmen who had studied advanced fish-grabbing in the secondary school could do no better than their less well-educated fellows who had taken only an elementary course in the subject, and even the university graduates with majors in ichthyology were baffled by the problem. No matter how good a man's fish-grabbing education had been, he could not grab fish when he could not find fish to grab [...] A horse clubbing education of the highest type could get no results when there were no horses to club. (p. 23)

There is no doubt that the elders in the Palaeolithic era found the curriculum congested, just as much as the 21st South African university curriculum is apparently over-stretched to accommodate any new subject/s. They contended therefore that they did not have to teach for any direct practical purposes but that the curriculum was designed *to develop a generalised agility that can never be developed by mere training. Education was understood as timeless,* something that endures through changing conditions.

All the radicals were silenced by this statement, all except the one who was most radical of all. He felt abashed; he was so radical that he made one last protest to include more up-to-date activities that had an educational value and transformative agenda embedded (Benjamin 1939):

> The wise old men were indignant. Their kindly smiles faded. 'If you had any education yourself [...] *you would know that the essence of true education is timelessness. It is something that endures through changing conditions like a solid rock, standing squarely and firmly in the middle of a raging torrent*. You must know that there are some *eternal verities*, and the Sabertooth curriculum is one of them!' (p. 20; [*author's added emphasis*])

The essence in the satire is that, as we face the challenges of a rapidly developing world and as we address the changes immanent in globalisation and the proliferation and permeation of digital technologies in our diverse cultures, the implications of this 'Saber-Cyber-tooth' curriculum are ever-more relevant today. The satire also suggests that some of the views held by the wise old men that Benjamin was gently mocking may have merit, though perhaps the right views held for the wrong reasons. In their strongest convictions, formal education should focus on teaching higher level principles, the eternal verities, and the enduring agilities, because the specific details – 'mere training' – may be too context-dependent. As we indicated earlier from Zeleza and the MRTEQ documents, there are calls from business and industry for young people who exhibit 21st-century skills, who can work together and who are more analytic and more creative in the way they tackle problems; yet these are rarely explicit curriculum goals, or the focus of competitive summative assessments. One of the

myriad skills that have been bandied as 21st century is critical thinking, and this has been defined as (Facione 1990):

> 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. (p. 2)

In a growing recognition of the changes in the curriculum and the expansion of the knowledge economy, critical thinking has been institutionalised as an examinable advanced level subject by the University of Cambridge International Examinations (CIE). The focus is on the economic imperative for productivity (Dede 2010). Critical thinking assesses the diverse abilities of students to access, interpret and communicate information represented digitally. Belshaw (2012) is therefore apt in discussing and critiquing the concept of digital literacy and the value of preserving some ambiguity. These capabilities are similar to the six skills identified as vital for inclusion as part of the US National Educational Technology Standards for Students prepared by ISTE (2007):

> Creativity and Innovation; Communication and Collaboration; Research and Information Fluency; Critical Thinking, Problem-Solving, and Decision-Making; Digital Citizenship; and Technology Operations and Concepts. (p. 3)

In one of the modules offered at the amalgamated university, all the literature in English texts in the second year group are Eurocentric: from Shakespeare to Jane Austen through to Dickens and Thomas Hardy. In addition to this Eurocentric orientation in the literature component, the linguistics section takes on a very descriptive and formalist approach that compels students to demonstrate mastery of morphology, phonology, semantics and syntax of the English language. Whatever defence there is for this 'selection from cultures' (Kelly 1996), the curriculum presented to a post-apartheid cohort of students cannot escape the critique offered in the following manifesto on epistemic (in)justice:

> We stand at a pivotal moment in the long history of our university, a fork in the path that offers two ways forward. One is to follow the business model of higher education to its logical conclusion, in a competition for students, research funding and ratings that values constant change as an end in itself. The other is to rediscover the civic purpose of the university as a necessary component of the constitution of a democratic society, with the responsibility for educating its citizens and furnishing them with the wisdom and understanding that will enable them to fashion a world fit for future generations to live in. (p. 2)

This clarion call takes us to the epistemic affordances that the amalgamated university allows. We have here a full diet of the English literary canon in the second year of study. There is neither poetry nor prose from the immediate South African nor the black African literary canon, harping for instance on the tragic sinking of SS Mendi, the ship carrying 600 men of the South African Native Labour Corps conscripts to World War 1 – no dirges nor

libations to their indelible contribution to the agenda of epistemic justice. Rampton (2020:13) is therefore quite accurate in making the following submission:

> Universities have of course also been affected by marketisation, bordering and securitisation, often giving their support to government policy. Indeed, academic linguists played a significant part in, for example, the turn to standard English in the schools National Curriculum and in the development of the Adult ESOL Core Curriculum, making contributions which some have later come to regret, at least in part [...] Researchers have produced a good deal of critical work on issues like language and citizenship policy (Blackledge 2005; Cooke & Peutrell 2019; Khan 2017). (n.p.)

In the post-democratic South Africa of 1990s, there was a strong current of essentialism in linguistic research, characterised by the assumption that a person's ethnolinguistic identity was fixed in place during their early years at home and in their local community, and that this home-based ethnicity was likely to be the most important aspect of their identity. This provided very little purchase on the cultural and demographic dynamics of globalisation – flows and mixing, diaspora and deterritorialisation – and it legitimated the policy of 11 official languages being promoted by the state and the legislative provincial governments. Since then, there has been a surge of work on language and superdiversity (e.g. Arnaut et al. 2015; Blommaert & Rampton 2011; Makalela 2016; Makoni 2017), on heteroglossia (e.g. Creese & Blackledge 2010) and on translanguaging (e.g. Garcia & Wei 2014; Heugh 2020; Makoni 2017; Stroud 2018; Williams & Stroud 2015). This work treats named languages as ideological constructs rather than natural entities, and it sees languages like 'English', 'German' or 'Bengali' as shallow and restrictive representations of how people actually communicate. Instead, it emphasises 'repertoire' as a concept that captures much better the ways in which the particularities of our biographies and situations give shape to our use and identification with a range of linguistic resources, a range that includes bits of nameable languages, styles, genres and a lot of other ways of speaking (Blommaert & Backus 2011; Breet et al., 2018). This repertoire perspective breaks the link between language and nation, and invites us to explore (Peutrell & Cooke 2019), for example:

> [*T*]he [...] marked difference between, on the one hand, seeing EFAL students as non-citizen outsiders, who we assist to acquire the language and cultural norms of their adopted homeland, and on the other, as diasporic locals, with their own linguistic, cultural, social, affective and other resources, whose very presence reshapes the locality they live in. (p. 229)

In many ways, the curriculum outline for second-year students outlined above essentially negates the repositioning and reframing of new ontologies that permit new possibilities of engaged self-actualisation. The transformative agency that Balfour (2019) spiritedly champions is apparently archived in this instance that disavows alternative modalities of interaction with the English for Education curriculum.

Intellectual dependence and epistemic extraversion

Muthama and McKenna (2020:13) raise critical questions on the role of the university in mediating the challenges of equity and justice. They recognise the imperatives that whilst attending to the legacy of apartheid in the sector, there was a concomitant need for South African universities to navigate participation and citizenship in a globalised order. With the occlusion of apartheid, South Africa entered into the global arena, compelled by a desire to increase research output so that South Africa could play its role in the 'knowledge economy'.

Publications or complete postgraduate student supervision have become visible signposts in the academy for both recognition and promotion. Researchers compete for individual ratings, sponsored by the National Research Foundation (NRF). These ratings are conferred upon recognition of scholarship in the discipline and this has given rise to specious research collaborations. At the amalgamated university, there has actually been an increase in collaborations, as evidenced in co-authorships both across the South African higher education system (DHET 2019a) and internationally (Bornmann & Mutz 2015). The increase in research co-authorships has especially taken place between the Global North and Global South (ASSAf 2018), although some literature suggests this may reflect problematic power imbalances already embedded in the academic publishing industry (Barbour 2015; Boshoff 2009; Harrison 2011). One particularly perceptive study by Boshoff (2009) examined the nature of research collaboration between 82 authors from the United Kingdom (UK), France, Cameroon and the US, and found that researchers from Cameroon were predominantly involved in data generation and in the contextualisation of the study whilst their counterparts in the Global North were the lead researchers in developing models and theories derivative from such data. The amalgamated university, specifically in the Faculty of Education, has a number of international collaborations but only a few lead researchers. Massive data have been collected from the myriad studies at the postgraduate level in educational leadership, self-directed learning, educational law and human rights and community-based educational research. Notwithstanding the copious publications from these studies, what is seriously concerning is the replication of largely western theories without the essential accoutrements of re-theorising, repositioning and re-centring of Southern analytic models that would make this data the foundation of an alternative episteme. This uneven research space has grave implications for visibility, knowledge generation, theory development and internationalisation. It has serious implications for the curriculum design, specifications and the research trajectories that the amalgamated university embarks upon. There is a dire need to interrogate how the current research agendas contribute to the public good and critical dialogues relative to gender violence, multidimensional inequalities and epistemic rights.

The quality of graduates and research

Quality, in whatever sphere, has been an ineluctable and tenuous construct. Alumni conglomerations have become a prominent feature in university establishments, specifically under the rebranded 'People & Culture' emblem in HEIs that replaced the business-like nomenclature of 'human resources'. Their resume includes generating archives of achievement, highlighting the employability and 'presence' of such alumni in prestigious positions both in the academic, research and industrial world. Such 'presence' is construed and disseminated as a marker of the 'quality of graduates and research' associated with a particular university (Walker 2002; Mouton & Valentine 2017). Thus, for instance, the metrics on completed postgraduate supervision, the metadata on published research articles, the numeric range of research entities, research niches and research chairs that a faculty hosts is often circulated as a hallmark of academic and research excellence. The (CHE 2013):

> [*M*]ain outcomes of postgraduate and doctoral education are the graduates themselves and their contribution to society through knowledge, competences and skills learnt by undertaking research. It is anticipated that postgraduate scholars should exhibit awareness and openness towards other disciplines. (p. 4)

Therefore, the interdisciplinary trajectories have become the bane of many-a-research undertaking. Such interdisciplinary postgraduate research must be original and 'suitable for dissemination within the scientific community', making a 'significant and original contribution at the frontiers of a discipline or field' (Bozalek & Boughey 2012; CHE 2013:41). This 'knowledge economy' refers to the premise that the economy is largely driven by the innovative development and use of research-generated knowledges. Universities are then perceived as key players in economic development through research-based knowledge production and dissemination, and through the development of highly skilled human capital to sustain such productivity (Bloom, Canning & Chan 2006; McKenna et al. 2018). There are many arguments in the literature that suggest that this has had the effect of conceptualising knowledge as 'an intangible commercial good' (Hove 2018:11; Le Grange 2019; Tomaselli 2018:2) that can be marketed for economic benefits, rather than as a public good (e.g. Maistry 2019; Shore 2010; Slaughter & Rhoades 2004).

In the context of the amalgamated university, the DVC Teaching and Learning outlined the statistics driving the 'knowledge economy' in the following terms in 2019 (Balfour 2019):

> We remain one of the top 7 institutions in South Africa in terms of research outputs; the only institution without a medical school in this category. In 2018 we registered 1497.96 published research outputs units. The University was ranked the 6th institution in South Africa in 2019 (our total number of NRF rated researchers in 2019 was 270). In 2019, 27 new ratings and 18 renewed ratings were achieved, and by the end of the year we had graduated 146 PhDs and 262 Master's graduates. So far in 2020 we have accepted 185 PhD and 822 Master's

> students, boding well for ongoing research outputs for this coming year. Also in 2019, 84 National and International Research Awards were awarded to members of the university staff and R40 702 200 IREA awards (based on 2017 output) were paid to 1493 researchers in 2019 – a fact affirmed by the [*amalgamated university*] being ranked in the top 5 universities in South Africa by the Times Higher Education World University Rankings. [*This university*] boasts with 12 Research Chairs, the latest being the DST/NRF Albertina Sisulu Research Chair in Nursing Science (SARChI). Of the 40 research entities of the [*amalgamated university*], 9 were internally evaluated in 2019. [*This university*] continues to occupy critical space in the South African national science system hosting 7 national entities linked with national and international imperatives: Department of Science and Technology/CSIR Hydrogen South Africa, DST/NWU Preclinical Drug Development Platform, DST Indigenous Knowledge Systems Centre, the Department of Trade and Industry Centre for Advanced Manufacturing, the South African Centre for Digital Language Resources (SADILAR), DST Metabolomics Platform all of which continue to enhance research and innovation excellence, visibility, and impact. The University also hosted 9 high-level public lectures in 2020 as part of the DVC's initiative to strengthen university visibility and national and international networks [...]. (p. 4)

The statistics here in terms of publications, completed postgraduate supervision and the impressive numbers of research chairs attenuate visibility in 'other words' rather than confronting the research question we outlined at the commencement of this chapter: should the university be a critical or an entrepreneurial institution? In wake of the figures and statistics presented here, the amalgamated university definitely comes through as one that serves government policy (NWU 2019), driven by a business product imperative and not asking those unsettling and disruptive questions that are the anchor for curriculum renewal and the social justice development imperative.

Vaughan (2008) and Muthama and McKenna (2020:1) submit a poignant observation when they state that universities have used an array of incentives to increase academic publications, which are highly rewarded in the South African higher education funding formula. While all universities use indirect incentives, such as linking promotion and probation to publication and postgraduate supervision, the mechanisms used in some institutions have taken a very direct form in the 'knowledge economy'. This process has paralleled a huge rise in publication outputs in both accredited and non-accredited journals, alongside increased concerns about quality of the research and its relevance to the South African and international community. These researchers acknowledge the critical significance of incentives in both teaching and research in HEIs but they conclude that incentives, 'in particular direct payment for publications, undermine the academic project by positioning publications and postgraduate supervision in terms of exchange-value rather than their use-value as a contribution to knowledge building' (Muthama & McKenna 2020:1). At the amalgamated university, like every university elsewhere in South Africa, publication and postgraduate supervision

are used as a key measure in probation and promotion processes (McGill & Settle 2011), and is often the means whereby departments bid for institutional funding through these epistemological archives. In order to fulfil this mandate, the amalgamated university cohort of researchers has been implored to (Balfour 2019):

> [/]mprove our visibility and impact, [*by ensuring*] all academic staff [...] are ORCID registered, have Scopus profiles, prioritise publications in Scopus accredited journals; and engage in Bibliometric benchmarking and strategies to improve our research status. (p. 4)

However, economists are quick to warn that where there is competition and incentives, there are also unintended consequences.

Conclusion

Radical reform needs to interrogate grammars of power that marginalise quests for new curricula and research agendas. There is therefore more urgent need for registers of epistemic justice that may potentially become an institutionalised vehicle for inculcating and sustaining social injustice. Students and researchers must have the rules of the culture of power made explicit to them if they are to have an opportunity to confront the racial, epistemic and structural barriers that exist in the South African academy. This could be achieved through reflective questioning of some of the curriculum offerings and the corporate vision and mission statements that have been discussed in this chapter. Some of the reductionist and essentialist tenets that have been conflated into merging diverse institutions such as diversity and internationalisation need to be problematised so that they offer alternative conceptualisations of the research agenda, the epistemic quests and the narratives of the university as a corporate enterprise. The power and success of research democracy 'depends ultimately on the vigour of its practice' (Drèze & Sen 2013:16). The economic growth of any well-meaning university is futile if the proceeds from curriculum renewal, recalibration and the research are not effectively used to eliminate limits on academic freedom and ongoing epistemic injustices. The more urgent need lies in critical thinkers and socially conscious citizens who ask unsettling and disruptive questions through epistemological discourses on social and epistemic justice, specifically the challenges of curriculum renewal in historically disadvantaged and amalgamated universities.

Chapter 3

Inclusive and equitable quality education and social justice in South Africa: A human capital theory perspective

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Synopsis

This chapter, using the human capital theory perspective, outlines the relationship between inclusive equitable quality education and social justice in South Africa. Despite 26 years of democratic governance, empirical evidence shows that South Africa provides unequal opportunities for access to quality education and exhibits high margins of social injustices. These persistent inequalities prevail against the democratic state's constitutional declaration of the right to education as a fundamental human right, compelling the state to

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take reasonable measures to promote, protect and fulfil such a right. Albeit a legal duty is superimposed on the state, legislations do not prescribe measures to fulfil these obligations. This normative legal perspective appears insufficient to address the observed disturbing social injustices and inclusive equitable quality education advocating for alternative approaches. Inclusive and equitable quality education is a major factor contributing to social justice by ensuring that people in particular the most marginalised and vulnerable, acquire the knowledge, skills and competencies that are useful for their well-being. This study thus adopts a conceptual analysis approach to understand the relationships between inclusive equitable quality education and social justice with implications suggesting that inclusive quality education mediates the development of human capabilities desirable for enhancing productivity of the citizens and improved social justice. This study concludes by designing and recommending a framework that explains linkages between inclusive equitable quality education, social justice and human capital.

Introduction

Inclusive and equitable quality education is one way of realising social justice. Education plays a fundamental role of not only equipping the individual with skills, knowledge and competencies but in its entirety makes societies more just and equitable (Schaeffer 2015). The need for inclusive equitable and quality education is in accordance with the UNESCO (2016). In its renewed mandate, UNESCO (2016) recognised the need for an inclusive and equitable quality education whose principles are underpinned by a humanistic education approach based on promoting human rights, dignity, social justice, inclusion, protection, cultural, linguistic, ethnic diversity, a shared responsibility and accountability. The vision, mission and objective of inclusive education designed by UNESCO (2016) endorse the fundamental rights to education declared by the United Nations (1948) in the UNDHR section 1 and 2 of Article 26. The pluralisation of the rights to education indicates that education is a universal right that must be enjoyed by all. This entitlement to quality education abrogates exclusion of young people from quality education as not only an infringement to the human rights of the youth but a denial of the opportunity to realise the full development of their human personhood. Indeed, equitable and quality education can be implemented to develop the capabilities of people that ultimately convert into human capital to the end of enhancing the livelihoods of the individuals and society. This chapter examines inclusive and equitable education through the lens of the human capital theory as an alternative to addressing social justice.

Based on legislation and educational policies, there are a number of ways that inclusive education may promote social justice. Inclusive education requires a fundamental restructuring and transformation of the education

system, its policies and its strategies to redress exclusion and inequalities in education (Shaeffer 2019). Social justice involves the recognition and redressing of differential conditions that could present obstacles to participation and enjoyment of quality education (Astuti 2020). Astuti (2020) explains social justice in the context of inclusive education as relating to educational processes and systems, policy, curriculum and learning that is focused on recognising the differences in backgrounds that might be obstacles to participation and achievement in education. Inclusive and equitable quality education thus places an obligation on the education systems to identify and address several systemic structural inequalities. Inclusive education ensures equality of education by meeting the diverse needs of learners (Shaeffer 2019).

The moral philosophy behind inclusive and equitable quality education is unlocking the potential in every individual for prosperity of the individual and society (Education International n.d). Equitable quality education provides people with the knowledge, skills, attitudes and creativity to solve problems locally and globally. This arsenal stimulates sustainable and democratic development of societies. Gilles (2017) elucidates that human capital that is developed through education generates general economic benefits to both the individual and society. Strategies for promoting inclusive education take the form of strengthening legislations, systems, policies and spaces, in the pursuit of equity and gender equality (UNESCO 2016). The SGD4, according to Johnstone, Schulman and Swadek (2020) focuses on plural-relational equitable inclusion, which is primed by full participation. Linking education for all to social justice, Johnstone et al. (2020) propose that the term *all* compels that special attention be directed to particular groups of the population who may have been excluded from the benefits of such pedagogic undertakings. Overall, the realisation of inclusive and equitable quality education in terms of SDG4 not only fulfils the universal right but it fosters equity and social justice through the human capital developed within a nation.

Presently, the UN (2015) 2030 Agenda for Sustainable Development Goals (SDGs) builds on the successes and challenges of the Millennium Development Goals (MDGs) that lapsed in 2015. A distinct feature of the SDGs is the designing and recognition of SDG4 – inclusive and equitable quality education as a driver for accelerating the achievement of all other SDGs. Nevertheless, despite progress, the world still lags behind in meeting the 2030 SDG4 education goals. UNESCO (2016) recommends that the implementation of inclusive education required the education systems to focus on attracting and retaining those who were excluded and risk being marginalised.

Recent inclusive equitable and quality education indicators suggest that the world continues to face the challenges of quality and inclusive education

thus raising an urgent need to find ways to realise social justice. According to a SDGs Report for 2021 by UNDP, despite the notable global efforts, the progress towards achieving inclusive and equitable education is behind schedule. The UNDP (2021) reported that inclusive and equitable quality education projection is that 200 million would be out of school by 2030 and only 60% of the children would complete secondary school. Recent evidence reflects that the goal is becoming more and more elusive despite significant efforts by international bodies and other stakeholders worldwide to promote this ideal. A report by the UNDESA for 2019 shows that between 2000 and 2018, the percentage of children out of primary and secondary school declined from 26% in 2000 to 19% in 2010 and 17% in 2018 worldwide. This decline reflects a slow growth and is indicative of a bleak future.

The UNDESA (2019, 2020) Report that in 2015, further established the fact that approximately 617 million children and adolescents did not achieve proficiency in reading and mathematics. This suggests serious discrepancies in skills replenishment in STEM which are critical for the development of any economy. Moreover, the UNDESA (2019, 2020) found that an estimated 258 million children were out of school in 2017 and three-quarters of these children live in South Asia and SSA. There is a little decline in numbers from 258 million to 252 million in 2018. Overall, the UNDESA (2019, 2020) verified that low-income country completion rate for primary school is 34% for children from the poorest 20% households against 79% for the children from the richest households with the rates relatively higher for high-income, upper- and middle-income countries. Based on this evidence, there are disparities that hinder the goal of inclusive and equitable quality education. The continued evidence of exclusion in education is a massive concern, given that Astuti (2020), Johnstone (2021) and Shaeffer (2015, 2019) propose inclusive education as the surest way of achieving social justice. The long-term consequences of exclusion from education are likely to marginalise the children's abilities and capabilities to contribute positively to their personal lives and those of others. In this regard, the redistributive and transformative potential of inclusive equitable and quality education are seriously challenged.

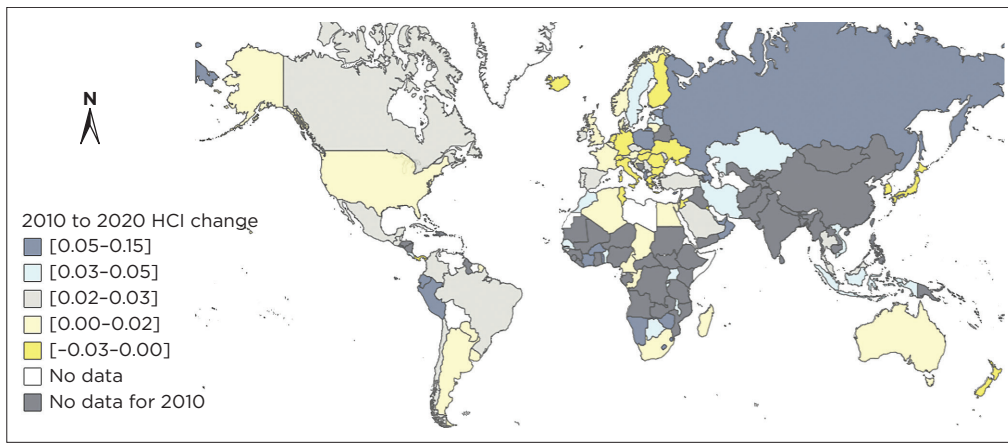
Empirical evidence from Africa and the South African context

There is evidence from the UN 2019 report that countries in Africa lag behind in achieving inclusive and equitable quality education. Africa still has the lowest number of qualified teachers in primary and secondary schools. The unavailability of qualified teachers impedes the facilitation of quality education in school. This means that opportunities for equipping students with skills necessary for the labour market are equally curtailed. The UN

2019 also found that curriculum underdevelopment in the region risks failing to equip students with the skills relevant to the changing demands of the labour market. The UN 2019 findings on equity reflect that the poorest rural dwellers and women, in particular, have a low skill set to allow for active participation in labour markets. Addressing these inequalities may contribute towards achieving social justice. The persistent disparities observed in the provision of inclusive and equitable quality education initiate a legacy of intergenerational social injustice and inequalities that imposes financial burdens on society. OCED (2020) describes intergenerational injustice as the placing at risk of future generations to lead lives they value and desire without compromising the ability of future generations to do the same. The inconsistences in equitable quality education result in inequalities and multidimensionality.

Global trends of human capital across countries are depicted in Figure 3.1. The World Bank (2020) observed that most countries experienced low human capital development between 2010 and 2020 as illustrated in Figure 3.1.

The comparison of the human capital index between 2010 and 2020 shows that the majority of countries in Africa and Asia have no data for 2010 compared to developed economies. SSA and Asia experienced high student dropout and low completion rate. South Africa recorded a human capital index change ranking between 0.00 and 002 which is quite low compared to other upper middle-income countries. Angrist et al. (2019) posit that human capital accounts for one-third of the cross-country differences in income. Interpreted from the human capital theory perspective, the evidence from SSA suggests that there is a massive skills gap that exacerbates social injustices.



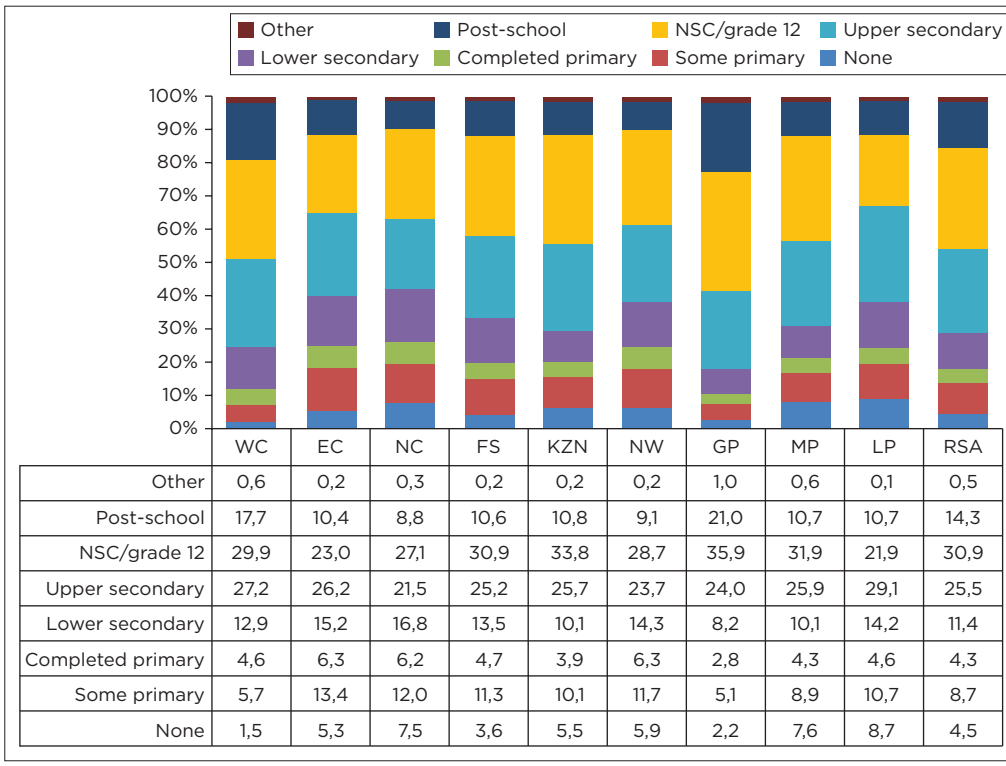
Source: World Bank (2020).

FIGURE 3.1: Human capital index: 2010–2020 comparison.

Recent evidence shows that South Africa is underperforming in terms of addressing social justice, based on its non-provision of inclusive and equitable quality education, the dissonance on the labour market and the ever-increasing levels of poverty. According to a report by United Nations Children's Fund (UNICEF) (2020), South Africa has made notable gains towards protecting and addressing the rights to access to education in early childhood development, primary and secondary education since 1994; yet inequalities in access to education in poor rural areas and vulnerable groups persist. The inequality is markedly higher in gender inequality. For instance, between 2002 and 2018, there is a smaller percentage of women in the age group 20–39 who were functionally illiterate compared to their male peers at an average of 3.5% compared to 5.3% for the males. Literacy measures the attainment of education outcomes and education is used as an indicator for social justice. It has been observed that 28.5% of females graduated in STEM-related careers (Statistics South Africa 2019). This indicates that in the South African context more effort on inclusive and equitable quality education should be directed towards reduction of gender inequality and inequity. The demographic population of South Africa has more females than males; therefore, the failure for women to participate in equitable and quality education compromises the goals of social justice. Social justice-related inequalities should be confronted head-on.

Social injustice-related inequalities are also evident in discrepancies in the provision of education across different regions. Statistics, South Africa (StatsSA 2018) reports on the percentage distribution of educational attainment for individuals aged 20 years and older by province, with figures from 2018 depicting significant provincial disparities in access to education.

Figure 3.2 depicts findings from the Statistics South Africa, 2019 report. The figure shows that although the percentage distribution of individuals without any schooling decreased from 11.4% in 2002 to 4.5% in 2018, the percentage of individuals without lower secondary education or less was high in the Eastern and Northern Cape (both 35.0%) and North West (32.4%) compared to the least figures in Western Cape (1.5%) and Gauteng (2.2%). These findings indicate that a low percentage of the age group 20 years or older attained some academic qualifications that are equivalent to or less than Grade 9 over the past 18 years. UNICEF (2020) warned that children from poor family backgrounds are less likely to complete their education compared to those from a richer background, thus widening the gap in access to opportunities in the future. These findings are consistent with those observed by UNDESA (2019, 2020), which found that globally, the majority of children do not complete senior education level. It is evident that equitable quality education is disproportionally distributed across provinces within South Africa.



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Other	0,6	0,2	0,3	0,2	0,2	0,2	1,0	0,6	0,1	0,5
Post-school	17,7	10,4	8,8	10,6	10,8	9,1	21,0	10,7	10,7	14,3
NSC/grade 12	29,9	23,0	27,1	30,9	33,8	28,7	35,9	31,9	21,9	30,9
Upper secondary	27,2	26,2	21,5	25,2	25,7	23,7	24,0	25,9	29,1	25,5
Lower secondary	12,9	15,2	16,8	13,5	10,1	14,3	8,2	10,1	14,2	11,4
Completed primary	4,6	6,3	6,2	4,7	3,9	6,3	2,8	4,3	4,6	4,3
Some primary	5,7	13,4	12,0	11,3	10,1	11,7	5,1	8,9	10,7	8,7
None	1,5	5,3	7,5	3,6	5,5	5,9	2,2	7,6	8,7	4,5

Source: Adapted from Statistics South Africa (2019:21; cf. General Household Survey 2018).
WC, Western Cape; EC, Eastern Cape; NC, Northern Cape; FS, Free State; KZN, KwaZulu-Natal; NW, North West; GP, Gauteng; MP, Mpumalanga; LP, Limpopo; RSA, Republic of South Africa.

FIGURE 3.2: Percentage distribution of educational attainment for individuals aged 20 years and older by province, 2018.

Educational policy and reforms in South Africa

South Africa has demonstrated a high commitment to reforming its educational policy systems relative to the social and economic needs since its democracy. The anchor has been ensuring inclusive equitable and quality education. Educational outcomes such as knowledge, skills, competencies, attributes, abilities and behaviours that learners should achieve have been the bane of policy and White Papers (Booyse & Du Plessis 2014). In 1996, South Africa abolished Bantu education and adopted the Outcomes Based Education (OBE). With all its limitations, Curriculum 2005 followed the OBE, then the National Curriculum Statement (NCS) and the Revised National Curriculum Statement (RNCS) culminated in the most recent Curriculum and Assessment Policy Statement (CAPS). Curriculum and Assessment Policy Statement is founded on inclusive and equitable quality education principles. CAPS aims to

ensure that the educational imbalances of the past are redressed and that, equal educational opportunities are provided for all sections of the population Department of Education (DBE) (2011). According to DBE (2011), CAPS also seeks to uphold the value of human rights and explicitly states that principal tenets are:

> Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. (p. 10)

The NCS Grades 10–12 (General) is sensitive to diversity in areas of poverty, inequality, race, gender, language, age and disability (DBE 2011:4). Regarding inclusive and equitable quality education, the DBE (2011:4) implores each school to consider and plan for inclusive education by identifying and addressing factors that may hinder inclusivity of learners.

The National Planning Commission (2012) recognises that education enables people to solve their problems, develop competently, define and take control of their lives, their families, participate in developing the societies, and ultimately reduce poverty and inequality. The quality of education exerts an impact on social justice through its effects on human capital and economic growth development. Olopade et al. (2019) show that education has long-term effects on the welfare of any economy.

In an attempt to address the systematic and structurally inherited inequalities, South Africa focuses on substantive equality rather than formal inequality. The Constitution of South Africa has, through the Bill of Rights, made several provisions that guarantee the promotion and protection of social and economic rights. This Bill of Rights in Section 29 1(a) provides for access rights that are reasonable, resources and progressive realisation of the right of everyone to basic education. The same bill imposes the duty to make reasonable measures for such access. Several other social and economic rights such as access to health, poverty reduction and adequate housing are protected in Section 27, Section 35 (2) (e), respectively. De Vos, Freedman and Brand(2014) point out that the South African Constitution embraces substantive equality by addressing different factors that have contributed to disadvantaging, marginalising and excluding different people from designated groups access to privileges and opportunities in the country. Substantive equality is necessary; otherwise, the participation of disadvantageous groups might be hampered. Gullies (2017) states that learners cannot develop the desired human capital skills unless effective teaching and learning are implemented.

Regarding social justice, inferences can be drawn from the StatsSA 2018 report that the South African economy faces a structural mismatch between labour demand and labour supply from largely unskilled workers. This suggests secondary schooling and matriculation do not necessarily guarantee chances

of getting a high-skill job in South Africa. Under these circumstances, it is necessary that considerable attention be paid to reformulating secondary school education to equip students with the skills relevant to the labour market.

The World Bank (2018) further found that although possession of a tertiary education gives a better chance of getting a highly skilled job, the number of such high positions in the labour market is relatively small. Overall, the World Bank (2018) elucidates that the structural mismatch between labour market demand and labour supply is attributable to inadequacies in the education systems to equip learners with skills required and relevant to the job market (StatsSA 2018). This demonstrates the misalignment between education and labour market's needs. The implications are that equitable quality education that leads to human capital should be considered first before social justice related inequalities such as unemployment and poverty can be realised.

Theoretical framework for inclusive equitable and quality education

This section unpacks the theoretical framework underpinning inclusive equitable and quality education human rights, together with the human capital and social justice approach that links the concepts.

Human rights-based approach

The UN started the call for inclusive education in 1996, in the Salamanca Statement and Framework for Action on Special Needs Education. These fora raised the demand to meet the educational needs of children with special education. The SDGs building on the MDGs are developed from a conceptual and theoretical framework that seeks to eradicate poverty and promote inclusive participation of people in sustainable development through inclusion of social, economic, ecological and education dimensions. The Dakar Education for All Framework spearheaded by UNSECO (2000) extends the call aimed at achieving universal primary education for all children and gender equality in education by 2015. The Education for All agenda focused on addressing the gap in funding and quality education by mobilising resources for financing education and improving the quality of education at different levels. UNESCO states that the primary goal of SGD4 is to '*Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*'. The UN conceptualised SDG4 from both a human rights and humanistic education principle. Within the SDG4, the vision, mission and objective of education shifted from the mere provision to emphasising inclusive access to equitable quality education, maintaining the focus on the universal and plurality of the right.

UNESCO (2007:1) describes the goal of the human rights-based approach to education as aimed at ensuring that every child receives quality education that respects and promotes their right to dignity and optimum development. The human rights based education places a legal obligation to create enabling conditions that address obstacles hindering access to education (UNESCO 2007). This indicates that education processes and practices at school and national levels should be adopted to address barriers to education. Literature shows that various approaches have been taken to interpret and promote inclusive and equitable quality education as a human rights issue (Macedo et al. 2020; Veletsianos 2020). Other approaches are evident in the works of Singal, Ware and Bhutan (2017) and Liasidou and Symeou (2018) who focus on the inclusion of students with disabilities whilst Carter and Abawi (2018) proffer leadership inclusion and occupational justice (Hocking 2017). These studies provide useful insights on the implementation of inclusive and equitable education based on specific human rights related perspectives.

Regarding the concept of equitability, De Vos et al. (2014) describe equality as the full and equal enjoyment of all rights and freedoms. Inclusive and equitable quality education has linkages to distributive and relational social justice dimensions. To this end, legislations and other measures have since been instituted to promote equality. Equitable human rights approach has linkages with the humanistic education philosophy. If all children get access to quality education then the human potential and capabilities of all the children could potentially be developed to help them to participate in local and national social and economic development leading to a just, equitable and cohesive society.

The concepts of substantive and formal equality are important elements of the human rights explicitly and implicitly relate to humanistic education and social justice. De Vos et al. (2014) elucidate that formal and substantive equality as well as the other rights are enacted lawfully to provide conditions that protect and respect the designated rights. De Vos et al. distinguish formal equality as referring to the principle of sameness and seeking standardisation whilst equity is concerned about fairness and just treatment. De Vos et al. (2014) describe formal equality jurisprudence as focusing on equal treatment of all people regardless of their differences in social and economic contexts. In addition, De Vos et al. (2014) argue that formal equality treatment by mere focus on equity and equality and disregarding social and economic issues may further generate inequalities of the marginalised groups. The human rights-based inclusive equitable and quality education framework calls for reconsideration of educational policies and practices to address inequalities experienced by the vulnerable and excluded population. These segments need to create productive livelihoods for their own benefits and the society. Bayad and Sayad (2014)

echo the same sentiments that substantive justice and equity rather than formal justice and equity address South Africa's economic inequalities. The current legal approach places emphasis on factors that are constraining the achievement of equality, equity, redress, good quality education and social justice for all.

Substantive equality is justice that takes into account the social and economic context leading to the inequalities before treating everyone as equal (De Vos et al. 2014). The notion of equality in social and economic opportunities draws attention to education, economic growth and distribution of the good and services. The argument is that increased productivity and improved skills base in a country promote economic growth, which is instrumental for economic and social development. Various studies such as those of Nwokoye, Onugha and Kalu (2020), Son (2010), Gillies (2015) observe that human capital contributes to economic growth. Empirical evidence suggests that although human capital is important for the purposes of optimising the welfare of the individual and society, it remains a major challenge in many countries. Obeng-Odoom (2019) states that countries in Africa should focus on building human capital. Nwokoye et al. (2020) found that Nigeria must prioritise development of human capital. Building of adequate aggregated levels of skills sets contributes to a country's economic and social welfare yet this remains a challenge in many countries.

Son (2010) describes human capital as the abilities and skills acquired through the education systems that enhance the efficiency of a people to transform raw material and capital into goods and services. Economic growth is desirable for creating economic opportunities generating both social and economic benefits (World Bank 2018). This implies that achieving social justice relies on quality education that mediates the development of human capabilities that in turn enhance the attainment of social justice. The OCED (2019:132) describes poverty prevention as a sine qua non for social justice that should take precedence over all the other factors. The validity of this perception lies in the fact that poverty triggers several inequalities, thus poverty impedes social justice. The World Bank (2018) recommended the generation of employment as an intervention strategy to reducing poverty. Macedo et al. (2020) found that quality education might also be used to break the vicious cycle of poverty when the people obtain productive skills in demand on the labour markets. In a trite expression, the poverty of the poor diminishes the wealth of the rich. The disparity in the distribution of educational attainment across provinces in South Africa is worrying because these generate the unintended consequences of inducing intergenerational injustices. The implication of integrating human capital entails the fact that inclusive and equitable quality education should then focus on addressing the economic and social needs of the economy in relation to the observed social justice inequalities.

Kuka, Shenhav and Shih (2020) advanced the idea of incentives to promote education. Angrist et al. (2019) identify the gaps in human capital observed as emanating from lack of quality education. This view suggests that there is a cause and effect relationship between quality education and human capital. South Africa faced a decline in social justice as reflected in the prevalence of deep forms of inequalities and uneven distribution of social and economic privileges. The inequalities persist despite the presence of strong legal systems that protect rights to education as along with promoting and protecting social justice. As such, drawing on lessons from the South African context, understanding inclusive and equitable quality education from a human capital theory might contribute to alternative ways of addressing social justice

Human capital-based inclusive and equitable quality education

Development of human capital has become a central development strategy globally (Nwokoye et al. 2020). Various inclusive and equitable qualities variables such as quality education, cognitive knowledge and skills, and learner literacy are used proxies of measures of human capital (Hanushek & Woessmann 2009). Education creates conditions where inequalities, unemployment and poverty can be reduced (Hanusheck 2020). A human capital approach focuses on skills that enable participants to find employment. The link between human capital and social justice also threads through the labour market and economic growth.

The World Bank (2018), using micro simulations to forecast the effect of generating employment, clarified that moving 10 people from unemployment to employment reduces poverty for seven people. The effects obviously differ with sectors. Likewise, adding 10 workers to employment would reduce poverty for 13 people. The findings and recommendations by Stats SA (2018) has implications on the use of equitable quality education as a predictor of human capital development that ultimately mediates social justice. The low correlation between education and the probability of finding a job in South Africa masks a dichotomy in the role of inclusive and equitable education, human capital development and social justice. The connection between strong social justice mechanisms and economic growth further reinforces the notion that inclusive and equitable quality education predict human capital, which mediates social justice. The OCED (2019) observed that social justice is stronger in countries that are supported by high economic growth.

The UNESCO (2016) views education as a system that aims to equip learners with basic skills that enable them to be productive in their communities and society. This suggests that the human rights inclusive and equitable quality education-based approach ensures that every child has the right to dignity and full development of their potential as human beings. It is therefore important to

ensure that every child is assured of access to opportunities that equitable quality education provides. Education and training entrench capabilities of the individuals, allowing them access to employment and distribution of income and other empowering opportunities. Marginson (2019) posits that the human capital theory postulates that quality education leads to the unlocking of productive talent within individuals in a nation to enhance economic productivity and economic development. The human capital theory views government expenditure on inclusive and equitable quality education as an investment that yields returns to the individual through earnings and the economic growth and economic development. Overall, such a scenario allows the realisation of social justice manifested in equal distribution and access of opportunities. Human capital theory endorses education of the individual as creating multifaceted material benefits and the individual social welfare of citizens.

Inclusive and equitable quality education is a strategic means for redressing injustices and inequalities to the end of attaining social justice. Social justice encompasses distributive and relational justice (Gewirtz 1998). De Vos et al. (2014) describe equality as the full and equal enjoyment of all rights and freedoms. An equitable human rights approach has linkages with the humanistic education philosophy. Inclusive and equitable quality education recognises equalling distribution and opportunities for developing human capabilities as central to achieving social justice. This UNESCO framework advocates education as contributing to equality in distribution and allocation of resources in the community. This implies that an inclusive approach can help provide different people with same means and substantial opportunities to develop their capabilities.

The World Bank (2018) findings verify that South Africa continues to suffer from inequalities, poverty and disparities in educational opportunities. Inequalities, when taken together, lead to the unequal distribution of opportunities. South African jurisprudence focuses on substantive equality to redress inequalities, taking into account the differences in the social and economic contexts, power and opportunities amidst the inequality. De Vos et al. (2014) warns that in the South African context, the historically unjust past created a system where social and economic exclusion and marginalisation of people based on certain attributes such as race, disabilities, gender and religion concretised inequalities and discrepancies in the wealth distribution and opportunities in the present times. It is debatable whether an attempt to redress persistent inequalities experienced in South Africa could be successfully pursued through a human rights approach alone.

Whilst formal and substantive equality is necessary, alone and in the absence of human capital, they may not be adequate to promote social justice through inclusive and equitable education in the South Africa. What is required is an understating of the role of inclusive and equitable quality education that mediates social justice. In the next section, this study discusses the context of

inclusive and equitable quality education and social justice in South Africa. We interrogate human rights, inclusive and equitable quality education in order to map a way forward.

Linking inclusive equitable quality education and social justice

The human rights-based quality education aims to respect and promote human dignity, human rights and freedoms. Hanushek (2020) noted that education creates conditions that reduce inequalities, inequities, unemployment and poverty. As part of it, inclusive and equitable quality education creates a platform for social justice. Hence, various bodies such as UNESCO, UNDP, United Nations Population Fund (UNFPA), UNICEF and the World Bank have made several efforts to promote inclusive and equitable quality across the world.

The mainstream thinking held by the UNDESA (2006) perceives social justice as focusing on participation and equity in the distribution of opportunities, resources and other privileges available in the society. Social injustice manifests itself in the inequalities such as extreme poverty, unemployment and income inequalities. UNESCO (2016) stresses that inclusive and quality education enables the individual to obtain decent work, raises their incomes and generates productivity that fuels economic development. The central idea behind inclusive and equitable quality education envisaged by UNSECO and other international bodies is unlocking the potential in every individual for prosperity and peace. For instance, UNESCO (2016) identifies education as a means for achieving equity and empowering individuals from various vulnerable groups. This entails the fact that education provides individuals from marginalised groups with an equal opportunity to participate in the social and economic opportunities available in the economy. A point overlooked in the human rights quality education is to integrate the human capital perspective. Gilles (2017) elucidates that human capital that developed through education generates general economic benefits to both the individual and society. Son (2010) points out that the primary benefits of education are that employers hire applicants with relevant education. Inclusive and equitable quality education increases a person's chances of employment and earning wages whilst stimulating economic growth for the country. Gilles (2017) elucidates that the human capital theory provides an understanding of the link between inclusive and equitable quality education and social justice.

Contribution of inclusive equitable quality to human capital in improving social justice

Inclusive education ensures that all those people who are excluded from education access quality offerings. UNESCO (2016) and Schaefer (2019)

identified the marginalised and disadvantaged learners who are excluded from receiving education and contend that the diverse needs of all children could be promoted through participation and inclusion. This quality education influences the nature of opportunities that learners could access for them to participate and promote social and economic opportunities in the society. Human capital theory considers education as an investment that should yield returns to the individual through increasing productivity and economic growth (Gillies 2015). In contrast to the human rights approach, the human capital theoretical principles focus on how young people from the vulnerable groups can develop their human capacities to realise their full potential for their individual benefit and that of the society.

Quality education and human capital are linked to economic development. This is a key indicator that determines standards of living and quality of life, which all contribute to social justice (Hendarmin & Kartika 2019; Ziyaviddinovna 2019). Economic development is important for overcoming problems of low living standards, high differentiation of society, unemployment and inequalities (Ziyaviddinovna 2019). The development of human capital leads to redistribution of income, employment and reduction of poverty (Olopade et al. 2019). Human capital contributes to social justice through its influence on productivity. Hendarmin and Kartika (2019) explain that productivity is a measure of economic outputs compared to inputs. Blanden and Machin (2010) elucidate that human capital development relies on the educational attainment of learners. They submit that this has an impact on the labour market through their capacity to participate in the productive economy. The human capital theory posits that each individual person has a set of skills that might be developed through the education systems to enable every individual to be productive in meaningful ways.

Gillies (2015) and Son (2010) clarify that human capital reflects the impact of overall learner attainment on the labour market in terms of the skills acquired by the learners to increase productivity, adopt new technologies and innovation. Son (2010) elucidates that individuals with better education tend to have access to better employment opportunities, greater earnings and produce better output than those who are less educated. The implication of the human capital perspective is that inclusive and equitable education is necessary for both the individual and the country. Blanden and Machin (2010) understand human capital development as the central undertaking that educational institutions should focus upon as this has a direct impact on the labour market with regard to productivity. The human capital theory views the goal of inclusive and equitable education as the basis for building a repository of skills that are necessary for creating the society and economy for the mutual benefits of the individual and the nation. Figure 3.3 depicts the framework that explains the relationship between inclusive and equitable quality education, human capital and social justice.

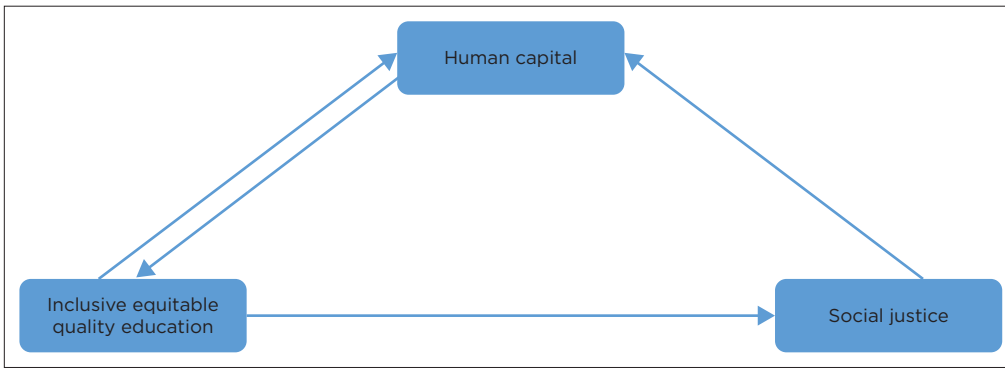


FIGURE 3.3: Human capital, inclusive quality education and social justice framework.

The proposed framework avers that education is a predictor of human capital development that consequently mediates human capital into social justice. The framework set above assumes that quality education mediates the development of human capital that is equipped with skills, values, attitudes and knowledge affording citizens an equal opportunity to lead healthy and fulfilled lives. The framework shows that inclusive quality education and human capital development operate in a mutual symbiotic relationship. This means that inclusive equitable quality education creates conditions that enable the development of human capital. In turn, human capital development creates conditions that mediate the attainment of inclusive quality education and vice versa. The framework assumes that inclusive and equitable quality education is an antecedent precondition for social justice. Gillies (2015) states that the human capital theory regards education as an instrument for promoting social justice. Such a scalar representation is perceived as leading to the attainment of social justice. Tikly and Barrett (2011) emphasise that inclusive and equitable quality education ensures equity to opportunities rather than mere access to resources or equity of outcomes.

Gillies (2015) underscores the fact that human capital theory is underpinned by the realisation that investment in education promotes a return on investment (ROI) through skills development and competencies gained by participants to initiate productivity in the economy. This suggests that equitable quality education is instrumental in achieving social justice through enhanced human capital abilities. The UN-UDHR legal framework reinforces education as a fundamental human right that concerns the development of their full personhood through equitable participation in education. Driven by the theoretical insights from the UN-UDHR inclusive and equitable educational policies should be informed by the human rights and human capital approach. The human capital theory links to social justice in three specific ways. Firstly, the

human capital theory regards education as an investment that redistributes income based on the skills and knowledge acquired through education and training (Gillies 2015). Secondly, education and training enhance workforce quality and generate economic benefits for the individual and society (Gillies 2015; World Bank 2020). Human capital development influences economic growth which in turn determines economic development reflected through measures such as the standards of living, rate of unemployment, poverty and equalities in the distribution of income (Son 2010). Developing human capital would therefore lead to social justice by enhancing income distribution and several other benefits to the society.

To achieve social justice, the human capital should integrate the human rights approach to inclusive quality education. Vandekinderen, Roets and Van Keer (2018) contend that inclusive and equitable quality education is a multi-layered concept, which seeks to recognise and redress obstacles that create exclusion or hinder access or participation in education, such as gender, disabilities, social economic and educational processes, policies and procedures. Shaeffer (2015, 2019) advocates that inclusive education is a prerequisite for equity and social justice. Astuti (2020) describes social justice as focusing on similarities and differences with the intention of avoiding discrimination and any forms of oppression. The human rights approach predominantly focuses on eliminating systemic barriers that deny opportunities to participate and emphasises redistribution of resources in order to redress inequalities.

Social justice encompasses distributive and relational justice (Gewirtz 1998). Fraser (1997) proposes social justice as being constitutive of redistributive recognition. Inclusive and equitable quality education is based on the human capital theory that provides the rationale for government to expand spending on education. Marginson (2019) points out quality education produces productive workers who are essential for optimisation of economics of education. This entails that investing in education enables adequately skilled workers to unlock their potential through productive services in the society and economy. De Vos et al. (2014) describe equality as the full and equal enjoyment of all rights and freedoms. Ensuring inclusive and equitable quality education for marginalised groups enhances their productivity in the economy and social lives. The aspiration of inclusive and equitable quality education is described by the UN Department Economic and Social Affairs (2021) which says that inclusive and equitable quality education aims to ensure a full and productive life to all individuals, fundamental skills and higher-order skills that are required at all stages of education and development. Weak access to education and social poverty generates a vicious cycle. If this vicious cycle is not disrupted, there is a potential risk that the imbalances in resource distribution and social justice challenges could be perpetuated *ad infinitum*.

Conclusion

Despite so much effort that has been placed towards promoting social justice through legislative measures, it seems impossible to achieve this goal in the absence of socio-economic development. This compels the government to promote inclusive equitable education, the development of human capital and economic development. This compulsion enhances the attainment of social justice and socio-economic rights. It is imperative for the state to consider investing in inclusive equitable quality education to alleviate social injustices. From the study, inclusive equitable quality education and human capital keep the economic wheels turning and pushing forward the values of social justice. To promote inclusive and equitable quality education focusing on building human capital and achieving social, it is important for policies and practices in schools at both local and national levels could be redesigned.

The human capital has effects on the distribution of income, employment and poverty reduction. This indicates that there is a need to strengthen the education system and to promote education for all by 2030 and beyond. To strike a balance of meeting the needs of the individual and society, the educational reforms are necessary. Given that education becomes an investment to both the individual and the society, it is imperative that 'state of the art' education systems and investment in education are privileged. The framework in Figure 3.3 could assist decision makers in addressing social justice through developing individual skills and capacities. This would readily feed into human capital development that refracts the productivity needs of the country as reflected in the labour market and development needs of the society. Education systems should consider the relevance of their educational outcomes with regards development of human capital needs of their economy. Of course, these vary with the social and economic development context of each country.

Inclusive and equitable quality education is the central hub of the framework. It is framed to keep producing individuals with attributes convertible into improved human capital skills base. The attributes should be enterprising and social-oriented to facilitate harmonisation of productivity with the socio-economic well-being. Economic and social justice are fundamental elements of human rights. In conclusion, there is an interrelationship between inclusive and equitable quality education, human capital, human rights and social justice.

PART 2

Empirical studies of quality educational practices

Chapter 4

The effects of personal epistemological beliefs on pedagogical use of information and communications technologies: A comparative case of Gauteng and North-West provinces in South Africa

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Synopsis

The adoption of Information and Communications Technologies (ICTs) in classrooms is often associated with enhancement of learners' learning experiences, acquisition of knowledge, broadening access to quality education and realisation of social justice in educational spaces. Despite these claims about the academic benefits of increased use of ICT in education, it is critical to acknowledge the fact that educators' personal epistemological and pedagogical beliefs may shape the trajectory of pedagogical use of ICTs (PUI). Yet, the substantial evidence on the connection between personal epistemological and pedagogical beliefs and the pedagogical (i.e. in traditional and constructivist) use of ICTs in the contexts of emerging economies remain speculative and under-explored. This grey area is concerning as effective deployment of ICTs as mediating tools in learning in classrooms remains scant in the resource-constrained contexts of emerging economies. This chapter reports on a study that investigated the relationship between educators' personal epistemological beliefs (PEBs) and their PUI in classrooms. Findings suggest that educators displayed an indifferent PEBs outlook characterised by naïve, albeit slightly more sophisticated PEBs, pointing to multidimensional conceptualisations about the source and nature of knowledge. Furthermore, the results show significant differences in PEBs and constructivist PUI based on gender and location. The findings suggest that policy changes and educator professional development on educational technology integration in the classroom should incorporate educators' personal beliefs that shape their classroom instructional practices.

Introduction

Information and Communication Technologies have become an integral part of contemporary classrooms as educators draw on them as instructional tools and resources in delivering the curriculum. The motivation for using ICTs ranges from their potential to improve the quality of teaching and learning (Groff 2013), bridging the societal gulf between the 'haves' and the 'have nots' in terms of access to quality education (Mikre, 2011). Information and communication technologies are also credited with improving access to learning resources, contributing to redressing of social inequalities and the delivery of lifelong learning (Republic of South Africa 2004:16). Information and communication technologies have also been hailed for their potential to drive economic development and social change (Hennessy, Harrison & Wamakote 2010; Myovella, Karacuka & Haucap 2020) and to enable the provision of innovative infrastructure.

Despite these promises, Ertmer et al. (2012) warn that increasing access to ICT is insufficient for changing educators' technology practices. This chapter

contends that ICT access must be accompanied by a corresponding shift in educators' PEBs. Chan (2011:89) defines PEBs as 'an individual's personal beliefs *or perspectives* about the nature of knowledge and knowledge acquisition or learning' (emphasis added). Personal epistemological beliefs have been found to frame the behaviour of educators when engaging in classroom practice (Fives & Buehl 2012; Olafson, Schraw & Veldt 2010), and contribute to their search for sources of knowledge and justification for what their students know (Hofer & Pintrich 1997:120). Therefore, educators' beliefs about the nature of knowledge and its acquisition in a learning context influence their decisions related to the pedagogical practices (Çetin-Dindar, Kırbulut & Boz 2014; Deng et al. 2014). We extend this argument by arguing that PEBs may also shape educators' conceptions and choices of learning resources and learning tools (e.g. educational ICTs) to be used in the classroom and improve student learning. For example, Çetin-Dindar et al. (2014) found that pre-service chemistry educators who hold sophisticated PEBs preferred constructivist learning environments.

Despite the highlighted benefits of PEBs in facilitating the development of constructivist learning environments, and shaping the pedagogical practices (i.e. traditional- or constructivist beliefs) that they use (Fives & Buehl 2012), it remains unclear whether such beliefs are homogenous amongst educators across different contexts. Jacobson et al. (2010) suggest that PEBs of educators are not relatively fixed and stable but are rather contextually influenced. Although scanty, other literature has contested this view and rather emphasised the relative permanence of PEBs irrespective of the contexts of educators (Hofer 2006). Chan and Elliot (2004a:129) further buttress this view but argue that 'there are certain common dimensions of epistemological beliefs identifiable in western and non-western cultures'. In view of this controversy regarding whether PEBs are context-dependent and bound or relatively homogenous across divergent contexts, the exploration of the relationship between PEBs and the specific context of their application becomes timely and relevant to educators and the academic community.

The other grey area is whether possession of certain PEBs facilitates and predicts the pedagogical use of ICTs (PUI) in classrooms. Some literature has claimed that PEBs have a significant relationship with how educators pedagogically use ICTs in their classrooms. For instance, Deng et al. (2014) found PEBs to significantly correlate with constructivist use of ICTs. Furthermore, they found PEBs to directly predict constructivist use of ICTs in the classrooms. Other literature contests this view and argues that possession of sophisticated PEBs does not necessarily translate to effective integration of ICTs in classrooms. For instance, Jacobson et al. (2010) highlight the fact that there was no relationship between beliefs about knowledge and learning, and the use of learner-centred practices by Singaporean educators. This lack

of consensus creates a grey area regarding the extent to which possession of certain PEBs bears on integration of ICTs in the classroom.

Re-searching personal epistemological beliefs

The foregoing discussion presents a strong foundation for investigating the effects of PEBs on the location of PUIs including whether educators' PEBs predict their PUIs. To close this research gap, this chapter addresses the following research questions:

- **RQ1:** What personal epistemological beliefs do select Gauteng and North West province educators have?
- **RQ2:** Is there a relation between Gauteng and North West educators' PEBs and their PUIs?
- **RQ3:** In what way do the educators' beliefs predict PUI by Gauteng and North West educators?

Addressing the above questions is fundamental to the realisation of meaningful educational outcomes through innovative deployment of technologies, which create opportunities that foster the skills and abilities of the 21st century (Lee et al. 2013). Furthermore, the use of ICTs and other technologies is central to pedagogy as they provide authenticity in recreating real-world experiences for the learners engaging in purposeful learning tasks (Herrington, Reeves & Oliver 2009; Mikre 2011; Windschitl 2002). Based on the same notion, PEBs have been integral in shaping the behaviours of educators on PUI in the classrooms (hereafter referred to as use of ICT) (Deng et al. 2014), the same way educators have been hailed as vital forces of educational change and critical resources in the successful integration of ICT in classrooms (Kwon et al. 2019).

Theoretical framework

Constructivist and traditional pedagogy

Constructivist pedagogy is a paradigm of learning that provides impetus to learner-centred learning. According to Felder and Brent (1996:43), learner-centred instruction is 'a broad teaching approach that includes substituting active learning for lectures, holding students responsible for their learning, and using self-paced and cooperative (team-based) learning'. Learners actively participate in their learning through authentic tasks that develop their real-world skills rather than just promoting knowledge recall. This warrants the creation of learning environments that facilitate self-directed learning and allow learners to collaborate on activities during their learning process.

Ultimately, the focus is on the process of learning over the outcomes of learning (Teo & Zhou 2017).

Constructivist pedagogy is a contrast to traditional pedagogy that embraces educator-centred strategies that privilege 'transmissionist' teaching practices and 'absorptionist' approaches to learning. Furthermore, traditional pedagogy casts the educator as the sole source of knowledge in the classroom, and the learners are seen as passive recipients of knowledge (Freire 1976). As indicated later, there is a link between the teaching paradigm or practice adopted by an educator and the pedagogical beliefs they possess (Çetin-Dindar et al. 2014; Deng et al. 2014; Fives & Buehl 2012). Additionally, the use of ICT promotes constructivist learning (Mikre, 2011).

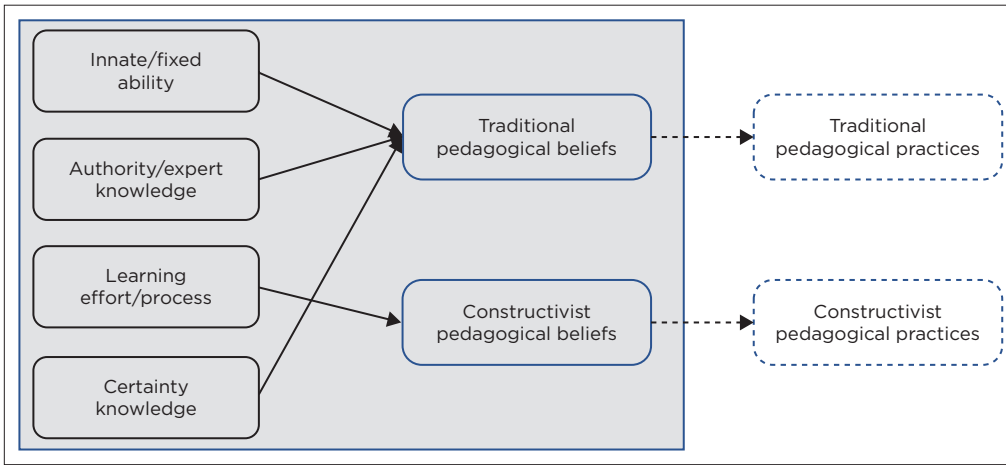
Literature review

Personal epistemological beliefs

According to Hofer and Pintrich (1997), research related to epistemological development began in the 1950s, and inspired by William Perry's 1970s developmental scheme – 'Scheme of Intellectual and Ethical Development', researchers have posited models that are structural and developmental. Research on epistemological development and knowing can be grouped into (Hofer & Pintrich 1997):

> That interested in '*how individuals interpret their educational experiences*', led by Marcia B. Baxter-Magolda and Mary Field Belenky and others.
>
> That interested in '*how epistemological assumptions influence thinking and reasoning processes,* [*in particular*] *reflective judgment*', led by Patricia M. King and Karen Strohm Kitchener, and 'skills of argumentation' led by Deanna Kuhn.
>
> That which has taken an '*approach that epistemological ideas are a system of beliefs that may be more or less independent rather than reflecting a coherent developmental structure*' (a multidimensional nature of beliefs), led by Marlene Schommer, and Michael P. Ryan. (pp. 89–90)

We examine PEBs based on the third option of schemes as these have been widely used in studies of educators' PEBs. These schemes are underpinned by Jean Piaget's equilibration model of cognitive change. In 1990, Marlene Schommer proposed a five-dimensional model for epistemological beliefs. In her model, each PEB dimension varies along a continuum from naïve (*objectivist*) to sophisticated (*evaluatist*) belief persuasions about the nature of knowledge and knowing (Schommer 1990). For instance, educators who hold naïve PEBs believe that knowledge is simple, specific and that it resides in and comes from an authoritative source; it is certain and unchanging. They believe concepts are learned quickly or are never learned at all (Chan & Elliot 2004b). In contrast,



Source: Adapted from Chan and Elliot (2004b).

FIGURE 4.1: The path model showing possible influences of personal epistemological beliefs dimensions on pedagogical beliefs.

educators who hold sophisticated PEBs believe that knowledge is complex, tentative and uncertain, they believe knowledge can be learned gradually through a reasoning process, and learners can construct new knowledge (Chan & Elliot 2004b). Therefore, the beliefs that educators have about the nature of knowledge and its acquisition in a learning context influence their decisions about the pedagogical practices (i.e. traditional- or constructivist beliefs) that they use (Fives & Buehl 2012). According to Schommer (1990), each individual belief dimension develops independently of the other; thus, an individual may have a multidimensional belief system that may contradict. This was confirmed by Olafson et al. (2010) who found educators to simultaneously have both naïve and sophisticated worldviews.

Figure 4.1 adapted from Chan and Elliot (2004b) depicts generally accepted relationships between PEBs and pedagogical beliefs in grey shade. Also shown (dashed lines) is the theorised relationship with educators' practices. Other studies, such as that by Deng et al. (2014) have found alternative relations, for instance, a significant relationship between Certainty Knowledge (CK) and constructivist pedagogical beliefs.

Personal epistemological beliefs and geographical location

Studies have claimed significant differences in individuals' PEBs from different geographical locations. For instance, literature reviewed by Hofer (2008) indicates that there are differences in PEBs between individuals from different geographical regions. Geographical regions have different socio-cultural

contexts; therefore, socio-cultural factors may have a significant influence in shaping PEBs (Youn, Yang & Choi 2001).

Personal epistemological beliefs and teaching with information and communications technologies

Personal epistemological beliefs are important antecedents to the use of ICT (Chai 2010; Tondeur et al. 2017). The assumption is that PEBs frame educators' pedagogical beliefs (Chan & Elliot 2004b) and other beliefs such as beliefs about ICT (Deng et al. 2014). Thus, educators' negative beliefs towards ICT become a barrier to their adoption in the classroom (Ertmer et al. 2012). Educators who hold constructivist beliefs are likely to use ICT for constructivist teaching, but may also be open to use ICT for traditional teaching (Chai 2010; Hermans et al. 2008). Therefore, it is possible for educators to hold and practise both traditional and constructivist pedagogical beliefs (Chai 2010; Tondeur et al. 2017).

Information and communications technologies have their affordances and constraints and customisability features that make them more applicable in certain tasks compared to others (Koehler, Mishra & Cain 2013). Understanding these properties helps educators to select ICT tools that align with certain curricular variables such as teaching strategies and their existing beliefs. When educators strongly believe certain ICT tools will be beneficial for achieving their goals, they will select and use those tools. Therefore, policymakers may not impose ICTs that contradict educators' core values and beliefs (Tondeur et al. 2017).

Participants and method

Context

The Gauteng provincial government through its Department of Basic Education (DBE) is on a massive drive to create 'SMART schools' where several selected classrooms in its 15 school districts are converted to 'smart classrooms' equipped with ICTs. To redress previous inequalities and uplift education standards, the provincial government targets public schools in previously disadvantaged communities. The schools are derelict and some lack basic facilities conducive for effective teaching and learning. Common ICT provided by the department includes Wi-Fi and subscriptions to Internet service providers, SMART boards, tablet devices for learners and laptops for educators. There were no known ICT integration projects in the North West by the time data were collected in 2017. However, the province has several schools that are equipped with ICT. In its 2019/2020 Annual Performance Plan, there are plans to train in-service educators to increase their competency in the use of ICTs,

hence improving the quality of teaching and learning. Furthermore, the plan proposes to introduce an e-Learning Solution Project, and the expansion of communications and ICT roll-out (North West Province 2019:20, 41). Windschitl (2002) argues that contextual dilemmas that may include school environment and resources influence educators' classroom practices, and how PEBs translate into practice.

Method

The study adopted a descriptive exploratory correlational design. A survey was conducted with a select group of educators from Gauteng and North West provinces of South Africa who teach using ICT. A total of 579 questionnaires were distributed in the third term of the school calendar in September and October of 2017, and 217 educators returned the questionnaires – this translates to a response rate of 37.5%. The educators were drawn from 43 purposefully selected schools (37 in Gauteng and 6 in the North West). The target population in Gauteng is much larger than that in North West as Gauteng has a better established programme for the introduction of ICT in classrooms compared to its other provincial counterpart.

Participants and sampling

The study's major focus was on describing and explaining educators' beliefs and how these relate and influence PUIs by the educators. Therefore, a key criterion was that the participants had to be using ICTs in their classrooms, and be willing to voluntarily participate in the study. A hybrid sampling strategy was used to select participants. The method merges purposeful sampling with the simple random sampling technique (McMillan & Schumacher 2014). Non-probability purposive sampling was used to obtain a list of schools with ICTs in the provinces and at each district level. Then a simple random sample was used to select five out of 15 school districts in Gauteng, and schools within a particular district. In North West, only one district out of four had a larger number of schools with ICTs concentrated in it, and this was selected. Following Liu's (2011) method, a total of 2–20 questionnaires were left at each selected school; these were distributed to educators through each school's principal.

The instrument

The survey instrument measures several variables and is derived from diverse studies that have validated the reliability of the PEBs latent variables (Chan & Elliot 2004b; Lee et al. 2013; Schommer 1990), and the PUI scale (Chai 2010).

The PEBs scale was used to gather PEBs of educators. It consists of 31 items covering the four hypothesised PEBs based on the work of Schommer (1990) and Chan and Elliot (2004b). The PUI by educators was measured using two sub-scales: traditional PUI and constructivist PUI scales. The scales are an adaptation from the work of Chai (2010) and Deng et al. (2014). Each scale has eight items and examples of statements are 'I use ICTs to measure and practice skills just learned by learners' (TPUI) and 'I use ICT [...] to create "real-world" tasks for my learners' (CPUI). To fit the local language and terminology, and relevance to the study purpose and context, statements were language edited and customised. The scales in the questionnaire used a five-piont Likert scale.

Data analysis

Statistical Package for the Social Sciences (SPSS) version 25 software was used to analyse the data. We derived descriptive data such as means, standard deviation, skewness, kurtosis and Cronbach's alpha coefficient. Further, several non-parametric inferential tests were used: Spearman's rho (*r*) was used to test bivariate relations of sample data; hierarchical sequential regression analysis to test the effects of PEBs on PUI by educators and Mann–Whitney U tests were used to compare belief variables on gender and school location (province, urban and township) groups.

To understand the findings from the data analyses, we adopt a few guidelines as benchmarks in this study. Yorulmaz et al. (2017) used (5-1)/3 evaluation intervals to interpret arithmetic mean scores. A score in the range of '1–2.33' is accepted as low; '2.34 – 3.67' is medium or moderate and a mean score in the range '3.68–5.00' is termed as high. Correlation coefficients are also used to measure effect size that explains total variance. Cohen (1988) and Field (2013) provide guidelines that suggest interpretation of coefficient values: r = 0.10–0.29 is considered a small or weak effect, r = 0.30–0.49 is a medium effect and r = 0.50–1.00 is interpreted as a strong effect.

Results

Reliability

Cronbach's alpha coefficient tests were conducted to establish the internal consistency of the instrument. However, before testing for reliability, factor analysis was conducted to determine how closely correlated the underlying variables were. According to Tabachnick and Fidell (2014), this entails combining into a factor those variables that are correlated to each other but are mostly independent of other subsets.

Using recommendations from Field (2013), principal component analyses were conducted in this study with the convergence of factors with an eigenvalue greater than 1 being retained. Further, according to Field (2013), a normal distribution is important if the results are to be generalised but this is not the case for this sample. Hence the assumption of normality was not important for the factor analysis. Following Field's (2013) guidelines and for the purposes of reliability test results interpretation, this study treats a Cronbach's alpha value greater than 0.70 as excellent, greater than 0.50 as moderate and the one below 0.50 as poor. The alpha value for most scales and factors was high indicating moderate to excellent reliability.

Reliability and exploratory factor analysis of personal epistemological beliefs

In SPSS, an exploratory factor analysis (EFA) produced eight dimensions of the PEBs which complicated the originally hypothesised groups of statements (Chan & Elliot 2004b). These new dimensions did not make any meaningful latent variables. Therefore, the EFA result was discarded. Instead, the dimensions from previous studies, where four dimensions were extracted were used, and were conducted by Chan and Elliot (2004b) and Lee et al. (2013). The results of the internal reliability test for PEBs are shown in Table 4.1: 'innate or fixed ability' (IFA) $\alpha = 0.64$ after removing one item, 'learning effort or process' (LEP) $\alpha = 0.81$, 'authority or expert knowledge' (AEK) $\alpha = 0.61$ and 'CK $\alpha = 0.79$. The widely accepted social science alpha cut-off proposed by McMillan and Schumacher (2001) is 0.70 and higher. Although the Cronbach's alpha coefficients are low on some dimensions, these are typical to those

TABLE 4.1: Reliability test and exploratory factor analysis of personal epistemological beliefs of educators.

Latent factor	Hypothesised personal epistemological beliefs (PEB)	*N*	Mean	SD	No. of items	α	Eigen-value	Percentage of Total variance explained	Average Frequency: Agree or strongly agree	Comments
1	Innate or fixed ability	216	3.01	0.67	6	0.64	6.45	20.81%	43.1%	**(Moderate)** Indifferent
2	Learning effort or process	217	3.88	0.50	13	0.81	3.68	32.68%	75.9%	**(High)** Sophisticated
3	Authority or expert knowledge	217	3.20	0.62	5	0.61	2.04	39.25%	43.5%	**(Moderate)** Moderately naïve
4	Certainty knowledge	217	2.70	0.79	6	0.79	1.73	44.84%	27.6%	***(Moderate)*** Moderately sophisticated
	Average mean score		3.25							

reported in related literature. For instance, in a study of pre-service educators in Hong Kong, Chan (2011) showed values for IFA $\alpha = 0.70$, LEP $\alpha = 0.67$, AEK $\alpha = 0.66$ and CK $\alpha = 0.62$.

Reliability and exploratory factor analysis of pedagogical use of information and communications technologies

Table 4.2 shows Cronbach's alpha coefficients of reliability and summary results of EFA of PUI. All derived dimensions had eigenvalues greater than 1, and had moderate to excellent reliability coefficients with values for alpha ranging from 0.55 to 0.91. The total variance explained by all three sub-dimensions under TPUIs was 63.88%, and CPUI was 54.49%.

The results presented in Table 4.2 bear similarities to those from Deng et al.'s (2014) study which also has one factor of 'constructivist use of ICT', with exactly the same Cronbach's alpha coefficient of 0.87. In a Singaporean context, Chai (2010) indicated a reliability factor of 0.91 for the same scale.

Test for normality

The choice of inferential tests on data depends on whether the data are normally distributed or not (Bordens & Abbott 2011). We ran the Kolmogorov–Smirnov (K-S) goodness of fit test to test for normality. Sampled data were not normally distributed as the *p*-values for the hypothesised dimensions were significant at $p < 0.05$. Non-parametric tests do not make robust

TABLE 4.2: Summary of reliability test and exploratory factor analysis of (1) traditional pedagogical use of information and communications technologies and (2) constructivist pedagogical use of information and communications technologies.

Uses of ICT	Latent factor	Hypothesised dimension	*N*	Mean	SD	No. of items	α	Eigenvalue	Percentage of total variance explained	Average Frequency: Agree or strongly agree
Traditional pedagogical use of ICT (TPUI)	1	ICTs for content representation or media representation	213	3.99	0.68	2	0.81	2.69	33.68%	80.6%
	2	ICTs for demonstration	214	3.47	0.76	3	0.62	1.31	16.43%	56.4%
	3	ICTs for practice	212	3.38	0.66	3	0.55	1.10	13.77%	51.9%
	Totals			3.61					63.88%	63.0%
Constructivist use of ICT (CPUI)	1	CPUI	205	3.48	0.68	8	0.87	4.36	54.49%	57.8%

CPUI, constructivist use of ICT; ICT, information and communications technologies; TPUI, traditional pedagogical use of ICT.

assumptions as compared to their parametric counterparts (Field 2013). Despite this shortfall, the study used non-parametric tests as the distribution was not normal. The results of the study are described in the following sections: (1) descriptive statistics of educators, (2) gender, location and differences in PEBs and PUI, (3) relations between PEBs and PUI, and (4) predictive model regarding PUI.

Sample demographics

The majority, 63.4% of the respondents were female and 36.6% were male. This reflects the actual skewedness in the recruitment of educators in South Africa where more females as compared to males are educators. Most educators fall in the 20–30-year age group (31.5%), it dips to 19.0% in the 31–40-year group, then peaks again (29.1%) in the 41–50-year group. A majority (65.3%) of respondents are located in the township schools whilst 34.7% are located in the urban schools. In South Africa, townships are densely populated, predominantly low-income residential areas built under apartheid exclusively for black Africans. Gauteng's 'SMART schools' project mainly targets township schools (ITWeb 2016), and this locational dynamic is reflected in this demographic. The intensity of Gauteng's classroom digitisation project also reflects a fairly higher number of educators in the target population compared to the North West. Furthermore, the Gauteng's project mainly targets senior learners; hence, more educators who use ICT are found in secondary schools.

Personal epistemological beliefs

The descriptive statistics of the four PEBs of educators help to partially answer the question '*What personal epistemological beliefs do select Gauteng and North West province educators have?*'

As can be inferred from Table 4.1, the educators' statistical mean score when all four sub-dimensions of PEBs are combined is $M = 3.25$. Thus, using Yorulmaz et al.'s (2017) interpretation, we can conclude that the educators have moderately sophisticated PEBs. When examining the findings according to individual PEBs sub-factors, the mean scores of three PEB factors, viz. IFA, LEP and AEK were just above the neutral mean of 3.00. Certainty knowledge had a mean below 3.00, indicating that educators are not certain or absolute in their beliefs in these dimensions. This means that the in-service educators who responded to the study have moderate albeit naïve beliefs in the first three measures, whilst a strong mean score $M = 3.88$ on LEP indicates more sophisticated beliefs about learning effort.

The results of IFA and AEK differ from those of Chan (2011) where participants had mean scores slightly below 3.00 indicating relatively sophisticated epistemological beliefs in the two dimensions. Thus, respondents

moderately espoused a belief that learning can be etched at birth but at the same time learning may depend on learners' effort, and the ability to learn can be developed. Therefore, the educators had moderately sophisticated epistemological beliefs.

Educators' beliefs on LEP and CK translate to sophisticated beliefs and slightly sophisticated beliefs about knowledge, respectively. A mean score of LEP $M = 3.88$ shows that Gauteng and North West provinces' educators believe that learning is a process that needs effort and better understanding. Certainty knowledge has a mean score of $M = 2.70$ a moderate sophistication (Yorulmaz et al. 2017). This indicates that the educators hold the moderate opinion that knowledge is not certain but tentative and is in a flux. This result corroborates Chan's (2011) finding on epistemological beliefs and conceptions of learning of selected Hong Kong pre-service educators, who believe knowledge acquisition is a process that requires effort and hence knowledge is not considered as certain.

Determining if medians of two or more groups are different

The TPUI dimensions were aggregated in subsequent analysis. Consequently, a new reliability test was run, the Cronbach's coefficient was $\alpha = 0.71$ where $N = 211$, with six cases excluded listwise. Subsequently, this had a small effect on the initial statistical mean. Mann–Whitney U and Kruskal–Wallis H tests, that are used when data are not normally distributed, were used to test for group differences based on several grouping variables. In this chapter, we report on gender and school location (province, and either urban or suburban or township) grouping variables.

Comparison of personal epistemological beliefs by gender and school location

This section partially answers *RQ1*. According to McMillan and Schumacher (2014), the median is the best central tendency measure to describe data that are highly skewed or when reporting non-parametric data. The non-parametric tests described in this study are rank-ordered; therefore, medians are also reported as part of the descriptions. Table 4.3 shows the significant results of comparisons of PEBs by gender, province and school location.

The results show that there is a significant difference for IFA between male educators (Mdn = 3.17) and female educators in the two provinces (Mdn = 2.83), $U = 4080.5$, $z = -2.89$ and $p = 0.004$. Similarly, there is a significant difference in CK between males (Mdn = 2.83) and females (Mdn = 2.67), $U = 4003.0$, $z = -3.19$ and $p = 0.001$. These results imply that more male educators believe learning ability is fixed at birth and unchanging as compared to their

TABLE 4.3: Comparison of personal epistemological beliefs by gender, province and school location.

PEBs dependent variables	Gender	Rank means		Median (Mdn)	Mann–Whitney *U*		
		N	Mean rank		Mann–Whitney U	*Z*	Asymp. sig. (two-tailed)
Mann–Whitney *U* test – showing only significant PEBs by gender							
Innate or fixed ability	Male	78	124.19	3.1667	4080.500	–2.888	0.004
	Female	137	98.78	2.8333			
	Total	215					
Certainty knowledge	Male	79	126.33	2.8333	4003.0	–3.192	0.001
	Female	137	98.22	2.6667			
	Total	216					
Mann–Whitney *U* test – showing only significant PEBs by province							
Innate or fixed ability	Gauteng	162	113.31	3.1667	3594.0	–1.967	0.049
	North West	54	94.06	2.8333			
	Total	216					
Certainty knowledge	Gauteng	163	118.59	2.8333	2838.0	–3.919	0.000
	North West	54	80.06	2.3333			
	Total	217					
Mann–Whitney *U* test – showing only significant PEBs by school location							
Innate or fixed ability	Urban or suburban	75	88.02	2.6667	3751.500	–3.458	0.001
	Township	140	118.70	3.1667			
	Total	215					
Authority or expert knowledge	Urban or suburban	75	88.27	3.0000	3770.0	–3.490	0.000
	Township	141	119.26	3.4000			
	Total	216					
Certainty knowledge	Urban or suburban	75	73.36	2.1667	2652.0	–6.042	0.000
	Township	141	127.19	2.8333			
	Total	216					

PEB, personal epistemological beliefs.

female colleagues. Furthermore, male educators believe more in knowledge being stable and unchanging as compared to their female colleagues. Thus, female educators have more sophisticated epistemological beliefs compared to their male counterparts. This concurs with related studies in literature which pointed to female in-service educators having fairly more sophisticated beliefs about IFA as compared to their male counterparts (Lee et al. 2013).

For instance, in a Chinese study, Lee et al. (2013) found that male in-service educators scored higher on IFA beliefs than female educators, suggesting that male educators are more amenable to believe in fixed ability as compared to their female counterparts.

The Mann–Whitney U comparison test was run for PEBs based on location (Province, and urban or township). Of the four PEBs, there is a significant difference in IFA, where Gauteng educators (Mdn = 3.17) have naïve beliefs compared to their North West counterparts (Mdn = 2.83), $U = 3594.0$, $z = -1.967$ and $p = 0.049$. Additionally, there is significant difference in CK where Gauteng educators (Mdn = 2.83) believe more in CK than North West educators (Mdn = 2.33), $U = 2838.0$, $z = -3.92$ and $p < 0.001$. Therefore, North West educators have more sophisticated beliefs in IFA and CK compared to educators in the Gauteng province. Locational context or geographical region has been shown to influence the instructional and pedagogical beliefs of educators. For example, the study conducted by Chan and Elliot (2004b) in Hong Kong produced results that were contrasting to those conducted by Schommer (1990) who popularised studies on dimensional epistemological beliefs in America. This shows that individuals in different contexts tend to have different emphases on their epistemological beliefs (Choi & Kwon 2012). For this study, the differences in beliefs by location could be an indication of the reality that despite national Department of Education's requirements for educators' compliance when teaching the curriculum, some differences in localised practices of educators persisted, pointing to the confounding influence of contextual factors on the conduct of teaching.

Results indicate that location in terms of either urban or suburban or township significantly influences three of the four PEB dimensions. For IFA, there is a significant difference between educators teaching in suburbs (Mdn = 2.67) and those teaching in township schools (Mdn = 3.17). Educators in townships believe more in fixed learning ability as compared to their counterparts in suburbs: $U = 3751.5$, $z = -3.46$ and $p = 0.001$. Also, on AEK, there is a significant difference between suburban educators (Mdn = 3.00) and township educators (Mdn = 3.40). Therefore, educators in suburbs are more sophisticated in AEK compared to those in townships: $U = 3770.0$, $z = -3.49$ and $p < 0.001$. Lastly, on CK, there is a significant difference between urban educators (Mdn = 2.17) and their township counterparts (Mdn = 2.83), $U = 2652.0$, $z = -6.04$ and $p < 0.001$, indicating that urban educators are more sophisticated in CK than their township counterparts.

Overall, township educators reported more objectivist epistemology when compared to their suburban educators; they have naïve beliefs in IFA, AEK and CK in relation to the more sophisticated beliefs held by educators in urban or suburban schools. To explain the differences, we focus on contextual differences, where, historically, suburban schools in South Africa have better teaching facilities and resources compared to those in townships.

One possible explanation for this difference could be the fact that the enrolment numbers of learners in the townships are generally larger than suburban schools. Large classes may limit the teaching methodological options as resources cannot be adequately stretched to match the large classes. In addition, suburban schools are more affluent, privileged and have better facilities than township ones where facilities and resources are scarce. Equally, the educators in urban schools would be more confident and willing to use technology in their classrooms as compared to township educators, as they probably spend more time using the devices both at school and home. This demonstrates the social inequalities between socio-economic groups in South Africa, a legacy of the apartheid era that unfortunately continues to this day (Christie 2016).

Comparison of pedagogical use of information and communications technologies by gender and school location

The results of the Mann–Whitney U comparison test for PUI based on gender, location (province, and whether urban or township), show that (1) there is no significant statistical difference between male and female educators with regards to their PUI. (2) In terms of province, there is no significant statistical difference between Gauteng and North West educators with regards their TPUI. However, for CPUI, there is a significant difference between educators teaching in Gauteng (Mdn = 3.63) and those teaching in North West schools (Mdn = 3.31). Thus, educators in Gauteng use ICT in more constructivist ways compared to those in the North West: $U = 2984.0$, $z = -2.45$ and $p = 0.014$. (3) Furthermore, there is a significant difference in terms of CPUI between educators teaching in urban (Mdn = 3.25) and those teaching in township schools (Mdn = 3.75). Ironically, educators in townships use ICT in constructivist modes compared to their urban counterparts: $U = 3267.0$, $z = -3.64$ and $p < 0.001$.

Correlations of variables in the study

Spearman's rho was used to determine the strength and direction of linear relationships between variables. As indicated earlier, correlation coefficients are interpreted using Cohen's (1988) and Field's (2013) guidelines. The correlational results help to answer the question: *Is there a relation between Gauteng and North West educators' personal epistemological beliefs and their pedagogical use of ICTs?*

Table 4.4 shows several pairwise correlations amongst the dimensions reported. Results indicate that only CPUI has a positive statistically significant but weak correlation with AEK ($r = 0.14$, $p < 0.05$) and CK ($r = 0.19$, $p < 0.01$)

TABLE 4.4: Spearman's rho correlation coefficients of variables.

Variables		1	2	3	4	5	6
(1)	Innate or fixed ability	–					
(2)	Learning effort or process	0.303**	–				
(3)	Authority or expert knowledge	0.467**	0.357**	–			
(4)	Certainty knowledge	0.442**	0.274**	0.601**	–		
(5)	Constructivist pedagogical use of ICT (CPUI)	0.104	0.099	0.140*	0.191**	–	
(6)	Traditional pedagogical use of ICT (TPUI)	0.216**	0.147*	0.219**	0.290**	0.481**	–
	M	**3.00**	**3.88**	**3.20**	**2.70**	**3.48**	**3.56**
	SD	**0.67**	**0.50**	**0.62**	**0.79**	**0.68**	**0.53**

Source: Authors' own work.
ICT, information and communications technologies; M, mean; SD, standard deviation.
*, Correlation is significant at the 0.05 level (two-tailed); **, correlation is significant at the 0.01 level (two-tailed).

PEBs. However, TPUI has positive significant correlations with all PEBs, viz. IFA ($r = 0.22$, $p < 0.01$); LEP ($r = 0.15$, $p < 0.05$); AEK ($r = 0.22$, $p < 0.01$) and CK ($r = 0.29$, $p < 0.01$). All correlations have small effect sizes. When compared to the results delivered by Deng et al. (2014), there are similarities and differences in results. Deng et al. (2014) found no significant correlations between TPUI and PEBs. Also, their CPUI had a negative significant correlation with sophisticated beliefs about AEK, and a positive significant correlation with naïve CK.

How the use of information and communications technologies in classroom practice is influenced by educators' beliefs

To explore whether educators' beliefs predict the PUIs in the classroom, we conducted two linear multivariate regression analyses with TPUIs and then CPUIs as dependent variables, with educators' PEBs as predictor variables. This exploration helps to answer the question: *In what way do the educators' beliefs predict pedagogical use of ICTs by Gauteng and North West educators?*

Several pre-tests were performed to check regression analysis assumptions such as *Durbin–Watson test* for independence and lack of autocorrelation. *Homoscedasticity* checked that residuals at each level of predictor(s) maintain the same variance. *Multicollinearity*: good models will have predictor variables where there is no perfect linear relationship or predictors that are not highly correlated. Variance inflation factor (VIF) can be used to diagnose collinearity (Field 2013), and this was used.

Effects of personal epistemological beliefs on pedagogical use of information and communications technologies

The analysis of variance (ANOVA) test to calculate levels of variability within a regression model and providing a form for tests of significance indicated that the regression model demonstrated how beliefs significantly predict the TPUIs, that is F (4, 209) = 4.535, p = 0.002. Nevertheless, the educators' PEBs explain only 8.0% (R^2 = 0.080) of variance in the TPUIs by educators. The model showed that only CK (β = 0.186, p = 0.039) exclusively positively significantly predicts TPUIs. Its explanatory power is indicated by its standardised beta values *(β)*, indicating its comparable importance in the model. Thus, holding all other variables constant, for an increase of every one standard deviation of CK, the use of ICTs in traditional ways increases by 0.186 (about one-fifth) of standard deviations.

For the CPUI, the F (4, 200) = 1.861, p = 0.119. Thus, the PEBs failed to predict the CPUI. However, the model accounted for a negligible 3.6% (R^2 = 0.036) of variance in the CPUIs by educators. Deng et al. (2014) found direct significant path coefficients between AEK and CPUI, and between CK and CPUI. Their R^2 value for TPUI was 0.028 and for CPUI was 0.543. However, besides PEBs, there were other two variables to explain these values. We concur with Deng et al.'s (2014) contention that more theorising and empirical testing is essential given the various socio-cultural contexts in which educators work.

Discussion

The chapter reported on the results of a descriptive, exploratory study undertaken to investigate the relationship between educators' PEBs and the educators' use of ICTs for teaching and learning.

The first goal was to investigate the PEBs in the select Gauteng and North West province educators held. This study shows that respondents possess complex PEBs. The PEBs results show a split-half or hybrid position – with educators indicating they have elements of both worldviews: neither purely naïve nor purely sophisticated, but claiming multidimensional, and simultaneous yet conflicting beliefs (Olafson et al. 2010; Schommer 1990). However, out of the four PEB dimensions, LEP stands out as distinctly sophisticated. Thus, for this dimension, the majority of educators believe in learning as a process of understanding concepts and a metacognitive process of learning. This is encouraging as sophistication in LEP is likely to see educators being amenable to government advocated constructivist practices.

Respondents were drawn from a mixture of subject domains ranging from the softer social sciences and languages, and the harder physical sciences.

This technique of drawing the sample from across disciplinary backgrounds is common in past literature on PEBs (Muis, Bendixen & Haerle 2006; Schommer-Aikins & Duell 2013). This could explain the distribution frequencies that reflect split-half position regarding respondents' beliefs in IFA, AEK and CK. For instance, educators who hail from the hard knowledge domains such as mathematics and physics believe that knowledge is more certain and there is either right or wrong (Muis et al. 2006) compared to those from the social sciences and humanities who would accommodate diversity and the relativity of responses from their learners.

It can be argued that educators in this study demonstrate varying epistemological beliefs where some are less sophisticated whilst others are more sophisticated. Thus, on average, the educators respond positively to both naïve and sophisticated worldviews (Şahin, Deniz & Topçu 2016). For instance, the educators have sophisticated beliefs in LEP and at the same time, they moderately believe that ability is inborn, and that the source of knowledge comes from experts. This is not surprising as it corresponds with Schommer's (1990) multidimensional independent personal epistemology framework that acknowledges that an individual's epistemological beliefs may develop independently of each other, and concomitantly be inconsistent with each other. This view is also supported by literature that suggests that an individual can hold multiple belief persuasions, which could be a mixture of both 'objectivist' and 'evaluatist' (Olafson et al. 2010; Şahin et al. 2016).

The conflated views of knowledge in this study may be a result of contextual conditions in which educators operate (Fives & Buehl 2012; Windschitl 2002). Several contextual 'dilemmas' (Windschitl 2002:132) such as availability of teaching resources and nature of subject content may cause an educator to move from one belief to another, or possess mixed beliefs based on what pragmatically works well in their given situations. Notwithstanding attempts to redress the imbalances by government, South Africa's ICT distribution in schools is hugely uneven; schools located in suburbs still enjoy more resources compared to poor township schools. This affects accessibility and creates social inequalities in the quality of education in different communities. Thus, educators are faced with barriers that hamper the exposition of their beliefs through unfettered practice – they fail to exercise freedom to choose the ICT they believe to best deliver the curriculum.

A comparison of statistical medians indicates that female educators have more sophisticated beliefs in both IFA and CK PEBs and there are no significant gender differences in LEP and AEK PEBs. There are also differences in PEBs based on location, with township educators exhibiting more naïve epistemologies compared to their suburban counterparts. Educators in suburban areas are more autonomous as they have more flexibility in the choice of teaching resources. In contrast, township schools are generally less

equipped and their socio-economic status is lower than suburban schools. Comparatively, suburban educators have probably been using ICT longer than township educators who only recently benefited, for instance, through the Gauteng's 'SMART schools' project – experience increases the inclination to use constructivist pedagogy (Song 2018) and equally CPUI.

Results show that there is a significant difference between provinces in IFA and CK, with the Gauteng educators being more naïve compared to North West province educators. This difference can be explained by the fact that schools visited in North West are previously whites-only model C schools established during apartheid, whilst Gauteng schools constituted both previously disadvantaged and advantaged ones. The bias in sampling from only model C schools in the North West could explain those educators expressing more sophisticated IFA and CK as this translates to the use of ICT in more constructivist ways. Further empirical investigation to elicit the nuances framing epistemological beliefs of educators in South Africa is necessary.

Yet another plausible explanation for the overall indifferent PEBs results that has also been echoed (Chan & Elliot 2004b; Lee et al. 2013) is that our sample was drawn from educators with (1) differences in age and teaching experience, (2) different knowledge domains (i.e. social sciences, languages and natural sciences, and (3) different grades being taught, from grade *R* (pre-school) to grade 12. For instance, individuals from different departments that represent different knowledge domains have significantly different PEBs (Aslan 2017). Drawing from William Perry's scheme of intellectual and ethical development (King 1978) and Schommer's (1990) arguments, individuals' PEBs cognitively develop gradually as they progress through the education system. Parallels can be drawn here, where younger educators who are inexperienced may trust experts and rely more in AEK (including textbooks) more than experienced educators.

The second goal in the study was to investigate if there is a relation between educators' PEBs and their PUI. We found PEBs to have positive relationships with PUI. Although the results are hybrid, showing both naïve and sophisticated beliefs, they concur with literature that epistemological beliefs of educators are influential factors in shaping their practice (e.g. Lee et al. 2013). Deng et al. (2014) argue that PEBs are core beliefs that cannot be ignored in educational reform. This applies to the South African context that emphasises the ability of educators to practice learner-centred pedagogy (DBE 2011). Clearly the relationships between PEBs and PUI indicated that respondents claim to have multidimensional PEBs that subsequently informed their use of ICTs in both traditional and constructivist approaches.

Both AEK and CK belief constructs have been theorised (Chan & Elliott 2004b) and empirically found to only positively align with traditional

pedagogies (Yilmaz & Şahin 2011) and not with constructivist-related pedagogies. Surprisingly, positive correlations were reported between the two PEBs (AEK and CK) and CPUIs. However, similar and alternative correlational results have been reported by Deng et al. (2014) who found AEK to significantly negatively correlate with CPUI, and CK to significantly positively correlate with CPUI. These results can be explained in the context of the South African educational system being in a state of flux, possibly putting educators in constant PEBs transition. They are faced with several contextual dilemmas including pedagogical and conceptual ones as they figure out how best to deliver the curriculum. For instance, a case in point is the latest amendments to a section of the curriculum statements effected in 2019 and implemented as of January 2020 (DBE 2019). Although the intentions are noble, such changes have a tendency to disrupt, positively or negatively, an educators' beliefs and their established practices.

The third goal was to investigate ways in which educators' beliefs predict PUIs by Gauteng and North West educators. The findings showed that PEBs explained merely 8.0% and 3.6% of variance in TPUI and CPUI, respectively. However, only the PEBs to TPUI prediction was significant. This suggests that PEBs have a small influence on PUI in the study's context. One possible explanation could be that the introduction of ICT for teaching purposes is fairly novel in South Africa. Windschitl (2002:132) defines a conceptual dilemma as 'rooted in *educators'* attempts to understand the philosophical, psychological, and epistemological underpinnings of constructivism'. Thus educators could still be experiencing a conceptual dilemma on understanding how to pedagogically use ICT in their classrooms. Certainty knowledge has a small positive effect on TPUIs. This is in harmony with the premise that CK is positively related to traditional pedagogical practices with ICT. For instance, Lee et al. (2013) found CK to positively significantly relate to traditional pedagogical conception but negatively significantly relate to constructivist conceptions. Accordingly, traditional pedagogical conceptions have been found to positively predict TPUI whilst constructivist conceptions have been found to positively predict CPUI (Deng et al. 2014).

Contributions

This study contributes to the better understanding of the under-researched area of the influence of PEBs on the effective implementation of ICTs as pedagogical tools in the classroom by educators. Results presented in this chapter show that respondents display a hybrid set of moderate PEBs that are both naïve and sophisticated. This adds to the understanding that educators in South Africa possess PEBs that are congruent with the epistemological developmental schemas that assert that '*epistemological ideas are a system of beliefs that may be more or less independent rather than reflecting a coherent developmental structure*' (Hofer & Pintrich 1997:89–90).

Additionally, results indicated there are significant differences in educators' PEBs based on location as a control variable. This contributes to the literature on how PEBs are influenced by geographical and the related socio-cultural context. Furthermore, the study found females to have more sophisticated PEBs compared to their male counterparts. This result corroborates other studies and contributes to the further understanding of the influences of gender on PEBs.

The results also show small correlations between PEBs and PUI, with all four PEBs factors significantly correlating with PUI. However, the PEBs marginally predict PUI. Further empirical investigation may need to be carried out to gain better understanding of this result. However, the findings about PEBs in this study are instrumental in the understanding of the developmental trajectory of South Africa's in-service educators' PEBs.

Conclusion

The results show that there are significant differences in PEBs in relation to location. Furthermore, there are also significant differences in the PUI in relation to location. Context has been shown to affect PEBs (Fives & Buehl 2012; Jacobson et al. 2010). Information and communication technologies integration initiatives in schools have tended to follow top-down technology adoption policies that impose ICT on educators (Hennessy, Ruthven & Brindley 2005) instead of bringing about empowerment. This raises the potential for non-adoption as there may be no sense of ownership by educators. The high investment in infrastructure has to transform into an equal increase in effective PUI. Therefore, to ensure the sustainability and effectiveness of ICT interventions for classroom use, policymakers and the school management need to consider the local needs of users before deployment. Every context is unique: each school has its individual needs and constraints, each subject domain has its own specific practices, educators have their own beliefs that inform their decisions and practices, unique set of competences, teaching styles and technology preferences. Therefore, an all-purpose intervention approach is not tenable. We also partially concur with Tondeur et al. (2017) that for successful integration, the introduction of ICT should be aligned with educators' current values and beliefs. However, abrupt changes may suddenly overwhelm educators and disrupt their belief equilibrium, contributing to resistance towards implementing ICT in classrooms. Therefore, we argue that a layered approach be implemented that gradually introduces new innovative pedagogies, supported by focused professional development. This would be done to achieve goals of the advocated constructivist teaching approaches. As Çetin-Dindar et al. (2014) argue, as educators practice more in constructivist learning environments, their PEBs will gradually improve from naïve to sophisticated conceptions.

The findings in this study show that educators have moderate PEBs; the goal is to have sophisticated ones. Theoretically, as one interacts with the environment and acquires more knowledge, the PEBs develop along a continuum from naïve to sophisticated PEBs (Hofer & Pintrich 1997). Arguably, ITE and CPD of educators' pedagogical and content knowledge, general ICT competence and most importantly technological pedagogical competence are crucial in imparting knowledge to educators when adopting ICT for pedagogical purposes (Hennessy et al. 2010). Both ITE and CPD are critical in influencing a positive development of beliefs, efficacy and practice of educators (Hennessy et al. 2010). Therefore, the effects of effective professional development (PD) would be an increased ICT self-efficacy and higher propensity to use and actual use of ICT by educators. For CPD, we concur with others that hands-on, customised and contextualised PD programmes are recommended for subject-specific pedagogy.

The notion is norms practiced are different in each subject domain (Muis et al. 2006), and educators' PEBs are influenced by these norms and objectives. Thus, an all-encompassing approach to PD may fail to equip educators with competencies required for specific PUI that fit specific subject domains. Integrating, instead of adding-on activities about PUI in ITE courses could impart knowledge and good practices early on for student educators. The use of authentic activities that imitate a real classroom environment should be an integral part of course design. Such activities include lesson plans that incorporate ICT use to promote active learning and micro-lesson teaching. Additionally, to develop positive PEBs about PUI, teaching reflective practices, and modelling experienced educators (during work integrated learning) to imitate good practices, and master their experiences, are recommended. The focus of PD programmes should be the continuous development of metacognitive strategies required in making informed decisions based on available knowledge and contextual constraints when selecting and using ICT for teaching and learning. Although insufficient on its own, the exposure to types of instructions at ITE that promote constructivism could positively impact how pre-service educators develop their PEBs.

We set to investigate the relationship between PEBs and educators' pedagogical uses of ICT. The knowledge gained should help initiate a rich discourse about best practices of instruction drawing on how educators' PEBs affect PUIs. Overall, the study found:

1. educators have moderate PEBs but with LEP being the only sophisticated of the four PEBs
2. educators in urban areas have more sophisticated PEBs compared to township counterparts
3. educators in North West are more sophisticated compared to their Gauteng counterparts

4. female educators have more sophisticated PEBs compared to their male counterparts
5. educators use ICT in both traditional and constructivist ways; however, the statistical mean showed that they use ICT more in constructivist than traditional ones
6. Gauteng educators use ICT in more constructivist ways than North West educators
7. surprisingly, township educators use ICT in a more constructivist mode compared to their urban peers.

It is unexpected because urban schools are contextually superior in terms of resources. Furthermore, because one of our findings in (2) shows that urban educators have more sophisticated PEBs than their township colleagues, one would expect urban educators to use ICT in constructivist ways more than those in townships. However, an alternative argument is that in an effort to correct the imbalances in the distribution of resources, provincial governments invest more resources and training in townships as compared to urban areas. Lastly, (8) the study found that there is a weak predictive power of PEBs with regards to TPUI and no significant predictive power of PEBs with regards to CPUI.

The findings summarised earlier in the chapter show different developmental levels of PEBs by individuals according to gender and location. The implications are that policymakers who carve the direction the curriculum takes and decide on educational reform, and educational practitioners such as instructional designers, cannot afford to ignore the importance of educators' PEBs in teaching practice in general, and in teaching with ICT in particular. It is important to implement PD curriculum designs that integrate activities to help develop educators' reasoning and justification of knowledge capacity, effectively acquiring sophisticated PEBs at ITE and CPD.

The teaching environment is complex; it contains a complex constellation of variables. Therefore, we propose that future studies could include more variables, incorporate other data collection methods for better insights about the variables that affect an educator's decisions and behaviours in the classroom, and to strengthen credibility of results through triangulation. Also, longitudinal research designs would help to fully understand the dynamic morphing, over time and of the relationships of variables that influence ICT use in classrooms by educators.

Chapter 5

Disrupting patriagraphies in the classroom: Gendered constructions and languaging difference in South African texts

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Synopsis

This chapter, based on South African classroom experiences, is informed by feminist post-structuralism, focusing on how teachers engage with gendered English textbooks. It highlights the ways in which teachers negotiate gendered identities, specifically what I perceive as a deliberate disruption or endorsement of patriagraphies – over-determined phallocentric narrative constructions of critical voices that ultimately push femininity to the margins whilst privileging masculinity. The chapter argues that progressive gendered

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texts unsettle dominant assumptions in public discourse and school textbooks, making these classroom apparatuses effective instruments in developing a panacea for gender equality and equity in the classroom. This demonstrates that it is the teachers' gender knowledge base, rather than the progressive gender text per se, that informs how teachers deploy textbook narratives to dis/empower redemptive knowledge and identity constructions in classroom encounters that have traditionally endorsed gendered textbook constructions. Patriagraphies as thinking systems are entrenched and fostered in forms such as teacher knowledge in the classroom, language constructions and texts. Such thought patterns may possibly be disrupted by the teacher in the classroom as well as through language and text reconstructions. Gender equality can be learnt through education consolidating attitudes that help students learn to see each gender as equal. Attaining gender equality is critically important in the development of human beings and necessary for socio-economic growth. This study contributes to making up for the paucity in scholarship on teacher talk stemming from textbooks, interrogating assumptions that gender is inherent to text and that re-looking at the asymmetries of power generates an enactment of gender equity. Therefore, research should shift the focus from solely investigating gender representation in texts, to also engage with teachers' practices around texts in order for them to critically navigate texts and deconstruct patriagraphies and gendered power relations. Disruption of patriagraphies in the classroom may promote transformation in the sense of changing the underlying beliefs about and approaches to gender equality and equity. Such an approach may create a deep structural shift in the conceptualisations, thoughts and alliances relative to gender identities, possibly altering our material and experiential realities.

Introduction

This chapter examines *how* teachers select, adapt and use textbooks to interrogate and disrupt gendered constructions. The term patriagraphy (Latinate *pater* + *graphos*) is used to locate the traditional use and naming of male characters and personalities in textbooks. This phallocentric inscription has been taken for granted with little interrogation or questioning. In the process, this patriagraphy has perpetuated marginalisation of the female body. The chapter highlights gendered discourses and practices enacted in the classroom, providing insights into teachers' agency and gender knowledge base. In essence, we seek to examine the ways teachers use gendered textbooks in the classroom. In assessing the specific discourses and practices that they circulate, we seek to understand how such discourses are evaluated. In tandem, the chapter investigates the consolidation and disruption of ways of performing gender as evidenced in the very purposeful selection and use of texts in South African classrooms and how these circuits consolidate

solidarities for equity and justice in classrooms. Feminism and post-feminism provide the lenses for this assessment.

Teacher talk around gendered textbooks

The overriding research focus on how gender is constructed in textbooks is undergirded by the logic that stance and positioning relative to gender is a pragmatic concern in the construction and usage of the text. The genderised construction of a text in the teaching of English language therefore remains one of the most significant aspects in addressing social justice, equality and equity, principally because both the teacher and student exhibit specific valuations and in the process ascribe specific identities to the agency embedded in different genders (Appleby 2015; Elgar 2004; Hove 2018; Pawelczyk & Pakuta 2015). The chapter suggests that gender equality can be attained through making texts 'progressive' in their construction of gender, rejecting the hierarchical, hetero-patriarchal politics. I draw a distinction between traditional gendered texts as those that maintain an asymmetrical representation of gender (Sunderland et al. 2001) and transgressive texts as those that disrupt this representation. Texts that represent women as nurturers, for example, could be categorised as traditional, whereas those that represent men as emotional could be categorised as transgressive, given how they unsettle a dominant discourse by attributing emotionality to men rather than women. I conceptualise this categorisation as a continuum rather than a binary opposition, recognising that texts can fall along the asymmetrical or progressive spectrum. The term 'gendered', extensively used here, was taken from Sunderland et al. (2002) in regard to texts which explicitly cite gender, casting a binary between what is traditionally deemed feminine and as such relegated for females and what is considered masculine and ascribed to a male domain.

Addressing gender inequality is necessary for promoting economic development in the South African economy as illustrated in this chapter. Education is a socialisation process to become a part of academic and epistemological cultures; it imparts beliefs, ways of knowing the world, fortifying or disrupting gendered constructions. These views are foundational in promoting gender equality and equity, ultimately enhancing economic development.

Often overlooked in literature is the view that the social injustices in terms of gender equality and inequalities are entrenched in society through gendered constructions, language texts and patriagraphies in the classroom. There is an inherent fallacy in assuming that making texts progressive in their construction of gender remedies systemic inequality and social injustice in the classroom principally because this overlooks the ways teachers and students appropriate textual meanings, allowing for further re-inscription of

gender and sexual normativities (Hutchinson 1997; Nicol & Crespo 2006; Sunderland et al. 2001). Scholars have argued that progressive representations of gender can be undermined, just as textbooks containing skewed representations could be used to challenge gender bias (Maraj, Prasad & Roundtree 2018). McLaren (2007) also states that students in classrooms are largely marginalised in the power dynamics when decisions are made about what gets taught and how this curriculum content is taught. The traditional hierarchies prescribe that students are expected to do what they are told and to respond to teacher-predetermined questions that of course have formulaic and predetermined answers. Morrell (2017), together with Jancovich (1993), offers a refutation, proposing instead that students in the language arts should display a critical reflexivity that goes beyond 'authorised' versions of reading between and beyond the lines. What teachers validate as incontrovertible interpretations should be equally interrogated. In Morrell's terms, students should be empowered to ask genuine questions that call for nuanced readings, justifications and revisions of aspects that are commonly taken-for-granted. In such classrooms, both teachers and students generate discussions emerging from their lived experiences and interpretations of texts and such interrogations account for deep learning.

Therefore, as Coffey and Delamont (2000) affirm, 'an increase in women's names mentioned and in pictures of women in texts does not in and of itself fundamentally challenge the taken-for-granted knowledge base' (p. 35), specifically the gender politics engendered in textualisation and enunciation. This is because a teacher who 'knows' that women cannot become pilots and engineers, for example, is likely to undermine progressive images depicting women as pilots and engineers. Teachers develop specifically 'monitored' classrooms where, as Loewen (1995) demonstrates, there could be a predominant focus on texts, 'rather than teachers' gender knowledge base. Focusing on texts as if they were neutral rather than nuanced and specifically positioned takes away the capacity of these same texts to disrupt certain epistemic injustices, furthering the capacity of texts to subvert agency and foist marginalizing classroom practices'. I emphasise, from the onset, that the discourses and gendered knowledge(s) and practices enacted by teachers and students in taking up the textbooks are not unique to these teachers and students. These discourses are effects of power situated in and springing from historically inscribed reasoning (Popkewitz 1998; Wortham 2006). The education systems, through the teacher using their knowledge of disrupting such patriagraphies in the classroom, provide a foundational basis for inculcating gender equality and equity in the learners as individuals and ultimately in the society at large.

Lawston and Meiners (2018) define the carceral state in terms that reach far beyond the network of prisons, jails and detention centres in a criminal-legal system. For Lawston and Meiners (2018:5), the carceral state refers to

'the multiple and intersecting state agencies and institutions that have punishing functions'. This carceral state, similar to the monitored classroom, regulates poor communities: 'child and family services, welfare/workfare agencies, public education, immigration, health and human services, not-for-profits that essentially do the regulatory work of the state and more' (Meiners 2018):

> For example, those who seek food stamps and social grants are subject to mandatory and/or random drug testing; postsecondary educational applicants and those that seek state educational financial aid are required to disclose histories of arrests or convictions. These entities, seemingly removed from the site of the prison or the practices of policing, have absorbed these carceral practices. (p. 9)

Underpinning this study therefore is the argument that how teachers engage with gendered representations in textbooks depends on their own gender knowledge, largely informed by their socio-cultural norms. Teachers may act as agents of change (the role of their knowledge on gender representation matters most). When teachers are proactive in their enactment of pedagogic content knowledge and subject content knowledge, they become not only progressive catalysts of change and re-curriculation, but they bolster the self-esteem and processes of becoming for their students. Such teachers go beyond 'fixing' gender in textbooks, making the text a dynamic site for interrogation and repositioning. This justifies the shift to 'teacher talk around the text' (Sunderland 2000, 2015), which as contemporary scholars argue, should be the focus of research (Mustafa & Mill 2015; Sunderland 2015). In taking up this imperative, Mustafa and Mills (2015:17) add, 'it does not appear that text research has attracted scholars' attention in Africa'. This study, situated in South Africa, focuses on how teachers engage with gendered English language textbooks. I contribute to the paucity in scholarship on teacher talk around textbooks (Moore 2015; Pawelczyk & Pakuta 2015) using a critical discourse approach (Youdell 2006). This approach allowed me to illuminate how the teachers' gender knowledge base and discourses informed how they took up both traditionally and progressively gendered textbooks. I argue that it is this knowledge that determines whether teachers reject, ignore or endorse gendered textbook constructions. The study challenges assumptions that gender is inherent to text, and that fixing it necessarily resolves its enactment by teachers, unsettling the idea that progressive texts guarantee radical gendered classroom enactments.

Research questions and purpose of the study

This study draws attention to *how* teachers select, adapt and utilise textbooks to interrogate and disrupt gendered constructions. It illuminates gendered discourses and practices enacted in the classroom, providing insights into

teachers' agency and gender knowledge base. The following research questions anchor the study:

1. In what ways do teachers use gendered textbooks in the classroom? What discourses and practices do they circulate; and how are such discourses evaluated?
2. What circuits on gender inform teacher selection of textbooks? How do these circuits consolidate solidarities for equity and justice in classrooms?

In the next sections, I provide the context of the study – a feminist post-structural framework – critical discourse analysis methodological considerations; discussion of findings and finally, a conclusion comprising a cross-case analysis, implications and limitations of the study.

Context of the study

South Africa became a democratic state in 1994 after a long struggle against apartheid and a socio-economic architecture buoyed by separatist policies. Women, then and now, continue to occupy liminal spaces characterised by gender-based violence, rape and gross marginalisation. The population is multiethnic, with dominantly patriarchal beliefs (Makoe 2012:3) in which women have traditionally been constructed as subservient to men (Bantebya & Keniston 2006; Butler 2004). These gender constructions are reproduced in pervasive gendered division of labour in homes, workplaces and schools (Makoe 2012; Muhwezi 2003). The DBE in South Africa is responsible for overseeing education, whilst a separate entity, the South African Council of Educators (SACE) holds the authority of registering teachers (Balfour 2019). However, the general aims and objectives of teacher education programmes are silent about gender issues (Hove 2018; Shizha 2020:21). Whereas the post-democratic education system aspires to redress the inequities of the past, there appears to be anecdotal evidence that this system further entrenched gender inequality and injustice through the patriagraphies in the classroom and gendered constructions in the texts used in teaching language and literature. In focusing on teachers' use of gendered textbooks then, this study illuminates teachers' gender knowledge base and dynamic classroom practices.

A feminist post-structural framework

Post-structuralism questions the belief in a universal truth, perceives knowledge as historical and socially constructed and power as productive and ubiquitous (Connell 2008; Foucault 1980; Gilroy 1998; Hall 2004). These ideas, integral to the work of Michel Foucault, have largely informed feminist post-structuralism (Baxter 2003; Francis 2001; Walkerdine 1998). The present study is informed by feminist post-structuralism, particularly work on 'un/

doing gender' in classrooms (Baxter 2003; Butler 2004; Deutsch 2007; Ropers-Huilman 1998; Walkerdine 1990, 1998; Weedon 1997). This chapter makes the inference that disrupting gendered constructions and disrupting male-centred narratives in South African texts might be an initial requisite process in promoting gender equality and allowing a narrative that inaugurates economic development.

Feminist and post-structuralist research privileges critical discourse in constructing gender (Butler 1990; Deutsch 2007). Discourses function as a 'regime of truth' (Foucault 1980). These regimes of truth prescribe the rules, practices and knowledge(s) that produce a range of historically specific possibilities in the distribution of circuits of femininity and masculinity. Some textbooks identified in this study invoke particularly familiar traditional discourses constructing women as emotional, nurturers and weak whilst men are projected as strong, protectors and providers. How we live our lives and make sense of the material social relations depends on the discursive practices available in naming our lived experiences; thus, a teacher socialised into 'knowing' women as inherently nurturers and men as providers is likely to deploy this knowledge in allocating care-giving roles to girls, regardless of how these roles are performed and constructed in the textbook. Such discursive practices, mindsets and knowledge constructions need to be deconstructed in the processes of teaching and learning where an emancipatory discourse is embedded.

As Sunderland (2000:153) therefore argues, 'an agreed case of gender bias in a text, then, cannot be said in any deterministic way to *make* people think in a gender-biased way'. While some teachers may take up the gendered constructions, others may resist and interrogate them. The feminist post-structuralist concept of critical discourse strives to illuminate the knowledge(s) teachers bring to texts, which informs how they take up and circulate traditional and progressive texts. The ways teachers use texts, therefore, cannot be predicted from the text as teachers have the agency to take up or undermine both traditional and transgressive texts, depending on the critical discourses available to them and their gendered knowledge.

A case study design

A case study design is suitable for identifying and understanding contextual conditions relative to the phenomenon under study (Yin 2003). I focused on two cases – Tshayinyoni High School, a mixed secondary school and Spiritus Mundi, a co-educational private school (both pseudonyms) because the ways gender is enacted in mixed public and private schools is largely informed by this gendered composition as this study demonstrates (Gibb, Fergusson & Horwood 2008; Gordon 2020; Jackson 2010). Further, because gender is constructed in relation to other socially constructed categories, Tshayinyoni

TABLE 5.1: Cases of the study.

Cases	Spiritus Mundi private school	Tshayinyoni mixed public school
Structure	Mixed boys and girls; international enrolment	Mixed boys and girls; largely local enrolment
Socio-economic status	Affluent; private; largely boarding with few local students from largely affluent socio-economic status	Less affluent; public; wholly day school
Religion	Non-denominational	Non-denominational
Ownership	Private	Public
Rating and public perception	Selective; high	Relatively selective; medium
Location	Low-density suburban school	High-density suburban school

and Spiritus Mundi also differ in socio-economic status, their categorisation as public and private schools and cultural capital as evidenced in the assessment bodies to which they are affiliated as summarised in Table 5.1.

Participant recruitment

Keitumetse and *Desiree* (pseudonyms) from Spiritus Mundi and Tshayinyoni, respectively, volunteered to participate in this study conducted in their Form 4 and an equivalent Grade 10 English classroom. Spiritus Mundi students sit for a highly competitive Ordinary Level Cambridge examination whilst Tshayinyoni students only write school-based assessments in Grade 10 and sit for one exit examination in Grade 12, 2 years later. Keitumetse, a 40-year-old black female has taught in Spiritus Mundi for 16 years and is a senior teacher, also heading the Department of English staffed by six teachers. Desiree, a 30-year-old female is a Christian, who has taught at Tshayinyoni for 6 years and is a senior teacher and head of the English Department staffed by six teachers.

Methods of data collection

This investigation involved textual analysis, classroom observations and interviews during the first term of the school year. Tshayinyoni follows the South African school calendar that is divided into quarters whilst Spiritus Mundi adheres to three terms in a year following the Anglican tradition of Trinity, Lent and Michaelmas. This is a critical differentiation in terms of time-on-task: there is some degree of disruption in the flow of teaching at Tshayinyoni that is apparently not the case at Spiritus Mundi. The focus of this chapter, however, is the classroom observations, illuminating how teachers used gendered texts.

Textual analysis: I examined each teacher's scheme of work identifying potential lessons that would yield data for the study. The textual analysis as

presented here is limited to two traditional female-dominated, one traditional male-dominated and one progressive text. I analysed each text, identifying gendered discourses. Indeed, as Baxter (2003) points out, the author's own voice is one of the powerful sources of data for a feminist post-structuralist discourse analysis. As such, my own author-voice addressed the first research question, which required the researcher's perspective on how texts construct gender.

Classroom observations: Observations allowed me to collect data on classroom interactions generated from and through the textbooks. I wrote detailed notes (Emerson, Fretz & Shaw 2011) describing what the text was about, what topic was taught and how the teachers deployed teaching strategies relevant to the development of specific topics. I strove to identify and interrogate how the teachers illuminated the gendered constructions immanent in the texts selected. I specifically observed how gender roles were allocated to students. Did the two teachers contest or reproduce the gendered constructions in texts and how? What questions were asked? How were the questions formulated and to whom were they directed? My notes captured how teachers interrogated the textual gendered representations, illuminating resistance or acquiescence.

Teacher interviews: In order to elicit an emic perspective (Reagan 2002) showing 'how, in principle, the teacher thought s/he dealt with [...] texts' (Sunderland 2004:262), I conducted two types of interviews with the teachers. The first comprised informal post-observation questions. The second was conducted at the end of the school term. The interview questions were based on the literature, classroom observations and my own intuition: whether gender representation matters for text selection and teaching; was gender taken into consideration in allocating roles as taken from textbooks during role play? What were students' responses? What were the key gender representations and concerns? In what ways could the emerging frames of gender be related to issues of equity and social justice? By extension, what messages were disseminated in these classrooms on gender roles, the need to disrupt patriagraphies and the burning issues of gender-based violence that has reached alarming proportions in South Africa? I consider patriagraphies as texts that un/intentionally endorse a male-dominant representation of voice, role and practice. I argue that constructors of texts are in a tight partnership with their chosen subject, simultaneously developing the all-important 'relationship' required to sustain the narrative journey. Questions and selections beset the processes of text construction and deconstruction. It was essential to acknowledge how classroom texts can be unusually 'double-voiced' in communicating a strong sense of the teller in the tale: the writers' own genderised experiences usually lead them to a specific genre and formulation of relationships; they also influence the shaping of the ultimate text.

Data analysis

Sunderland et al.'s (2001:246) 'working model of analysis of teachers' discourses around gender in textbooks, takes account of both the text and what is said about it'. First, I used the 'text descriptor part' to categorise texts as 'going beyond a traditional representation of gender roles' or 'maintaining a traditional representation of gender roles' (p. 246). I then took up the second part or 'the discursive practice' component of the model to analyse teachers' use of textbooks. This part provides four verbs to account for how teachers address the gendered representations in the textbook: exaggerate, endorse, ignore and subvert. Endorsement and exaggeration (differentiated by degree) were coded when the teacher maintained, took up and affirmed the gendered representation in a text; subversion was coded when the teacher undermined, questioned and queried the textual representation of gender, and ignoring was coded when the teacher overlooked or underplayed the gendered representations in a text. I drew on the feminist post-structuralist discourse analysis to identify and classify discourses and discursive practices enacted and performed during the classroom interactions. Finally, I transcribed the interviews, clarifying in elaborate descriptions the teachers' perspectives and discourses submitted regarding text selection.

Revaluation of gender materiality – Discussion of findings

I do not present *all* the data gathered but focus on 'telling cases' (Mitchell 1984) extrapolating insights from how the teachers used the texts. I focus and follow closely the suggestion from Lisa Gitelman (2013) who states that there is no such thing as raw data because data are always structured, shaped to conform to one system of knowledge or another. In each case I show first how teachers selected textbooks, illustrating whether gender was a criterion and then attend to how teachers took up the texts.

Case study I: Spiritus Mundi private school

Text selection

In Spiritus Mundi, the more affluent school, Keitumetse used a variety of textbooks to teach: '*We do have a variety* [...] *The library and book room are very rich* [...] *we also have Internet*'. The school also encouraged teachers to identify and extract reading materials from websites, including the writing of curriculum materials. Textbooks were distributed to students at the commencement of the school term and returned for auditing and safe keeping at the end of each trimester, with all students receiving an individual copy of the selected text.

In terms of text selection, Keitumetse decided on suitability for the topic:

> I check for which book [...] can easily be understood [...] It is basically about language learning [...] rather than gender issues. I do not think I have ever taken that into consideration [...] Based on past exam papers, I look at the reading texts and decide what tasks to do in oral and written exercises. (Keitumetse, teacher, date unspecified)

She added that specific textbooks are good for specific topics: '*Practical English* for grammar [...] *English in Context* for comprehension [...] IGCSE for model examination questions and effective word choice [...] It is a very good one for vocabulary'.

Keitumetse explained that whilst the CIE determined the curricula, it is teachers who selected specific teaching materials, developing a variety of other texts *in situ*. As Keitumetse confirmed, gender representation was not an issue for consideration in text selection. She explained nevertheless that in hindsight, some texts she had selected were gendered, largely skewed in the representation of patriarchal hierarchies. She cited the example of one text, *A Letter to God*, in which a male village farmer, Lencho, owns the land, cultivates beans and a drought looms. The heat withers the flowering bean crop and when Lencho prays for rain, a storm deflowers the entire crop and he is set to re-plant the field. In all this agonising experience, Lencho's wife is cast in the background; she performs all domestic chores and merely follows what Lencho speaks. This storyline is a grand illustration of patriagraphies, constructing Lencho as 'an ox of a man', re-inscribing the ubiquitous narratives that associate farming, productivity and writing with men whilst women are projected as emotional nurturers nested in the 'feminine' chores and silenced by the 'authoritative' naming of men (Maraj, Prasad & Roundtree 2019). Yet, Keitumetse's reason for selecting *A Letter to God* was that she thought a text like this one would be very interesting for the irony conveyed in Lencho's second letter where he advises God not to send the 'remainder of thirty pesos through the post office [...] because the post office people are a bunch of crooks' (Keitumetse, teacher, date unspecified).

The hinge on which a story turns – and therefore an important clue to its meaning – is the authors' use of irony. Irony does not occur in all stories, but when it does, it is extremely important. Irony involves a difference, or discrepancy, between what appears to be and what really is – is the hiatus between appearance and reality. The simplest is verbal irony, where writers or speakers say the opposite of what they mean. Another, more important version is dramatic irony with discrepancy between what a character says and what the audience knows is true. In dramatic irony, the speaker is not aware of the full import of what they are saying; their words suggest, to the alert reader or audience, more than they know and more than they intend.

Keitumetse chose the text *not* because of the normative construction of gender therein, but because she thought it would generate interest through

its simple style, the irony of 'a letter that could not be delivered' and the gravitas of faith exhibited in Lencho. Therefore, contrary to Keitumetse's claim that gender is not a criterion for text selection, her choice of text in this example was implicitly and inadvertently informed by hetero-normative truths about polarised gender representations. As a female teacher, she was apparently oblivious to the marginality ascribed to the 'woman' in 'this exquisite short story' as she called it. This shows that, contrary to the teacher's claims, gender had *implicitly* informed text selection. In categorising this text selection from the four verbs accounting for how teachers address gendered representations in the textbook, we recognise the fact that Keitumetse endorses patriagraphies by ignoring the messages embedded and circulated in this specific text.

Teacher use of gendered texts

I first show how Keitumetse taught using *A Letter to God* – a traditional male-dominated text, followed by *The Maternal Instinct* – a female-dominated text, and then Wilfred Owen's timeless sonnet, *Anthem for Doomed Youth* – a transgressive text.

A letter to God: Teaching a traditional male-dominated text

This text, from the textbook *IGCSE Summary Skills,* explains the precarity of Lencho, the male protagonist, exposed and vulnerable to the buffets of nature and the weather. I argue here that the anxieties of Lencho as a farmer and father figure influence perceptions of males, the world and the entire experience of vulnerability and precarity. This text portrays women as vulnerable who need men for protection, material provisions, moral and emotional support. In citing dominant discourses of the father as head of family, breadwinner, the writer of the letter, the initiator of an epistolary conversation with a male God and disciplinarian, *A Letter to God* constructs feeble femininities, legitimating the valorisation of fathers. The father, as Marshall (1991:103) affirms, is 'responsible for the most positive aspects of childcare and the mother for the maintenance work'. The mother's role, as Lazar (2002:123) affirms, 'is taken for granted as part of their maternal "nature" and therefore [...] unremarkable'. She is marginalised in the narrative as she only cooks and calls out to the male characters to 'come for dinner'.

Keitumetse introduced the text through a general discussion of farming, asking students to share their experiences. One student asserted that most farmers are white, male, living on the plaas, and women were largely invisible except when portrayed as dependent on the man, or as nurturers (Connell 2008). Keitumetse then asked students for their individual experiences in

which farmers were female. One girl from Zimbabwe gave the example of several politically connected names in her country of such female entrepreneurs who benefited from the fast-track land reform programme, but she was quick to state that 'these are cellphone farmers who did not live on the farm' and delegated responsibilities to male hands. Beyond the palpable consternation of the entire class at this example, lively talk suggested that this re-gendering of farming as a female vocation was uncommon. Instead of this being an illustration of the reconfiguration of mutating emplacements and empowering of women, a number of male students argued that the 'cellphone farming' regime enacted by the women farmers was an illustration of how women *could not insert themselves into the materiality of the land as productive space.* The girl's response, derived from her experience, suggests that beyond textbooks, students have a myriad resources from which they process gender knowledge. Indeed, as Paechter (2007:2) affirms, 'For children [...] there are three key sites in [...] learning of masculinities and femininities: the family; the peer group; and the school'. I would venture to add a fourth site as the text, where inscriptions of 'treacherous masculinities and assertive femininities' (Hove 2014) are inescapable, shaping therefore the identities that learners portray in classrooms and later in their own homes and workplaces.

Keitumetse then asked students to continue sharing their experiences of farming. One male student stated that he missed the open fields and the cattle-breeding project that he and his father were engaged in. To this, Keitumetse, drawing on a discourse of gender difference, responded that boys must be affected differently by a father's ownership of an enterprise, be it farming or industrial. Keitumetse therefore *inserted* an opinion of male as sunburnt, white and unemotional, which was resisted by some girls, chorusing 'Nnnnooo', as one girl added, 'Some girls drive 4x4s on farms too!' The girls *resisted* pervasive discourses that categorise females as emotional consumers and males as rational producers. This makes it difficult for men to acknowledge their emotions without threatening their masculinity (Walkerdine 1998).

Citing a discourse that associates farming with masculinity (O'Connor 2000; Oslund 2012), Keitumetse added, 'Not many women take up farming [...] if they do, it's flowers and gardens' (Keitumetse, teacher, date unspecified). She also asserted that there is less control on the farm in the absence of a father as patriarch. While the textbook construction of women as vulnerable and in need of men such as Lencho is *endorsed* by Keitumetse, her students face a conflict – some taking it up and others resisting these discourses:

> 'I agree [...] Farms are better in the hands of men [...] girls are not good at planning crop rotation and cattle-breeding [...] my dad concentrates on calculations and aggressive marketing [...] mum looks and has teas with the other women who visit [...].' (Female student 1, date unspecified)

> 'True. I am always in awe when I see a girl roughing it with a tractor [...] the new ones are easier to handle [...] but it is hard, very hard.' (Keitumetse, teacher, date unspecified)

The teacher and the female students here draw on their lived experiences to *legitimate or endorse* patriagraphies and discourses on marginality of women within the text. As explained by Francis (1998), children draw on evidence from family roles to construct gender differences. Further, the narrative that constructs the 'woman' in *A Letter to God* as nameless and unvoiced was also engaged:

> 'I disagree [...] that because she does not have a name like Lencho therefore she is not affected by the drought and the hailstorm [...] She is just mum about it because if she cries then no one [...]. the father and his sons [...] would be able to console her [...] She does not want to make trouble.' (Female student 1, date unspecified)

> 'I agree [...] *she cannot make decisions* especially on the cropping because that is messing into the father's project.' (Female student 2, date unspecified)

> 'She is the only woman in this story and we do not hear her say much, except calling the boys to come for dinner [...] *That's what she does* [...] *cook and call* [...] I do not see why we should ask too many questions [...] this story is crazy with Lencho writing to God [...].' (Female student 3, date unspecified)

> '[...] All the post office workers are male [...] they come up with a rational solution to contribute and the postmaster writes back [...] he acts God.' (Keitumetse, teacher, date unspecified)

The narrative that constructs a woman as a backdrop against which the narrative of Lencho's phenomenal faith and Sisyphean struggle against Nature is inscribed, re-inscribing the discourse that women *need* men (Walkerdine 1984). The woman projects a self-effacing *discourse of 'silence, maturity, obedience'* (Francis 1998:40). However, Female student 2's endorsement of women as 'interrupting' if they volunteered an opinion in agrarian matters is linked to *the discipline and control attached to a father's role*, imagined as powerful enough to ask God to intercede in mitigating the destructiveness of the hailstorm. This power to control in the father figure is also linked to the discourse of men as breadwinners, invoked when Female student 3 offers her own interpretation of the role of the woman in this disquieting narrative: '[...] we should [not] ask too many questions [...] this story is crazy with Lencho writing to God [...]' (Female student 3, date unspecified). Female student 3 added that unlike gullible mothers, fathers can only be seen as 'crazy' yet still constructing fathers as rational, cautious and protective. As Foucault (1980) affirms, dominant discourses can be rejected by drawing on alternative discourses, as some female students did in this classroom to resist this script.

Rather than critically engage with gendered issues raised by the lengthy classroom discussion, Keitumetse apologised for its length, reminding students

to 'keep in mind that we have spent so much time on this *Letter* but [...] this is for us to understand the passage' (Keitumetse, teacher, date unspecified). She then pulled the discussion back to the 'main' focus – summary writing. She instructed the students to do an exercise focused on preparing them for testing their summary-writing skills.

Overall, whilst the teacher largely *endorsed* this traditional gendered text, she used it in ways that allowed students to engage with its gendered constructs. Rather than passively take up gender as suggested in previous research, the teacher and students drew on myriad resources (such as their own material lives), endorsing and rejecting gendered constructions of Lencho, the woman and the all-male troupe at the post office. Nonetheless, in apologetically reverting to the 'gist' of the lesson, the teacher demonstrated that gender was in fact insignificant to teaching or learning in this specific case.

'The Maternal Instinct': Teaching a transgressive female-dominated text

'The Maternal Instinct', a text from *Structures and Skills in English,* is about a woman, Laura, and her daughter, Lorna, both projected as victims of an unflinching patriarchal system on Miguel Street. Laura has eight children, from seven different men (Beat that!). Bruised and caged in this hovel, she hopes that none of her girl children shall suffer a similar fate of 'blaming God' and the 'wickedness of men'. In spite of her vivaciousness and fierce optimism and sense of feminist adequacy, Laura is shattered to the core when Lorna comes back from nocturnal typing-school lessons to announce, '*Ma, I going to have a baby*' (Naipaul 1974:87). Tugged by this invasion and inversion, Lorna commits suicide rather than become a replica of her mother's life: 'According to the papers, it was just another weekend tragedy, one of many. Lorna was drowned at Carenage'. This narrative projects women as victims (Connell 2008), and women as nurturers, who are also simultaneously as brave as they are cowardly, as frivolous as they are hardened by bruising experiences at the hands of men and unperturbed by physical appearances. This complex and highly ironic text is untraditional and pessimistic in its dissemination of images of conventional gendered discourses.

Keitumetse gave the students 20 min to read the story individually. Using the story as a model, she explained the structure of a good composition that exploits irony as a stylistic device. She advised that planning is the first step: 'make an outline, a mind map'. She then outlined some attributes of a good story: 'beginning, climax and end'. She encouraged the use of 'rich language so the story is *not malnourished*' (Keitumetse, teacher, date unspecified). She gave them 12 min to develop an introductory paragraph of their own composition, which she then asked them to share. She provided feedback,

emphasising, for example, the need to tap concretely into the senses: 'Let us see, taste and feel through reading your composition' (Keitumetse, teacher, date unspecified). She reminded them to be descriptive and to appeal to the senses, affirming 'girls are good at describing feelings' – again entrenching a discourse that reproduces females as emotional. She then wrote some topics on the chalkboard:

1. Fatal deception.
2. The first time.
3. My worst embarrassment.

This was an assignment for homework requiring students to use the titles to provide a framework and guide them in writing a narrative-cum-descriptive composition. She mentioned, however, that because she knew all females were interested in revenge, she was sure most of them would write about it. A few girls murmured disapprovingly – resisting this discourse that interpellated them as emotional whilst remaining silent on her perceptions of the male students in her class.

Overall, *ignoring* the traditional gendered constructions within the text, which dominantly portrayed men as authoritative narrative voices and equally dubious providers and women as victims, Keitumetse focused on the 'official' curriculum. However, she re-inscribed discourses of women as emotional, victims of a patriarchal script, vengeful and suicidal. In so doing, Keitumetse drew on her own gendered knowledge, inserting gendered fidelities that were verily a subtext of the story, *The Maternal Instinct*. She did not query the il/logic in the title (*not* the paternal but maternal instinct); she did not interrogate the reliability of the 13-year-old narrator nor the very conflictual if unnerving perceptions of women by the quartet of Hat, Eddoes, Boyee and Nathaniel; she did not highlight the innuendo so stark in the story.

'Anthem for Doomed Youth': Teaching a transgressive text

'Anthem for Doomed Youth', a martial text from the comprehensive anthology *Minds at War*, draws largely on male military experiences and discourses. It is in sonnet form, an elegy, a lament for the dead and a judgment on Owen's experiences of war. The octet contains a catalogue of the sounds of war, the weapons of destruction – guns, rifles, shells – linked, ironically, to religious imagery, until in line 8, we switch from the fighting front to Britain's 'sad shires' where loved ones (*specifically women*) mourn. The tone now drops from bitter passion to rueful contemplation, the mood sombre, the pace slower, until by line 14 the poem quietly closes with 'the drawing down of blinds'. What makes this poem a lasting requiem to the horrors of war courses through the devilish clamour of trench warfare carefully set against the subdued atmosphere of

the church. These religious images: passing bells, orisons, voices of mourning, choirs, candles, holy glimmers, symbolise the sanctity of life – and death – whilst also suggesting the inadequacy, the futility, even meaninglessness, of organised religion measured against such a cataclysm as war. Right at the start the simile 'die as cattle' jolts us with its image of the slaughterhouse and the idea of men being treated as less than human. The juxtaposition of 'choirs' and 'wailing shells' is a startling metaphor, God's world and the Devil's both as one; after which line 8 leads into the sestet with the contrasted, muted sound of the Last Post. Aptly, dusk is falling in the last line and speaks of finality. The dusk is slow, for that is how time passes for the women who mourn, and with the drawing down of blinds and the attendant sadness (again genderised experiences by the women).

After dramatised recitals of this poem by individual students, Keitumetse asked whether any of them had ever read any other war poems. The students looked askance, asking why they would have had reason to read about gory details and death. Three female students spoke strongly against war as a senseless undertaking. One of them suggested that war was a male affair, and only recently have female recruits been inducted into national armies. Keitumetse then asked if they could state the theme/s that they identified in *Anthem for Doomed Youth*, which were immediately listed on the chalkboard: the horror of war, dehumanisation, alienation, sacrifice and disillusionment.

It was interesting to witness the development of this lesson as Keitumetse asked students to provide reasons why the poetry from World War 1 should be a genre worth studying. The students unanimously gave the following reasons: the study of war amplifies an appreciation of human frailties – power, pride, idealism, technological advance, loyalty, camaraderie, courage, cruelty, sorrow, revenge, racism, atrocities, heroism, injury, death, sickness and pity. One female student added the following: 'War literature provides the means of remembering the past and (hopefully) learning from it and moving on' (Student, female, date unspecified). A male student qualified this submission and offered the following: 'War poems have something to do with the way in which we look at the world and make meaning of this world' (Student, male, date unspecified).

In summary, the ways Keitumetse taught the three texts could not have been predicted from the texts. While she *endorsed* the dominant construction of women as marginal in the traditional *female-dominated text*, she *ignored* both the dominant construction of men as heroic combatants in the traditional *male-dominated text,* as well as the dominant construction of men as invested in their physical appearances in the *transgressive* text. Also interesting was how she used the traditional male-dominated text, rather than the transgressive text, to generate discussions on gender. This suggests that the dominant focus on making textbooks transgressive does not guarantee a redemptive

engagement with gender to trouble gender hierarchies. Here was a gendered text taught to curriculum specifications without adapting it to address the callous gender-based violence in South Africa; none of the questions allowed the students to incorporate their own experiences onto the poem.

Case study 2: Tshayinyoni high school

Text selection

Desiree usually distributed a book to be shared amongst an average of three students who crammed around it, some peering over to get a glimpse into it. This resource-scarcity shaped the method of teaching, as Desiree often read to the students, or asked students to volunteer to read out aloud so that those who did not have individual access to the text could follow the lesson.

Desiree*'s* choice of textbooks depended on availability in the school bookroom or the library. She explained, for example, that she had to use *Integrated English* even if she preferred *Practical English* for teaching grammar because she had only one copy of the former. Desiree affirmed that in addition to subject content, moral lessons and contextual relevance were the criteria used in textbook selection for her classes in English as a First Additional Language (EFAL). It is critically important to recognise that at Spiritus Mundi, the subject was English Language (implicitly as a home language) whilst at Tshayinyoni the subject was specifically an additional language (implicitly *not* a home language).

She also explained that whilst the Department of Education determined the curricula, teachers selected materials for teaching and, that gender and social justice were *not* specific criteria for text selection: 'I have never seen this as an issue […] but while in class I try to make sure both girls and boys participate' (Desiree, teacher, date unspecified). Citing an equal opportunity discourse (Smithson & Stokoe 2005), Desiree's perception of gender equality and social justice reduced it to visibility of male and female, disregarding *how* they participated or the gendered power relations inscribed in texts. A discourse of gender equality may leave dominant gender norms superficially interrogated whilst taking for granted the masculine as desirable subject positions. Desiree also affirmed that gender matters, explaining, 'I think in a way it does […] if textbooks focus on boys, girls may be left out' (Desiree, teacher, date unspecified). Desiree cited a gender differences discourse here, suggesting a binarised understanding of the interests of boys and girls, which plausibly informed her selection of texts that include the perceived interests of boys and those of girls. Evident here is how the teacher's understandings of gender *implicitly i*nformed textbook choices, although she had *explicitly* denied gender as a criterion for text selection.

Teacher use of gendered texts

I demonstrate how Desiree engaged with '*Letter to a Son*' – a traditional male-dominated text by Fergal Keene, '*Gender-based violence – Presidential Address*' – a traditional female-dominated text', and 'The Raffle' – a transgressive text.

'Letter to a Son': Teaching a male and child-dominated text

In this text from *BBC*, Fergal Keane, a UK war correspondent, writes to Daniel, his newly born son, about the memories of a man in his role as a foreign correspondent, then working in Hong Kong, with reflections on the journey of life, the father's experiences and the horrors of war. This emotionally charged text has a strong male and female presence, more significantly the emotional tug of witnessing war and the trauma experienced by children in military zones. The strong female presence coupled with the sentimentality within the text, firmly locate it within a traditionally male realm.

Desiree's lesson started with the entire class listening to the 1997 BBC recording of this narrative. This was followed by Desiree nominating a boy to read the letter aloud, a task that he eloquently performed, intermittently looking at the class, and matching his reading with gestures and facial expressions. Desiree complimented him for his good reading, eliciting a smile on the boy's face. In the meantime, another boy copied the opening of the letter from the typescript onto the chalkboard. Desiree asked comprehension questions such as what the letter was about, what incidents Fergal Keane highlighted in this letter directed to a child that could not yet read, and what new words they encountered in the letter. The first answer was from a boy, followed by a mix of answers from girls and boys. Interestingly, whilst most students whom Desiree selected raised their hands first, she selected three girls who had *not* raised their hands.

Desiree then asked the students to use the first part of this letter on the chalkboard as a model to write an imagined response from Daniel, years later when he opens this treasure, to his now retired father. After about 20 min, she asked them to voluntarily read their responses aloud, provoking some murmurings of resistance, especially from the girls. Several hands shot up from some assertive female students: 'Why should we write like Daniel, mam? Can't you allow us to write like [...] like ourselves?' (Student, female, date unspecified). There was palpable silence from Desiree: she had not imagined this outburst from girls who resisted writing in the voice of a boy when they were girls. One girl's reading, inaudible initially, was further drowned out by laughter from the boys who apparently felt her letter was not 'genuine'. Seemingly shy, the girl shifted uncomfortably during the reading process.

Although Desiree reminded her to read louder, she acquiesced for a whilst, reverting to reading inaudibly. The class endured her, reluctantly clapping for her when Desiree asked them to. The interactions around the text inaugurated equal discursive practices, in which both boys and girls took part in the lesson but contested how this acclaimed letter subverted female identities and unintentionally projected women as emotional, victims, pushed to the margins.

Yet, the contrast between their engagements remained problematic, given the gender relations in which power was skewed towards the male students. The first reading was taken by a boy, whilst another boy copied the text onto the blackboard. The first response to Desiree's questions and the first volunteer to read a response letter aloud was a boy. Therefore, Desiree, *ignoring* the female presence within this male and adult-dominated text, enacted it using a strong male presence, in which boys participated more actively than girls. This substantiated Thorne's (1993) claim that males dominate in public spaces, also evoking discourses of active boy vis-à-vis passive female (Abolaji 2015; Paechter 2007). The order of mention and male firstness (Gee 2006) in which men come before women as demonstrated in interactions around this male-dominated text has been problematised by scholars for inscribing gender hierarchical relations (Gee 2006; Hideto 2004; Moore 2015). While Desiree, who was a female, taught a male-dominated text, it was enacted through a strong male presence. As such, 'the *add-women-and-stir* method' (Gonsalves 2010) of changing demographics in texts by increasing visibility of women as overburdened victims, as shown in this text, was not sufficient to change the classroom's gendered status quo.

Further, Desiree asked comprehension questions that tested students' understanding: she neither raised questions about the gender roles in the script, in which women were produced as tired mothers, deserted in labour and victims, nor questioned the gendered representation of Daniel's mother, nor Fergal's mother who would probably have died on the way to maternity (Hargreaves & Anderson 2014; Messner 2002). Further, the boys volunteered to take on tasks like reading aloud and writing on the chalkboard, autographing dominant constructions of women as emotive and re-inscribing the patriagraphy of the text (Francis 1998; Rich, 1980).

Further, gendered discourses that were absent in the textbook, circulated within the classroom interactions around it. The disruptive boys' discourse (Jacksona, Dempstera & Pollard 2015; Jonsson 2014) for example, was evoked by disruptions caused in what I saw as an all-boys naughty corner, forcing Desiree to remind the boys incessantly to observe silence. An equal opportunities discourse (Porecca, 1984, Smithson & Stokoe 2005) was also enacted in Desiree's attempts to choose girls, even when they protested that they were uncomfortable writing like Daniel because they were female and

often they had not raised their hands to ensure equitable classroom participation. Davies and Kasama (2004) attributed girls' silence and shyness, even when they are offered opportunities to speak, to rules of correct behaviour and propriety, but in this case, it was more dramatically the fact that Desiree was insensitive to their gender perspectives. In positioning themselves as not masculine – less self-confident, unwilling to appropriate a male persona, the girls contested gendered participation patterns, *consolidating* hierarchical power relations.

Overall, Desiree *ignored* dominant constructions of women as emotional, marginalised and as nurturers in this text. She also *ignored* the dominant role of males in the text, as it was enacted through greater male participation, reproducing gendered hierarchical power relations. The visibility of women in the text, therefore, did not change the gendered hierarchical order in which the text was taught.

'Gender-based violence: Presidential address, 2020'–Teaching a female-dominated text

The text 'Gender-based violence' from *The Presidency, South Africa*, gives insights into the lives of women under the relentless siege of male-perpetrated gender violence in South Africa. These women, represented in the 21 names that President Ramaphosa catalogues, are overworked, deprived of an education, denied voice, choice and necessities like clothes and a decent accommodation. The speech constructs women as vulnerable, and objectified, targets of an inexplicable violence and murderous inclination in the men of South Africa: 'Their killers thought they could silence them. But we will not forget them and we will speak for them where they cannot'

In introducing the speech text, Desiree asked students what their experiences of domestic violence were and what they thought caused such tensions in both the domestic, social and work spaces. There were mixed responses, with some harrowing testimonies of witnessing male atrocities against women. This discussion generated a heated and emotively laden debate for at least 5 min. Desiree then asked the entire class to listen to 'Gender-based violence is South Africa's second pandemic' (Desiree, teacher, date unspecified), a recording of the presidential address delivered to the nation on 18 June 2019. In the second part, Desiree chose a boy who volunteered to read the printed speech aloud. She then posed some questions:

Desiree: 'What is the speech about?'

Boy: 'Women and children have been murdered.'

Desiree: 'Why are they killed?'

Boy: 'Their killers thought they could silence them.'

Girl: 'I hate men [...] they kill us for nothing [...] How can you kill someone you love?'

Girl: 'Men are pests [...] They only like your body.'

Desiree: 'Why does the president take this occasion to speak about the murder of women as a pandemic?' (*Murmurs from class*)

Girl: 'It [*Gender-based violence* {*GBV*}] is a wildfire [...] That is the only way to see it.'

Girl: 'It is bad [...] horrible mam.' (*murmurs*)

Desiree: 'There are more cases unreported. Why do you think the president mentions only those names in his address?' (*Silence*)

Boy: 'Mam, I have a problem [...] it is only girls and women he talks about. There are women who violate men.'

Desiree: 'We are not talking of that [...] this speech, eh, it is about women killed. This is serious [...].'

Ok, stop the discussion and answer these questions.

Desiree writes questions on the chalkboard as follows:

1. Why do the men in this address come through as sly and jealous?
2. What reasons does the president provide for the surge in male violence against women?
3. Who do you think is responsible for the several brutal murders that the speech highlights?
4. Given an opportunity to make recommendations to stop the gruesome murder of women in South Africa, what three suggestions would you submit?
5. Write a speech about some social or political challenge in South Africa that really bothers you.

Desiree taught this female-dominated speech, in which women are largely reproduced as vulnerable victims, by raising questions that *uncritically* related the narrative to students' lived experiences. Their discussion raised thorny gendered issues like gender-based violence, maternal mortality, girl-child abuse and infidelity. In discussing these, three boys blamed women for getting pregnant, insinuating that they had 'enjoyed' the sex that led to their tragic deaths or the unhappy relationships with their male partners. The boys drew on their own gendered truths, citing discourses that construct women as sexual objects (Hoffman 1986; McLaughlin, Uggen & Blackstone 2012; MacGhail, 1994). Such discourses are bound up with a male-gendered discourse (Phipps 2014), which exonerates men from taking responsibility for losing their sexual control, blaming women for it.

Overall, Desiree *ignored* the dominant discourse in the female-dominated text which inherently constructed women as victims. Nonetheless, she asked questions allowing student engagement with gendered concerns and GBV in a South African context. Rather than give her opinion, Desiree let students

argue until she shifted to the next activity. This idea of remaining 'neutral' and/or 'not taking sides' (Barton & Sakwa 2012) is a pervasive narrative in South Africa meant *not* to impose teacher's beliefs on students. Desiree did not challenge pervasive discursive practices around the killing of spouses and loved ones in South Africa presented in the text, reverting to business-as-usual to focus on the curriculum. It is interesting, nonetheless, that the traditional gendered text had generated conversation regarding gender-based violence – *albeit uncritically*.

'The Raffle': Teaching a transgressive text

This text is a male-dominated transgressive text from *Integrated English*, which draws largely on discourses typically used to describe women in order to talk about men. In this text, a soft and gullible male student describes Mr. Hinds, a male teacher preoccupied with his physical appearance.

Desiree opened the lesson telling students to recall instances of favouritism in their school experiences, eliciting active discussion. One boy responded: 'But male teachers always favour girls!' (Student, male, date unspecified). There was a chorus of 'Yessss' and outbursts of laughter. Desiree then narrated her own school experiences about a teacher-favourite girl who became unpopular because her classmates were jealous. Desiree added that the teacher who favoured this girl was a woman. This seemed to surprise the students, eliciting laughter and general commotion.

More recognisable and intelligible within this mixed-sex group would have been favouritism that involved a male teacher favouring a female student. The pervasive discourse of a normative heterosexuality (Rule 2019; Kuzmic, 2000) rendered non-normative coupling arrangements unthinkable. While Desiree could have engaged with this conundrum, potentially inaugurating conversations around homosexuality, a thorny issue in South Africa in spite of the Constitutional recognition of LGBTQ (lesbian, gay, bisexual, transgender, queer) orientations, she quickly turned to the immediate comprehension passage. She asked a volunteer to read the story aloud, choosing a boy and then a girl before posing some discussion questions:

1. What was the name of the favourite student?
2. What shows he was the teacher's pet?
3. Did he remain the teacher's pet by the end of the story?

The questioning is based on simple recall and basic comprehension skills. The questions do not allow for any discussion nor evaluative accent. There are no inferential questions in the three illustrations. This prescription to regurgitate answers dissipates the generation and development of critical and reflective skills amongst the students.

In summary, Desiree *ignored* dominant traditional and disruptive constructions of gender in both traditional and transgressive texts. It was interesting, nonetheless, that it was the traditional rather than transgressive text that was more generative in discussing gender — albeit uncritically. Also noteworthy is how the female-dominated text failed to secure female dominance in terms of classroom participation, instead re-inscribing active-male-vis-à-vis-passive-female discourses to reproduce hierarchical gendered power relations (Davies & Kasama 2004).

A cross-case analysis of teacher selection and use of gendered texts

In using my 'comparative gaze' (Davies & Kasama 2004), I examine the findings from the two cases in relation to each other. I focus on whether gender was a criterion in text selection, before turning to how teachers used the texts.

The teachers from both cases affirmed that how gender was constructed in textbooks did not inform text selection because the focus was getting apace with the curriculum. These findings, corroborated by Tainio's and Karvonen's (2015) study in Finnish schools, echo teachers' assertions that gender is not relevant to subject knowledge, specifically in the English language curriculum. The teacher from Spiritus Mundi, the more affluent school, however, was more likely to access and select 'progressive' texts, which the teacher from Tshayinyoni High School was unlikely to access, given the paucity of resources.

The focus on making textbooks more progressive in deconstructing patriagraphies and gender-based inequalities, therefore, is likely to benefit affluent schools, eluding most public schools in South Africa, which from my experience as a teacher-educator, are poorly resourced. Therefore, Davies' (2003) recommendation that teachers select feminist versions of old stories or new feminist stories, as well as Rifkin's (1998) proposal to make gender representation a criterion for text selection is impracticable for under-resourced schools, which are the majority in South Africa.

Additionally, access to texts in Tshayinyoni High School was largely mediated by the teacher, who read the text aloud given the scarcity of textbooks for each student. The teacher's role in text selection and mediation of gendered scripts was therefore accentuated. Nonetheless, the role of the teacher, even within the more affluent school, remained central, given their role in development, selection and mediation of texts. These teachers, however, are oblivious to the urgency of taking gender-construction into consideration in text selection.

The thrust to 'fix' textbooks by making them progressive in their representation of gender is but in vain if teachers do not take negative and taken-for-granted constructions into consideration in text selection. Moreover, this fixation on texts alone is based on the assumption that teachers inadvertently teach gender-loaded meanings as constructed in texts without the necessary interrogation, evaluation and questioning. The teachers' use of texts, on the contrary, was informed by their own gendered truths as summarised in Table 5.2.

The ways in which teachers in both cases engaged with texts were unpredictably ambiguous. While they endorsed some of the traditional discourses, they ignored others to focus on the official curriculum. This 'hidden curriculum' a la Bowles and Gintis, where texts are 'under-read' in classroom encounters for the sake of covering the 'official curriculum' surreptitiously gets disseminated as 'normative'. Interestingly, however, the teachers in both cases used the traditional rather than transgressive texts, allowing students to engage with gender – albeit uncritically. The traditional gendered texts opened up the conversation, providing a 'familiar' space in which the class engaged with dominant lived 'realities'. The transgressive text, on the other hand, in constructing an 'unfamiliar' reality, was disregarded. This unsettled the overriding assumption that progressive texts necessarily inform a progressive classroom.

Scholars remain polarised regarding whether texts should reflect social 'reality' or transgressive or social ideals (Gupta & Yin 1990; Jones, Kitetu & Sunderland 1997; Mustafa & Mill 2015; Ott 2015). Foulds' (2014:9) study on Kenyan secondary school students demonstrated that the incongruence between transgressive gender roles in textbooks and students' lived realities confused them. She affirms that this disconnect culminated in 'students' inability to absorb textbooks' images that fall outside their cultural experiences'. The potential of texts to disrupt traditional constructions of gender lies in the congruence between how gender is constructed and the students' lived experiences. As this study demonstrates, therefore, traditional gendered texts can be engaged in ways that deconstruct traditional gendered constructions, whereas progressive gendered texts can be undermined and ignored, especially when they contradict the lived experiences of the teacher and the student. Rather than passively accept gender constructions as

TABLE 5.2: Summary of teachers' use of gendered texts.

Text type	Case study 1: Spiritus Mundi school	Case study 2: Tshayinyoni high school
Traditional female-dominated	*Endorsed*	*Ignored*
Traditional male-dominated	*Ignored*	____
Transgressive	*Ignored*	*Ignored*

indubitable and uncontested constructions in textbooks, teachers and students draw on their own gendered truths, endorsing, ignoring and rejecting gendered constructions.

Also interesting was how gender was enacted in the two cases. The students in Spiritus Mundi took on both masculine and feminine roles, whilst those from Tshayinyoni, the mixed high school, took on discrete gender roles, with girls taking on feminine and boys affirming masculine roles. This enactment of gendered texts with roles which 'match' sex was also demonstrated in Moore's (2015) study in a school in Russia. The contrast in the engagements with mixed-sex school suggests that they generally provide fecund conditions to reproduce and endorse gendered hierarchies. Both schools and the texts selected from diverse cultures offered conditions teeming with possibilities to disrupt the commonsensical constructions of gender.

The teachers' selection, adaptation and use of textbooks mainly provide fertile ground for critiquing and challenging previous research on the function and authority of gendered texts. The two teachers in this study evinced significant moments in which gender as constructed in textbooks proved quite problematic for both the teachers' own epistemic reconstructions and the students' possibilities for emancipatory learning practices (cf. Namatende-Sakwa 2021:1–26). This overlooks teachers' gendered truths, which, as shown in my study, informed how they interrogated, questioned and rejected traditional and transgressive gendered texts. There is evidence in this case study that traditional gendered texts, which illuminated dominant realities, surprisingly offered more disruptive potential for engaging with gendered hierarchies. This was achieved better compared to progressive texts, which constructed marginal positioning of male–female dynamics and realities incongruent with dominant practices. Morrell's research and the findings in this study oblige all teachers and students to interrogate knowledge of the complex socio-historical dynamics underlying South Africa's social and epistemic problems. Indeed, we could safely argue that critical talk alone is not enough to bring about substantive social justice, gender equity and radical change. For this reason, Morrell (2019) is perfectly justified in suggesting that literacy pedagogy must be more than learning to read and critique. There is little if any dissent on the fact that the acquisition of academic and critical literacies is crucially important, but indeed learning to read *the word and the world* are insufficient ends for education to begin redressing the persistent, and growing, social and economic inequalities in South Africa. Recognising the importance of imagining alternatives and seeking to transcend the boundaries of past and present injustices, Morrell (2019) calls on educators to:

> [*C*]onsider the implications of our work with students, families, and communities as it relates to dismantling patriagraphies – the systems and structures that have caused all of the problems in the first place. (p. 185)

Conclusion

Textbooks as the most commonly used curriculum material in South African schools remain central to education systems (Bag & Bayyurt 2015; Moore 2015), providing a great resource for troubling gender relations, social justice and patriagraphies. The discretion of teachers in selection, mediation and production of textbooks indicates their privileged positions in text interrogation and consumption. Teachers are capable of challenging gender bias if they are well-prepared (Tainio & Karvonen 2015; Litosseti &Sunderland 2002). Therefore, research should focus on teacher education to help teachers critically navigate gendered texts. This is a call for classroom practitioners to fully engage in deconstructing gendered power relations during classroom engagements. In tandem, researchers into classroom practices are exhorted to observe lessons in which expert teachers engage with gendered textbooks. Such emic research provides a model to inform the very productive engagement that students could make in re-reading texts as ideologically suffused constructions. Gender-biased approaches that are entrenched in the existing traditional classroom and gendered language text are detrimental to the development of learners' perspectives on gender. Literature suggests that gender equity and equality are paramount for the economic development and re-appraising GBV in South Africa, and therefore allowing for a more disruptive if dissident epistemology. This study, limited to an examination of teacher practices around gendered English textbooks in South Africa, recommends studies in other disciplines, as well as research that investigates teacher and student perspectives about the gendered constructions in their textbooks. This would veer away from the dominant focus on textbooks, providing greater nuance to inform teacher education.

Chapter 6

Challenges and imperatives in pedagogical content knowledge: The case of Natural Sciences teachers

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Synopsis

This chapter investigates the pedagogical content knowledge challenges faced by Natural Sciences teachers in implementing the CAPS. It also assesses the contribution of this construct in mediating the attainment of social justice through the development of human capital skills in Natural Sciences by both teachers and learners. Pedagogical content knowledge is

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recognised globally as a major element of curriculum implementation that determines the quality of knowledge, skills and critical thinking acquired by learners. The CAPS was introduced as a curriculum reform aimed at redressing the educational imbalances of the past, social justice, inclusivity and ensuring that South African schools provide equal educational opportunities for all learners. It envisages the development of every learner by equipping each of them with the skills and values necessary for self-fulfilment, meaningful participation in society as citizens of a free country where social justice prevails, irrespective of the learner's socio-economic background. However, according to literature, the successful attainment of curriculum reform depends on the innovative pedagogical content knowledge of the teacher despite its transformative goals. Research on the pedagogical challenges faced by teachers in the implementation of CAPS remains scarce in South Africa. Data used for this study was collected qualitatively and analysed using ATLAS.ti. The findings identified specific pedagogical challenges faced by teachers, precisely those competencies necessary for effective implementation of CAPS. Recommendations for the strategic development of teacher pedagogical knowledge which leads to improved quality of education, human capital development, skills, knowledge, and attainment of social justice were drawn.

Introduction

'There is great consensus that high-quality science education teaching and learning at school level is fundamental for learner success and advancement in life' (Bantwini 2017:39). 'South Africa faces a real challenge to generate adequate levels of economic growth and development in order to reassert its place within the global community of nations' (Ramaila 2020:7). Ramaila (2020) further postulated that a globally competitive school curriculum has to be conceptualised and implemented by South Africa to sustain broader economic growth and development scale. High-quality science and mathematics teachers are recognised as an important human resource by the NDP (South African National Planning Commission 2011). Furthermore, the NDP 2030 (South African National Planning Commission 2011) emphasises the importance of access to strong science and technology education as a crucial and necessary prerequisite for the future innovation and development of South Africa, as the country underpins economic advances, improvement in health systems, education and infrastructure. Science and technology lead to poverty alleviation by growing and developing national economies and is an important indication of differences between developed and developing countries. Science education in South Africa has recently received some but not enough attention from various stakeholders as a result of the students' poor performance in international assessment studies such as Trends in International Mathematics and Science Study (TIMSS) (Reddy et al. 2019;

Reddy 2005). The dismal performance of students in science and mathematics is a major concern and a factor that contributes towards skills shortage and thereby affecting the country's economy as explicated by the South African former Minister of Education (Pandor 2008). Several studies recognise the need for improvement in science education (Bantwini 2010; Centre for Development and Enterprise 2007; Reddy 2005).

South African science teachers struggle because of inadequate science content knowledge. Bantwini (2012:3) noted that 'pedagogical skills and lack of confidence' have remained a cause for concern for South African science teachers. These struggles are to a degree attributed to the nature of training that many teachers received during the apartheid era; the current crop of teachers being produced is as much a part of the problem. Though these inadequacies emanated from the past, it is important that South Africa moves swiftly and urgently in redressing and transforming the curriculum to meet the global economic imperatives. Like many other developing countries, this is a mammoth task for South Africa.

South Africa has been through a number of curriculum changes demonstrating the effort to ensure attainment of social justice, development of the much-needed human capital skills, and economic growth and stability. According to Reddy et al. (2019:170) 'South Africa has embarked on an inclusive economic development pathway dependent on science, technology and innovation for which mathematics and science are necessary for social and economic progress'. The current CAPS, being the most well-thought after the previous four versions, focuses on mirroring the world trends. Maharajh, Nkosi and Mkhize (2016) concurred with Adam (2009) that global curriculum changes are driven by the impetus to prioritise skills, application and problem-solving.

However, the 'how' of implementing a curriculum intended to meet global economic demands is problematic for the teachers, such that a curriculum shift of this magnitude comes at a price. For many teachers, the paradigm shifts in the curriculum, as indicated by Dudu (2014), exposed the teachers to several challenges. For example, one of the basic imperatives for the teachers was to shift from simply facilitating learning after the RNCS to ensuring that the learners are also equipped with necessary skills. The reform initiatives in South Africa reflect a paradigm shift from a teacher-dominated perspective to a learner-centred approach (Ramnarain 2014). The envisaged teachers' approaches to curriculum components such as content presentation and assessment required alterations to nurture students that should fit in well in a self-sustained economic environment. Such changes were aimed at redressing the injustices of the past and ensuring quality education for all. It is against this background that the next section assesses the skills that South African teachers need in order to meet the world standards.

Imperatives of pedagogical content knowledge in quality teaching

'Effective solutions to challenges involving student learning, teacher learning and organisational change are more likely to emerge through professional collaboration' (Anderson 2003:12). This suggests that current South African curriculum reforms (CAPS) ought to offer strong pedagogical content knowledge (PCK) in science teaching. It is one of the most basic forms of knowledge used in teacher preparation (Mayne 2019). This type of knowledge allows teachers to reason pedagogically and to make decisions pertaining to practice that ensure students developing an understanding of science (Lee, Kim & Yoon 2015). The major premise in this chapter is that in the absence of PCK, it is impossible to achieve quality education that contributes to the desired human capital which may effectively spur economic development. Guerriero (2017) referred to pedagogical knowledge as the specialised knowledge of teachers for creating effective teaching and learning environments for all students. These attributes express how crucial PCK is in quality teaching. Albeit these obligatory statements, there are still major impediments to teacher quality.

Studies in countries where curriculum has been reviewed several times (UNESCO International Bureau of Education 2008) like South Africa have put teachers' PCK to test. According to Mnguni (2018:97), 'internationally, governments from formerly colonised countries have instituted curriculum reforms to redress the inequalities and injustices caused by those colonial policies.' He (2018:97) further clarified that 'the primary aim was to "cleanse" curricula of content, pedagogy and other aspects that used education as a weapon for oppression'. Rambuda (2019) concurred that in South Africa, education under apartheid was characterised by racism, discrimination and inequalities. The ripple effects of this disparity are still felt despite the introduction of varied new reforms. This is not only true to South Africa but other developing nations as well. In a similar experience, Kosovo suffered discrimination in the language of the education system as well as teacher-centred, objective and content-based curriculum offerings. Berisha (2020) therefore asserted that 'in order to effectively implement the new reform, there must be significant improvement in the quality of education and fields of innovation in Kosovo'. Berisha (2020) further proposed that:

> [*T*]eacher preparation in Kosovo should provide balanced and consistent teaching practices with proper access to training and professional development for the improvement of CK, PCK, teaching skills and teaching practices in schools. This could be a possible solution to Chemistry education and science teaching and learning, as well as catalysing the creation of a proper system that fits the population and their goals for the future of science development. (pp. 125–144)

Historically, Nepal is another country that reels from the effects of the colonial education system. Nepal either has unskilled or less skilled human resources because of its failure to invest in quality education (Nowak & Dahal 2016). Nepal for a long time focused on an education system that failed to nurture a productive and educated society. Most of the educated members of the society could not even become entrepreneurs to foster economic growth (Nowak & Dahal 2016). In other words, neither the curriculum nor the implementers did enough to bridge the knowledge and skills gap. This is over and above one of Mayne's (2019) findings that the strength of PCK within a teacher and that a lack thereof will influence teacher's effectiveness in carrying out the teaching and learning process within the classroom environment. The Nepal scenario is reflective of the UNESCO 2004 declaration that quality of education in schools is generally declining in many countries (Leu, & Price-Rom 2006). As a result, UNESCO has dedicated a renewed focus on the quality of education in schools worldwide (Garira 2020). Despite the latter, Nowak and Dahal (2016) conscientised that socio-economic development is measured through macroeconomic indicators such as GDP, life expectancy, literacy and opportunities for employment in the country. From his observation of education system that has been perpetuated by an ideology of colonialism and inequality in Jamaica, Mayne (2019) further posited that PCK and social justice knowledge must frame the practice of teacher preparation.

Challenges of quality science teaching in the South African context

It is a fact that prior to democracy, the South African divided education system produced different quality students and teachers, magnifying the inequalities amongst members of society. Black teacher training was not meant to groom and nurture a quality learner (Christie & Collins 1982; Sayed 2002; Spaull 2015). Teachers were inadequately trained to produce inept learners who were less skilled with very little knowledge of highly demanding jobs such as medicine, engineering and commerce. That is to say, it was not conducive to building human capital. In other words, like other colonised states, teacher training was content-driven for regurgitation in and by the black community. Against this background, it can be inferred that teachers had less of pedagogical knowledge (PK) and content knowledge (CK), and none of the PCK. All these deficiencies drove the need for a curriculum that is more content and skills-driven to address the inequalities and imbalances of the past. This, however, does not mean that all is now well. Quality education is still beset by several contextual impediments that hamper bridging the gap of inequalities. Failure to address these imbalances, Mnguni (2019) lamented that South Africa faces a serious challenge of non-skilled individuals who cannot build the essential human capital even in the future. The implication is that the desired goals of CAPS

might not be attained unless proactive measures are taken to link PCK and human capital development.

To start with, the upgrading of teachers' PCK to master the knowledge and skills has been neglected; it is still neither long nor intense enough (Almazroa & Al-Shamrani 2015). In addition, PD training for practicing teachers is generally sporadic (Rollnick & Mavhunga 2015), leaving them to make their own interpretation of expected curriculum outcomes. Almazroa and Al-Shamrani (2015) further lamented that this neglect creates a void in the subject matter knowledge (SMK) of the teachers, resulting in low self-efficacy and curriculum saliency. According to Mayne (2019):

> [*C*]urrent reform debates ignore preparing teachers to become critical citizens. They limit teachers to the status of high-level technicians, who fulfil a required set of objectives decided upon by experts rather than on the realities of classroom life. (n.p.)

These shortcomings remain a challenge for the teachers in the foreseeable future. As Garira (2020) puts it:

> [*The*] processes that go on in the classroom are important in actualising quality of education in schools. Thus, it is vital to monitor and evaluate what goes on in schools, and particularly in classrooms, to find out where improvement may be required for effective realization of quality of education. (n.p.)

According to Thijs and Van den Akker (2009), 'if quality of education is determined by student achievement (cognitive, cultural heritage, social preparation, and personal development', the classroom becomes an indicator of quality of education (cf. Garira 2020). Interestingly, this argument points directly to the capabilities of a teacher. Anderson (2003) supported this argument by suggesting that allowing teachers to interact through PD trainings may be the best way to deal with their challenges of classroom practices in particular, and their competencies in general. Thus, the recommendation of PD by Almazroa and Al-Shamrani (2015) is a significant mechanism for maintaining a high standard in science teaching. As such this chapter focuses on the need to explore PCK challenges of science teachers that emanate from imperatives of the education system mandate.

Problem statement

Research on the challenges and imperatives of PK in teaching and learning of Natural Sciences, particularly CAPS, remains scarce in general (Bantwini 2017; Samuel 2020). Pedagogical content knowledge is an imperative for the attainment of quality education that leads to human capital development, that is, development of learners' full potential and capacities (Timperley et al. 2007). South Africa introduced CAPS with the purpose of (DBE 2011):

> [*E*]quipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values

> necessary for self-fulfilment, and meaningful participation in society as citizens of a free country. (p. 9)

Furthermore, according to DBE (2011:8), this purpose of CAPS is based on social transformation, and human rights, inclusivity, environmental and social justice principles (DBE 2011):

> Natural Sciences at the Senior Phase level lays the basis of further studies in more specific Science disciplines, such as Life Sciences, Physical Sciences, Earth Sciences or Agricultural Sciences. It prepares learners for active participation in a democratic society that values human rights and promotes responsibility towards the environment. (p. 9)

Natural Sciences can also prepare learners for economic activity and self-expression (Darling-Hammond et al. 2020). This study argues that good PCK might result in wholesome outcomes such that learners are prepared to enrol for any of the aforementioned sciences disciplines in the further education and training (FET). Drori (2000) argued that more advanced societies have superior science institutions, and, thus, the conclusion that there is a strong link between science education and national economic growth and development. Drori further stated that scientific progress rests on scientific knowledge and scientific skills; hence, science education is essential to future scientific advances and in turn, economic prosperity. This is a claim that exemplifies the argument in this chapter.

The attainment of the science goals is dependent on PCK. According to Chan and Hume (2019), science is a pillar and a building block of modern education for personal and social development in that it spurs advances in human society. Chan and Hume (2019:1) further identified gaps in the PCK literature which include several challenges associated with PCK and highlight diversity in the 'thinking around the PCK concept within the PCK research community in the field of science education'. Extending the work of Drori (2000) and Chan and Hume (2019), this study examines challenges and imperatives of PK in teaching and learning of Natural Sciences within the South African context for human capital development, economic growth and social justice.

Research questions

The following research questions were posed:

1. What PCK related challenges hamper the quality of teaching and learning aimed towards building human capital when implementing CAPS, particularly Natural Sciences?
2. How does PCK influence the attainment of desired learning outcomes when implementing Natural Science curriculum?

Theoretical framework

This study is underpinned by two interlinked theories namely PCK and Human Capital Theory. A description of how PCK informs this study is provided first, followed by Human Capital Theory, and how the two are connected. Quality education has always been the backbone of a strong economy (Ramaila 2020). Equally so is the teacher quality. Teacher quality in this chapter is operationalised as the teacher's ability to transform knowledge and skills to build a versatile student. Several authors agree with Shulman (1986, 1987) that teacher's PCK and teacher quality are inseparable; by inference, PCK is embedded in teacher quality. Thus Shulman's (1986) assertion that PCK is an important aspect of teacher's knowledge.

Moreover, Soguel and Jaccard (2008) indicated that the importance of teacher quality is related directly to economic benefits. Soguel and Jaccard (2008) further connected 'quality education to human capital'. Hanushek and Wößmann (2007) concluded that there is 'strong evidence that the cognitive skills of the population – rather than mere school attainment – are powerfully related to individual earnings, to the distribution of income, and to economic growth'. Hanushek and Wößmann (2007) made this conclusion from empirical results which 'show the importance of both minimal and high level skills, the complementarity of skills and the quality of economic institutions, and the robustness of the relationship between skills and growth'.

The evidence from these studies suggests that countries interested in cultivating human capital and economic growth in their economies should prioritise configuring ways of improving quality education. This view exists in the background where a growing body of literature has established evidence that teachers' professional knowledge is a key factor in teaching quality (Abell 2008; Cauet et al. 2015; Desimone 2011; Fischer, Borowski & Tepner 2012; Van Driel, Verloop & De Vos 1998). It is, therefore, important to note that PCK plays an integral role in human capital and economic growth trajectories in general.

As indicated by Gillies (2017):

> Human Capital Theory lays considerable stress on the education of individuals as the key means by which the individual accrues material advantage and by which the economy as a whole progresses. (p. 1)

In a simple equation, Gillies (2017:1) expanded this idea as follows: 'the more and better education individuals possess, the better their returns in financial rewards and the better the national economy flourishes'. Interestingly, this notion has implications on teacher quality, the dispositions and capabilities of the learner, and the influence on the country's economic growth in general. Putting the two theories together, this chapter explores the challenges and imperatives of Natural Sciences teacher quality in implementing CAPS for human capital and economic growth. Gillies (2017:3) further asserted that

Human Capital Theory centralises teachers as those who help create and develop human capital. Because of the imperatives of the new reforms, teachers have shifted from being minor public servants into 'key figures in developing the human capital necessary for economic growth' (Gillies 2017:3). According to Gillies (2017), Human Capital Theory holds the returns of education investment both personally and socially. The individual normally receives financial reward, and the economy is boosted by individuals with advanced human capital who invariably earn more than those less skilled. 'The education system and its quality become an extremely important focus for state investment' (Gillies 2017:3). In a nutshell, Human Capital Theory and PCK theories could provide a platform for bridging the gap of inequalities in South Africa.

Methodology

This study is purely qualitative. Lesson observations and interviews were conducted with 10 Natural Sciences teachers who were purposefully selected. These teachers teach Natural Sciences at Grade 9 level, belong to the same district, and are all qualified to teach Natural Sciences. The interviews were preceded by lesson observations to get the sense of teacher quality and the classroom practices that were enacted. Each teacher was observed once during normal school time. The observations included taking note of how teachers operate in their classrooms and the operational challenges that affect competent pedagogic enactments. Soon after lesson observations, one-on-one interviews were conducted. This qualitative data were triangulated to enrich the findings. Findings were coded and analysis was done using ATLAS.ti version 8.0.

Data analysis technique

Analysis of data were guided by an analytical tool adapted from Attride-Stirling (2001) known as Thematic Networks analytical tool (see Figure 6.1). According to Attride-Stirling (2001), applying thematic networks is a way of organising a thematic analysis of qualitative data. Thematic analyses seek to identify the themes salient in a text at different levels, and thematic networks facilitate the structuring and depiction of these themes.

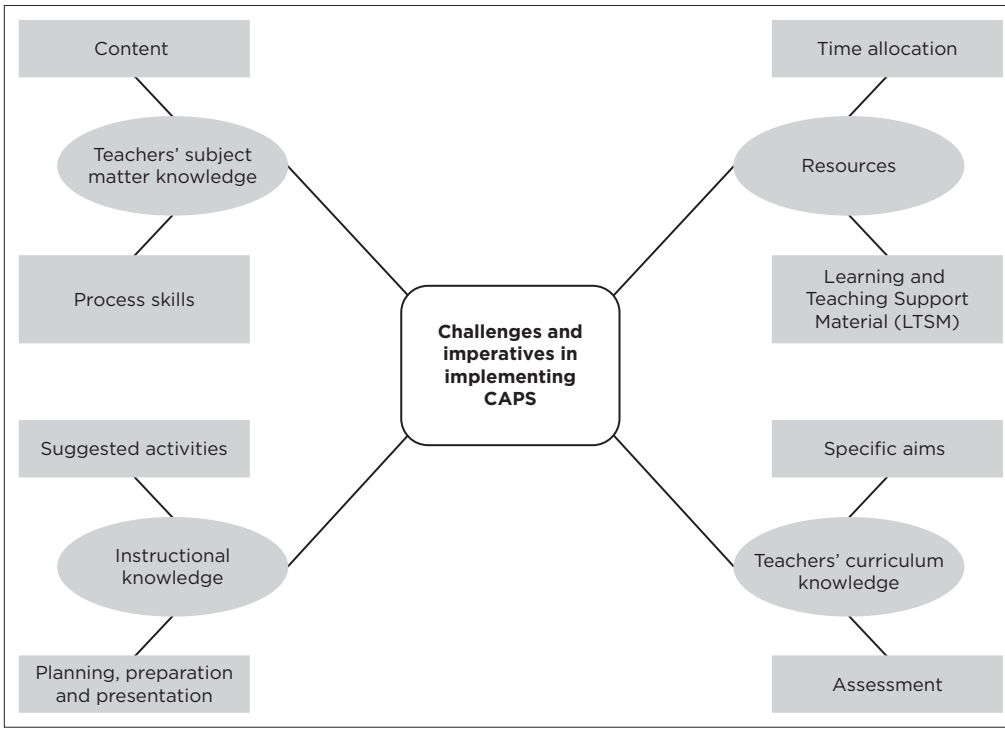
In this analytical tool, a network of themes is used to present an argument about a given reality (Attride-Stirling 2001):

> A thematic network is developed starting from the *Basic Themes* and working inwards toward a *Global Theme*. Once a collection of *Basic Themes* has been derived, they are then classified according to the underlying narrative they are telling, and these become the *Organizing Themes*. *Organizing Themes* are then reinterpreted considering their *Basic Themes* and are brought together to illustrate a single conclusion or super-ordinate theme that becomes the *Global Theme.* (p. 389)

Figure 6.1 depicts the analysis of lesson observations and interviews following the Attride-Stirling's tool.

The thematised data were coded. A network of themes was created from these recordings and then networked into (1) *Basic Themes* (content, process skills, specific aims, learning and teaching support materials (LTSM), planning, preparation and presentation, assessment, and time allocation), (2) *Organising Themes* (teachers' SMK, resources, instructional knowledge and teachers' curriculum knowledge), and (3) *Global Theme* (challenges and imperatives in implementing CAPS curriculum). The thematised categories were entered into ATLAS.ti Version 8.0 for analysis. Through coding and themes generated, a clear picture of what emerged from the observations was engendered.

Interview audio recordings were transcribed into text, coded and categorised into the same themes that were used for the observation analysis. Field notes were similarly coded, thematised and entered into ATLAS.ti Version 8.0 for analysis as data sets. An inductive process of systematic coding, categorising and interpretation of data provided 'an explanation of a phenomenon of interest' (McMillan & Schumacher 2006:401). This process of data analysis was achieved through 'reading and re-reading' (DeCarlo 2018:389) of transcriptions 'to



Source: Adapted from Attride-Stirling (2001).
CAPS, Curriculum and Assessment Policy Statement.

FIGURE: 6.1: Thematic networks.

identify common patterns' (DeCarlo 2018:389) as well as tracing patterns that had emerged from observation analysis. The transcriptions were subsequently classified based on the themes generated.

Artefacts analysis, also known as document analysis, is considered the most systematic scrutiny of instructional documents such as work-schedules, syllabi, lesson plans, assessment tasks and lesson notes to clarify instructional needs and challenges (Denscombe 2010). In this chapter, teachers' lesson plans and CAPS document served as artefacts that supported data for this study. These documents were textual and categorised into similar themes with the interviews and observation schedules. Furthermore, data gathered through artefacts is considered authoritative and credible since it is emanating from a large pool of sources and experts (Denscombe 2010). Scrutinising these documents enabled understanding of the embedded meaning within the text and the salient implications thereof. The artefacts that were analysed clarified teachers' experiences of curriculum implementation and possible challenges encountered.

Trustworthiness

Trustworthiness is described as the bedrock of qualitative research (Birt et al. 2016). This study ensured reliability and validity through several quality measures (Merriam 2002), including credibility, transferability, trustworthiness and confirmability. For the purpose of determining credibility, two experts other than the researchers independently scrutinised the contents of the lesson observation schedules and the interview protocols for reliability. This process reduced potential bias in the researchers and enhanced the credibility of the results. Different data sources were used in order to improve the trustworthiness (Cohen, Manion & Morrison 2011). Participants in this study were drawn from across one district spanning both the rural and semi-urban schools to enhance transferability of findings. Lastly, this study achieved the confirmability of findings partly through triangulation and member checking. The recordings from lesson observations and interviews were immediately played for teachers to confirm if it were a true reflection of the data collected.

Ethical considerations

Ethical considerations such as informed consent, confidentiality, anonymity, privacy and fairness (McMillan & Schumacher 2006) were considered in both negotiating access and conducting the study. Cohen et al. (2005) emphasised the importance of ethics, hinting that ethics concerns right and wrong, good and bad, so one must consider how the research contents, methods, reporting and outcomes could affect the participants. As part of ensuring the observation of ethics in this study, ethical clearance number NWU-00677-17-A9 was issued

from the NWU Ethics Committee. On approval, the researchers obtained written permission from the district head office – Director's office and proceeded to the schools to negotiate consent with the site managers. The Natural Science teachers were permitted by their principals to decide on whether or not to take part in the study. Finally, after the teachers had agreed, the consent forms were distributed and explained to them with full assurance of confidentiality and safe keeping of information collected. The researchers also made it known to the participants that they can withdraw from the process at any stage should they feel uncomfortable to proceed. While providing a conducive atmosphere for the participants, the researchers were mindful of their culture, religion and gender as well as other significant differences that existed within the population. Before signing the consent form, they were assured of their protection (anonymity), transparency, that is, no withholding of any information away from them. As Denzin and Lincoln (2000) pointed out, respect to the community confers on the researcher an obligation to respect the values and interests of the community in research and whenever possible, to protect the community from harm. This unreservedly and unconditionally bound the researchers to observe privacy, respect and consent of the participants.

Results

From the lesson observations and interviews, the results were coded and the following emerged.

Subject matter knowledge (content and science process skills)

The challenges pertaining to SMK were traced from teachers' lesson presentations. The lesson observations indicated that all teachers had prepared adequately for their presentations. Amongst the 10 teachers, there was no indication of lack of knowledge on the topic presented. However, indications of lack of experience in teaching the knowledge strand was evident. Lack of resources to support the processes of teaching and learning exacerbated the inexperience challenge. It is impossible for such teachers to be expected to build concrete knowledge and skills with limited support. This was highlighted by new recruits and the three teachers who did not specialise in Physical Sciences, like MR who said: 'I specialised in Life Sciences and Geography, my knowledge of Physical Sciences is not up to scratch' (MR, teacher, date unspecified). MR is a new B.Ed. graduate who qualifies to teach Life sciences and Geography. This means that he did not specialise in Physical Sciences but he can be allocated to teach Natural Sciences to grades 7 to 9 in a secondary school. Moreover, MR needs continuous content development support as well as teaching and learning resources from the line manager.

Meanwhile, majority (7 of the 10) of the participants who were observed teaching were fluent in the subject because they specialised in Physical Science. Physical Science is seen as more robust compared to Natural Sciences. Thus a teacher who was trained for Physical Science does not struggle with content knowledge for Natural Sciences. The knowledge strand of Natural Sciences (Matter and Materials) that teachers were observed teaching is a component of Physical Science, thus a teacher who did not specialise in Physical Science has insufficient knowledge in this knowledge strand. This was clear from teacher SM who was observed teaching a class of 35 learners in a laboratory, a highly conducive teaching environment. SM is an experienced postgraduate teacher who holds M.Sc. (Physical Sciences). He teaches in a well-resourced school in a semi-urban school. He taught density of matter. His lesson plan was well-executed and the notes (artefacts) facilitated his explanation of the topic. During the interview, this teacher was asked what he found difficult in teaching the strand matter and materials, and the response was succinct: 'To me there is nothing difficult about teaching this strand [...] I was trained in my undergraduate degree on these concepts' (SM, teacher, date unspecified). Though this teacher makes the majority in this study's participants, it cannot be generalised for a district, let alone the province. This paints a picture of the inequalities that still prevail in different schools two decades into democracy.

Still on content, one of the interview questions was on the standard of content of Natural Sciences. Teachers were asked, what their take on the standard of content of Natural Sciences is. Teachers confirmed that some topics in this knowledge strand have been deepened and amplified. Teacher TL explained his response as follows:

> 'The standard is high for these learners because some of them were not well taught at lower grades. When I was checking the practical, we have conducted now uhmmm, when I was doing my degree [...] the very same report, the skeleton of processing skills [...] were the very same processing skills we did here today.' (TL, teacher, date unspecified)

TL is an experienced teacher who holds B. Ed (Hons) and specialises with Physical Sciences. He teaches in a rural under-resourced school. This teacher taught 'dissociation of compounds ($CuSO_4$) by electrolysis' to a Grade 9 Natural Sciences class. He continued to add:

> The standard for this curriculum is really high because you check we are talking about compounds, we are also talking about components, they are the very same definition you are going to get in Grade 12. (TL, teacher, date unspecified)

As affirmed by this teacher, the heightened standard calls for developmental training for the teachers. However, the challenge remains a palpable disinterest in updating teachers' CK which is the crucial part of PCK in developing better human capital.

Teacher' instructional knowledge (annual teaching plan layout and planning, preparation and presentation)

This theme focused on teachers' ways of handling the amount of content knowledge prescribed for single school term. They are guided by the part of the CAPS document known as Annual Teaching Plan (ATP). During the interviews, 6 of the 10 teachers who taught both Grade 8 and 9 were most bothered about congestion in the ATP. The teachers were asked if they found the syllabus well spread in the ATP. All the responses suggested that the root cause of their time constraints is the congestion of the ATP. Teacher MR explained his view during the interview as follows:

> 'The knowledge strand matter and materials requires a lot of experiments besides the prescribed ones. So practicals on their own require time. Moreover, the strand is packed with many concepts and topics to complete. So the layout as it is, has too much to deal with in a short space of time'. (MR, teacher, date unspecified)

Teacher MR was implementing the Natural Sciences ATP for the first time, over and above the speed he has to move by, he should also learn content.

This particular teacher was asked what he would suggest in order to ameliorate this challenge. He said: 'The content of this strand can be reduced or taken into the next term. I think that will give us space to breathe' (MR, teacher, date unspecified). This suggestion was reiterated by teacher PM also. Clearly, from their lived experiences, teachers find a need to reduce topics and focus on providing a full repertoire of skills to the learner. This challenge affects all teachers in the same way, whether their schools are resourced, experienced or have subject content knowledge (SCK) of science. The effects of this loaded syllabus result in high number of non-skilled but certificated citizens.

From the artefacts, all teachers submitted their lesson plans before teaching. Each lesson plan was ATP compliant. Everyone knew what should be in the lesson plan. During lesson presentation, all the teachers were observed following what they wrote in their plans, starting with using learners' prior knowledge to introduce the lesson.

Lesson observation established that teachers use varied teaching strategies. This was clarified during interviews as follows: for those with limited resources, chalk and talk; those with enough resources prefer hands-on; and those with crowded classrooms followed question and answer technique. Despite all the challenges of resources uttered and observed, to an extent, teachers tried to use the learner-centred approach, even though teachers of large classes struggled to keep order when learners get involved with the learning activities, bringing in another challenge of discipline thereby losing on time.

During the interview, teacher PR was asked what his reliable strategy is; he was frank in his response: 'I just teach and give the learners work. How can I use learner-centred method without resources in an overcrowded class? But of course, I plan and prepare using ATP, which is policy' (PR, teacher, date unspecified). Teacher PR is a qualified B.Ed. holder and specialises in Life Sciences and Geography. He teaches in an under-resourced township school. According to this respondent, the hindrance of learner-centred approach does not only emanate from lack of Learner Teacher Support Materials, but also from infrastructure. These responses explain why it is imperative to prioritise support for teachers as this indifference may result in high volume of under-developed workforce.

In schools with limited resources, demonstration lessons were conducted. It was observed that the teacher would outline what was to be demonstrated then alert the learners on what to observe carefully. Teacher SM was observed using demonstration method to present her lesson. She demonstrated testing for the presence of carbon dioxide using lime water, as well as using litmus paper to test the pH of substances. SM is a Diploma in Education and Advanced Certificate in Education (ACE) (Natural Sciences) holder. She teaches in an under-resourced school. During the interview session, she was asked what teaching strategy she relied on for teaching topics on matter and materials, and she responded:

> 'I like doing experiments, because it helps the learners to remember. It's just that when apparatus is not enough, you have no choice but not all learners can see what you are doing because of their numbers. But my school is supportive in getting learners involved.' (SM, teacher, date unspecified)

The response in this instance portrays that teachers are willing to uplift and develop students who can boost the economy of the country, but there are clearly several systemic challenges.

Teachers' curriculum knowledge (specific aims and assessment)

In this theme, very few challenges were identified. Based on the interviews and lesson observations, the majority of teachers (9 of 10) neither faced any challenge in incorporating the specific aims when teaching the topics on matter and materials nor did they encounter any challenge on what or why they had to assess. From the artefacts, their lesson plans outlined each specific aim chosen for each topic. The teaching strategy for each lesson and learner activities as outlined in the plan were convincing and amply demonstrated that teachers were aware of what the specific aims are and what these imply in their daily classroom practices. When asked during the interview, how he incorporated specific aims in teaching content and what the specific aims imply,

teacher TL responded by first mentioning the three specific aims in teaching Natural Sciences, and then said:

> 'They (aims) specify the particular approach, e.g. I usually choose SAs 1 & 2, when I start a new topic. I know that I must first give my learners knowledge, explain or teach content first (knowing science) and then we get involved in practical or experiment (doing science) and so forth. This implies that there must be a specific way to drive the concept till it's complete. SAs also make us teach our learners to respect the environment and incorporate science into society.' (TL, teacher, date unspecified)

TL is an experienced teacher of Natural Sciences. He has been teaching Natural Sciences for more than 10 years. This implies that he has been exposed to all the waves of South African curriculum developments, explaining his intense knowledge of the strategy to implement curriculum policy.

The teachers' assessment records indicated that they do live up to expectations, in terms of number of assessment pieces required per term. This affirms their depth of curriculum knowledge on CAPS. However, a concern was raised by the same teachers that assessing practicals presents a challenge because of overcrowding and lack of resources and infrastructure. These challenges deprive teachers of time to do their work diligently. This similar concern was raised by Physical Sciences teachers elsewhere in South Africa (Gudyanga & Jita 2019; Koopman et al. 2016). From the responses on this theme, CAPS is well accepted and the document itself is user-friendly, even though putting the contents of the policy document in practice in order to attain the desired learning outcomes is still a challenge. If teachers are to assess science process skills of every learner, they certainly need more time. Failure to address overcrowding, lack of infrastructure and lack of teaching and learning support materials has the ominous implication that the South African economy might remain stagnant for some time. Sadly, policies in documents remain speculative and documents of hope.

This study also found that, much as it plays a crucial part in producing quality education and quality products, PCK alone without support and resources is not enough to build a citizen who can respond to the societal economic crisis and build a stable and sustainable economy. Teachers need continuous professional support and constant updates in the pedagogical matters in order to match world standards. Thus, PCK related challenges experienced by teachers may derail curriculum implementation and failure to attain the aims of the CAPS. This was also clear from the interviews which brought forth that teachers' PCK and its development is left entirely to the teachers. Moreover, their PD workshops are policy-based and little was done to enhance their pedagogical approaches, thus PCK had a limited role in influencing the attainment of the desired goals specified in the curriculum.

Curriculum and Assessment Policy Statement was introduced as a curriculum reform aimed at redressing the educational imbalances of the past, social justice, inclusivity and ensuring that South African schools provide equal educational opportunities for all learners. The CAPS envisages the development of every individual learner by equipping them with the skills and values necessary for self-fulfilment, meaningful participation in society as citizens of a free country where social justice prevails, irrespective of the learner's socio-economic background. However, according to literature, despite its transformative goals, the successful attainment of curriculum reforms depends on the innovative PCK of the teacher. Research on pedagogical challenges faced by teachers in the implementation of CAPS remains scarce in South Africa. This is because PCK is an important education input that determines the process of teaching and learning, and educational outcomes.

One key finding of this study was how lack of resources forced most teachers to chase after completing syllabus instead of nurturing the much-needed human capital. The teachers expressed their displeasure in finding themselves helplessly contributing to the regression in the quality of education. In other words, this challenge is beyond their control.

Discussion

The discussion in this chapter focuses on the following results that were reported:

- Which PCK related challenges hamper the quality of teaching and learning aimed towards building a human capital when implementing CAPS particularly Natural Sciences?

Pedagogical content knowledge remains the most important tool that each teacher should possess for quality teaching and learning. However, like any other tool, it also needs to be sharpened and enhanced periodically. There is a dire need for continuous support for the teachers. In this study, lesson observation verified the differences in classroom ambience. Some schools used laboratories to teach Natural Sciences whilst other schools used ordinary classrooms. Some classrooms were in a dilapidated state and overcrowded. A recent study by Gudyanga and Jita (2019) also established that Physical Sciences teachers still grappled with constraints in assessing practical tasks. Naturally, it is senseless to try to do a quality job with an inferior tool (Megowan-Romanowicz 2016). From the lesson observations, these challenges compel teachers to resort to ineffective methods such as demonstration for a large group, alternatively breaking the class into groups and repeating the practical three to four times, which also manifests itself as a challenge of time loss and pressure on the remaining workload.

This finding is consistent with time constraints found by Du Plessis and Marais (2015) who noted that most schools do not have the required equipment, let alone time for conducting practicals. This challenge engenders regression in teacher quality, perpetuating mass production of certificated citizens which may result in low human capital in the coming generations. Regrettably, this challenge ultimately defeats the good intentions of CAPS curriculum. Unlike resources, teachers' SMK was found to be generally adequate. From observation and interviews, this study also found that teachers were conversant with content except for the non-specialist who also have less or no experience in teaching Natural Sciences. This finding contradicts with the views of other researchers like Bantwini (2010) and Rollnick et al. (2008) who found that some science teachers had inadequate content knowledge in teaching science. During the interviews, though he (MR) was determined to fit in, the non-specialist in Physical Sciences declared lack of knowledge background and insufficient CK in particulate nature of matter. This is consistent with Gudyanga and Jita (2018), who found that teachers who specialise demonstrate adequate CK as compared to the non-specialising counterparts who are challenged when it comes to conducting practicals as well as guiding the learners in that regard. As such, economic growth will remain a dream:

- How does PCK influence attainment of desired learning outcomes when implementing Natural Sciences curriculum?

Based on the findings from teachers' steadfast commitment and adherence to curriculum policy, classroom practices and willingness to produce the kind of learners as envisaged, teachers seem undeterred by the operational challenges that continue to prevail. From artefacts and lesson observations, teachers' PCK and their curriculum knowledge are adequate to train and provide quality knowledge and skills to the learners. Interviews corroborated lesson observations as teachers attested to the knowledge they gain from teacher training. Their planning and preparation as well assessment as indicated by the artefacts portray commitment to attain the desired learning outcomes. However, circumstances defeat their commitment. Teachers' adequate curriculum and instructional knowledge were evident from the artefacts. Their planning confirmed common features, which meant a common understanding of the CAPS document. This is attributed to the streamlined curriculum and its policy document which guides teachers in executing the implementation process.

From the interviews, it could be gained that the teachers claimed using different teaching strategies. It could also be confirmed that they were following learner-centred approach. For those who specialise in Physical Sciences, they try by all means to meet the standard as they mentioned in the interviews. This suggests that they abide by the policy and are willing to see

it succeed. This is consistent with the DBE (2011) recommendation that teachers should involve the learners in the learning process whilst they facilitate the process. The level of commitment shown by teachers indicates that they are still hopeful that when the education system reciprocates the same level of commitment, the influence of PCK could bear the envisaged fruits.

Conclusion

To sum up, the lesson plans and teachers' prepared notes (artefacts) amplified the classroom practices that should transpire during the lesson. These artefacts supported the findings from the survey but contradicted the lesson observations. From classroom observations, it could be garnered that what some teachers claim to be learner-centred approaches in their teaching strategies are skewed towards class discussion or question and answer instead of inquiry-based learning. This points to how lack of resources narrows the nature and scope of pedagogical competencies. For example, instead of demonstrating a real experiment, when teachers explain the events of an experiment and ask the learners questions, they are depriving the learners of the chance to discover the changes that were expected to occur during the experiment. All this is blamed on time constraints and lack of resources, which curtail teachers from showcasing their instructional knowledge. Some teachers found external assessment as inhibiting them from being innovative in their own profession. This is consistent with the findings by Gudyanga and Jita (2019) that teachers' opportunities to develop higher thinking skills were limited by providing them with practical lesson plans and tasks to use in their classes.

Finally, in answering this sub-question, this study found teachers' nature and scope of pedagogic competencies in teaching matter and materials adequate. They have in-depth knowledge of the curriculum and its components. It can therefore be assumed that they have acclimatised to CAPS curriculum. Although their instructional knowledge has been put to the test by shortage of resources, driving them to improvise or altering the expected practices to suit the prevailing circumstances. Artefacts showed that teachers' plans speak to the intentions of curriculum even though some of the practices are skewed. Sadly, the optimisation of the nature and scope of pedagogic competencies for these teachers is dependent on the availability of resources. Such shortcomings compelled the classroom practices to vary from teacher to teacher, and from school to school.

This study therefore recommends that teachers be periodically involved in the PCK-based professional training sessions and not only policy training matters. They should be continuously provided with such professional support

for the purpose of quality teaching expected by the current curriculum and the kind of learners the system envisages.

Based on the findings, this study serves to highlight the effects of the challenges faced by the Natural Sciences teachers in dealing with the curriculum imperatives to attain the desired outcomes of the new reform. The study initiates a wakeup call for the authority. There are scarce research studies that focus on pedagogical challenges faced by teachers in the implementation of CAPS in South Africa. This study also recommends PCK enhancement as an imperative for attainment of quality education that leads to human capital development.

Chapter 7

The use of argument frames for solving word problems in Mathematics in primary schools

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Synopsis

This chapter deliberates on the results from a research inquiry that interrogated using argument frames (AFs) for solving word problems in Mathematics at primary school level. The science, technology, engineering, arts, and mathematics (STEAM) perspective privileges Mathematics as an important subject not only for school purposes but for providing opportunities to develop problem-solving strategies, innovative reasoning and critical thinking

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in the 21st century. The growing acknowledgement of Mathematics as a driver for STEAM-related national, human and economic developmental trajectories has increased the imperative to improve attainment in Mathematics in schools. Learner's attainment in Mathematics advances the development of capabilities and human dignity enabling individuals to meaningfully participate in the socio-economic opportunities. Although Mathematics is viewed as the foundation for STEAM-related economic development, South Africa continues to produce appalling results in Mathematics. Research often overlooks that most ideas in Mathematics are in word format that need to be comprehended and interpreted. The poor academic attainment observed in various studies might be attributed to the drawbacks and challenges in the capacities of teachers and students, and their performances which inherent potential injustices and inequalities. Data were collected using an interpretive case study of Grade 7 learners to explore how AFs as an intervention and mediating tool in classes could enhance authentic problem-solving in Mathematics at primary school level. The outcomes imply that the use of AFs leads to improved problem-solving abilities and skills in Mathematics. There is therefore a need to appropriate AFs strategies to improve learners' attainment in primary school Mathematics.

Introduction

This chapter deliberates on the findings from a study that interrogated the use of AFs for solving word problems in Mathematics in primary schools. There is a growing evidence that poor academic attainment of learners in primary school Mathematics has become a worldwide concern (Jaafar 2015; Sepeng & Madzorera 2014). Globally, Mathematics is considered as one of the key indicators of human capital growth and economic growth for any country (Valero 2017). Bieda, Bowers and Küchle (2019) recognised that nurturing and promoting excellence in Mathematics, reading, and the Science-related domains constitute factors that lead to sustainable development. Bieda et al. (2019) further postulated that school attainment in Mathematics and Sciences could provide a basis for understanding and predicting individual development and economic growth. Therefore, this chapter seeks to establish whether the use of AFs in word problem-solving could improve learners' performance in Mathematics in primary schools.

Literature documents that primary school Mathematics provides the foundation for the progression into Mathematics and Science disciplines in higher education, and consequently the mastery of mathematical knowledge and competence is central to stimulating and sustaining human capital development and economic growth. In a study, Hanushek and Woessmann (2020) used the average of the Mathematics and Science scores as one of the proxies for an aggregated measure of the knowledge capital and skillset possessed by the whole labour force in a country. They found evidence of a

significant relationship between Mathematics education and the economic growth of a nation. It is may be inferred from these foregoing findings that Mathematics education through the critical skills that it imparts to learners provides a stimulus for economic growth and development in any economy.

For over 50 years, poor performance in primary school Mathematics has been attributed to difficulties that the learners encounter in solving word problems in Mathematics. Word problems are mathematical tasks that are constructed using word text and often complex information instead of a notation thus requiring intricate comprehension skills, and therefore prompt the use of cognitive strategies, critical thinking and problem-solving strategies (Schäfer 2010; Setati & Adler 2000). In principle, word problem solving in Mathematics aims to accomplish goals such as offering lived experiences in solving problems in the real context coined in mathematical representation that enhance the training of the learners to think creatively over what they have learnt in school (Verschaffel et al. 2020). Mathematical word problems consist of crucial components within the Mathematics discipline, yet learners' attainment in this area has been poor. The DBE in South Africa (2013) and Salemeh and Etchells (2016), amongst many other sources, have established that learners experience some complications in solving word problems in the real wor(l)d context, explicating them in a correct way, correctly using information that has been taught as well as translating the English language into the mathematics register whilst generating sense of the problem in real-life contexts.

The overall learner attainment in solving word problems in Mathematics is influenced amongst many other factors by the teaching and the learning strategies adopted by the educator. Verschaffel et al. (2020) pointed out that there is a lack of correspondence in associating word problems with contextualised problems in the real world settings within the Mathematics education research community, yet this influences how learners are developed to respond efficiently to mathematical problems in terms of the complexities in the real life. The introduction of ICT has become an option for researchers to exploit as a possible tool to promote word problem solving learning in Mathematics. Verschaffel et al. (2020) further argued that the use of ICT has not been as effective in promoting adequate problem-solving Mathematics skills. Research has neglected to focus on this field of study. Hence against this background, it is imperative to examine AFs for solving word problems in Mathematics at primary school level.

Problem statement

The need for using AFs in primary school cannot be over-emphasised. There is a growing consensus in literature that mathematical argument writing (frames) in the context of early childhood education and primary schooling

lays a concrete foundation for Mathematics education (Kosko & Zimmerman 2019). Scholars like Kiwanuka et al. (2015) have raised the concern that despite Mathematics being significantly linked with science and technology subjects, learners still perform poorly resulting in developing countries thus lagging behind the developed economies. These constellation of subjects are not only critical for the development of the economy but are also the drivers of social justice imperatives (Petersen, McAuliffe & Vermeulen 2017). Empirical studies provide evidence suggesting that countries promoting economic growth and consequently overall social welfare of the citizens should improve the learners' competencies in solving word problems in Mathematics at the primary school level.

Presently, South Africa continues to experience low learner performance in Mathematics despite the critical place it holds in addressing the socio-economic needs of the society. A recent survey by Reddy et al. (2016) showed that out of 39 countries reported in the TIMSS in 2015 on Mathematics attainment, South Africa ranked second lowest. South Africa with 372 points was amongst the five lowest performing countries: Botswana (391), Jordan (386), Morocco (384), South Africa (372) and Saudi Arabia (368). Four categories of benchmarks in the TIMMS report were given, amongst which 400 to 475 points were low level attainment scores. Furthermore, although South Africa portrayed the greatest increment, by a 90-points score in Science and 87 points in Mathematics, such attainment in these subjects depicted only a switch from an embarrassingly very low level mark to just a low level (Reddy et al. 2016).

Until 2020, an insignificant improvement was recorded in the TIMSS 2003 and 2011, with South Africa's scores in Mathematics and Science improving by 67 and 64 points, respectively. Moreover, the attainment was ameliorated by 20 and 26 point scores achieved respectively in 2011 and 2015 (Reddy et al. 2016). It was established that South Africa exhibited a wide range in the scores attained, and this has been contemplated as a reflection of the inequalities entrenched in the education system, which in turn reflects the systemic inequalities prevalent in the South African society. These views are in concurrence with the DBE outcomes which observed that learners from the Foundation Phase (Grades 1 to 3) display poor comprehension and knowledge solving of Mathematics word-problems (DBE 2011). Venkat (2013) suggested that it appears as if Mathematics teachers in the primary schools find it difficult to demonstrate effective teaching strategies that could help learners in understanding what they are being taught. Word problems in Mathematics present a challenge to learners because the exercises are formulated in words that require learners to comprehend, interpret, analyse and apply their cognitive understanding to the mathematical concepts.

The major problem experienced in South African primary schools is that many learners are not achieving the minimum requirements in the Inter-Sen phase (Intermediate phase and Grade 7) Mathematics, especially in the area of problem-solving strategies (Petersen et al. 2017). The parlous attainment in basic numeracy skills by learners in Grades 3 and 4 prevails against a background where there is a growing demand for improved quality education. Amidst these challenges, Government Gazette (1996) had proposed a new South African educational system, deemed a requirement, to gradually harness high-quality education for all *learners* by laying a strong foundation to unleash and nurture talents and competencies of the *learners*. Issues of low performance should be addressed because challenges could worsen the poor attainment of learners. Consequently, such poor attainment diminishes the chances of the learners getting promoted to the subsequent grade (DBE 2011; US. DoE 2004). The gap identified in literature is that the poor learner performance in Mathematics education in South African primary schools prevails amidst the convictions that AFs may be used for solving word problems in primary school Mathematics.

Taking into consideration the observed poor learner performance in the Mathematics curriculum in South African primary schools and the insights from the literature discussed above, the major research question that the study sought to answer is: What is the influence of using AFs on Mathematics word problem-solving and learner attainment in South African primary schools?

In answering the main research question, the following secondary questions are addressed:

1. What are the challenges experienced by learners in Mathematics word problem-solving and how does this affect their attainment in Mathematics?
2. What is the nature of problems that arise in the absence of AFs on the learner attainment in Mathematics?
3. How can the use of AFs improve learner performance in Mathematics word problem-solving?
4. What strategies could be used to enhance the use of *AFs for word problem-solving primary school Mathematics?*

Theoretical and conceptual framework: Mathematics education and economic development

Mathematics education contributes to the economic growth of an economy. In a study conducted in Uganda, Mathematics was made one of the compulsory core subjects both in the primary and secondary educational curricula. This was done with the intention to guide and direct the country

towards economic growth and development (Kiwanuka et al. 2015). Likewise, in South Africa, Mathematics is a compulsory subject for all learners in Grades 1 to 9, which forms the General Education and Training (GET) band. Grades 10 to 12 form the FET band, where the learners have a choice to continue with Mathematics or Mathematics Literacy (Adler & Pillay 2016). The findings from both studies suggest that South Africa should prioritise improving the attainment in Mathematics education by enhancing word problem solving skills in Mathematics at the primary school in pursuit of economic growth.

Minister of Basic Education, Angie Motshekga (cited by *BusinessTech* 2020), stated that the DBE is persistently planning around positioning the present curriculum with the national economic development plan so as to address the urgent challenges such as those presented by the Fourth Industrial Revolution (4IR). It is imperative then to address problem-solving in Mathematics in pursuit of attracting and retaining a diverse STEM workforce in the country. It has since been argued that the education system needs to reconceptualise the ways in which we teach our learners. To attain quality education, components of the STEM must be preserved and re-defined by capturing the essence of the STEAM in primary schools, in response to the global demand of quality education (Quigley, Herro & Jamil 2017). The STEAM approach is defined as the transdisciplinary contours of teaching and encouraging a wide variety of knowledge and skill sets that promote problem-solving and thus preparing the learners to solve the world's pressing issues through critical thinking. Learners solve authentic scenarios and problems incorporated in content areas by merging the subjects and their involvement in the tasks set. Jamil, Linder and Stegelin (2018) contended that for any emerging teaching strategy such as STEAM to succeed or fail, the onus rests on the teachers to absorb and appreciate responsibilities in the new approaches.

Using argument frames for solving word problems in mathematics

Argument frames support interactional skills amongst learners as they collaborate within their groups. They also foster cognitive skills such as applying, perceiving and interpreting as well as cultivating creative skills in connecting ideas (Guyotte et al. 2014). Argument frames thus harness intellectual growth that develops a line of thought, competence in decision-making and problem-solving in learners. They essentially cultivate and encourage self-expression (Ge, Ifenthaler & Spector 2015) especially when the learners are asked questions on Mathematics word problems. Through AFs, learners who are creative and divergent problem solvers are enabled to artistically express their views as there is not one way to reach the right

answer (Jamil et al. 2018). Professional development of teachers is crucial to harness the art of teaching and resultantly teachers are enriched to better teach and orchestrate the contents of Mathematics in the classrooms in all levels (Jojo 2019).

Shortcomings identified in the education system produce learners who are incompetent in doing Mathematics. Oke and Fernandes (2020) confirmed the assertion of the African continent education division being inadequately prepared for the 4IR era in capitalising and embracing teaching and learning opportunities It is, however, noted that a number of education institutions support teaching and learning by using computers, in an attempt to integrate the influence of 4IR. However, it is likely to disrupt the approaches used in teaching, learning and participants' engagement in Mathematics classrooms as it operates beyond mere using the computers.

Argument frames for solving word problems in mathematics curriculum in South African primary schools

The NCS was aimed at nurturing learners who can analyse and solve word problems, and articulate ideas by reasoning as well as innovative thinking in Grades R to 12 (DoBE 2011). This requires a curriculum that exhibits that problem-solving contexts are indeed a significant part of related systems. The foreword by Minister Angie Motshekga in the NCS stated that in the CAPS Grades 1 to 3 Mathematics (DoE 2011), amongst other things, the education sector aims on fostering democratic values, social justice and human rights as the foundation of an established society healed from the divisive experiences of the past. Hence, the education system of a nation and the curriculum adopted should enhance equality. The NCS is grounded on propositions that resonate with social justice, cooperative and interpretative learning, high knowledge and high competence, progression, quality as well as inclusiveness, human rights, and environmental and social justice. In so doing, such a curriculum talks to issues of inequalities, educational imbalances, language and quality, and standards of knowledge and skills that learners must attain and exhibit in all subjects (DoE 2011).

Most learners have been 'remarkably deficient' in solving mathematical problems globally (Carnoy & Garcia 2017; Geesa et al. 2019), as also in South Africa (DBE 2011; Sepeng & Madzorera 2014). Attainment in Mathematics has been and still is a concern in a number of countries. Indeed, Mathematics is a discipline that affects learners' success across the curriculum and has a significant impact on the learners' future careers.

The influence of using argument frames

The use of AFs supports the initiative of using frames (genres) as an art to inaugurate logical arguments by teachers and learners, and scaffold problem-solving mathematics word tasks (Bieda et al. 2019). Gaps in the little *talk* (or lack of talk) in the classrooms stifle argumentation or discussion, and this results in learners' poor academic attainment in Mathematics in the primary school. This suggests a lack of social justice, as teachers are expected to demonstrate competence in their teaching whilst their learners lack the concomitant empowerment.

Argument frames expose learners to the art to argue about what information is presented in a mathematical question (word problem) (Quigley et al. 2017). Learners can be taught this art and they can be developed to challenge how to think critically about what information or solution to present, and how to present it. Mathematical argumentation helps us see how teachers and the curriculum frames learners' engagement in argumentation in way that has consequences for students' understanding and social practice (Bieda et al. 2019). However, using just genres is not complete, engaging learners on the genres through utterances (talk) is deemed more effective as the teacher mediates the process of learning and scaffolds learning within the Zone of Proximal Development (ZPD). Confirmation of Mathematics as a body of knowledge owes much to the art of rigorous logical argument. The gap in the 'art' mentioned is enacted in the AFs. Sepeng (2013) used the concept of cartoons to provoke learners' discussion and stimulate mathematical thinking and argument writing frames in South African schools educational context. When learners start talking about how to solve the word problems, the more the cognitive abilities (creative thinking, reasoning and problem-solving) are enhanced, resulting in better attainment.

In this chapter, the medium of argumentation and discussion was the word problems in Mathematics which pose a threat to learners' academic attainment should the understanding of the word problems be lacking.

Theoretical framework

The study reported here is particularly buttressed by the social-cultural constructivist perspective developed by Vygotsky. This interpretive research paradigm (constructivism) (Creswell 2003) is a naturalistic perspective that considers the formation of words and reporting of detailed conversations from the participants (Okeke & Van Wyk 2015). This viewpoint is embedded in the possibilities of learners talking with their peers and teachers in their local settings that is Mathematics classrooms (Cohen, Manion & Morrison 2018).

The essence of establishing meanings about the learners in their world of experiences points to how research participants understand their experiences. As alluded by Merriam (2002), the significance of the experience is mediated as an instrument by the researcher in presenting the results in a descriptive manner.

Within the constructivism context, the interaction of learners in the process of teaching and learning rests on a dialogic instruction provided by a more knowledgeable person such as a teacher. In acquiring skills to handle knowledge and solve problems, mediation plays a fundamental role in different schools for developmental education. More to that, the socio-cultural philosophy reinforces the creation and conceptualising of meanings by learners through their utterances. Vygotsky's socio-cultural theory rests on the core tenets of mediation, social interaction, as well as the ZPD (Shabani 2016). His notions enable the participants to socially interact through *talk*, in a classroom context where Mathematics word problems are solved. In his postulation, Vygotsky avers that in conceptualising change of knowledge, cognitive growth that is limited to the learner can be accomplished with the help of a more knowledgeable individual (peer, tutor or teacher) (Kozulin et al. 2003). There is an emphasis on the social origin of mental functions. This social origin of knowledge is enhanced through mediation, coupled with conversations that probe the individual's cognitive conceptualisation networks. Social interaction leads to development if it is embedded within the interactions dealing with tasks in solving problems. In a socially mediated process, language plays a vital part in the intellectual experience of the learner. Learning awakens numerous learner's procedures that are logically growing when engaging with teachers (adult), explored in the learner's immediate context (Kozulin et al. 2003).

Using AFs helps learners develop their critical skills which in return nurtures the naturalistic approach in the development of students as apprentices. Glaser (2007) contended that people know what they think of, wish to make sense of their worldview naturally. It was for this reason that AFs were taught to learners as they themselves generated multiple realities, constructed in interactive ways in their context, as they investigated and explored their natural world (Khasawneh, Khaled & Al Momani 2016). The neoclassical approach of imposing uniformity (Marks & Hooghe 2000) contributed to the development of the learners as they exercised their critical thinking skills, hence bringing the benefits of security as equal citizens those are treated the same. It is worth noting that all learners have a natural intelligence within them, which is the capacity to solve problems (Checkely 1997). The logico-mathematical intelligence is sensitive to a capacity to discern; logical mathematicians perceive patterns and are capable of handling long chains of reasoning.

Research design and methodology

This section deliberates on the paradigm, methodology, research design and data collection techniques. Furthermore, it describes sampling strategies, the enrolment of participants and the research site. This study followed mixed elements of the interpretivist and the positivist paradigm, where empirical and interpretative techniques were applied to create knowledge. The researchers followed an explanatory and sequential process grounded in the interpretive mixed method case study design building on the work of scholars like Maree (2007) and Merriam (2002). A two-phase approach was used in collecting the data, quantitative in the first stage, analysing the resultant, followed by using the outcome to influence the qualitative stage. The mixed method approach integrates data from both the qualitative and quantitative methods in a research study (Cohen et al. 2018; Creswell 2014). This approach enabled a nuanced understanding of learners' experiences of *talk*.

Two Grade 7 groups from two different schools were used in the case study to analyse and ascertain if using AFs to augment class discussions in the experimental group had an influence as learners participated in Mathematics word-problem solving. The generation of data from the participants required ethical clearance (Creswell 2014). We were cognisant of the fact that participants were minors, hence, were to be protected from exposure to risks greater than what they could gain stemming from participating in the study.

The researchers used a pre-test–intervention–post-test design derived from a quasi-experimental design articulating the non-equivalent design that is anchored on the pre-test and post-test capturing of a comparison group design. The AFs were used as an intervention to probe learners in a *talk* in the form of argumentation and discussions, where learners were taught how to deal with Mathematics word problems (Creswell 2014). The researchers purposefully selected the two groups: experimental and control, and were subjected to – a pre- and post-test. The experimental group received treatment in the form of using AFs intervention (Table 7.1).

Participants

A small case study was used in order to get more in-depth understanding of this AFs strategy before implementing it on a broader scale. Learners who took part came from two Grade 7 schools located in the North West Province in South Africa. Grade 7 classes formed part of this study of word problem-solving because this is the inception grade in the Senior Phase (secondary) band that comprises Grades 7 to 9 in the South African school context. Grade 7 learners were chosen because they are expected to display algorithm thinking abilities that portray relational thinking as solving word problems

TABLE 7.1: A non-equivalent comparison-group design.

Group	Pre-test measure	Treatment	Post-test measure
Experimental group	O_1	X_1	O_2
	–	–	–
Comparison group	O_1		O_2

Source: Johnson and Christensen (2017:357).
Note: The dotted lines indicate non-random assignment to the comparison group; O_1 represents a pre-test measure before any intervention was done. X_1 represents the treatment which was the intervention in using AFs and O_2 is the post-intervention measure of the group.

and using the thinking skills becomes more challenging as they progress to Grade 8 (secondary school) (Kunene 2019). A purposeful sampling of the two schools was based on convenience (Hanley-Maxwell & Bottge 2006). Data were collected from learners in schools that shared the same background conditions, academically and socially (both in a location), and who could have had the same exposure and experiences in those contexts. Although the findings obtained from this sampling could not be generalised (Johnson & Christensen 2017), they still formed a good foundation to work our way up to a bigger scale.

Data collection strategies

The researchers designed the pre- and post-tests for both groups. Observations were conducted using a video, as well as the pre- and post-intervention learners' focus groups interviews with the experimental group as the instrumentation (Maree 2007).

Pre- and post-tests

Both the experimental and comparison groups of learners were taught by one of the researchers. The Mathematics concepts taught based on solving word problems were drawn from the Grade 7 curriculum, and were used to write the post-test. The pre-test was used as a precedent of a number of intervention lessons, in order to establish and assess the extent of performance attained by learners and their competencies in solving word (multiplicative) problems. The pre- and post-tests were constituted of the same tasks (seven) after a pilot-testing was done in the previous year. The post-test scores informed the researchers in evaluating the influence of AFs in solving word problems in Mathematics attainment amongst the learners. Concepts and topics taught during the study followed closely the Department of Education curriculum recommendations.

Pre- and post-intervention learners' focus group interview

We employed pre-intervention face-to-face focus group interviews to better evaluate the learners' pre-test responses (Maree 2007). We used a semi-structured interview schedule with 11 learners that formed part of the experimental group. The interview carried out after the treatment sought to examine the extent of influence and pedagogical implications on the study as well the viewpoints of the learners about the intervention. The interviews were audio-recorded with the parents' consent as well as the learners' assent.

The argument frames intervention

The researchers adapted 10 writing frames from Seidlitz Education (2010) which were modified to suit the context of learners where the intervention took place. We chose the frames suitable for better mediating conceptualisation of solving word problems in learners. Teaching of word problems was done in some days to accommodate other concepts that had to be taught, hence only 10 frames were used. Learners used AFs as starters to frame their argumentations and discussions during the teaching of word problem-solving. The two groups were taught similar concepts around the same days. When learners responded to word problem-solving questions, the researcher who was involved in teaching this concept introduced not more than two frames in one lesson. The frames were therefore used *in situ*. We presented the AFs in stages to assist learners in using them as starters and as connectors to the interpretation of the Mathematics problem embedded in the words. These frames helped the learners to contend why each answer given was the best solution or not, as the teacher used the frames in mediating understanding the solving of word problems by learners. The study used frames like, *the problem gives the following information...* from tasks given on word problems. The learners were expected to list information stated in the word task. The frame, *I already know that... so that/because...* made the learners to connect it to the previously learned information on topics or concepts, which formed a fundamental construct to build upon when solving the word task (Kunene 2019).

How the researchers used the argument frames in class

The researchers did not want to distract learners in the beginning of the intervention process, hence, distributing the AFs worksheet was delayed until learners got used to using the frames on what they wanted to say. The learners started reading the frames from the worksheets after they were comfortable to respond to questions that were asked with expected solutions. Each group of learners was given a frame different from the other groups to work on,

write it down in their exercise books, and respond to the word problem question assigned to the whole class. The learners were timed to work with the frame given in their groups and reported to the whole class. The participant-researcher engaged the whole class in a discussion on the same questions orally, with every group reporting on their answers according to the AF they were using. During the social interaction, the researcher encouraged learners to present, explain and argue claims arising from their solutions. The researcher mediated learning in the smaller group discussions by learners who were using the AFs to rationalise their answers. The researcher provided insight and clarity whilst motivating learners to talk and argue more whenever it was necessary after the groups had presented and explained their answers. The researchers used the AFs to conceptualise the topics that were taught: *percentages; area of two-dimensional (2-D) shapes* and *multiplication of decimals.* The core reason for the researchers using the AFs was to assist the learners in understanding the word problem questions, deliberate and argue their points as a mediating tool, to arrive at the correct solutions. The fundamental reason for learners using the frames was to demonstrate that they could frame their *talk* and not just learn how to write them. Hence, learners verbally/orally argued mostly, and not in writing per se. Hence, the frames were called AFs (Kunene 2019).

■ Observations (video recordings)

The researchers also used videos to capture the progression of the intervention lessons that they observed to counter tendencies of partiality of the observer to record occurrences that appeared often (Cohen et al. 2018). Videos promote the completeness and comprehensiveness of material as the researcher watches more than once to interpret the data in meticulous ways. Learners' written work was captured in their exercise books in class using the AFs. The videos were used to gain deeper perception (Maree 2007) where learners participated in *talk* – collaborations by way of conversations together with their responses in word problem-solving based on the Mathematics tasks designed. For every video with learners' utterances transcribed, the researchers coded the themes as argumentation and discussion which followed the pre-intervention, intervention and post-intervention sequence (Bowman 1994).

As the study anchored upon Vygotsky's constructivism theory, the researchers used theoretical lenses: the ZPD, mediation and social interaction notions as units of intervention during the observations of the *talk* in the form of *discussions* and *argumentations*.

Vygotsky (1978) asserted that the ZPD is:

> [*T*]he 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 or in a collaboration with more capable peer. (p. 38)

During the ZPD conceptualisation, the participants continued performing activities they could not do before. This was observed within a social mediation protocol by a more capable individual (peer or teacher) who operates at a higher level by integrating teacher scaffolding in the learners' learning (Wass & Golding 2014). We mediated the process of teaching and learning which included interaction, iteration, formation of new knowledge braced in rethinking ideas, the art of arguing, as well as comprehending the corroborated contextual aspects of Mathematics as learners solve problems in an improved way (Landsberg, Krüger & Swart 2016; Reed & Walker 2015). Mediation uses an internal learning process called language that comprises essential tenets such as attention, memory and the formation of concepts (Van de Walle, Karp & Bay-Williams 2013). During the process of mediation, participants first give answers for the word problem questions, followed by *making claims* and those should be demonstrated in the learners' *talk*. The aspect of *learners engaging with teacher* meant instances where learners participated in the discussion or argumentation processes. In this way, learners showed that they were engaging with the teacher by raising up their hands to respond to questions. According to Ross, Fisher and Frey (2009), language frames promote the process of argumentation when learners are taught how to solve word problems during teacher modelling and group discussions.

Analysis of quantitative data

The analysis of the quantitative data was as follows: the test was first administered and marked. The results of the learners' marked test were analysed and informed the interviews. The researchers converted the achieved test marks to percentages to manage the pass benchmark of 40%. According to the DBE (2011), a mark of 40% qualified the participant to be promoted to the following grade. Researchers used the learners' scripts in identifying problems and errors manifested. Researchers used the Statistical Package for the Social Sciences® (SPSS' IBM®) software that uses the Wilcoxon Signed Rank Test, the Mann–Whitney test and Wilcoxon rank-sum test as well as the Pearson's Chi-Square Test, suggested by a statistical consultant in generating the statistical outcome (Field 2013). To compare data obtained from the same group of learners, the researchers used both tests results (pre- and post-) to subject in the Wilcoxon Signed-Rank Test (Field 2013; Imam, Mohammed & Abanyam 2014; Mehta & Patel 2012). According to Wagner (2017), the Wilcoxon Signed-Rank Test produces statistical significance of *t*-tests when means are compared in paired entries. In this case, the variables that were measured to establish the *t*-test statistical significance were the pre-test and the post-test. The researchers used the Pearson's Chi-Square Test to evaluate current performance levels within each group, using the performances obtained in the pre- and post-tests. According to Field (2013), for any association to be considered statistically significant, the *p*-value must be equal to or less than 0.05.

Findings

This section presents the established quantitative and qualitative data results that were used to respond to the research question and the secondary questions.

Quantitative results

Findings from the quantitative data were derived from the pre- and post-tests yielded by the experimental group (n = 42) and the comparison (n = 35). The focus group produced the qualitative data through the focus group interviews; observations from the video recordings and learners' written calculations in their exercise books. Learners were required to solve seven-word problems test items (TIs) adapted from Verschaffel, De Corte and Lasure (1994), and were immediately required to discuss and justify the solutions they derived. As researchers, we were conscious of the fact that all four basic mathematical operational signs which are addition, subtraction, multiplication and division apply in tackling word problem-solving. However, the multiplicative operation was used to solve the word problems in the Grade 7 context, as quite a large number of learners experience difficulties in this regard.

The researchers used the pre-test to determine the influence of the use of AFs intervention tool in solving the multiplicative word problems, when compared to the post-test. To establish any noticeable changes in the performance of the learners to solve word problems in two sets of test scores, the researchers used the Mann–Whitney t-test as a non-parametric test within the SPSS Wilcoxon Signed Test Statistics Strata. However, the results reported in this chapter were based on the overall attainment of the experimental group learners as far as the Basic Education Departmental requirements and benchmarks in the subjects are concerned.

The performance of learners in the experimental group: Pre-test and post-test (framed within the Department of Basic Education requirements)

Table 7.2 shows performance attained by the learners in the experimental group during the pre- and post-test. On the left-hand side of the table, 98% (41) of the learners produced results in the category of levels 1–2, meaning that they got between 0 and 15 marks out of 40 marks. These weak results justify a reason for the learners to be retained in the current grade and that they could not proceed to the next grade, that is they are considered to have failed the current grade. The table also presents results of one of the learners who attained 16 marks out of 40, and this accounts for 2% of the cohort.

TABLE 7.2: Performance attained – Experimental group.

Parameters	Test			
	Pre-test		Post-test	
Mark range	(0–39) marks	(40–100) marks	(0–39) marks	(40–100) marks
Results within the mark range	0–15 marks out of 40	16 marks upwards	-	-
Percentage	98%	2%	50%	50%

Source: Kunene (2019:148).

The interpretation of the 2% means that the learner was eligible for promotion to the next grade because the marks were ranked at level 3. Any attainment of 40% and over is ranked between levels 3 to 7, justifying the progression or promotion of that learner to the next grade.

The post-test analysis for the experimental group reveals (see right-hand side of Table 7.2) levels 3 to 7 marks attainment by 50% (21) of the cohort as well as levels 1 to 2 by another 50% (21) learners. This proves that in the post-test, half (50%) of the class passed the test by obtaining levels 3–7. This is a noticeable and significant increase of 48% from 2% in the pre-test to 50% in the post-test. The outcome displayed in the table implies an influence arising from the use of AFs intervention experienced by the experimental group expressed in favour of the post-test results (Kunene 2019:148).

Qualitative findings

The intervention (use of argument frames)

At the beginning of the intervention, the participants would 'switch off' and were reluctant to engage in discussions. The learners engaged in organised talk by participating in the discussions with the participant-researcher through the groups formed based on the researchers' instructions, whilst the learners negotiated ways and strategies to solving the Mathematics questions. The learners started to participate by taking up questions to the chalkboard to explain how certain word problems could be solved to reach an answer in the presence of the teacher. The researchers used the AFs to scaffold and mediate understanding. The learners started using the AFs to frame their sentences, dwelling on systematic interpretation of the Mathematics word problems. They also used AFs during the discussions and wrote down one or two frames during a lesson to scaffold their understanding of the word problems. We noted that the learners now used the correct operations and correct computations and procedures to answer their questions. Even though the tasks were not completely correctly computed, the solutions were partially more correct than incorrect.

Discussion of quantitative results

The researchers noticed that in the pre-test results (see Table 7.2), most of the participants in the experimental group attained levels 1 to 2, which was an increase of 48% in the learners' attainment recorded in the post-test. The results made it possible to discern an implicit positive impact of the AFs intervention evinced within the treatment group. According to the DBE assessment system, attainment in the range of levels 1 to 2 exhibits marks between 0% and 39%, and having failed in the mathematics subject, hence

TABLE 7.3: Comparison group's overall performance of the pre-and post-test scores

Variable	Min	Max	Mean	Median
Pre-item 1.1	1	3	2.857143	3
Pre-item 1.2	0	2	0.9142857	1
Pre-item 1.3	0	2	1.857143	2
Pre-item 2.1	0	5	1.771429	1
Pre-item 2.2	0	6	1.228571	0
Pre-item 2.3	0	2	0.3142857	0
Pre-item 2.4	0	0	0	0
PRE- TOTAL	**3**	**17**	**8.942857**	**8**
Post-item 1.1	0	3	2.8	3
Post-item 1.2	0	2	1.371429	2
Post-item1.3	0	2	1.714286	3
Post-item 2.1	0	5	3.085714	2
Post-item 2.2	0	6	2.114286	2
Post-item 2.3	0	8	2.371429	1
Post-item 2.4	0	8	1.457143	1
POST- TOTAL	**6**	**34**	**14.91429**	**13**

TABLE 7.4: Experimental group's overall performance of the pre-and post-test scores

Variable	Min	Max	Mean	Median
Pre-item 1.1	0	3	2.595238	3
Pre-item 1.2	0	2	1.261905	2
Pre-item 1.3	0	2	1.809524	2
Pre-item 2.1	0	5	1.952381	2
Pre-item 2.2	0	5	0.5238095	0
Pre-item 2.3	0	1	0.2380952	0
Pre-item 2.4	0	1	0.0238095	0
PRE- TOTAL	**0**	**16**	**8.404762**	**8**
Post-item 1.1	0	3	2.761905	3
Post-item 1.2	0	2	1.166667	1
Post-item1.3	0	2	1.714286	2
Post-item 2.1	0	5	2.47619	1
Post-item 2.2	0	8	2.52381	2.5
Post-item 2.3	0	9	2.47619	1
Post-item 2.4	0	9	3.47619	2.5
POST- TOTAL	**4**	**32**	**16.78571**	**15.5**

Source: Kunene (2019: 137).

the learner cannot be promoted to the next grade. Learners who obtain marks in the range of levels 3–7 denote a mark bracket of 40% to 100% and these are considered to have passed and may proceed to the following class (DBE 2011).

Problem-solving abilities from post-test: Experimental and comparison groups

The post-test total scores of the experimental group were slightly higher than the post-test scores of the comparison group. The median scores stood at 15.50 for the experimental and 13.00 for the comparison group. The mean scores were 16.7857 and 14.9142, respectively. Regarding marks attainment, the lowest mark for the experimental group was 4, whilst for the comparison group it was 6. Maximum scores were 32 and 34, respectively. It is noted that the experimental group had marginally higher scores in the post-overall scores compared to the comparison group, in terms of the means and medians. The experimental group attained higher marks by 1.8714 and this could be attributed to the use of AFs in word problem solving in Mathematics (Kunene 2019:161).

Discussion of qualitative results

The outcome of the intervention using AFs in Grade 7 to improve classroom *talk* yielded positive influence in word problem-solving teaching. After receiving the treatment, the learners in the cohort produced better results in the post-test word problem solving compared to the comparison group. The aspect of *talk* also improved in the experimental group and was evident during the social interaction in the classroom facilitated by the researcher. Encouraged by the researcher, the learners were able to frame their discussions by using the AFs to explain and argue their claims, within the ZPD.

The abilities in solving word problems and the level of mathematical reasoning amongst the experimental group improved after the intervention. We noted that the engagement of the learners in the dialogues and the discussions, where they gave their views and justifications of their answers also improved. The learners also showed improvement in expressing themselves in English language which was the language of teaching and learning in the school, and all this had a positive impact on the classroom Mathematics discussions that were held using AFs (Kunene 2019).

The use of AFs intervention brought about improvement in the learners' abilities to apply correct problem-solving skills which were evident during the social interaction with the teacher and the peers. The scaffolding provided by the teacher through the ZPD enabled learners to apply more reasoning skills when answering their word problem-solving exercises assigned by the teacher.

Learners needed some mediation from the more knowledgeable teacher to improve their reasoning skills (Wertsch & Tulviste 1992). This was because they had difficulties in comprehending word problems and applying logic in choosing the correct operation for calculating the problem, such as in '[...] if Richard climbed 120 metres in 1 hour, then in 4 hours?' In such a question, common sense implies that the answer must have more hours, thus a division operational sign cannot be used, but a multiplication sign. It is imperative for the researchers to use psychological tools like language, symbols and signs when mediating teaching word problem solving as these are considered as higher-order mental processes (Woolfolk 2007). It is noted from experience and literature that primary school learners find it difficult to relate what they learn in Mathematics classrooms at school and what they experience daily in their contexts (Kunene & Sepeng 2017). When learning was mediated through the ZPD, learners displayed traces of improved solving abilities in word problems. Several learners could compute word problems on the chalkboard as well as in their practice workbooks, in addition to participating in the class discussions.

The learners could better read and understand word problems activities by using the frames to anchor or connect their ideas when talking. They could use the AFs to identify the information in the word problem text that was to be solved. Learners also understood that, in some instances, one-word problem tasks could be solved by using more than one operational sign. Mostly, learners worked out correct solutions, or at least partially correct solutions. The learners managed to identify and work around the challenges when solving the word problems which was noticeable in the change in their strategies when answering the word problem tasks (Kunene 2019).

Issues related to lack of terminology explanations

Literature suggests that a substantial number of learners do not possess the correct mathematical register. The reason is that such problem errors are contributed by teachers who teach mathematics, yet they are not qualified or competent enough. In this regard, the teachers lack the art of properly explaining the Mathematics register in the classrooms. Reikerås (2009) corroborated that the low reading ability impedes the positive attainment increase in learners' assessment scores. Learners lacking the semantic abilities, entailing reading word problems and arithmetic processing skills contribute to poor academic performance and it further complicates issues in Mathematics word problems. Reikerås (2009) advanced the fact that Mathematics word problems are challenging to the learners because of the diverse linguistic structure in the presentation of the text information that is displayed in different orders in most word problem tasks.

Learners are always exposed to more than one language to find an answer to the mathematical word problem which is embedded in the text. They deal with the natural language as well as the specific register embedded in the Mathematics language. These intertwined languages demand learners to be cognisant of the aspects of Mathematics that have to be identified from the mathematical language whilst adapting to the natural English language that literacy understanding inherently requires of the learner as a textual unit (Ilany & Margolin 2010).

Coding and interpretation of solving word problems

Learners often do not possess the correct strategies to use to solve word problems which leads to applying the wrong algorithm, yielding wrong solutions as a result of not understanding the semantics in the word problem texts (Sepeng & Sigola 2013). This could be a result of limited time given to learners to work on the tasks resulting in insufficient practice in critical word problem skills which entail decoding the message in the text as well as interpretation. Another problem that poses difficulties in solving word problems is the word problems that carry multiple meanings, hence those questions become ambiguous (Sepeng & Sigola 2013). Difficulties in solving word problems also emanate from the translation process of the word text in the problem to a mathematical representation which can then be solved by applying the correct computational algorithm, which sometimes lead to learners having difficulty to connect and apply the Mathematics problems they learn in class to what happens around them in real-life contexts. Learners must possess the conceptual and procedural understanding of concepts in Mathematics that are prerequisite to solving tasks correctly (Jaafar 2015). Learners who lack multiple reasoning techniques are tempted to apply one strategy to solve all the problems at their disposal to get answers, resulting in incorrect or inappropriate demonstration of organisational strategies (Steele 2002). Specific strategies come into play in structuring and formulating correct answers when solving word problems that are not familiar. The new unfamiliar word problems present great chances and the learners tend to apply a wrong strategy in solving the task, thus leading to low Mathematics academic attainment (Huang 2004).

Lack of reasoning and critical thinking

Learners' creative thinking could be adversely affected if there are gaps in critical thinking. This is so because Verschaffel et al. (2020) averred that through the Mathematics word problems, learners could be trained to think creatively about what they have learnt in school which constitutes a crucial

part of school mathematics globally. The lack of critical thinking leads to a stifling of skills such as the information-processing amongst the thinking processes. The actual process of problem-solving also becomes a conundrum which is one crucial element in preparing learners to solve real issues of the world (Quigley et al. 2017). As mentioned earlier, educational reform is an ongoing process, however, literature confirms that there is still low learner attainment in Mathematics. Amongst other things, the absence of AFs in the Mathematics classrooms, for solving of word problems, in particular, is a major reason.

Challenges of the absence of argument frames on learner attainment

Lack of *talk* (argumentation/discussions) was observed to be a major challenge contributing to the *absence of AFs required to solve word mathematics problems.* The frames are influential techniques that augment deep understanding and meaning-making during class discussions and they enhance an appreciation of grammatical rules as the teacher demonstrates the solving of word tasks (Rawson 1997). Consequently, the absence of AFs, skills such as reasoning in a more accurate line of thought and conceptual understanding where learners demonstrate their argument abilities (Nussbaum 2011), encompassed in the argumentation and discussions are seriously compromised. The learners' development of the holding power in reasoning during a dialogue or discussions about a task becomes a problem (Mercer & Sams 2006). Subramaniam (2010) stated that the frames actuate previously learned knowledge in learners, thereby enabling them to conceptualise and organise knowledge acquisition by using suggested templates. Hence, without the AFs, it becomes difficult for learners to activate prior knowledge that ought to be applied when solving the word problems as well as organising the constructed knowledge. The development of learners' metacognitive processes gets impaired as identified by Warwick et al. (2003). In classes where there is less talk or the absence of AFs which anchor learners' decision-making skills, there is difficulty in cultivating and encouragement of self-expression (Ge et al. 2015) in learners during questions and answers on the word problems.

The role of argument frames in improving learner performance in Mathematics word problem-solving

The use of AFs activated prior knowledge in learners (Subramaniam 2010) and that is the foundation of what learners display when solving the word problem tasks. For that reason, the participants started demonstrating and applying techniques and mathematical operation signs that resulted in

correct answers. The AFs supplied leading hints, prompts and suggestions for learners to engage in talk whilst augmenting understanding of the word problems. The AFs furnished templates that were sentence modifiers, starters and connectives that learners used to frame their articulations as the intervention was mediated. As a result, the participants improved their attainment of positive results after using the AFs. The frames can improve learner attainment in word-problem solving by engaging them in undertakings and activities coined in cognitive procedures like attention, memory and language. Other effectual processes in AFs are self-questioning, self-monitoring and self-evaluation which are metacognitive in nature.

The argumentation resulted in class discussions and dialogues between the teacher and the learners, as well as learner-to-learner conversations. In this way, this social interaction enhanced more elaborations, enlightening meanings and understandings of concepts and problem-solving techniques through the participants' utterances (Barnes & Todd cited by Norenes & Ludvigsen 2016). In solving multiplicative word problems, the learners' low reading ability (Reikerås 2009) was improved and worthwhile academic learner performance in the post-test scores was noticeable after exposure to AFs.

Strategies for enhancing the use of argument frames for word problem-solving primary school mathematics

To start with, word problem-solving modelling/teacher modelling is a strategy that could be used to enhance the habit of AFs for word problem-solving in primary school Mathematics. A Mathematics classroom necessitates the promotion of informative task-based reciprocal classroom educational social interaction through word problem-solving demonstration strategies. Bonotto (2010) stated that learners will miss more on experiencing activities outside the classroom as realistic as they do not relate to what is taught at schools because of the stereotypical nature of textbook content used. Modelling necessitates learners to perform mathematics tasks using relevant strategies and models which is a prerequisite attribute for the learners to possess. Participants' word-problem solving abilities anchor on problem-posing which has proven to be influential in such classes. In Turkey, Erbaş et al. (2014) reported that mathematical modelling cultivated learners' contextualised systems evident in the mind as well as in external representations and algorithms. Therefore, it is imperative for learners to take note of the conceptual and external systems so that they are competent problem solvers.

It is through the ZPD that learners' utterances (*talk*) are effective as the teacher mediates the process of learning and takes it through the AFs. Literature confirms that Mathematics, as a body of knowledge, owes much to

the art of rigorous logical argument by teachers and learners. This logic allows teachers to scaffold teaching and learning during word problem-solving in Mathematics (Bieda et al. 2019; Kunene 2019).

Mediation also promoted the use of AFs or word problem-solving primary school Mathematics. Mediation promotes mental processes such as problem-solving and reasoning, knowing higher-order actions using language, signs and symbols as psychological tools (Woolfolk 2007). Units of dialogue, language, mathematics symbols and problem-solving (computations) are the cornerstone of mediation (Jacobs, Vakalisa & Gawe 2016). Mediation augments attention, memory, formation of concepts and the functions systems in the learners' minds (Van de Walle et al. 2013).

Social interaction may promote the use AFs in word problem-solving primary school Mathematics. The construction of own knowledge is underpinned in learners as well as being active in the social interactions (Woolfolk 2007). Doolittle (1997) contended that learners are equipped with higher mental procedures such as problem-solving skills, schemas of memory, language, logic, through the process of social interaction with well-informed individuals (teacher and peer). Within the social interaction process, learners then conceptualised meaning and understanding of the mathematical concept taught (Jacobs et al. 2016).

Lastly, learners benefit from the use of code-switching which is explained as translation (Adler 1998; Setati, Molefe & Langa 2008) where the learners employ language repertoires as learning resources. According to Schäfer (2010), code-switching is one key approach in Mathematics teaching and learning amongst other academic strategies characteristic of the creative classroom. Code-switching enables learners and teachers to communicate in English and their mother-tongue at the same during Mathematics lessons hence inculcating conceptual understanding. Essien (2018) stated that there is space for enhanced understanding provided for those learners who are taught in the same language as their mother-tongue as they are acquainted with the semantic structures in Mathematics as a subject. Sibanda (2017) argued that language difficulties result in English language learners' (ELLs) poor performance in Mathematics. Sibanda (2017) reported that it was difficult for most learners to express their ideas and thoughts in English language during mathematical problem-solving in the Annual National Assessment (ANA) in 2013.

Conclusion

The use of AFs as an intervention had a positive influence on inculcating discussions and argumentations in the mathematics classrooms. This was evident before the intervention took place as very little educational conversations took place in the Mathematics classroom. The AFs provided

starters, connectors and mediating tools for learners to use during their talk to express themselves on what they wanted to say, on their ideas and views in understanding the word problems. Findings in this study are consistent with those of Mercer and Sams (2006), Nussbaum (2011) and Ross et al. (2009), who observed that the use of AF as a technique promotes participants' sense of deduction and corroboration in the line of argumentation and discussions. The AFs augmented classroom discussions and argumentation by offering learners the essential statements they used to present their solutions, logically justifying them and defending themselves to a position of reaching meaningful decisions.

The AFs treatment was an instrument used to mediate the process of thinking and reasoning in learners to communicate as well as to answer word problem tasks more convincingly (Jacob et al. 2008; Webb, Williams & Meiring 2008). They improved classroom participation and Mathematical critical thinking amongst the learners (Krummheuer 2007; Sepeng 2014). The use of AFs involved cognitive processes such as language used by learners to generate conversations braced by recollection of learned concepts (Jitendra et al. 2015; Planas 2014). On another note, the use of AFs enhanced learners to use the correct operations (calculation strategies). Its use activated the correct use of computations (mathematical calculations and operations) in the post-test tasks. Learners worked out their answers better than in the pre-test, by using correct Mathematics operational signs, strategies and algorithm in solving the word problems. This was observable confirmation of teaching and learning taking place in the intervention process.

In conclusion, the findings demonstrate that the use of AFs leads to improved problem-solving abilities and skills in Mathematics. It can thus be concluded that AFs provide a foundation that determines learner's attainment in Mathematics. The empirical findings in this study provided evidence that the use of AFs in word problems assists learners to develop the requisite cognitive thinking, creative problem-solving and logical reason. The implication of such findings is that practice and policy makers in government must seriously consider AFs to improve learner attainment in word problems in Mathematics. In essence, the development of Mathematics, Sciences and Technology related skills are necessary for promoting STEAM-driven economic growth.

PART 3

Frameworks for quality education

Chapter 8

Science, technology, engineering and mathematics education and economic growth in South Africa

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Synopsis

This chapter examines the relationship between STEM education and economic growth in South Africa. The endogenous economic theory postulates that economic growth is primarily determined by internal forces such human capital, innovation and knowledge advancement. Technological frontiers are envisioned and enabled through new technologies and adapting these technologies to promote economic growth. Globalisation and advances in technology place a premium on both cognitive and

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technical competencies that facilitate innovation and the charting of technological frontiers. It is generally observed that countries at the cutting edge of scientific and technological innovations have desirable and stable economies. Thus, there is a strong correlation between advances in technological prowess and robustness of the economies. This therefore calls for the government authorities to spearhead, promote and ensure sustainability of dynamic STEM education programmes that span the entire schooling spectrum in order to achieve economic prosperity for the nation. Although South Africa has made several initiatives and devoted substantial monetary and infrastructural resources towards the advancement of STEM subjects, the nation continues to fare poorly in international benchmarking assessments such as the TIMSS. This chapter uses a conceptual analysis to interrogate how the STEM subjects could be reimagined in the South African context to stimulate and sustain economic growth. The current scenario regarding the STEM subjects is examined and lessons learnt from other parts of the world that have made steady progress in advancing the promotion of these crucial gateway subjects are discussed. Finally, an STEM conceptual framework that privileges the role of context in STEM education is presented.

Introduction

This chapter explores the conceptual and theoretical relationship between STEM education and economic growth. It is well-documented that countries at the forefront of scientific and technological innovations have enviable and stable economies. There is a correlation between advances in technological prowess and maturity of the economies. The Endogenous Growth Theory argues that long-run growth emanates from economic activities that create technological expertise (Onyimadu 2015). In essence, for technological knowledge and skills to be acquired, a country needs to provide its citizens with high-quality education, which in turn ignites economic growth (Spring 2008). At the centre of promoting economic growth of countries lies the need to promote the STEM subjects as they are viewed as key cogs in the advancement of human endeavours (Chiu & Duit 2011). Although South Africa has made notable strides in the provision of quality STEM education, a lot still needs to be done to empower the future generations.

The National Development Plan: Vision for 2030 (NDP) of South Africa clearly places strong emphasis on the effective teaching and learning of STEM subjects, since these subjects are aptly regarded as the cornerstone of socio-economic prosperity of the nation (NDP 2011). The South African education system faces systemic challenges that generally lead to poor educational outcomes for children from low-income households (Van der Berg & Hofmeyr 2018).

Study rationale

Although several studies have been conducted on the status of STEM education in South Africa, this research area is far from being exhausted as a field of study. In particular, fresh studies can be undertaken to close the gap in the interrogation and analysis of the relationship between STEM education and economic growth in the South African context. Studies can be further extended to investigate the extent of the effects of STEM education on the socio-economic well-being of citizens. This study therefore intends to fill this gap and assists various stakeholders such as the government, education policy makers, STEM curriculum developers, scholars and the entire STEM education practitioners' community at large.

Objectives of the study

The chapter is designed with specific objectives crafted to:

- Establish the relationship between STEM and economic growth in South Africa.
- Analyse the existing global trend of STEM education.
- Recommend an alternative framework for improving the provision of quality STEM education in South Africa.

The following sections examine matters related to STEM education with a specific focus on South Africa.

Theoretical overview of science, technology, engineering and mathematics education and economic growth

The endogenous growth theory states that long-run economic growth is determined by internal economic forces such as those that govern the creation of technological knowledge (Howitt 2010; Romer 1994). The endogenous growth theory contrasts the neoclassical growth theory that relied on exogenous technological advances as a determinant of economic growth. It can thus be argued that long-term economic prosperity of any nation is directly influenced by key technological change drivers such as human capital. According to Shell (1966), technological advances and prowess rely on the amount of resources dedicated to invention and innovation. Therefore, technological change can be presented as a differential equation as follows:

$$\frac{dA}{dt} = \sigma\alpha\left(t\right)Y\left(t\right) - \beta A\left(t\right) \qquad \text{[Eqn 8.1]}$$

where A represents the level of technology, σ represents research success coefficient, α denotes the proportion of output devoted to research and

development (R&D), Y represents the output and β is the rate of decay of technology (Fedderke 2002). In brief, the equation makes it clear that the more the resources are advanced towards R&D, the faster technological knowledge is acquired subject to the success of the research.

According to Marginson et al. (2013), evidence obtained from studies conducted for several countries reveals that quality education in the sciences and mathematics has a significant impact on the economic progress of a nation. Marginson et al. (2013) further contended that quality STEM education is generally regarded as a cornerstone to building capacity in R&D that spurs innovation that would in turn promote economic growth. From the endogenous growth theory, it can thus be argued that human capital development particularly in the STEM fields leads to economic and social prosperity of any nation.

Global trends of science, technology, engineering and mathematics education and lessons for South Africa

According to the Australian Department of Employment, Skills, Small and Family Business (2020) analysis of employment figures for the period between 2014 and 2019, employment in the STEM fields grew by 19.7%, and this figure is nearly twice higher than the growth rate for other fields. On the global scale, according to the 2020 report of the World Economic Forum (WEF 2020), STEM clusters could provide 1.7 million jobs in 2020 and 2.4 million in 2022.

Over the past decade, significant and dedicated studies have been conducted to gain insight into the dynamics involved in the provision of quality STEM education (Bybee 2013; Freeman, Marginson & Tytler 2015; Tytler et al. 2019). It is important to note that the pursuit for meaningful STEM education has led to massive re-curriculation of the school curricula and the attendant policies (Freeman, Marginson & Tytler 2019). In 2018, the United States of America (US) enacted and published the 'STEM Education Strategic Plan' as a strategy for lifelong access to quality STEM education for all Americans (US Report 2018). The strategic plan also aims at placing the US on the lead of global STEM innovation and employment. Realising the positive correlation between economic growth and quality STEM education provision, the UK government responded by introducing the 'STEM Strategy' (UK Report 2011). The UK's 'STEM Strategy' is premised on the need to empower future generations through STEM subjects in order to develop and nurture an innovative and dynamic economy. Although the quest for developing solid STEM education in China could be dated back as early as the 1950s, it was not until the beginning of the 21st century that the Chinese government clearly pronounced its aspirations and goals in relation to the advancement of STEM

subjects. The Chinese government came up with Science and Technology (S&T) development goals in 2006, and these covered advancements in agriculture, technology and basic science research (China State Council 2006). The guiding philosophy for the enactment of these goals was that superior progress in S&T provision catalyses economic emancipation and social development.

The government of Australia developed the 'National STEM School Education Strategy 2016–2026' in order to advance the offering of the STEM subjects in the schooling system. The reason behind this initiative was grounded in the belief that (Education Council 2015):

> [*A*] renewed national focus on STEM in school education is critical to ensuring that all young Australians are equipped with the necessary STEM skills and knowledge that they will need to succeed. (p. 3)

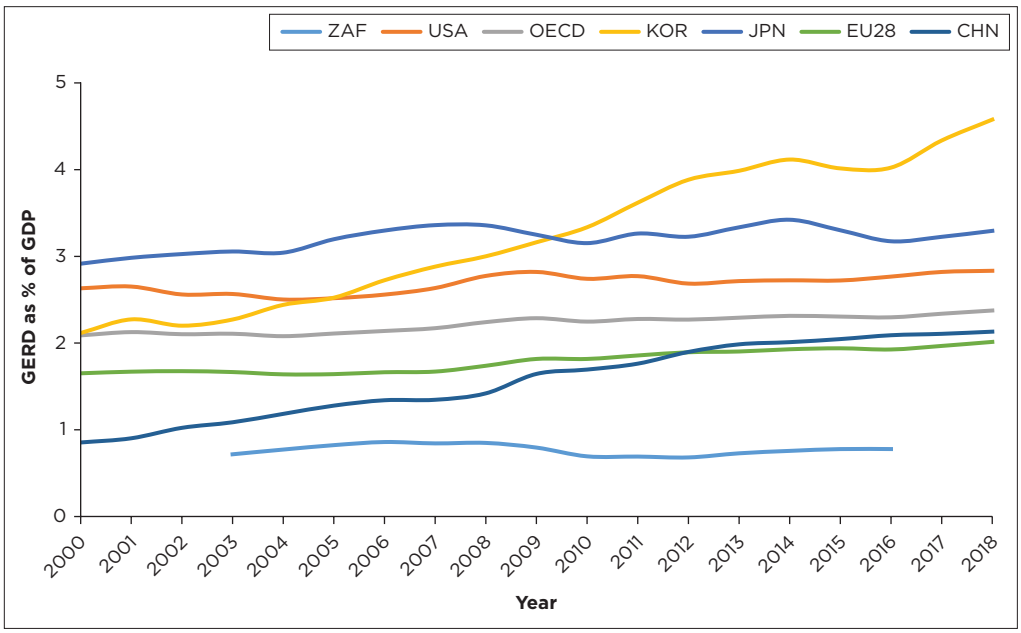
In a similar way, South Korea's Ministry of Education in 2011 published a national policy that targeted the improvement and promotion of STEM and arts education. The policy slightly differs from those of other nations stated above in the sense that in addition to STEM subjects, it also harnesses the power of the arts (e.g. fine arts and liberal arts) to deliver an integrated education system that is referred to as the STEAM education (Baik et al. 2012; Kang 2019). According to results from revered international benchmarking assessments such as the TIMSS, the Programme for International Student Assessment (PISA) and the International Science Olympiads, South Korean learners displayed outstanding achievements particularly in mathematics and the sciences (Jon & Chung 2012; KOFAC 2011). These achievements are mirrored in the meteoric rise of the country's economy which transformed the nation from being an aid recipient to a formidable international aid donor (Hong et al. 2010).

It is unquestionably clear from the above-stated STEM strategies and policies of different countries that it is nearly impossible for a nation to succeed in the present era without the provision of a robust STEM education curriculum. In addition, the stated initiatives amplify that meaningful STEM education directly inaugurates better socio-economic benefits to citizens of the respective nations. This narrative gains traction when one assesses the scientific and technological advances made by some of the most developed nations such as the US and South Korea, and their corresponding economic progress.

The intensity of R&D is viewed as one of the key indicators of how a country values its investment in future growth that is anchored on innovation. According to the OECD (2020b), R&D intensity is defined as 'gross expenditure on research and development (GERD) as a percentage of gross domestic product (GDP)'. In essence, countries that have high R&D intensities have progressive economies that lead to superior

socio-economic development of their citizens as opposed to those nations with low investment in this enterprise. The OECD views the R&D intensities as indicators of solid provision of S&T by any nation and thus countries should strive to improve their STEM education offerings in order to realise economic and sustainable growth. Figure 8.1 shows the R&D intensity trends from 2000 to 2018 for OECD countries, selected developed countries and South Africa.

From Figure 8.1, it can be observed that South Korea made tremendous strides in improving its R&D intensity, in particular, the country's rapid growth begun in 2005. The country's R&D intensity almost doubled between 2004 and 2018, a spectacular feat that no other nation has managed to achieve to date. The R&D intensities for the European Union (EU) countries, OECD countries, the US and Japan have been steady and almost unchanged for nearly the last 20 years. However, it is important to note that Japan leads this pack with its R&D intensities that are almost double of those of the EU countries. The figures for the Republic of China are very promising since their GERD as a percentage of GDP rose from slightly below 1% in 2000 up to approximately 2% in 2018. In essence, China's R&D intensity doubled over the last 20 years, which is a remarkable achievement. The R&D intensities for South Africa have



Source: OECD (2020a).
ZAF, South Africa; USA, United States of America; OECD, Organisation for Economic Co-operation and Development; KOR, South Korea; JPN, Japan; EU28, European Union countries as Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden; CHN, China; GERD, Gross domestic expenditure on R&D; GDP, Gross domestic product.

FIGURE 8.1: Research and development intensity in the Organisation for Economic Co-operation and Development countries, selected developed countries and South Africa.

only been consistently captured between 2003 and 2016 with the 2017 and 2018 figures not available at the time of the data presented for other countries. From the information presented in Figure 8.1, it can be clearly seen that the R&D intensities for South Africa have almost consistently been below 1% over the entire period that the data depicts. This is certainly far below the EU and OECD countries average figures over the same period. It is also crucial to note that the average R&D intensity for South Korea is almost four and a half times that of South Africa. South Africa is the only African country on the list and therefore the country was compared with countries from other regions of the world other than Africa. Although South Africa's R&D intensity does not fare well compared to other countries from other regions of the world, the country is amongst the few African countries that have the highest R&D intensity on the continent over the past decade (UNESCO 2020).

The pivotal role that STEM education plays in the advancement of human development and progress has become quite evident in the ever-increasing need for adequately qualified personnel that are required to steer and man the Fourth Industrial Revolution (4IR) that is currently upon us. With the global populace presently faced with one of its most cataclysmic diseases in recent times, the coronavirus disease 2019 (COVID-19) pandemic, the demand for adequately skilled health services professionals and scientists cannot be overstated. In addition, with 4.0 billion people owning a cellular phone compared to about 3.5 billion people who use a toothbrush, the quest for the training of dedicated innovators is undoubtedly crucial (Smithsonian Science Education Centre 2015). Since we live in the information age, the current and the future citizens of the world need to be literate and functional.

Conceptual analysis approach

Using a conceptual analysis approach, scholarly research articles, scientific and technical reports related to STEM education, this chapter provides an understanding of systematic approaches to support the provision of quality STEM education in South Africa with a view to promoting economic growth.

Science, technology, engineering and mathematics education: Conceptual frameworks and models

Curriculum integration promotes learning by aiding learners to view and understand the entire curricular picture, as well as its fundamental connections (Schmidt et al. 1996). Consequently, learners will be able to firmly comprehend the content learnt and thus will be saved from engaging in meaningless rote learning of concepts. Quality STEM education should

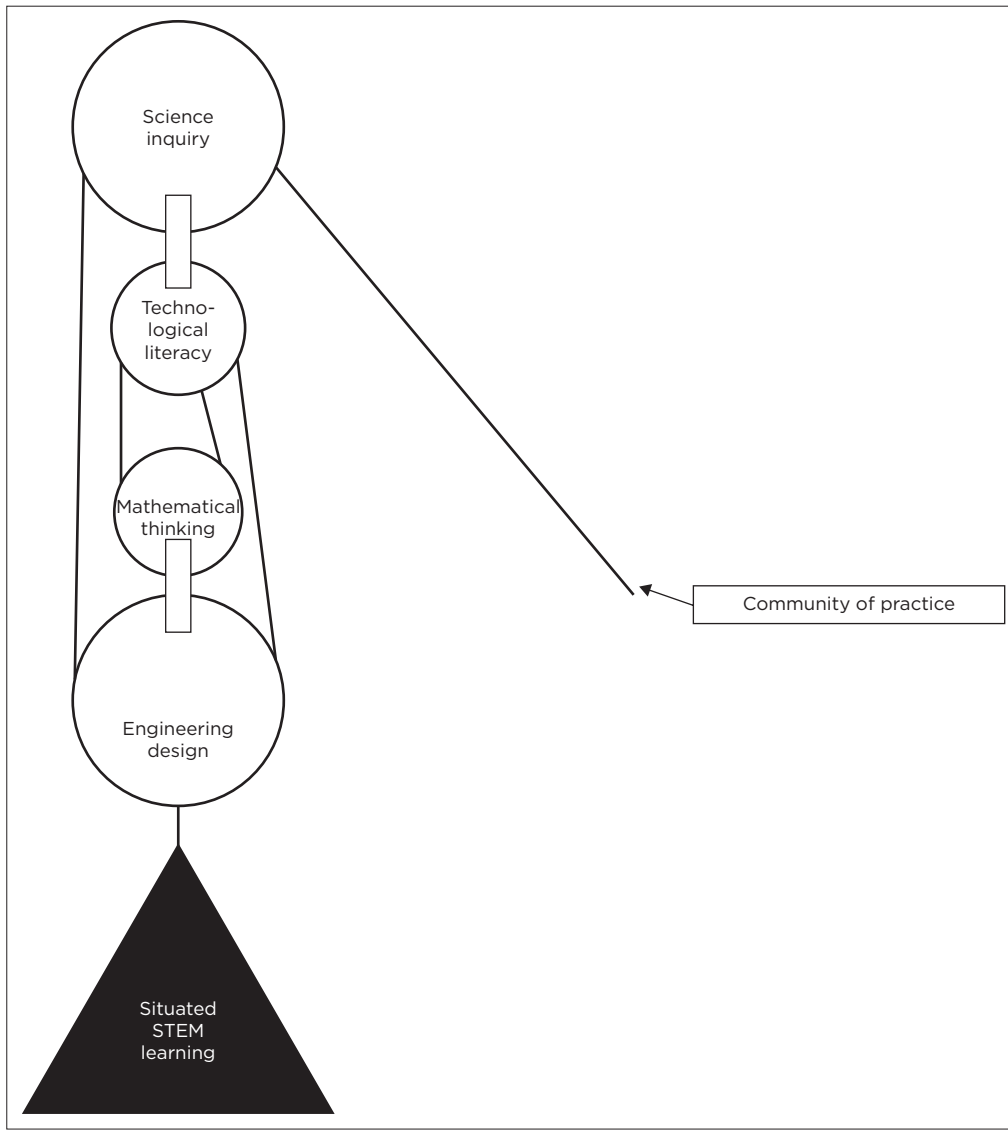
therefore be premised on curriculum integration theories. Curriculum integration theories have their roots in the work of John Dewey who was an advocate of progressive learning that emphasised the importance of connections between subject knowledge and real-life scenarios (Dewey 1909). Although there are various definitions of curriculum integration and models, it is appreciated that curriculum integration in STEM subjects helps both the educators and the learners in understanding the interconnectedness of the four constituent disciplines that comprise the subjects (Berlin & White 2009; Hartzler 2000).

Stohlmann et al. (2012) contended that quality STEM education has the potential to improve the number of learners who may be interested in taking up professions in the STEM fields. An increase in the uptake of STEM-related careers would surely have a positive impact on the economic well-being of any nation. Presently, there are numerous challenges experienced globally in the quest to provide quality STEM education. Some of these challenges include ineffective implementation of otherwise sound policies and the treatment of STEM subjects in a disjointed manner with no clear connections being established (Breiner et al. 2012; Wang et al. 2011). To address some of the problems currently bedevilling the provision of quality STEM education, some scholars propose the rolling out of varied integrated STEM education systems that will not only focus on curriculum integration, but also broadly include factors such as the economy, society and the environment (English 2016; Honey, Pearson & Schweingruber 2014; Koehler, Binns & Bloom 2015; Lesseig et al. 2019; Moore et al. 2014; So et al. 2018; Stohlmann 2018; Wei & Chen 2020).

Kelley and Knowles (2016) proposed a conceptual framework for integrated STEM education that is specifically suited for high school students and teachers. The conceptual framework is depicted in the form of a block and tackle that contains four pulleys and is supposed to lift a 'load' (see Figure 8.2). In the framework, the following aspects are connected in an integrated manner: situated STEM learning (which represents the load), engineering design, scientific enquiry, technological literacy and mathematical thinking (Kelley & Knowles 2016).

Every pulley in the system connects the respective STEM subjects via a rope that represents a community of practice. In essence, the conceptual framework emphasises the need for all the main STEM domains to work in unison to ensure the provision of quality STEM education.

One possible drawback of this model is that implementers of the STEM education curriculum may interpret that 'scientific inquiry' and 'engineering design' are more important concepts than 'technological thinking' and 'mathematical literacy' owing to the different sizes of the respective pulleys

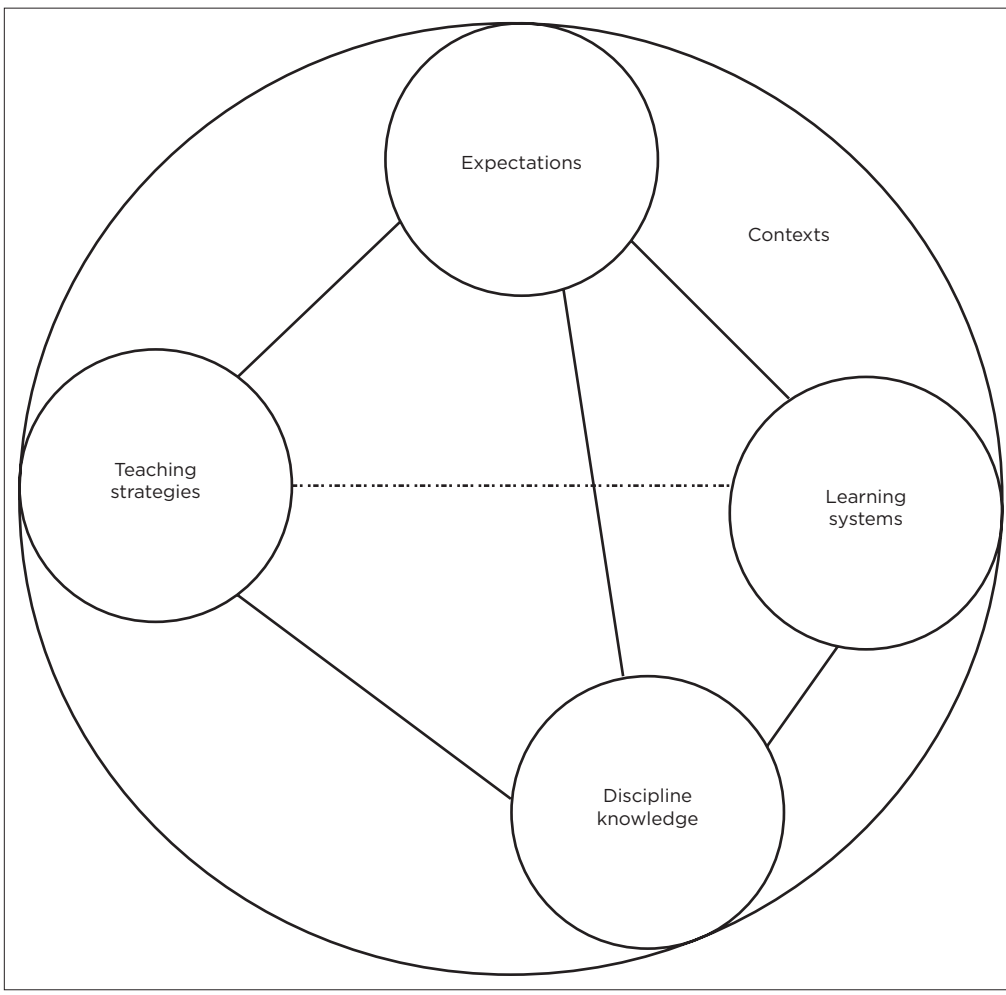


Source: Kelley and Knowles (2016).
STEM, Science, technology, engineering and mathematics.
FIGURE 8.2: Science, technology, engineering and mathematics education model.

that depict them in the model. In the end, the extent of integration of the STEM model would be compromised and thus the model needs to be fined-tuned to present a holistic picture of an integrated STEM education.

Wei and Chen (2020) proposed a different integrated STEM education conceptual framework based on four key characteristics that they believe are

vital for the provision of quality STEM education. These four characteristics are discipline knowledge, teaching strategies, expectations and learning systems. This model framework is in the form of a regular tetrahedron that has four spheres of equal volume at each vertex and the whole structure is encapsulated in a huge sphere. In addition, the model adds the 'context' dimension in order to consolidate and strengthen the connections within the framework. Figure 8.3 shows an ideal integrated model for STEM education as proposed by Wei and Chen (2020). The four spheres constitute the four elements and the straight edges represent the interconnections between the elements. It is important to note that a regular tetrahedron is made up of four equilateral triangles and is regarded as one of the most stable structures owing to the triangulated sections.



Source: Wei and Chen (2020).

FIGURE 8.3: An integrated science, technology, engineering and mathematics education model

The most important element in Wei and Chen's (2020) model is discipline knowledge, which is generally found in all models of integrated STEM education. There is no need to overemphasise the role and position that discipline knowledge takes in any meaningful study of any subject, let alone STEM subjects. This requirement calls for the ready availability of the necessary teaching resources that are manned by highly skilled STEM teachers holding unquestionable SMK. The second vital element in the model concerns teaching strategies. Because of the nature of STEM subjects, various teaching and learning strategies should be explored and implemented to ensure that learners extract optimal benefits from their experiences. Greater emphasis is placed on those teaching strategies that are learner-centred and based on constructivism theory to allow learners to make meaningful connections of the learnt material. The third element in the model focuses on expectations, and these should be clearly derived from the curriculum. In addition, the expectations stated in curriculum documents should resonate with the individual and societal ones, and an integrated STEM education system should be viewed as a vehicle for the realisation of such expectations. The final element in the model, learning systems, entails the creation of a conducive and appropriate learning environment, and this should not only be limited to the formal schooling setup. All the above-stated key elements should be valued and nurtured in an environment that is cognisant of the contexts of learners from diverse backgrounds.

The two models that have been discussed above are just some of the promising models that are geared towards the realisation of quality STEM education that will in turn spur economic growth and empower communities at large. Bearing in the mind the importance of the STEM fields in socio-economic development, it is imperative to adequately prepare future leaders to tackle challenges by planning and providing them with a solid STEM curriculum that will empower them to solve any novel challenges.

Science, technology, engineering and mathematics education in the South African context

Although South Africa has made several initiatives and devoted substantial monetary and infrastructural resources towards the advancement of STEM subjects, the nation continues to fare poorly in international benchmarking assessments such as the TIMSS (Mullis et al. 2012). The National Science and Technology Forum (NSTF) (2018b) stated that:

> South Africa continues to suffer from problems in its school education system, notably in STEM subjects. University graduation in STEM-related courses is around 20%, contributing to a dire need for high level skills in STEM areas. (p. 1)

This statement paints a gloomy picture of the South African education system in general, and STEM education in particular. To address this unfortunate development, various stakeholders who have a common goal of advancing STEM education in South Africa need to consistently engage with each other to address the problems that affect the growth of quality STEM education provision. As a way of coordinating the activities geared towards the strengthening of STEM education, the Academy of Science of South Africa (ASSAf) established a STEM Education Standing Committee that was mandated to provide guidance on STEM education matters (ASSAf 2008). Having earlier introduced the National Strategy for Mathematics, Science and Technology (MST) Education in general and Further Education and Training that was particularly aimed at improving MST pass rates in schools in 2001, the DBE enacted the Revised National Strategy for MST Education in GET and FET (2019–2030) in 2018 (DoE 2001; NSTF 2018a). The national strategy crafted in 2001 led to the conception of the Dinaledi Schools Project (DSP) that was specifically aimed at capacitating selected schools nationally to improve Mathematics and Science examination results. The revised strategy is a welcome development and it is hoped that the lessons learnt from the varied successes of the DSP have been incorporated into this new initiative. It goes without saying that a strategy will be of no use if it is not accompanied by dedication from all concerned parties in order to reap the desired results. The rolling out of the strategy in South Africa is in sync with countries such as the UK, the US and China that are leading the way in STEM education advancement since they all have clearly stated official STEM strategic plans and policies.

Despite the clearly written national STEM strategies and policies, there are numerous obstacles that hamper the development and growth of STEM education in South Africa. Some of these challenges include a shortage of adequately qualified STEM teachers, overcrowded classrooms, lack of suitable teaching and learning resources, and outdated curricula (Anderson & Barnett 2011; John 2019; Tikly et al. 2018).

Shortage of qualified teachers

The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) IV scores for Mathematics teachers in South Africa are a serious cause for concern since the educators' performance was below that of other African countries such as Kenya, Zimbabwe and Swaziland (DBE 2017; NSTF 2018a). It is unfortunate that South Africa compared to those better performing countries on the continent devotes a significant amount of its financial resources towards education in general, and MST education advancement in particular (UNESCO 2017; UNICEF 2018; World Bank 2018). This therefore brings into the picture the quality of the STEM subject educators that are produced by higher education institutions. The shortage of adequately

qualified STEM educators seriously undermines the realisation of the noble goals stated in the NDP of South Africa. One of the main causes of this shortage is that talented and gifted STEM learners tend to enrol for highly regarded and attractive programmes such as engineering and medicine, and thus teaching as a profession largely attracts the 'second best' students. This leads to a situation whereby students with low grades in the STEM subjects end up enrolling for the ITE qualifications such as the Bachelor of Education degree (BEd).

Another reason for the lack of properly qualified educators in the STEM subjects is the generally low uptake of these subjects by learners in high school and this in turn leads to fewer potential STEM educators as compared to other school subjects. In order to remedy the setback posed by the shortage of adequately qualified STEM educators, the government needs to acknowledge that teaching as a profession requires competent and well-compensated personnel as in other highly esteemed professions such as engineering and medicine. In addition, the government will also need to allocate dedicated resources and incentives to attract, train and retain competent STEM teachers.

Overcrowded classrooms

Although the problem of overcrowded classrooms is not unique to the STEM subjects, one important way of resolving this quandary is to avail resources for the infrastructural development of the STEM education buildings such as workshops and laboratories. The challenge of overcrowded classrooms can also be linked to the shortage of adequately qualified STEM educators and thus both challenges should be given serious attention in order to provide quality STEM education to the learners. Because of the huge financial resources needed to construct dedicated STEM education infrastructure, the government of South Africa may consider collaborating with the corporate sector to render the necessary infrastructure in this regard. It is important to note that several private companies have already done commendable work in assisting the government in building specialised STEM buildings such as computer and science laboratories (Sasol 2018; Vodacom 2016). Initiatives such as these should be celebrated and promoted since the government alone seems constrained in providing all the infrastructure required by schools.

Lack of equipment and apparatus

Another hurdle that needs redress is the lack of equipment and apparatus in schools. Because of the nature of the STEM subjects, practical work in these subjects is crucial so that learners are afforded meaningful learning experiences. There should be no room for just offering theoretical work in subjects such as Electrical Technology and Life Sciences without allowing learners to perform

the necessary workshop practice and experimental work, respectively. Once again, one way of addressing this problem is the provision of the requisite resources and equipment by the government. In addition, the government may also seek assistance from willing private sector entities to augment the required equipment and machinery. Another way of solving this challenge is to bring together key role players involved with STEM education such as university researchers, research institutes, teachers and relevant government departments, so that they may come up with creative ways for the local manufacturing of low-cost equipment and apparatus using readily available resources. This initiative was significantly successful in Zimbabwe immediately after it attained its independence from colonial rule in the early 1980s in a project christened the Zimbabwe Secondary School Science Project (ZIM-SCI, Mukundu, Chineka & Madzudzo 2017). The project's aim was to make and provide scientific equipment in order to offer the same scientific learning experiences to students in disadvantaged and rural areas of Zimbabwe as that afforded to students in urban schools where conventional scientific apparatus was easily accessible.

Contextualising the challenges

It can be clearly observed that all countries that are at the forefront of providing quality STEM education make exclusive use of their indigenous languages as the languages of learning and teaching in their respective countries. Examples of such nations include South Korea, the Netherlands, the UK, China and Russia. Although South Africa has made some notable strides in the use of indigenous languages in the teaching and learning environment at the lower and foundational phases of the education system, a lot still needs to be done to address the language question in respect of the STEM subjects. Vygotsky's theory explains the important contribution that language plays in the growth of vital cognitive skills necessary in how children learn (Pempek & Lauricella 2017). Bearing in mind that South Africa has 11 official languages, it would certainly not be an easy task to fully teach all learners in their respective vernacular languages. The challenge is particularly complex and difficult to address in STEM education since a huge pool of experts in these subjects from diverse linguistic backgrounds need to spearhead the teaching and learning of these subjects in the local languages. Notwithstanding the number of challenges that inhibit the versatile use of indigenous languages in the teaching and learning of STEM subjects in South Africa, innovative ways should be found to address this critical language question if the country is truly committed to economic and social empowerment of the citizens. One ambitious way to address this challenge is to initiate a massive recruitment drive that targets young and gifted students and training that cohort the different STEM subjects in their indigenous languages until they gain the

requisite research skills, pedagogic practices and qualifications. The pioneers of such an enterprising initiative would then be given the necessary resources and tools to author STEM textbooks and generate other relevant material in their respective indigenous languages. The teaching and learning material and other necessary resources should specifically promote the use of indigenous knowledge systems (IKS) in STEM subjects and the contexts should be appropriate to the respective learners. Even though initiatives of this nature may take long to realise, the benefits that they bring along to the country could genuinely address the persistent and ongoing problems that are clearly caused by language barriers and of the current disregard for context-specific realities in teaching STEM subjects.

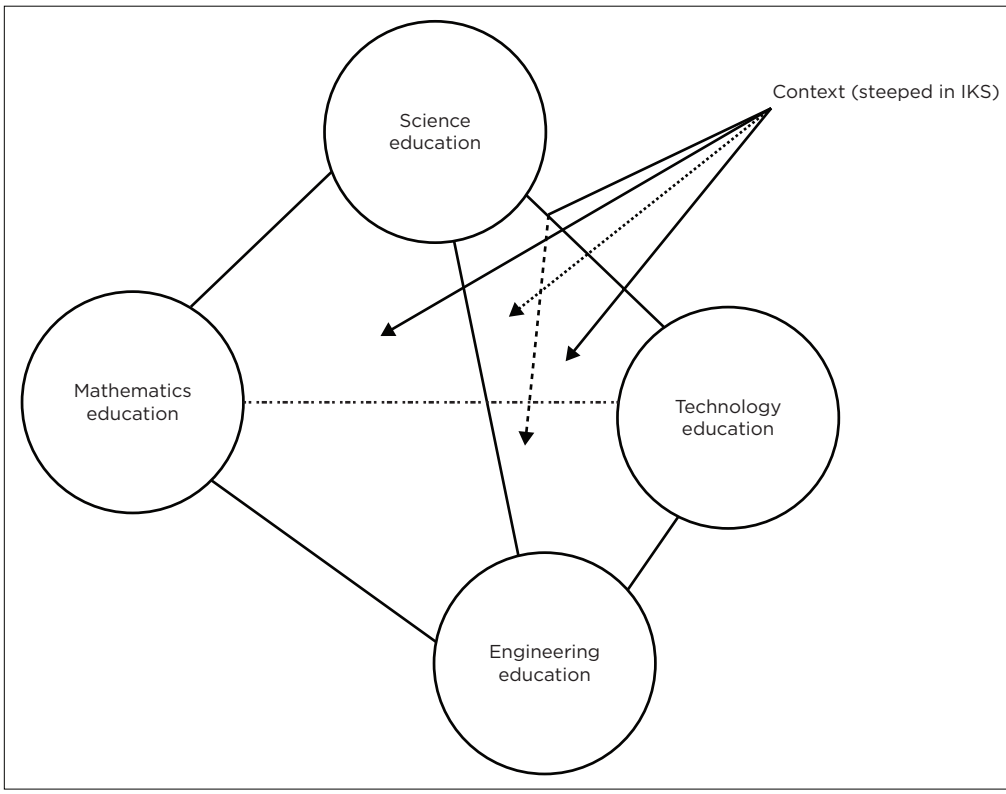
An emerging science, technology, engineering and mathematics education conceptual framework

Recommendations

One of the main challenges that learners face in learning STEM subjects is the lack of contextualisation and thus the content taught is predominantly alien to the majority of them (Westbrook et al. 2013). Science, technology, engineering and mathematics subjects should be taught in a way that promotes and make necessary connections with the local IKS. In this way, it can be argued that learners will easily comprehend the subject matter and build essential conceptual connections.

In order to realise the enormous potential socio-economic benefits that accompany the successful offering and implementation of quality STEM education in South Africa, the author hereby proposes and presents a conceptual framework. This framework is heavily influenced by the STEM education frameworks developed by Kelley and Knowles (2016) and Wei and Chen (2020). The proposed STEM education conceptual framework is depicted in a model form in Figure 8.4. The recommended framework is unique in the sense that it treats all the four constituent subjects of STEM education equally, and this is depicted by the sizes of the respective spheres. It also stresses the importance of integration amongst the subjects and overtly places great emphasis on the role that context in the form of IKS should play in the provision of meaningful STEM education in South Africa.

The framework comprises four spheres of equal sizes that respectively represent: Science Education, Technology Education, Engineering Education and Mathematics Education. These four spheres form vertices of a tetrahedral structure, which is arguably one of the most stable three-dimensional shapes. This metaphorically represents a stable and solid STEM education system



IKS, indigenous knowledge systems.

FIGURE 8.4: The proposed science, technology, engineering and mathematics education model.

which is envisaged if all the dictates of the framework are carefully adhered to. The straight edges of the tetrahedron connect all the STEM subjects, emphasising the importance of connections and 'integratedness' of the different subjects. The triangular faces of the tetrahedron represent the context in which the subjects should be handled. The context should be strongly embedded in the South African IKS.

For the Science Education sphere's purpose to be fully realised, teachers should be well-grounded in both SMK and pedagogical content knowledge. In other words, the teachers' knowledge about the subject should be beyond reproach for the successful offering of quality science education. This certainly implies that the government should ensure that higher education institutions admit suitably qualified individuals and that the STEM teacher training programmes offered by these institutions are of a superior quality. In addition to subject knowledge, the teachers should practice and implement teaching strategies that place the learner at the centre of the teaching-learning environment. In the same vein, the teachers should promote the use of effective learning strategies such as self-directed learning (SDL) in their classrooms. To ensure proper comprehension and mastery of the subject, the

educators should incorporate indigenous science education in their teaching of the science subjects. This should take the form of giving examples of science concepts that are commonly appreciated and acknowledged in the learners' cultural environment. A typical example could be the use of cow dung as a source of nutrients that are required by plants to grow as opposed to just discussing the use of commercial fertilisers to achieve the same objective. Learners in rural areas where the practice of using cow dung as manure is common, would certainly comprehend easily that cow dung contains nutrients important for plants to grow. It would be desirable to have science textbooks written in such a way that they place enormous emphasis on the learners' IKS.

In order to also fulfil the requirements for the Technology Education, Engineering Education and Mathematics Education spheres, respectively, the aspects discussed above for Science Education need to be incorporated accordingly with a very strong emphasis on the importance of context in each scenario. For learners to appreciate the integrated nature of STEM subjects, there should also be clear examples in all these subjects showing how one subject's knowledge and skills are related to other subjects. As an example, a mathematics topic on *complex numbers* should have examples and questions that are tied to the applications of *complex numbers* in physics, technology and engineering. Topics on Alternating Current (AC) circuits are common in physics, electrical technology and engineering sciences, and they make use of *complex numbers* that are primarily introduced and taught in mathematics classes. The STEM curriculum should be designed in such a way that the connections between the respective subject areas are overtly clarified.

The proposed STEM framework should be a good starting point for mapping out the processes needed to revamp the current curriculum in order to provide quality STEM education that in turn spurs socio-economic prosperity of the people of South Africa.

Conclusion

Quality STEM education has the potential to provide a solid platform for the economic development of nations. This could lead to improved service delivery and social upliftment of communities. The provision of quality STEM education empowers learners from poor and impoverished communities to escape the vicious cycle of poverty. The empowered learners would certainly bring hope to their communities and inspire others to succeed.

This chapter explored the global STEM education trends and their relationship with economic growth and prosperity. It was observed that countries at the forefront of the provision of quality STEM education have stable and thriving economies and thus, there is a strong positive correlation

between quality STEM education and economic growth. Focus then shifted to the status of STEM education in South Africa, and it was established that notable progress has been made since the initial pronouncement of the MST strategy by the then Department of Education. However, a myriad of challenges that need to be overcome exist and chief amongst them is the shortage of qualified and competent teachers in the STEM subjects. Another hurdle holding back the provision of quality STEM education is the lack of apparatus, laboratories, workshops and related infrastructure. In addition to the lack of resources, the author is convinced that the context in which the subjects are taught and presented is an impediment affecting the realisation of quality STEM education in South Africa. Lastly, the chapter presented a proposed coherent STEM education framework that addresses most of the challenges that the South African learners currently face. The model framework strongly emphasises the role that the IKS should play in the teaching and learning environment in addition to the integration of the constituent subjects of STEM education.

Innovative ideas must be taken aboard in order to realise the provision and sustenance of robust STEM education in South Africa. Creative ideas geared towards the development and promotion of STEM education must be implemented and supported. The enacted policies and strategies should be reviewed and assessed constantly through effective monitoring and evaluation routines. Remedial actions should be taken swiftly to address any challenges and weaknesses identified in this important project.

Chapter 9

A classroom conditions model for enhancing learner attainment of quality educational outcomes in Accounting education

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Synopsis

This chapter reports on a study that examined the influence of classroom conditions on learner attainment of quality education outcomes in Accounting education. Literature considers quality education as developing learners' critical thinking and problem-solving skills to address challenges in real life.

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Quality education opens horizons for personal development, meaningful engagement with socio-economic realities and ultimately reduces poverty. Improving learner attainment of quality education remains a huge challenge in South African schools. The problem could be solved by developing a Classroom Conditions Model (CCM) for enhancing learners' attainment of quality education. This is because the education system has the responsibility of ensuring that skills and knowledge attained by learners equate to quality education. The study used an explanatory mixed method design to investigate classroom management practices in Accounting in the FET phase. The first quantitative phase was a descriptive survey with a heterogeneous group of learners from public secondary schools in the Vaal Triangle area of Gauteng. The findings show that positive classroom conditions had a significant effect on learners' attainment of quality educational outcomes, although teacher pedagogical content remains a concern. A key priority for improving quality education should focus on understanding the different classroom conditions influencing learner attainment. A CCM for enhancing learner attainment of quality education was developed and recommended for education policy and decision-makers for use as a classroom intervention capacity building tool. The model identifies and delineates classroom conditions that exert significant effect on learner attainment of quality education.

Introduction

Classroom conditions have a significant influence and are regarded as important determinants of learner attainment of quality education outcomes (Kurilovas 2020). This study identifies classroom conditions as a part of the micro level foundational educational inputs and processes that mediate teaching and learning in order to achieve quality educational outcomes by the learners. Classroom conditions during the teaching and learning process create an environment that affords learners opportunities to equip themselves with skills, knowledge and a proclivity to solve problems (Kurilovas 2020). It can therefore be postulated that a study that focuses on developing a CCM for enhancing learner attainment of quality educational outcomes is imperative in establishing the factors contributing to quality educational processes.

Learner attainment is an important measure of the extent to which educational outcomes in terms of cognitive knowledge, skills, competencies, personal development and emotional aspects are acquired by the learner (Pournara et al. 2015). These outcomes are reflected in learners' cognitive abilities (knowledge), skills and behaviour (effect) during and after completing their education in different subjects. According to Sharp et al. (2009), learner attainment displays subject or discipline-specific knowledge, understanding and skills that learners are expected to have acquired by the end of a programme of education. Such attainment is assessed against a predetermined

set of learning outcomes. Shangase (2013) found that positive classroom conditions are necessary for enhancing the learning and attainment of educational outcomes. Since classroom conditions have both direct and indirect effects on learner attainment, it can be presumed that the goal of achieving quality education outcomes is largely dependent on the classroom conditions created by the teacher during teaching.

A learner's attainment of quality education outcomes is important for their individual personal lives and the society as a whole. Kurilovas (2020) asserted that quality education empowers individuals and helps them out of poverty, exclusion and marginality. Ubogo (2020) postulated that if learners receive low-quality education, and come from poor households, they tend to be at bottom of the job-seeking process and consequently are less likely to obtain stable and lucrative employment. Therefore, quality education is critical to stimulate productivity, and the development of economic, political, sociological and human resources in order to create a socially just and functional society. Moreover, education should recognise children as individuals and must therefore work towards developing each child's personality, talents and abilities, with the goal of shaping learners to become well-rounded citizens. Besides teaching them how to read, write and add, they also need to develop respect for people and the world around them (Kurilovas 2020). Even though successful learning is dependent on several factors, the most vital is the 'engagement of the learner with the environment' (Phillips & Graeff 2014), that is, a psychological connection with the contextual setting in which the learning takes place.

Learners' educational needs and characteristics include prior knowledge, ability levels, learning goals, cognitive traits (i.e. working memory capacity, deductive and inductive reasoning ability and associative learning skills), and different learning behavioural traits (Jevsikova, Berniukevičius & Kurilovas 2017). This suggests that the provision of educational opportunities should enable learners to participate as contributing citizens and bringing about socio-economic changes to improve living. Ubogo (2020) elaborated that, through quality education and innovation, 'inclusive and sustainable human-centric socio-economic growth and development can be fostered in the learners'. Therefore, the question that arises is: how does classroom conditions contribute towards improving successful teaching and learning in view of developing learners' cognitive capacities whilst, at the same time, 'equipping them with knowledge and skills' essential 'for civic and professional lives' (Ubogo 2020).

Lyke and Young (2006), as well as Lake (2009), clarified that classroom conditions refer to the creation of a learning environment by the teacher where learners feel safe, nurtured, intellectually stimulated, and challenged. Crotty (2002) and Lake (2009) elucidated that conducive classroom

conditions can be created by choosing the most effective teaching methods and strategies, as well as teaching and learning activities through which an intellectual environment that inspires learners to explore on their own is created. The foregoing views demonstrate that effective teaching and learning occur when there are positive classroom conditions. A study by McCoy (2011) concluded that effective teaching in the classroom requires significant understanding of a subject's basic concepts, as well as an ability to establish connections amongst and between the topics. This implies that classroom conditions may enable or otherwise make it impossible for learners to acquire capabilities that would lead them to live a meaningful life in the society. This justifies the search for an understanding of the impact of classroom conditions on learner attainment in promoting quality education for all.

Purpose of the study

Several studies (e.g. Bonner 1999; Bratten et al. 2013; Phillips & Graeff 2014; Wu 2008) have investigated the skills needed for being a good Accountant, but little is known on the importance of creating positive classroom conditions in obtaining the requisite skills. Many classroom practices are associated with an emphasis on performance, such as the frequency of homework, whether assessment records are up-to-date, and the extent to which the curriculum is covered. It is evident that several factors need to be addressed in creating positive classroom conditions for learners to experience successful learning in the Accounting classroom. Ku and Haider (2012) pointed out that competent and well-qualified accountants are critical for the world of business; and it is therefore crucial to investigate classroom-related factors that could contribute to positive learning conditions.

The purpose of this study was to determine how positive classroom conditions could be created for learners to experience successful learning of Accounting subject and enhance learner's attainment. The study also aimed to establish and assess factors that influence positive classroom conditions which exert an impact on successful learning in the Accounting classroom. Another objective informing this study was designed to determine the role of positive education as well as attitudes and skills of teachers and learners in order to create positive classroom conditions necessary for the successful learning in Accounting education. And finally, the chapter strives to develop *in situ* a CCM for enhancing learner attainment of quality educational outcomes in Accounting education.

The research problem

One of the objectives of Accounting education is to prepare learners for a successful professional life. This goal can be achieved when teachers use their knowledge, identify core skills and formulate strategies to develop

well-equipped learners (McVay, Murphy & Yoon 2008). According to Buckhaults and Fisher (2011) studies:

> [*H*]ave shown that the standard (based on pass rates) of Accounting at all levels (schooling and further education and training [FET]) in South Africa, as well as the number of learners taking this subject, have been on the decline despite the high demand for careers in Accounting. (pp 16–22)

This means that the matric results as well as the pass rates among the university students in Accounting is decreasing; and of more concern is the fact that the number of learners taking this subject has also declined (DBE 2013).

Jansen-Thomas (2017) was convinced when he said that not only the through-put pass rate with the number of matriculants who passed should be calculated but also the number of learners who actually reached matric and not just the number of learners who wrote the examinations. An education specialist, Jansen (2014) argued that the government 'wrongly, but conveniently' uses the matric results as 'a barometer of the state of the school system', when all other data points otherwise to the reality that the education system has been deteriorating and failing. According to Stegmann and Malan (2016), Accounting, specifically in the Auditors and Chartered Accountant (CA) programmes, has been taught very successfully at the tertiary level at the University of Johannesburg in South Africa. After a pilot study involving 200 Accounting students to gauge the questionnaire's perceived face validity and an intensive review conducted by SAICA (2009) of the Accounting programmes at the university, a new teaching and learning strategy which entails self-directed learning was adopted by the university. Two Faculty of Education professors, who might be regarded as experts in formative assessment, pre-tested the questionnaire and confirmed the aforementioned face-validity construct. Self-directed learning places more emphasis on students taking responsibility for their own learning. The classroom environment, which is mainly designed and regulated by the teacher, has the potential to influence both the way in which learners approach their learning of Accounting and the learning outcomes they achieve in this subject.

According to the American Institute of Certified Public Accountants (AICPA), Accounting does not only require technical knowledge, such as keeping books of accounts, calculating profits and so on, but 'broader based skills and competencies, which include critical thinking, communication, teamwork, ethical awareness, technological competence and independent thinking' (Jayaprakash 2005). When learners are taught Accounting at school as well as at higher education levels, they should be prepared to communicate effectively about the subject in both written and oral forms, think critically, make difficult decisions related to the business world and master proficient technical skills (Kermis & Kermis 2010).

For students to obtain a position in the top Accounting firms, as well as becoming a CA in South Africa, they need high marks in the Accounting

subject (Botha 2014). It is therefore important to look at the pass rates in Accounting at school level to establish if the requirements are met. Consequently, teachers must create classroom conditions that motivate students, enabling them to think critically, persist and work accurately in Accounting (Costa & Kallick 2009; Darwin 2011; Jacobs & Harvey 2010). This compels a classroom without anxiety where learners do not experience constant failures and negative feedbacks (Ameen, Guffey & Jackson 2002). Considering learning principles outlined in the constructivism theory, we could claim that motivation and hard work is as important as cognitive factors in explaining learners' academic performance. This leads us to submit that a hostile classroom environment, where the teacher uses inappropriate pedagogical approaches, discourages learning.

An unfriendly environment creates dissatisfaction in learning and consequently unfavourable learning outcomes manifesting in poor academic performance. This kind of environment impedes the development of learners and can culminate in undesirable behavioural outcomes (Telford & Masson 2005). The enhancement of learner engagement with quality education and learning significantly promotes learners' satisfaction with learning, successful academic performance, personal development and growth, improved social responsibility and positive behavioural outcomes (Hallinger & Lu 2013). This consolidates the premise that classroom conditions created for the learner during teaching and learning have significant influence on their overall attainment of educational outcomes.

Qhoshola (2016) highlighted the fact that teachers seem to lack the skills to foster active and participatory learning in the Accounting classroom. Qhosola's (2016) study confirmed that teachers struggle to engage learners optimally with teaching methods that could nurture deeper knowledge. Developing deeper knowledge requires interactive and participatory learning strategies. Thus, learners should be enabled to construct their own knowledge through participation, whilst the teachers provide the space and opportunity for interaction. Yet again, Qhoshola (2016) found that teachers appear to prefer methods of teaching that constrain interaction, resulting in learners becoming passive observers and intrinsically demotivated.

Theoretical framework

The context in which learning takes place can be dynamic and multidimensional; and therefore a combination and integration of learning theories should be considered in the instructional design process to ensure successful learning. In this study, constructivism was regarded as the driving force behind the instructional design process in the Accounting classroom to achieve successful learning (Schunk 2004). Constructivism asserts that humans have a better understanding of information and knowledge if they have constructed it

themselves (Ozgur 2004). Two pioneers of constructivism are Jean Piaget (1896–1980) and Lev Vygotsky (1896–1934). Piaget's developmental theory of learning and Vygotsky's constructivism are based on discovery, meaning that learners must explore and create their own knowledge.

According to Piaget's (1953) constructivist theory, in an ideal learning environment, children should be allowed to construct knowledge that is meaningful for and to them. Vygotsky (1978), known for his theory of social constructivism, affirmed that learning and development are collaborative activities, and that cognitive development takes place in the context of socialisation and education. Constructivist teaching asserts that learning occurs when learners are actively involved in the process of meaning and knowledge construction as opposed to passively receiving information. This fosters critical thinking and creates motivated and independent learners, both of which are important aspects in the learning of Accounting (Donald, Lazarus & Lolwana 2010; Schunk 2004). This assumption highlights the importance of context in teaching and learning.

For successful learning in Accounting, the classroom conditions should enhance positive attitudes by engaging learners in activities where cognitive skills are applied and practiced (Schunk 2004). The constructivist approach has also been linked to the application of indirect, independent and interactive teaching methods and strategies. These methods and their related strategies are regarded as effective in generating classroom conditions that promote successful learning and enhance learner attainment of education outcomes (Schunk 2004).

Literature review

There are several factors influencing classroom conditions that enhance learner attainment of quality educational outcomes in Accounting education. Diener and Chan (2011) explicated that strong meaningful social relationships can have a positive impact on learners working towards goals, helping them achieve these outcomes. The following segment explores classroom conditions that could influence learner performance.

Teachers' understanding of knowledge

Although knowledge of the subject content is necessary for teaching, it should be combined with the ability to create positive classroom conditions that enhance learner attainment. The focus of education in recent years has not only been on improving learner outcomes but on improving the quality of the teaching workforce (Guerriero 2016). This includes teachers knowing and understanding the content of the discipline which has a major impact on the quality of learning. This necessitates that teachers in Accounting education

not only stay well-informed with new teaching methodologies to develop learner competencies but also consistently reflect on curriculum changes and recent content knowledge in the subject. By continuously accessing new knowledge and practices, effective teaching and learning can be ascertained, leading to improved teacher quality (Calderhead 1991).

Teacher quality, and specifically teacher knowledge of the discipline, plays a crucial role in learner performance (Spaull 2011). The teacher is the prime actor in the educational delivery process, as no educational framework outperforms the quality of its teachers. The availability of quality teachers at the lower levels (foundation phase) helps to improve the quality of inputs at the higher level (senior and FET phase) (Ubogo 2020). Key classroom conditions identified as essential for the successful learning of Accounting include positive and passionate teachers (Phillips & Graeff 2014). Such teachers accommodate different ability levels by employing a variety of teaching and assessment strategies and methods (Hattie 2009); providing constant, precise and constructive feedback (Sharma 2010); motivating and encouraging accuracy in calculations (Jackling 2005); and creating a safe space for learners to ask questions. In addition, they provide essential support, establish positive relationships between them and the learners as well as between learners (Borkar 2016) and stimulate the development of critical thinking skills (Mangieri & Collins 2004).

Teachers' subject expertise has a significant impact on learner performance. However, the ability to teach learners is more dependent on the teacher's capability to convey knowledge and the teacher's motivation and dedication than on their subject knowledge alone. This implies that the professional competence of teachers is critical in ensuring that learners achieve educational outcomes (Cochran-Smith & Zeichmer 2005). Furthermore, Fernandes, Ross and Meraj (2013) asserted that quality teaching is the core construct that dominates perceptions of quality. This requires teaching excellence which includes an innovative instructional approach, effective classroom management, mastery of content, commitment to pedagogical philosophy, proficient communication, and positive relationships between teachers and learners. These aspects could significantly and constructively affect learners' academic and behavioural outcomes (Oliveira, Oliveira & Costa, 2012)

Developing critical thinking skills and dispositions

The development of skills and dispositions to think critically in Accounting is pertinent to creating positive classroom conditions where learners do not experience anxiety and become motivated to achieve success in the subject. Facione (2009) asserted that critical thinking skills include interpretation, analysis, evaluation, inference, explanation and self-regulation. With reference to Accounting, accountants require strategic thinking, also in addition to

critical thinking elements that focus on identifying strengths, weaknesses, opportunities and threats involved in a situation. This entails reviewing and assessing a variety of data from different sources that could be used in analysing the problem for decision-making and applying deep knowledge from one situation to another (Camp & Schnader 2010). Behavioural change can include improvements in attitude, developing a habit of reading, active participation, a proactive approach towards problem-solving, as well as logical and critical reasoning (McFarland & Hamilton 2006). This has been associated with successful learning outcomes (Lien & Yu 2001). Spaull (2015) indicated that the level of cognitive achievement of the majority of South African learners is alarmingly low, justifying the need to investigate the factors influencing classroom conditions for enhancing learner attainment of quality educational outcomes in Accounting education.

Effective teaching and learning strategies

Fisher (2005) affirmed that teachers are the primary source for creating opportunities for learners to think critically. How learners respond to these opportunities depends primarily on the attitudes and the teaching methods, and the strategies that the teacher adopts. How teachers teach and learners learn, as well as the mental, physical, social and emotional factors have a significant influence on learner outcomes. According to Hattie (2009), several interventions related to teaching and learning, such as providing formative evaluation and feedback, mutual teaching and metacognitive strategies, can have an important impact on learner performance. Schunk (2004) therefore asserted that effective teaching requires that the teacher should not always be at the centre of instruction and that learning environments should rather be devised to encourage an active role for learners in their learning, which affirms a social cognitive and constructivist approach to learning. Although many academic organisations have started implementing blended learning, most of the educational institutions (schools, colleges and universities) are still based on more traditional methods of learning, such as face-to-face lectures in a classroom (Dhawan 2020). However, the sudden global outbreak of the deadly COVID-19 caused by the coronavirus (SARS-CoV-2) challenged the education system across the world and forced the educators to shift to an online mode of teaching overnight. Consequently, many academic institutions that were earlier reluctant to change their traditional pedagogical approaches had no option but to shift almost entirely to online teaching-learning modalities (Dhawan 2020).

Radu (2014) asserted that the benefits of effective teaching and learning strategies in education involve the representation of the learning content in novel ways, as well as multiple representations over space and time. However, innovative educational strategies require the cognisance of following factors:

tunnelling of student's attention, usability difficulties, ineffective classroom integration and learner differences. This means that teachers must carefully negotiate and select teaching and learning strategies that are understood by learners in the diverse classrooms.

The capability to combine the real world with innovative strategies in the classroom presents new possibilities for learning and could enhance the overall quality of the education. Teachers must create real-life situations where they help learners with new strategies most suitable for their needs and thus generate motivation to learn, and consequently, it enhances the quality and effectiveness of the learning. Effective teachers set high standards for learners by communicating clear goals. Learners should know upfront what they will learn and what they will be expected to do (Ramsden 1992). Such teachers also strive to motivate and engage all their learners rather than simply accepting that some learners cannot perform well (O'Neill 2014).

In online and blended environments, learners do not have to be in a classroom to learn and interact with teachers and other learners, encouraging more independent learning (Singh & Thurman 2019). The synchronous learning environment is structured in such a way that learners attend live classes, with real-time interaction between teachers and learners, and there is the possibility of instant feedback. Asynchronous learning environments are not fully structured. In such a learning environment, learning content is not available in the form of live classes; it is available on different learning systems and fora (including online). Instant feedback and immediate responses are not always possible in such an environment (Littlefield 2018).

Learning activities

The Accounting profession requires that Accounting teachers incorporate activities that develop lifelong learning skills, analytical thinking and the ability to work in teams (Hall, Ramsay & Raven 2004). To achieve this, Accounting education should emphasise a more conceptual and analytical form of learning than a 'predominant focus on routine tasks and memorising of principles' (Beattie, Collins & McInnes 1997; Davidson 2002). Methods and techniques that can be used to facilitate this type of learning include: case studies, group-based learning, cooperative learning approaches, and specific tasks designed to address communication and presentation skills (Booth, Luckett & Mladenovic 1999; Rebele et al. 1998). These teaching techniques are also appropriate for the development of the relevant competencies in Accounting, refining the skills of interpretation, analysis, evaluation, explanation, calculation and recording of financial information.

The type of learning approaches used by Accounting learners influence the quality of their learning outcomes (Booth et al. 1999; Davidson 2002).

Ngwenya (2014) emphasised the fact that generally teachers view Accounting as a subject field:

> [*W*]hich requires a particular kind of practice and instruction, incorporating thinking, reasoning and problem-solving activities. In Accounting, learners are frequently faced with challenging problems which they have to solve in order to develop higher-order reasoning and problem-solving skills. (p. 11)

Because of the practical nature of the subject, actively practicing exercises is very relevant and important. This requires repeated exposure to Accounting scenarios and problems to develop the competencies of the students (Farrell & Farrell 2008; Pickford & Brown 2006).

Personalising learning activities, where learners' backgrounds and interests are taken into consideration is effective in terms of improving learning motivation, quality and efficiency (Kurilovas 2016). Moreover, learners' participation in academic, pedagogic and non-academic activities enhances learners' understanding of their responsibilities, which in turn influences their behaviour, thus shaping their perceptions about quality education (Brown & Mazzarol 2008). The desirable outcomes of active participation are to improve learners' 'social fulfilment and actualise their positive role in societal development' (Helgesen & Nesset 2007; Pace & Kuh 1998). Learners' engagement is a multidimensional construct and includes psychological and behavioural components related to their willingness to actively participate in meaningful learning endeavours, both academic and non-academic. This engagement has a long-term effect in that it manifests in the level the learners get involved in their work. It could enhance commitment in spite of obstacles and instil a concerted effort to achieve learning outcomes (Fletcher 2005).

Motivation

Teachers motivate learners in different ways. According to Anderman and Anderman (2010), this is evident:

> [*T*]hrough daily interactions with learners, where they influence learners' beliefs about their own abilities, their attitudes towards certain subject content, their immediate and long-term goals, their beliefs about the causes of their success and failures and their reasons for ultimately choosing to do their academic work. (p. 5)

Many factors drive learners to be motivated, ranging from external rewards or schools' environments to their personal goals and interests (Pintrich & Schunk 2002). Dweck and Cohen (2016) affirmed that learners' beliefs about themselves, their environment and what it takes to succeed in cognitive activities can influence their motivation and, as a result, their performance in school. How teachers shape these beliefs could positively or negatively affect learners' academic motivation and performance. Moving from a predominant focus on memory-based learning to a more motivated and creative education

environment is essential. The traditional learning method, where the teacher lectures the content to passive learners, has been consistently blamed for the poor quality of education (Azuma et al. 2001). For example, introducing technology in the classrooms could enhance the effectiveness and attractiveness of teaching and learning for learners and advance real-life learning. Learner motivation can be viewed as probably the single most important construct for successful learning. Successful learning entails hard work and pushing the brain to its limits, and this can only happen when one is sufficiently motivated. Highly motivated learners will learn readily, and make any class fun to teach, whilst unmotivated learners will learn very little and generally make teaching frustrating (Kurilovas 2020).

Emotions involved in the Accounting classroom

Borja (2003) found that many learners new to Accounting view the subject as difficult as learning to speak a foreign language. Phillips and Graeff (2014) noticed that learners seem to have a rigid negative perception about the difficulty of Accounting, which colour their experience of the subject with fear and anxiety, resulting in a lack of motivation. In addition, a large number of learners are oblivious of the relevance of Accounting to their personal lives and therefore exert little effort by simply memorising just the basic material to pass the exam. Based on research conducted by Buckhaults and Fisher (2011), the Accounting classroom creates anxiety for teachers as much as it does for the learners. Anxiety has been consistently identified as impeding academic learning and performance, specifically when learners need to give attention in classrooms, memorise difficult content or use different strategies for solving set tasks (Pintrich & Schunk 2002).

Assessment and feedback

In Accounting where learners are exposed to difficult concepts and calculations, feedback is crucial. When learners engage with feedback through discussion with teachers and peers, it is an opportunity to constructively develop the required skills in Accounting. Thus, teachers who provide feedback to learners regularly and adequately use such mechanisms to enhance mastery of the concepts. Feedback is successful when the criteria for success are known to the learner in advance (DoE 2008). The link between feedback and successful learning (Hounsell et al. 2006), and the reciprocal relationship between feedback and performance is well-established (Bloxham & West 2007; Holmes & Papageorgiou 2009). In essence, feedback needs to be appropriate and relevant in order to give the opportunity for an individual learner to succeed (Hattie & Yates 2014).

O'Neill (2014) asserted that effective teachers closely monitor each learner's achievements, by providing regular feedback on their performance and, more importantly, assessing the impact of their teaching. Constantly asking learners questions, checking for understanding, generates corrective feedback, ensuring that learning occurs systematically (Pintrich & Schunk 2002). Therefore, it is important that teachers always reflect on how well they are getting through to their learners whilst looking for better ways to teach learners who are struggling, as well as those who are achieving the required core competencies.

Classrooms should be active spaces where teachers and learners constantly interact with one another and thus positively affect learner motivation (Pintrich & Schunk 2002). This means that teachers ask questions, provide feedback, give rewards and punishments, praise and criticise, respond to learners' questions and requests for help, and offer assistance when learners experience difficulties. Studies with secondary school learners affirm that feedback becomes more effective when it reflects progress made in terms of actual accomplishments, rather than normative standards such as marks (Harks et al. 2013). The use of appropriate feedback in the Accounting classroom creates a learning space where learners feel more in control and can better monitor and direct their own learning (Black & William 2009). They then 'tend to be more accountable for their actions' (Walton 2010). In other words, 'when learners have a sense of accountability, they realise their responsibility' (Walton 2010) to reflect on the feedback in order to prepare for tasks more effectively.

Research methodology

This study is pragmatic, focused on exploring and understanding the research problem through mixed approaches (Creswell 2009). Pragmatism is applied to mixed methods research where the researcher draws conclusions from both quantitative and qualitative methods (Creswell 2009). The pragmatic paradigm seeks holistic and complete information regarding a research problem by using multiple methods of data collection to obtain a complete picture (Creswell 2009; Maree & Van der Westhuizen 2007; Thomas 2009). This study used mixed method research to develop a model that could change the classroom practices of Accounting to create positive classroom conditions.

Research design

An explanatory mixed method design was used to investigate Accounting classroom conditions in the FET phase. The first quantitative phase was a descriptive survey with a heterogeneous group of learners (N = 576) and

teachers (*N* = 12) from public secondary schools in the Vaal Triangle Area of Gauteng. A Likert scale questionnaire was used for this, with the opportunity to add comments. In the qualitative phase, semi-structured individual interviews were employed with learners (*N* = 13) and teachers (*N* = 6), as well as classroom observations to gain more in-depth understanding of the learning conditions in the Accounting classrooms.

Data analysis

A descriptive and inferential statistical procedure was followed during the data analysis of the questionnaires used in this study. Descriptive and inferential statistics can be divided into two ways of representing or describing the data: graphical and numerical ways (Maree 2010). The purpose of most research is to use the findings from the sample data to generalise or draw conclusions about the population. This is called statistical inference, a field that relies on the probability theory (Maree 2010).

The qualitative data in this study came from interviews and observations. After the interviews were transcribed, a content analysis was done on the data generated from the transcribed interviews (Merriam 2009). Secondly, data were analysed using the constant comparative method of data analysis. It involved comparing one segment of data with another to determine similarities and differences (Merriam 2009). In this study, the data were analysed from the interviews with teachers and learners and then compared with data from the observations done in the classrooms of the same participants.

Findings

The primary purpose of this study was to determine how positive Accounting classroom conditions could be created for learners to experience successful learning and enhance learner attainment. The broad and most recent literature was reviewed and the data were bolstered by an empirical research to answer the following main research question: What kinds of classroom conditions are important for an Accounting classroom to ensure successful learning and enhancing learner attainment of the educational goal? (Petzer 2019:7)

The purpose was to evaluate the general learning conditions in the FET Accounting classroom in order to determine to what extent the learners feel capable of achieving the learning outcomes of the Accounting subject and how they experience the learning environment. The responses as captured in are presented in Table 9.1.

TABLE 9.1: Construct: General earning conditions.

Sub-constructs	Questionnaire items	Construct: General learning conditions	Almost always	Often	Sometimes	Very seldom
Sub-construct 1: Feeling able to achieve outcomes	1	I feel able to do Accounting successfully	176 30.6%	175 30.4%	199 34.5%	26 4.5%
	4	I am well prepared for formal tests and exams	179 31.1%	190 33.0%	168 29.2%	39 6.8%
	5	I believe that I can obtain good marks in Accounting	239 41.5%	191 33.2%	120 20.8%	26 4.5%
	5.1	Indicate your goal % to achieve in the subject Accounting: _____% Missing: Learner 34 (5.9%)	0%–49%	50%–60%	60%–79%	Above 80%
			19 3.3%	37 6.4%	198 34.6%	288 49.8%
	6	I have confidence that I can achieve all the objectives/ learning outcomes required by the curriculum	216 37.5%	216 37.5%	125 21.7%	19 3.3%
Sub-construct 2: Experiencing the learning environment	2	I find the Accounting learning environment a meaningful learning environment	258 44.8%	158 27.4%	129 22.4%	31 5.4%
	3	I am challenged to think critically (e.g. to question information)	198 34.4%	185 32.1%	160 27.8%	33 5.7%
	7	I am involved in different activities in the class to succeed in Accounting Missing: Learner 1 (0.2%)	187 32.5%	148 25.7%	168 29.2%	72 12.5%
	8	The teacher creates a positive learning environment for learners to achieve learning outcomes in Accounting	387 67.2%	92 16.0%	76 13.2%	21 3.6%
	9	My learners experience constant failure in Accounting Missing: Teachers 1 (8.3%)	0 0%	0 0%	4 33.3%	7 58.4%
	10	I experience negative feedback from my learners about the content of Accounting Missing: Teachers 1 (8.3%)	0 0%	2 16.7%	3 25.0%	6 50.0%
Sub-construct 3: Experiencing the learning environment	2	I find the Accounting learning environment a meaningful learning environment	258 44.8%	158 27.4%	129 22.4%	31 5.4%
	3	I am challenged to think critically (e.g. to question information)	198 34.4%	185 32.1%	160 27.8%	33 5.7%
	7	I am involved in different activities in the class to succeed in Accounting Missing: Learner 1 (0.2%)	187 32.5%	148 25.7%	168 29.2%	72 12.5%
	8	The teacher creates a positive learning environment for learners to achieve learning outcomes in Accounting	387 67.2%	92 16.0%	76 13.2%	21 3.6%

Source: Petzer (2019).

It emerges from the findings that the expectations for successful learning in Accounting are not very high. Some of the learners expect to become successful accountants or auditors, and some learners (37.5%) felt confident that they would achieve the outcomes of the Accounting subject. However, there were still some learners (33.3%) who indicated that they sometimes experience constant failure and negative feedback regarding their performance in Accounting. There were still some learners (25%) who indicated that they sometimes experience constant failure and negative feedback regarding their performance in Accounting. From the responses obtained from the quantitative data above, some learners (27.8%) indicated that they are sometimes challenged to think critically in the Accounting classroom and only a few learners (34.5%) felt that they can do Accounting successfully and are seldom well prepared for formal tests and exams. Phillips and Graeff (2014) asserted that the teacher as an individual personality is an important element in creating an effective teaching and learning environment and in the failures and successes of the learner experiences.

During the quantitative phase of the research, most of the respondents (44.8%) who completed the questionnaire viewed the Accounting environment as a meaningful learning environment, whereas most of the learners (67.2%) indicated that the teachers try to create a positive learning environment for them to achieve the learning outcomes in Accounting. To be successful in Accounting, learners were asked what they think the ideal learning environment ought to be. A learner participant indicated that the learning environment needs to be strict, where 'a teacher isn't afraid to put you back in line, when you're stepping out of line, but not in the way that discourages you' (L4EGR10). Another learner participant (L5EGR10) indicated that 'a teacher that will find a different way to explain work to you and will always nurture you to grow in a specific way' contributes to the learning environment and the 'teachers' attitude plays a huge role' according to another learner participant (L13DGR11).

The factor analysis revealed that the original questionnaire items (variables) in the original construct (Learning in the Accounting classroom) could be grouped into five sub-constructs (Factors affecting learning in the Accounting classroom) as indicated in Table 9.2.

Sub-construct 1: Motivation in the accounting classroom

Some learner participants reported that 'to be successful, somebody must motivate you to do well' (L8TGR11); and 'I think you need somebody to motivate you, encourage you to say you can actually do this' (L4EGR10). Another learner participant stated that 'a lot of motivation comes from our

TABLE 9.2: Construct: Factors affecting learning in the Accounting classroom.

Sub-constructs	Questionnaire items	Construct: Factors affecting learning in the Accounting classroom	Almost always	Often	Sometimes	Very seldom
Sub-construct 1: Motivation in the Accounting classroom	1	The learning activities chosen by the teacher motivates me to complete them	195 33.9%	211 36.6%	140 24.3%	30 5.2%
	3	The classroom activities stimulate my interest in the Accounting subject	179 31.1%	206 35.8%	143 24.8%	48 8.3%
	6	I feel motivated to do the class activities in the Accounting class	200 34.7%	187 32.5%	154 26.7%	35 6.1%
	7	I feel motivated to do the homework activities in Accounting	174 30.2%	184 31.9%	172 29.9%	46 8.0%
Sub-construct 2: Support in the Accounting classroom	4	Classmates support one another when they struggle	227 39.4%	140 24.3%	101 17.5%	108 18.8%
	8	I feel safe to ask questions in the Accounting classroom	288 50.0%	91 15.8%	109 18.9%	88 15.3%
	18	I experience good relationships between teacher and learners in the classroom	336 58.3%	113 19.6%	77 13.4%	50 8.7%
Sub-construct 3: Teacher attitudes in Accounting classroom	2	An atmosphere of mutual respect exists in the Accounting class between teachers and learners	339 58.9%	119 20.6%	80 13.9%	38 6.6%
	5	The teacher encourages me to question things	286 49.7%	148 25.7%	90 15.6%	52 9.0%
	13	The teacher is enthusiastic about teaching Accounting Missing: Learner 1 (0.2%)	414 71.9%	80 13.9%	54 9.4%	27 4.8%
	14	The teacher treats all learners the same way	376 65.3%	83 14.4%	62 10.8%	55 9.5%
	19	The teacher encourages learners to participate in class discussions	318 55.2%	127 22.0%	79 13.8%	52 9.0%
Sub-construct 4: Development of thinking skills: Teacher expectations	9	The teacher expects of me to solve problems on my own Missing: Learner 3 (0.5%)	119 20.8%	178 30.9%	179 31.4%	97 16.9%
	10	The teacher expects of me to motivate my answers Missing: Learner 3 (0.5%)	214 37.2%	192 33.3%	134 23.3%	33 5.7%
	11	We have to analyse (to examine something methodically and in detail) information in class Missing: Learner 4 (0.7%)	243 42.2%	198 34.4%	98 17.0%	33 5.7%
	12	We have to interpret (explain the meaning of information or actions) information in class	244 42.2%	177 30.7%	115 20.0%	40 6.9%

Table 9.2 continues on the next page→

TABLE 9.2 (Continues...): Construct: Factors affecting learning in the Accounting classroom.

Sub-constructs	Questionnaire items	Construct: Factors affecting learning in the Accounting classroom	Almost always	Often	Sometimes	Very seldom
Sub-construct 5: Feedback in the Accounting classroom	20	The teacher provides feedback after activities done in class	316 54.9%	146 25.3%	65 11.3%	49 8.5%
	22	The teacher always provides feedback after tests and exams (assessments)	404 70.1%	102 17.7%	51 8.9%	19 3.3%
	23	The teacher provides feedback after homework is done	315 54.7%	142 24.7%	82 14.2%	37 6.4%
Sub-construct 6: Learning activities	5	I listen to the opinions of others during class discussions	271 47.0%	174 30.2%	102 17.7%	29 5.0%
	6	I ask questions in the class	168 29.2%	126 21.9%	170 29.5%	112 19.4%
	9	I explore alternative viewpoints when doing Accounting activities	137 23.8%	188 32.6%	189 32.8%	62 10.8%
Sub-construct 7: Teaching methods and strategies	12.1	I make use of different teaching methods Missing: Teachers 1 (8.3%)	2 16.7%	6 50.0%	3 25.0%	0 0%
	12.2	Indicate which of the teaching methods are used in the class				
		Lecture method Missing: Teachers 3 (25.0%)	5 41.7%	2 16.7%	1 8.3%	1 8.3%
		The discussion method Missing: Teachers 3 (25.0%)	4 33.3%	4 33.3%	1 8.3%	0 0%
						0 0%
						3 25%
						7 58.3%
						4 33.3%

Source: Petzer (2019).

teacher [...] she motivates us all the time, because she wants you to do your best' (L3TGR10).

Most of the learners felt safe in the Accounting classroom and regarded their teachers as their mentors. In general, positive relationships with teachers and sustained motivation characterised the classrooms. Good and positive relationships between teacher and learners motivate learners and are important for ensuring successful learning in an Accounting classroom. The findings agree with Carter and Hogan (2013) who argued that Accounting teachers need to encourage learners to become actively involved in their work by going beyond the information given, and restructuring it according to their own thinking. The study also concurs with Darwin (2011) who indicated that creating classroom conditions where learners are continually motivated should be a constant goal of teachers.

Teachers must try to make the lessons meaningful, be sensitive to learners' difficulties and give regular feedback about their progress. Anderman and Anderman (2010) indicated that learner motivation is enhanced when learners have opportunities to make choices during classes and therefore teachers should provide all learners with opportunities to make choices about their learning strategies. The findings confirmed that some learners (30.2%) are motivated to do their homework, but this trait is linked to positive and constructive feedback. Teachers also emphasised that motivation keeps learners positive. They stated that if a learner is not motivated, they would be frustrated and consequently perform poorly in Accounting subject. From the teacher participants' perspectives, one teacher reported that 'motivation is important to keep them positive' (T3EGR11), whilst another stated:

> '[*M*]otivation is very important, and if you take a learner for Accounting that is not motivated, then you will have a learner that will be frustrated and will perform poorly in the subject.' (T1DGR12)

One teacher participant expressed, 'learners will not get distinctions if they are demotivated' (T2PGR10).

Sub-construct 2: Support in the Accounting classroom

In this sub-construct, the learners had to indicate how often they experience support and good relationships in the Accounting classroom. A few learners (18.8%) reported very seldom, whilst 17.5% said they sometimes experience support from classmates when they struggle. Learners (58.3%) almost always experience good relationships between teacher and learners in the classroom, whilst 13.4% sometimes feel that they do not experience these positive relationships and support. From the learners' responses in the questionnaire, only 50% of the learners almost always, and 18.9% sometimes feel safe to ask questions in the Accounting classroom.

Sub-construct 3: Teacher attitudes in Accounting classroom

Some learners responded during the interviews by expressing strong feelings about how they experience the teachers' attitudes as positive and passionate:

> 'I feel because my teacher takes time to go through the work my attitude towards it is positive.' (L8TGR11)

> 'Because of the class environment and getting to know the teacher more, Accounting became more fun for me and it's now one of my favourite subjects.' (L7EGR11)

> 'I love it, the teacher makes it very fun' (L5EGR10)

> 'It's positive, good and I think I really appreciate the teacher [...] because the teacher makes it enjoyable and she puts in effort for us.' (L11TGR12)

Most of the teachers showed a positive attitude towards teaching Accounting and are satisfied to be teaching the subject. During the qualitative phase, positive learning conditions were characterised by the learners as a space where there is mutual respect and everyone can just be positive. Some teacher participants experienced the learners' attitudes as 'positive' (T2PGR10; T1DGR12; T6TGR11), whilst a teacher participant mentioned that 'learners show more confidence if they understand the work and see improvement' (T4VGR12).

Sub-construct 4: Development of thinking skills – Teacher expectations

The development of skills and dispositions to think critically in Accounting generates positive classroom conditions that dispel anxiety in Accounting. This requires a wide range of cognitive skills, accuracy, persistence and technical skills. The purpose of this section was to get an indication of the expectations teachers have of learners regarding analysis, interpretation and solving of problems that occur in the Accounting classroom. According to the responses of the learners, only 42.2% indicated that they are almost always challenged intellectually to analyse and interpret information in class. Only 20.7% of the learners indicated that teachers almost always expect them to solve problems on their own. A significant number of learners (37.2%) indicated that teachers almost always expect from them to motivate and give reasons for their answers to questions posed to them in the Accounting classroom.

Pickford and Brown (2006) noted that in Accounting it is important to teach and assess practical application skills and give learners opportunities to practise them. In this process, the responsibility for learning must be gradually shifted to the learners through practice exercises, question-and-answer dialogues, and discussions that engage them in increasingly complex handling of discipline-specific problems (Carter & Hogan 2013). This requires teaching methods that promote active involvement of the learners (Fortin & Legault 2010).

During the interviews, teachers raised concerns that they do not have sufficient time to finish all the curriculum content and to teach critical thinking skills. A few teacher participants expressed: 'critical thinking is a concept that brings the learner into much deeper level of thinking, e.g. when they need to solve problems' (T3EGR11); 'that is thinking about

thinking' and 'giving them problems to solve, will teach them critical thinking' (T5DGR10).

Some concerns about this were also highlighted. One teacher participant declared that 'we do not teach this enough' (T4VGR12). Another teacher participant raised a concern about the time that is limited to finish all the curriculum content and there is 'no time to teach these skills' (T3EGR11), whereas another teacher expressed that 'teaching to the test' (T4VGR12) is the only way learners will pass the subject. One teacher indicated that these skills must be 'stimulated in the classroom' (T2PGR10) and added that you 'need time to do this'.

☐ Persistence

Teachers felt very strongly about persistence in Accounting and some teachers conflated persistence with motivation and feedback. They believed that giving feedback to learners about mistakes they made and by motivating them to do better next time, the learners will start to persist and experience successful learning. Some teacher participants linked persistence with feedback: 'if you teach learners, they do activities and you get feedback and give feedback, they persist' (T1DGR12; T2PGR10; T4VGR12). Many learner participants agreed that persistence will motivate them to succeed in the Accounting subject: 'To get it right, I do not give up at all and I'm challenged to get it' (L3TGR10); 'I can't leave things unfinished, so it's a good thing, I'd rather push through till the end and have everything wrong than to just start and then stop' (L11TGR12); 'I am motivated to persist and do everything' *(L4EGR10);* 'do not give up when I am motivated' (L1DGR10); and 'I never give up, because there is a way to do it' (L2EGR10). One learner declared that 'I actually taught myself to persist' (L7EGR11).

☐ Accuracy

Some learner participants asserted that 'working accurately in Accounting' (L2EGR10) is very important and one learner declared, 'You need to work accurate to understand the work correctly' (L9DGR12). Many of the learner participants reported on how they ensure to work accurately in Accounting. Two learner participants mentioned that 'you have to read very carefully and if there's something that I don't understand I like to go back, recap, and then go back to my question' (L3TGR10; L2EGR10). Another learner participant stated, 'I'll usually have my notes next to me and when I find something I don't understand I'll read the question over and over until I understand it correctly' (L5EGR10). Other learner participants added, 'I will make sure that I at least go back, then I refer back to the summary' (L8TGR11); 'then I'll go over each individual adjustment' (L7EGR11); and 'I go back to the summary to check how it's done' (L6TGR11). One learner participant asserted, 'Literally sat down to

look where I have gone wrong' (L13DGR11). Working with different transactions in Accounting also seems to have an effect on how the learners work accurately. One learner participant stated, 'I normally start to read the question to realise that this one is going to be more difficult, then my brain starts to think and I take a highlighter and pencil and write it down' (L9DGR12).

Sub-construct 5: Feedback and assessment in the Accounting classroom

The quantitative results revealed that some teachers give positive feedback and take learners' ability into account when they compare their tests against a memorandum, and the teacher helps them to understand their mistakes. The majority of the learners (54.9%) indicated that the teachers almost always provide feedback after activities in class, 70.1% stated that the teachers almost always provide feedback after tests and exams, and 54.7% said that the teachers provide feedback almost always after homework is done. Feedback in Accounting classrooms was reported to be done, mostly after tests and exams, and was mainly teacher-guided. Some learner participants indicated that the teacher 'usually gives us our mark and she gives us the test to see what we got wrong and then we work through it' (L5EGR10; L8TGR11; L7EGR11; L4EGR10). All the teacher participants confirmed that they use 'memorandums' to give feedback after homework, tests and exams (T1DGR12; T2PGR10; T3EGR11; T4VGR12; T5DGR10; T6TGR11). Most of them indicated that they give the learners their scripts back to them and then 'they have to work through their tests and highlight what they did wrong' (T3EGR11).

Sub-construct 6: Learning activities

Under this sub-construct, the learners were asked to give responses regarding their learning actions and activities in the Accounting classroom. Firstly, they had to indicate how often they listen to opinions of others during the class discussions. Almost half of the learners (47.2%) stated that they almost always listen to others, whilst a majority (30.2%) of them indicated that they often do that. Only 29.2% of the learners almost always and 19.4% very seldom ask questions in the Accounting classroom. Only 23.8% of the learners indicated that they almost always and 32.8% often explore alternative viewpoints when doing Accounting activities.

Sub-construct 7: Effective teaching and learning strategies in the Accounting classroom

Different methods and techniques used to facilitate learning in the classroom can include case studies, group-based learning, cooperative learning

approaches, and specific tasks designed to address communication and presentation skills (Booth et al. 1999; Rebele et al. 1998). From the findings obtained in Table 9.2, only 16.7% of the teachers indicated that they almost always and a majority (50%) often use different teaching methods. As seen from the findings, most of the teachers (41.7%) make use of the lecturing method, 33.3% often use discussion methods, 41.7% almost always use demonstration methods, only 16.7% almost always use brainstorming methods and only 8.3% use role play methods. More than half of the teachers (58.3%) very seldom use role play as a teaching method in Accounting. Group work, which is an important method that enhances learners' ability to work in teams, is very seldom (33.3%) and sometimes (33.3%) used by the teachers in the Accounting classroom.

Teachers' understanding of knowledge

Although knowledge of the subject content is necessary for teaching, it should be combined with the ability to create positive classroom conditions that enhance learner attainment; and it is imperative that the teachers understand the content themselves. Some teacher participants indicated that 'the real challenge is they struggle with certain topics and experience it as difficult' (T5DGR10; T6TGR11; T1DGR12). A few teacher participants mentioned that they experience Accounting as a 'difficult subject that takes hard work' (T1DGR12; T3EGR11), whereas another teacher participant indicated 'certain topics in Accounting is difficult to teach' (T4VGR12).

Positive education, emotions and relationships

The field of positive psychology was originally founded in happiness and positive emotions; the empirical studies conducted during the last decades have changed the understanding of well-being (Diener, Lucas & Scollon 2009). Research shows that well-being and related constructs such as life satisfaction, happiness and enthusiasm have several positive effects on health, success, education and other important life outcomes (Diener & Chan 2011; Diener & Tay 2012).

An educational environment conducive to more positive learning of Accounting is where teaching methods are more learner-centric, including a good relationship with learners, whilst encouraging deep learning and sustaining constant communication, support and feedback (Sharma 2010). Many of the learners reported good and positive relationships between teacher and learners in the Accounting classroom. Many of the learner participants felt that they have more positive relationships with their Accounting teachers than negative ones. A few learners realised that 'the teacher helps everyone a lot, she does her best for you to take out your best and that's a good relationship' (L3TGR10;

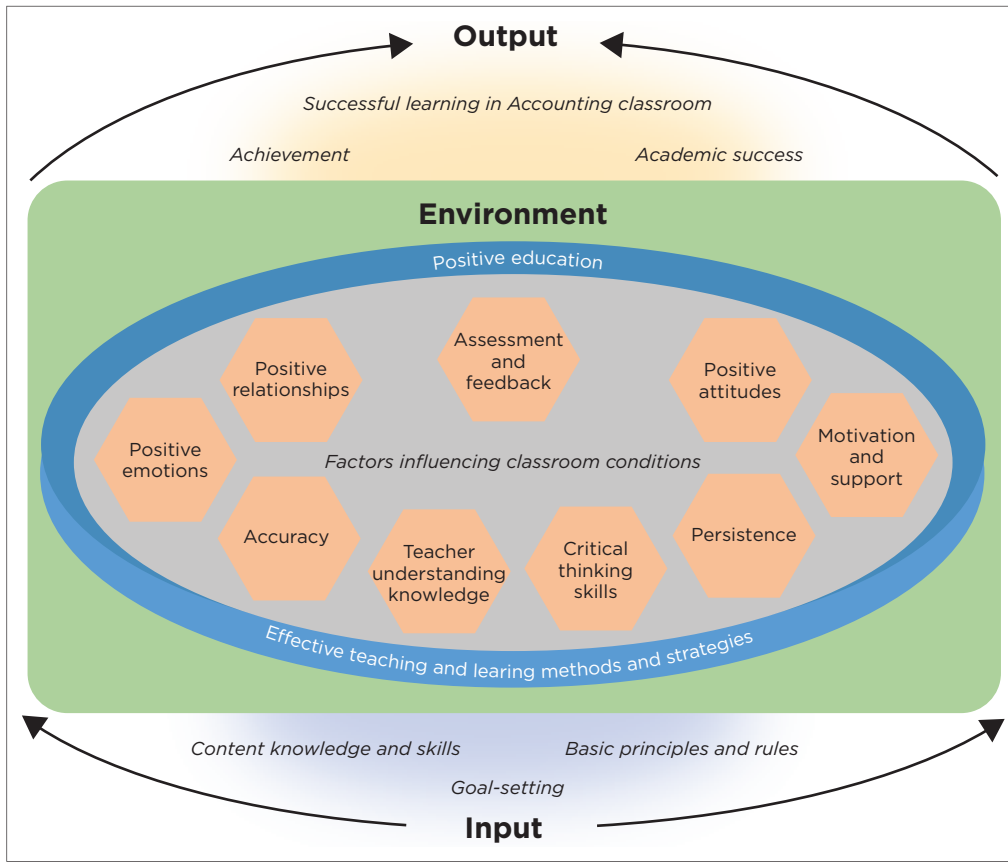
L8TGR11; L7EGR11). Another learner participant stated that he has a 'good and comfortable relationship with teacher but a little bit casual' (L2EGR10). The teacher–learner relationship was seen as 'a mentor relationship' by one of the learner participants, and he claimed that 'it's supposed to be like that' (L5EGR10). A few learner participants did feel that the relationships were negative. One learner participant felt that 'the relationship between us and the teachers is not very good' (L1DGr10), whereas another learner viewed the relationship 'not so open' (L2EGR10). Some of the learner participants expressed their concerns regarding the relationships in the classroom. One learner voiced that: 'if you do not work in class and you sit and do nothing, the teacher have a little sore and difficult attitude towards you' (L9DGR12). A teacher participant stated that 'I believe there must be a good relationship so that they can feel comfortable in my class' (T1DGR12).

To summarise, motivating learners to work accurately in Accounting and to persist with positive attitudes, emotions and relationships, as well as giving corrective and constructive feedback on the teaching and learning activities, appear to be critical factors for successful learning in Accounting. The literature review and empirical study have revealed that successful learning in the Accounting classroom is dependent on several factors, but most important is the positive engagement of the learner with the environment in which the learning takes place. One of the objectives of this study was to develop a model for teachers towards creating positive Accounting classroom conditions that support successful learning and learner outcome attainment at school.

Proposed model of learner outcome attainment as a function of classroom environment

Successful learning in Accounting can be seen as the achievement of positive academic results. Teachers who create a positive learning environment in the Accounting classroom provide more help to learners to ensure they succeed. Based on the literature review and the empirical findings a suggested Positive Accounting Classroom Conditions for Successful Learning (PACCSL) model was developed to provide guidelines on how positive classroom conditions could be created for successful learning. The PACCSL model consists of three phases: input, environment and output. During the input section of the model, a foundation should be established, including the content knowledge, the application of different skills and basic rules and principles of Accounting. This would support learners to set clear goals to succeed in Accounting.

The classroom environment created in the Accounting classroom must consider motivation, teaching strategies, learner activities, feedback and assessment. Influencing the classroom conditions for successful learning and



Source: Petzer (2019).

FIGURE 9.1: The positive Accounting classroom conditions for successful learning model.

positive education should be the umbrella for these factors. Effective teaching and learning methods and strategies should be used in the Accounting classroom to support successful learning. This could eventually lead to successful learning in the Accounting classroom. This would be evident when Accounting learners experience academic success and achievement. The purpose of developing the PACCSL model was to simplify visual relationships between factors influencing successful learning in the Accounting classroom (see Figure 9.1).

Model: Phase 1: Input

The Accounting teacher should set clear goals for the achievement of the objectives of the Accounting curriculum as spelt out in the CAPS document and the Programme of Assessment. Firstly, learners must understand the

basic principles and rules related to the Accounting content. By laying this foundation and setting high expectations of all Accounting learners, the learners could experience a positive ambience. It is essential for learners to know upfront what they will learn in the specific grade (Grade 10, 11 or 12), what the Accounting curriculum consists of and what is expected from them in each Accounting lesson. This includes expectations regarding content knowledge, as well as applying this through different skills. It is also important that Accounting teachers acknowledge the personal expectations that learners have and encourage all learners to work towards achieving these goals of successful learning. The findings confirmed that setting achievable goals is important for learners to prepare for tests and exams and consequently experience successful learning.

Model: Phase 2: Classroom environment

The environment in the Accounting classroom should offer positive education, meaning that the subject education must be a positive and inspiring experience. Therefore, all the factors influencing the classroom conditions for learners to succeed should be approached in a positive manner (e.g. Crotty 2002; Lake 2009; Lyke & Young 2006; McCoy 2011; Mcvay et al. 2008). This includes the learner attitudes towards subject content, their approaches to learning, as well as their learning activities which should be conducted with a positive attitude whilst experiencing positive emotions. Accounting teachers should motivate their learners to stay positive and support learners to persist and work accurately when approaching difficult activities, homework exercises, tests and exam papers. This means assisting the learners with difficult calculations and showing them systematically how to approach different questions, by using different strategies, methods and steps. By striving to engage all the Accounting learners in the class and showing interest in their unique learning needs, the teacher exudes a positive influence on the learners' success.

Furthermore, Accounting teachers must stay in touch with new content knowledge and teaching methods that may assist in developing the learners' competencies. Evaluating learner outcomes continuously by giving regular informal and formal assessment tasks is needful to keep the teacher informed about the adaptability of teaching methods for successful learning progress. Accounting is a practical subject that needs a lot of practice, and teachers should expose their learners to different assessment opportunities, including tests, assignments and homework tasks. This will help the learners to practise a variety of questions and prepare them for the final exam paper with confidence. Moreover, assessment can be done by asking the learners questions, monitoring their work and constantly providing corrective feedback to ensure that learning occurs successfully.

Accounting as a subject has been developed to ensure learners acquire critical thinking; communication skills; mathematical skills such as collecting, analysing, interpreting; and organising skills. In order to teach and assess the practical application of such skills, it is important to provide learners with opportunities to practise these skills regularly when they engage in activities, homework, tests and exam papers. Accounting teachers should also develop positive relationships with their learners. This would be evident when they get to know the learners and take a particular interest in their overall development and progress and treat all the learners with respect and expect the same in return. Such relationships inaugurate a positive contribution to the Accounting learner's sense of belonging, engagement, motivation and achievement. This would then encourage learners to view Accounting as an interesting subject in which they want to succeed.

Model: Phase 3: Output (outcome attainment)

The output section of the PACCSL model focuses on the achievement of the learning outcomes and successful learning of Accounting. Achievement is the competence a learner demonstrates in Accounting. This competence is the result of several intellectual and non-intellectual variables. Some of these variables and factors include learner's intellectual ability, self-confidence, persistence, positive attitude and hard work (Capar & Tarim 2015).

For Accounting learners to succeed, they need basic content knowledge, correctly apply the rules and principles of Accounting and set clear goals to obtain good marks. If all the factors discussed previously are implemented in the Accounting classroom, positive conditions could be created for successful learning. These factors can be implemented in the classroom if Accounting teachers encourage their learners to work accurately, persist them to do activities, show positive attitudes and emotions, and motivate and support the learners by building positive relationships with them.

Successful Accounting learners will be those who positively and persistently self-regulate their learning in order to achieve their goals. Successful learning in the Accounting classrooms should be measured by assessing how far the desired learning outcomes of the Accounting curriculum have been achieved using specific assessment criteria in tests and exam papers in line with the CAPS of the specific grade requirements. Accounting learners who succeed are more likely to be motivated to learn continuously and will consequently improve their marks. Such successful learning could be evident, not only in the pass rates of the learners of the Accounting subject but also in their homework exercises, tests and assignments. It is also essential to acknowledge that reducing negative attitudes and anxiety are also supportive strategies that would potentially

enhance successful learning and motivate learners to become successful accountants. The findings of this research study are consolidated in the 'Conclusion' section.

Conclusion

The chapter submits that creating positive classroom conditions in the Accounting classrooms could inspire learners to persist and successfully achieve their goals. It also provided evidence that when Accounting teachers take into consideration all the factors (teacher's knowledge, critical thinking, effective teaching and learning strategies, motivation, assessment and feedback) that influence Accounting classroom conditions, successful learning could take place and pass rates might soar in the subject. This PACCSL model developed and presented in Figure 9.1 may be used to assist in understanding classroom conditions that could lead to improved learner performance. Classroom conditions are basic educational inputs that determine learner achievement of the educational outcomes in the school. In focusing on improving quality education with a view of enhancing the basic skill sets obtained by learners, educational policy makers should prioritise improving classroom conditions with the view of enhancing learner performance. This model therefore could assist education policy makers interested in enhancing quality education for all with the aim of promoting social justice to invest first in improving classroom condition before looking at other educational processes.

Chapter 10

A framework for strengthening instructional leadership practices and learner attainment culture in school systems: A case study

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Synopsis

This chapter explores the perceived influence of instructional leadership practices on learner performance. It protracts into the development of a framework for strengthening instructional leadership practices and learner attainment culture in the school systems in South Africa. The processes of quality education provide opportunities for learners to develop capabilities that enable them to lead socially and economically productive livelihoods. These are influenced by instructional leadership practices, which are strategic management functions meant to develop quality education for all through leadership and management practices in the implementation of the curriculum. Literature suggests that learner attainment varies with the instructional leadership enacted in the school systems. Until recently, however, there has been little explanatory analysis of the influence of instructional leadership practices on engendering learner attainment culture in the South African schools. The lack of evidence in literature perhaps explains the absence of a framework for strengthening instructional leadership practices for engendering improved learner attainment culture. This may be because of the lack of educational leadership and educational management systems which strive for quality education for all. This chapter uses a sequential explanatory methodology to identify instructional leadership constructs that have a significant effect on learner attainment culture. The framework developed in this study delineates instructional leadership practices that strengthen instructional leadership practices and learner attainment culture in school systems.

Introduction

Learner performance is relevant for the social and economic well-being of a society. Learner attainment is the evidence of the knowledge, skills and competences forged on the educational furnace which enable the students to live productive lives as individuals in the society. Instructional leadership exerts a major influence on learner attainment culture in the school systems (Gowpall 2015; Hompashe 2018; Wyatt 2017). The gap that exists between the instructional practices within the school system in South Africa remains a major concern since learner performance can only be nurtured on the acuity of instructional leadership provided. Yan (2015:110) attributed the achievement of core educational goals of a nation to the teaching activities that occur in the school, further explaining that it is the teaching activities that amplify the implementation of the school curriculum. It implies that learner attainment varies between different instructional practices performed in managing teaching activities in the schools.

According to the neoclassical theory, endogenous economic theory and human capital theory, the basic skills and competences attained by learners have long been recognised as major determinants of economic growth in any

economy (Romer 1989; Uba & Chinonyerem 2017). Findings from the macroeconomic and microeconomic studies such as those by Hanushek and Weismann (2007) and Hanushek (2013) found a high significant positive correlation between skills possessed by learners after completion of primary and secondary school and human capital development. Economic growth ultimately improves the social economic well-being of a country's citizens. Recent findings from the global competitive report by the World Economic Forum (WFE 2019) confirmed that South Africa's critical thinking in teaching declined from 78 out of 140 to 95 out of 141. These observations have implications for research that must focus on strengthening instructional leadership practices and learner attainment culture in the South African school system.

Objectives of the study

This study explored the perceived influence of instructional leadership practices on learner performance. It also developed a framework for strengthening instructional leadership practices and learner attainment culture in school systems in the quest to enhance quality education for all. Several studies have broadened our understanding of instructional leadership (Ng 2019; Spring 2015; Yan 2015). However, studies that explore the perceived influence of instructional leadership practices on learner performance and improved learner attainment culture in school systems are scant in literature. Such a framework is necessary for delineating instructional leadership practices that nurture learner attainment in schools. This study has two-fold objectives: *firstly*, to investigate the principals, deputy principals (DP) and Head of Departments' (HoDs) perceptions about the influence instructional leadership practices have on learner attainment. *Secondly*, it develops a framework for strengthening instructional leadership practices and learner attainment culture in school systems.

The effects of instructional leadership practices on learner attainment of educational goals

A school is an institution that exists for the purpose of achieving educational goals of developing learners' cognitive capabilities. Through intrinsic and extrinsic motivation, schools develop basic skills as outlined in the educational curriculum policy operationalised in a nation. The South African CAPS (2012:4) outlined its primary goals as ensuring that learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability are equipped with the knowledge, skills and values necessary for self-fulfilment and meaningful participation in society as citizens of a free country. Yan (2015) argued that teaching takes place within the classroom and this engagement

determines the achievement of educational goals by the learners across the schools.

Edmond (2009) observed that many countries such as China, South Africa, Kenya, the United States (US), Australia and the UK have struggled in adopting specific approaches that schools could use in the teaching and learning of Accounting as a subject. In South Africa likewise, the Basic Education (2015) and National Senior Certificate NSC (2017) statistics clearly showed a decline in the pass rate of the Accounting subject. Low learner attainment raises concern because it is an indictment of a failure to achieve the educational goals outlined in Accounting Curriculum Grades R-12 in terms of the knowledge, skills and values that should be taught and learnt in South African schools. Poor learner attainment implies that learners have not acquired adequate skills and knowledge to pursue career opportunities in that subject field. Moreover, such lack in the desirable competencies leads to the dire scarcity of skills in Accounting, thus negatively affecting the productivity of the country.

The South African CAPS (2012) described Accounting as a subject that aims to equip:

> [*L*]earners with Accounting knowledge, skills and values that focus on the financial accounting, managerial accounting and auditing fields. These fields cover a broad spectrum of Accounting concepts and skills to prepare learners for a variety of career opportunities. (p. 8)

Tang (2009), cited in Yan (2015:10) referring to learning processes, emphasised the role that the teachers play in imparting knowledge to students and developing students' intelligence. Yan (2015) further explained learning as an important process through which teachers cultivate student's moral character and behaviour for developing students' physical and psychological quality. The implementation of the new curriculum in the FET band (Grade 10–12) resulted in novel changes in terms of the subject knowledge and teaching activities (Ngwenya 2014). Ali and Botha (2006) advised that the curriculum changes require instructional leaders in schools to focus on adequate teaching, learning and the frequent management of instruction in order to yield the anticipated good results. Ezeagba (2014) found that some instructional leaders are specifically struggling with the leadership and management of teaching.

Theoretical framework

The theoretical principles underpinning the concept of instructional leadership and learner attainment culture in school systems are grounded in the instructional leadership theory which was developed by Hallinger and Murphy (1985), as well the human rights-based education approach. UNESCO (2007:1) described the human rights-based approach to education as ensuring that every child receives quality education that respects and promotes their right

to dignity and optimum development. The instructional leadership theory posits that leadership roles can be categorised into three dimensions namely, defining the school's mission, managing the instructional programme and promoting a positive school-learning climate. Hallinger and Murphy (1985) categorised the roles of instructional leadership into the following 10 categories:

1. Framing the school's goals.
2. Communicating the school's goals.
3. Coordinating the curriculum.
4. Supervising and evaluating instruction.
5. Monitoring student progress.
6. Protecting instructional time.
7. Providing incentives for teachers.
8. Providing incentives for learning.
9. Promoting professional development.
10. Maintaining high visibility.

The instructional leadership theory has implications for the teaching activities that should take place and resulting in learner attainment.

In an attempt to ensure effective instructional leadership, Ng (2019) set the different instructional activities into three dimensions. Firstly, there is the school's mission under which the roles of instructional leadership focuses on defining the school's goals and communicating the school's goals. The second dimension is where instructional leadership is involved in a set of activities namely, supervising and evaluating instruction, coordinating the curriculum and monitoring student progress (Ng 2019). The third dimension consists of leadership tasks that comprise protecting instructional time, promoting PD, maintaining high visibility, providing incentives for teachers and providing incentives for learning (Ng 2019). At this level, the principal instructional leadership practices influence the implementation of teaching and learning in the classroom that is aligned to the goals and mission of the school. This study builds on the instructional leadership theory as postulated by Hallinger and Murphy (1985) and advanced by (Ng 2020) to explore the perceived influence of instructional leaders' performance on learner attainment.

Literature review

Influence of principals, deputy principals and head of departments' instructional leadership practice on learner attainment culture in school systems

The principals, DPs and HoDs are expected to play different but interrelated instructional leadership roles to ensure the achievement of the desired learner attainment. Spring (2015) categorised the roles of instructional leadership

into leadership, managerial and administrative responsibilities. Dipaola and Hoy (2013) elucidated that instructional leadership improves learner's achievement by creating an environment in which both the educators and the learners share a clear purpose, and take shared responsibility for learning, as well as engaging collaboratively in activities which promote the goals of the school. The HoDs as instructional leaders affect learner attainment through overseeing duties such as teacher evaluation, budgeting, scheduling and maintenance of facilities with a deep involvement with teaching and learning (Spring 2015).

Bambi (2012) argued that principals are no longer the sole runners of instructional leadership, as the responsibilities of instructional leadership have devolved evenly across various stakeholders in schools. Hoadley, Christie and Ward (2009) argued that South African principals have little experience of instructional leadership. Lunenburg (2010) added that most principals do not perform these leadership roles because of a heavy workload. The National Association of Elementary School Principals (NAESP) (2019) had observed that the roles of the effective instructional leaders extend not only to the classroom and curriculum attainment but to providing feedback, managing the administrative roles in schools and improving the teaching and learning process. Mestry (2017) highlighted that some of the Deputy Heads did not understand their role and often lacked skills to perform it effectively. Research that focuses on developing a framework could provide a basis for standardising ways of strengthening learner attainment culture in the systems.

Research design and methodology

A pragmatic paradigm which is embedded in the mixed method approach to research was followed in this study. An explanatory sequential design was used. This design involves the collection and analysis of quantitative data followed by the collection and analysis of qualitative data (Creswell 2016). Maree (2010) explained that explanatory sequential design is suited for studies in which the researcher further explains some constructs from the quantitative trends through the qualitative approach. The population size for the quantitative phase of this chapter consisted of N = 61 secondary schools from the North West Province of South Africa. These secondary schools include both performing and underperforming schools. This ensured that the findings identify the reason why students in underperforming schools have not been performing well. A stratified random sampling was used to select n = 180 School Management Teams from the population of schools. In the qualitative phase, data were collected from 15 participants (six school principals, four DPs and five HoDs, from both the underperfoming and performing schools). These participants were selected based on their age and years of instructional leadership experience. This enabled the researcher to obtain detailed preceptions into the influence of instructional leadership on learner performance.

For the quantitative data, a self-constructed, close-ended questionnaire was used. The questionnaire utilised Likert scales to evaluate the trends, views and attitudes of participants (Kisanga & Ireson 2016). Emerging constructs were further investigated through open-ended interviews in the qualitative study. This enabled the validation of the constructs emerging from the quantitative data collection phase. The reliability of each construct in the questionnaire was confirmed. The Cronbach alpha coefficient was used to test the reliability of the items in each of the constructs of the questionnaire by measuring the internal consistency among the items associated with each factor (Muijs 2004). Cronbach's Alpha value of at least 0.6 was deemed acceptable in this study (Field 2009; Yong & Pearce 2013). The validity test was further used to examine the extent to which the study reflects on the real meaning of the variables under each construct (Babbie 2010). A Confirmatory Factor Analysis (CFA) was used to confirm the validity of items under each construct.

Findings

The principals, DPs and HoDs' perceptions about the influence of instructional leadership practices on learner attainment were analysed in this study using the following factors:

- **B9.2** represents instructional leaders' (IS) influence on instructional change in schools through collaborative effort with the educators.
- **B9.7** represents IS as the duty of the HoD and other educators to effectively manage resources and staff.
- **B9.9** implies that IS requires senior management teams (SMTs) to mentor the educators in using learning aids to enhance learning and the performance of learners.
- **B9.10** implies that IS should make classroom resources and learning aids available (maps, posters, lab equipment, chalkboard, pencils, notebooks, etc.).

Figure 10.1 shows the principals, DPs and HoDs' perceptions on the influence of instructional leadership practices on learner attainment. It shows that 77% of the respondents strongly agree that leaders influence instructional change in schools through collaborative effort with the educators, whilst 22.8% agree. It also shows that 50% strongly agree that the nature and scope of instructional leadership that have influence on the learners' performance includes mentoring educators in using learning aids to enhance instructional leadership, whilst 38.9% agree. It is also shown that 50% strongly agree, whilst 50% agree that the nature and scope of instructional leadership that have influence on learners' performance includes mentoring educators to use learning aids to enhance performance instructional leadership. These findings are consistent with Bhengu and Mkhize (2013) who found that instructional leadership

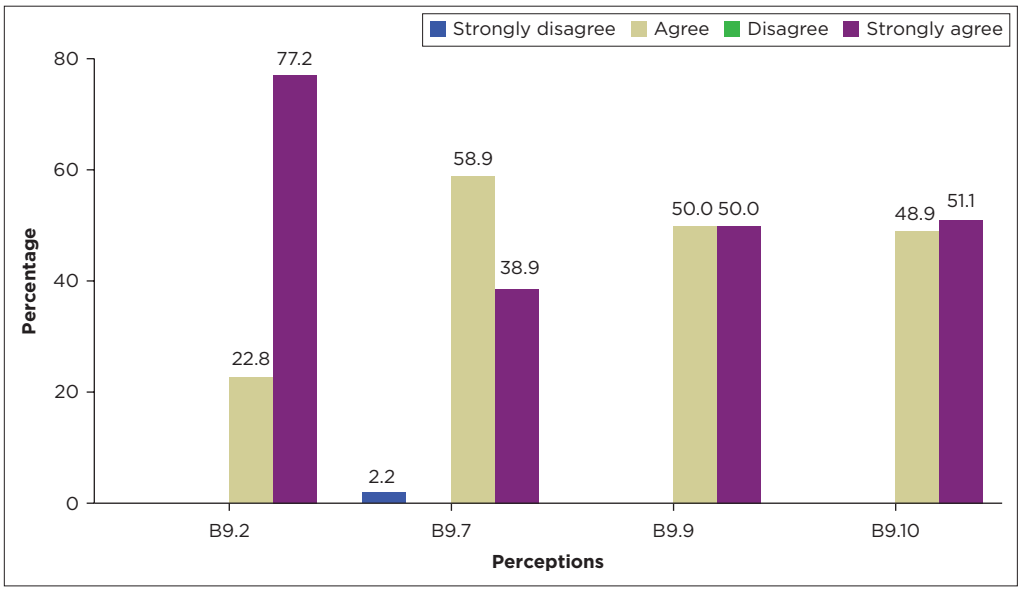
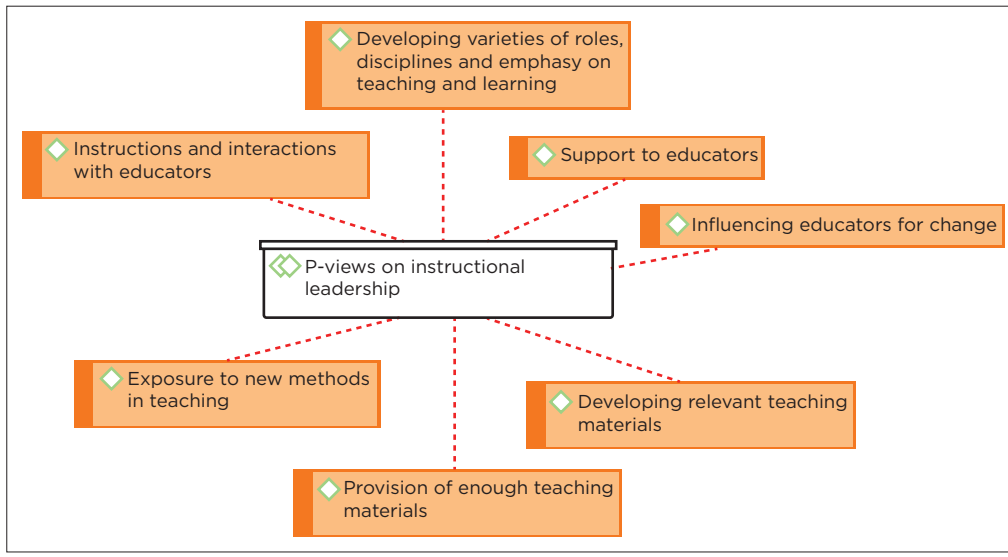


FIGURE 10.1: Principals, deputy principals and head of departments' perceptions on the influence instructional leadership practices on learner attainment.

involves providing guidance, influence, management, and teaching-learning processes and resources.

The emerging constructs from factor B9 were validated through qualitative data collected from Principals, DPs and HoDs regarding the emerging constructs on the roles of instructional leadership on learners' performance. The findings from a qualitative study are presented in the following section.

Figure 10.2 shows the findings for the principals' perceptions on the influence of instructional leadership practices on learner attainment. It is evident that the principals hold the perception that learner performance is influenced by instructional leadership provided for set instructional activities such as emphasis on teaching and learning and support for educators, learner attainment culture in school system, influencing education for change, developing relevant teaching materials, provision of teaching and learning, exposure to new methods of teaching and instruction, and interaction with educators. The response of these principals validated the constructs in B9 in Figure 10.1 which showed that the principals strongly agree on the instructional leadership practices that influence learner attainment. It also was found that despite a commonly shared recognition of the impact of instructional leadership on learner attainment, there were diverse perceptions of how this is manifested in actual practice. The following verbatim statements echo these perceptions.



P, Principal.

FIGURE 10.2: Principals' perceptions on the influence of instructional leadership practices on learner attainment.

P1 sees instructional leadership as an activity that extends beyond resource management to behaviour and mentioned that:

> 'Instructional leadership is about instructing, interacting with educators and developing relevant materials, routines and behaviour of educators and their ability in teaching the learners, as they engage in activities that affect the exposure directly [...] We make sure that there are enough resources. We make sure that we expose our teachers to new methods in terms of their duties.' (P1, principal, date unspecified)

P3 on the other hand states that instructional leadership is:

> '[...] about giving support to educators, ensuring they got the required skills, identify their gaps. It is about leading the human resource element and providing the space for development [...].' (P3, principal, date unspecified)

P2, unlike P1, associated instructional leadership with disciplinary matters, teaching and learning saying that:

> '[...] I believe it's about varieties of roles, the role of discipline [...] we emphasise that in teaching and learning [...].' (P2, principal, date unspecified)

P4 mentioned that:

> '[...] Instructional leadership is about influencing educators to change their teaching and learning [...] through proper instruction [...].' (P4, principal, date unspecified)

The findings show that even though principals recognise the influence of instructional leadership on learner performance in theory, in practice they hold different perceptions about instructional leadership practices. Mestry

(2017) likewise found that instructional leaders have different views about the nature and scope of the relationship between instructional leadership and learner performance.

The DPs are also a relevant part of the instructional leadership in schools, therefore interviews were conducted to collect data to validate the emerging construct in B9 as depicted in Figure 10.1. Deputy Principals' perceptions on instructional leadership practices that influence learners' attainment are presented next.

Figure 10.3 shows the findings from the DPs perceptions on instructional leadership practices that influence learner attainment. The findings show that the DPs hold the perception that instructional leadership practices influence learner attainment through performing duties that involve interaction with educators, management and administration of the school, instructing and directing educators, and offering awards to learners to foster effective learning. The responses validate the emerging constructs from factor B9.2. It is worth noting that the responses of the DPs provide instructional activities for different practices. The participant further confirmed their understanding by stating that:

> '[...] I do not necessary say I know but I have an idea of instructional leadership but I think their roles relate to service delivery.' (DP1, deputy principal, date unspecified)

> '[...] Not sure of the word instructional leadership but we give instructions, motivate educators and monitoring [...] I play a part in the management and administration of the school.' (DP2, deputy principal, date unspecified)

> '[...] We do school performance awards to encourage them [...] when they see these they perform well.' (DP3, deputy principal, date unspecified)

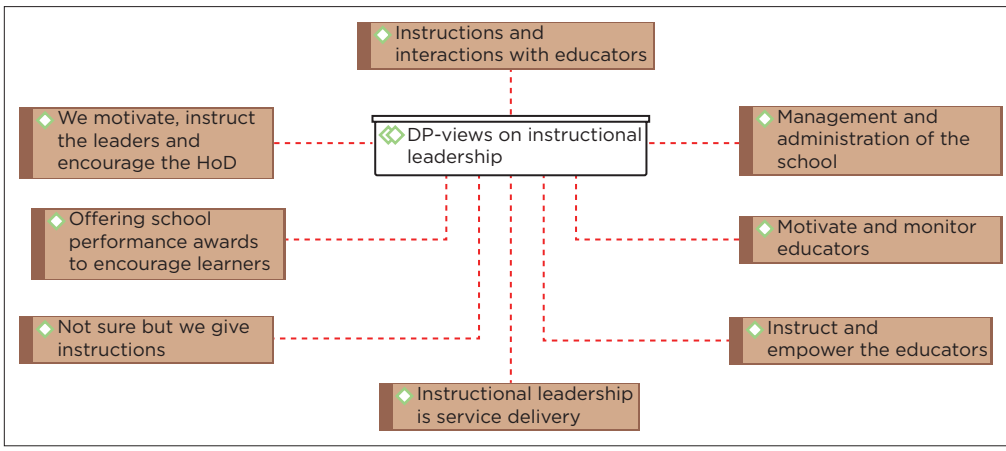


FIGURE 10.3: Deputy principals' perceptions on the influence instructional leadership practices on learner attainment.

> '[...] Yes I know. I am an instructional leader. Actually, our role is to instruct and empower the educators to foster effective teaching and learning.' (DP4, deputy principal, date unspecified)

The responses from DP1 and DP3 suggest that some of the DPs have limited understanding of their responsibilities as instructional leaders in the schools they serve.

The HoDs are part of the instructional leadership, and the data on their perceptions on the influence of instructional leadership practices on learner attainment were collected and analysed. The findings from the qualitative strand of this study are presented as follows.

Figure 10.4 depicts the HoDs' perceptions of the influence of instructional leadership practices on learner attainment. It clearly shows that the HoDs hold the view that instructional leadership affects learners' performance through mentoring educators, influencing educators for change and giving instructions to educators. Overall the findings show that the role of the HoD as an instructional leader includes several activities such as: instructing, developing relevant teaching materials, supporting educators, influencing educators for change, monitoring and empowering educators. These responses further validated the emerging constructs from factor B9.7.

The HoD 1, HoD 2 and HoD 3 represent some responses from the six HoDs who were interviewed during the qualitative data collection phase. These representative responses are a window to HoDs' perceptions of the influence of instructional leadership on learners' attainment:

> '[...] I know I am an instructional leader because as HoD, I am part of the committee that instruct. I instruct educators to do the right things.' (HoD1, head of department, date unspecified)

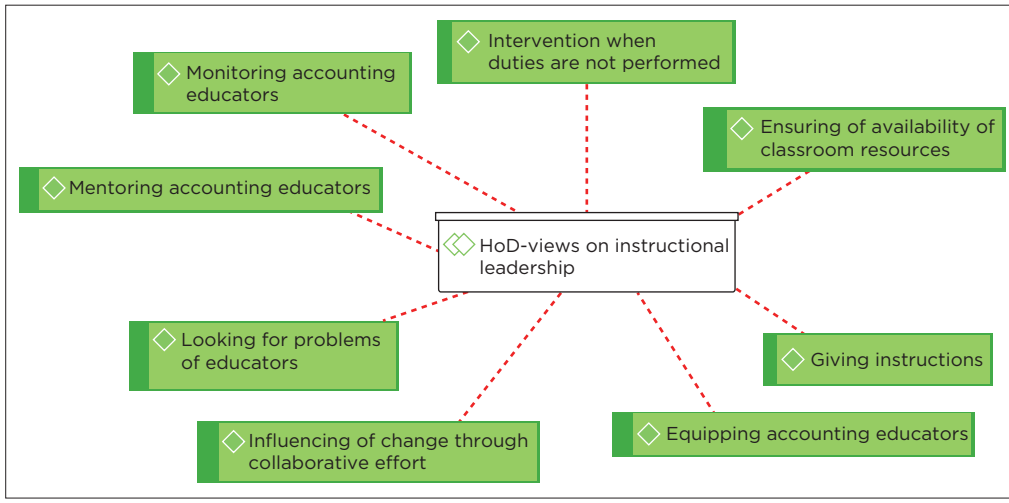


FIGURE 10.4: Head of Departments' perceptions on the influence of instructional leadership practices on learner attainment.

> '[...] As a leader, I instruct educators. By guiding the teachers in my department but unfortunately, I am working as HoD and an educator such that I have a heavy workload.' (HoD2, head of department, date unspecified)

> '[...] I scrutinise the work of the educators by looking at their performance [...]. Some educators have the knowledge but no methodology. [...] I also influence change in the school through collaborative effort with the principals, deputy principal and educators.' (HoD3, head of department, date unspecified)

The responses here show that different HoDs have diverse understanding of instructional leadership as a responsibility for the HoD. NASSP (2018) emphasised that instructional leaders should have an understanding of the roles and responsibilities played by different role players individually and collaboratively such that this conceptualisation of roles is built into the efficient enhancement of learner performance.

The influence of instructional leadership and management of teaching and learning on learner attainment

Data on the perceptions of principals, DPs and HODs regarding the influence of instructional leadership on management of teaching and learning on learner attainment were collected and analysed using Factor C13, wherein:

- C13.1 = involvement of principals, DPs and HoDs in management of teaching and learning in enhancing curriculum implementation and quality of instruction delivered in the classroom.
- C13.5 = improve the teaching approach and didactics of the educators.
- C13.6 = reduce the pressure and workload placed in managing teaching and learning.
- C13.7 = enable instructional leaders to identify problems that educators face in class and provide informed strategies in dealing with the problems.
- C13.9 = improve instructional leaders interpersonal, planning and technical skills.

Figure 10.5 depicts the perceptions of the principals, DPs and HODs on the influence of instructional leaders in management of teaching and learning on learner attainment. The findings show that 60.6% strongly agree that instructional leaders are involved in the management of teaching and learning, and this role creates room for educators to effectively manage the teaching and learning, whilst 39.4% agree. Similarly, it shows 58.3% strongly agree that their involvement in the management of teaching and learning can also improve the teaching approaches and didactics of educators, whilst 41.7% agree.

Overall, findings in items C13.6, C13.7 and C13.9 show that the majority of the respondents strongly agree and agree on the influence of the role of

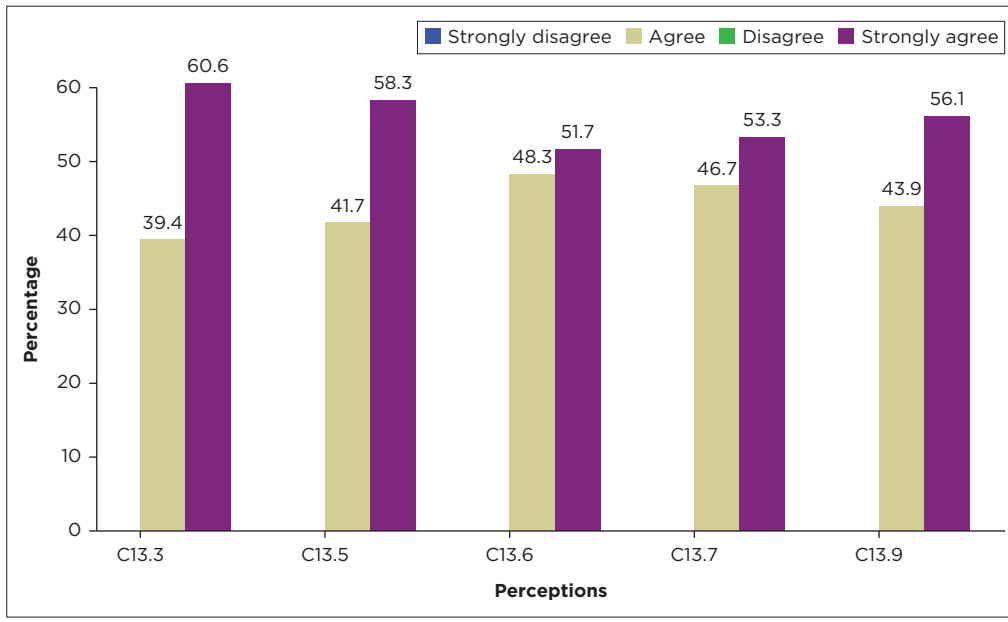


FIGURE 10.5: Perceptions on the influence the role of instructional leaders in management of teaching and learning on learner attainment.

instructional leaders in management of teaching and learning on learner attainment. It is evident that instructional leadership influences learner attainment through managing workloads, identifying and solving problems faced by educators, and nurturing and fostering interpersonal relationships within the school. The need for managerial responsibilities is consistent with Rigby (2014) who suggested that effective instructional leadership requires leaders to have efficient management skills. The three skills identified by the management skills theory that managers and instructional leaders should have include: planning skills, technical skills and interpersonal management skills (Seyedeh et al. 2014).

Qualitative data were collected to validate and explain the constructs emerging from factor C13. Principals, DPs and HoDs perceptions are presented and analysed to explain the emerging constructs observed in the quantitative findings. Principals hold the perception that instructional leadership practices involve performing leadership and management responsibilities that influence teaching and learning activities within the school. These views validate the construct that emerged in factor C13 above, where respondents strongly agree and agree that instructional leaders influence learner performance by ensuring that curriculum implementation and instruction received are aligned to school's vision and goals.

Some of responses indicated that although different instructional leaders strongly agree on the influence of leadership on learner performance,

they have different understanding of instructional leadership practices that have impact on learner's attainment. For instance, P2 explains the influence of instructional leadership on learner's motivation in the following terms:

> 'If the learners see that the principals are checking their work, put the stamp; they work hard and in turn improve the performance. Parents need to be involved. A number of parents have come forward to seek clarification on why the child is not performing well in one subject but doing well in other subjects. We sit and analyse the individual case and often, we found the teacher to be at fault.' (P2, principal, date unspecified)

P2 provided a more comprehensive analysis of various roles played by instructional leadership in the management and supervision of the HoD in the school stating the following:

> 'We get the report from HoD [...] check how far they are covering their curriculum [...] check to make sure learners are assessed on what was taught. Check if educators are not behind [...] and if they are, we do catch up plan for the HoD and educator need to come up with strategies for catch up plan to make sure the teacher is not behind. We check the lesson preparation of the educator. The HoD must monitor the catch up plan for the curriculum. We have Leaners Improvement Attainment Plan (LAID), to assist us in ensuring that we hold the educator accountable because we have to submit to the Department. We also do every subject plan performance weight to gauge the performance and plan.' (P2, principal, date unspecified)

P2 further explains that as an instructional leader, the responsibility included interaction with educators and the comment below captures the essence of their understanding:

> 'Interact with the educators and make sure they are on point. In addition, if there can be a guide provided by the Department on how we can work on our roles as instructional leaders and then managers of teaching and learning roles we will be glad.' (P2, principal, date unspecified)

P2, P3 and P4 acknowledged the importance of instructional leadership in terms of learner performance citing their perceptions and understanding. Regarding the influence of instructional leadership on the management of teaching and learning on learner performance, P2 mentioned that:

> '[...] there is need to make sure the teacher is on par in terms of planning and to make sure the teacher is following ATP whether learners are taught before they are assessed.' (P2, principal, date unspecified)

P1 explained the multiplicity and multidimensional nature of the instructional leadership practices and responsibilities that affect learner attainment saying that:

> 'My roles are indeed a lot. I ensure that the educators teach the learners what they assess; I interact with the HoD to find out the needs of the teacher. Even though I experience challenges in playing my roles but I try to do the best I can but limited to be sincere.' (P1, principal, date unspecified)

P3 unlike P2 and P4 believes that educators should take the responsibility of indicating the challenges they are facing when he inquires of them. P3 states:

> 'I will just ask the educator if they are up to date. If they have problems, they will say. I make sure there are Learners Teaching and Support Materials available to teach even though I struggle on that part.' (P3, principal, date unspecified)

On the other hand, P4 *says*:

> 'By ensuring that the curriculum addresses the learners' cognitive development and that the curriculum enables the learner to construct ideas through what has been taught by the educator. I oversee the work of the HoD by ensuring that the HoD supervise the work of the educators.' (P4, principal, date unspecified)

The above-stated comments of the participants suggest that principals have different perspectives about their roles as instructional leaders in managing the teaching and learning. According to Yan (2015:10), a 'correct understanding of the role of teaching in all work of the school is the premise to improve instructional leadership competence of principals'. The differences in principals' understanding of instructional leadership is concerning because it might be a reflection of the different instructional practices that actually play out in schools.

Data on the DPs perceptions on the influence of instructional leaders in management of teaching and learning on learner attainment were collected and analysed through DP1, DP2 and DP3. The statements given by DPs show that their instructional leadership practices are focused on supporting the principals and HoDs in the management of teaching and learning. For instance, DP1 mentioned that:

> 'Even though we do not involve them as such but if we can I'm sure it will change a lot but the workload keeps drawing us back because we also teach.' (DP1, deputy principal, date unspecified)

DP1 identified the role of instructional leaders in interacting with educator in creating an environment that promotes effective learning:

> 'By making sure the educators teach in a friendly way. This will enable them to have good interaction with the learners. Learners tend to learn in a friendly atmosphere. We need to make sure the educator is on par in terms of planning and to make sure the educator is following the Annual Teaching Plan whether learners are taught before they are assessed'. (DP1, deputy principal, date unspecified)

DP1 further stated that:

> 'I interact with the HoD to find out the needs of the educator. Even though I experience challenges in playing my roles but I try to do the best I can [...]'. (DP1, deputy principal, date unspecified)

Similarly, DP2 holds the perceptions that instructional leadership practices have impact on learner performance however explaining that:

> 'Even though we do not involve them as such but if we can manage our workload and be involved in the management, I am sure it would help to improve performance, to

> ensure that learners realise their potential in the field in which they have chosen. It has a huge impact on learners' performance'. (DP2, deputy principal, date unspecified)

DP2 further states:

> 'By ensuring that they also do class visits, check if the educator has the right teaching approach and intervene in the discipline of the learners. Monitoring, calling meetings related to curriculum, discuss assessment etc. We monitor the curriculum and do some guidance on how they should carry out their duties. This will ensure that they perform their duties in the best interests of the school and the ultimate performance of the learners'. (DP1, deputy principal, date unspecified)

The response from DP3 indicates instructional leadership involves considering learner's conduct and behaviour, as well as providing support to educators. For instance, DP3 says:

> 'It goes a long way. It promotes creativity and encourages learners to improve their marks. If we neglect that part, then learners will not be serious. By participating in the activities of the learners, we reinforce the point'.

> 'I think if we can speak directly to the educators then we can see more improvement. However, time limit is a concern as we have a lot of work waiting on our desk. The HoD makes sure she identifies the weaknesses in the curriculum, which need to be addressed. The other DP works more on the curriculum implementation and works in collaboration with the HoD'. (DP1, deputy principal, date unspecified)

The response from DP3 demonstrates that instructional leadership practices vary within schools, saying for instance:

> 'We have two-DPs to minimise the workload. I work more on managing the teaching and learning. The other works on the curriculum management and the principal works more on the administration. This delineation of duties and responsibilities allows us to focus on specific tasks [...] I make sure that learners attend classes and do not skip classes and do all the necessary things required by the educator'. (DP3, deputy principal, date unspecified)

DP5 recognises that managing curriculum implementation is an important instructional leader's practice that directly influences learner attainment, and states that*:*

> 'We check if what they have set is in line with the curriculum, if they are able to construct good questions for the learners. This helps to ensure that the learners do assessment tasks that are well constructed by professional educators'. (DP5, deputy principal, date unspecified)

The perceptions of the DPs cited above indicate that although instructional leadership practices exist in school systems, it is understood differently by the principals and the DPs. This implies that the importance given to instructional leadership practices depends on the perceptions and experiences of the principals and the DPs.

Data on the perceptions of HoDs on the role of instructional leaders in management of teaching and learning on learner attainment were collected

and analysed. HoD1, HoD2, HoD3, HoD5 and HoD6 are representative of some of the viewpoints captured during the interviews with the HoDs. Responses of HoD1 highlighted different roles of instructional leadership that are deemed to influence learners' attainment as involving several functions at operational level. HoD1 said:

> 'Check the syllabus; make sure the content matches the exam papers. Check the marks of the learners to make sure that the assessments used are in line with what they do but sometimes we just do not have the time to moderate some of the tests. The greater number of the teachers do not prepare thoroughly according to the curriculum, they skip some aspects because they do not know it and learners struggle in exams'. (HoD1, head of department, date unspecified)

HoD1 further elaborates the role of instructional leadership with regard to interaction with the educators:

> 'My roles are to supervise the teaching and learning of the educator, make sure she covers the content, and credits those learners who perform well'.

> 'When the teacher is struggling, the involvement in teaching helps, as I go in and show the teacher. I have knowledge in my subject area so it helps. I am involved in the teaching and learning due to my knowledge. If the principal and deputy can find out from us what our problems are and also listen to our demands, then we can proceed towards providing a worthwhile experience. Check if the management part is okay and not only the instructional part'. (HoD1, head of department, date unspecified)

HoD2 whilst highlighting the role of HoDs in implementation of curriculum and instruction delivered in the classroom, stated that:

> 'I do many roles but most especially I make sure the content is covered [...] I build a good working relationship with the learners so they can pick interest in the subject'. (HoD2, head of department, date unspecified)

HoD2 further points out that instructional leadership has a direct influence on learner attainment mentioning that*:*

> 'It will improve learner's performance. Because now they can go to class and monitor the teaching and classroom discipline and facial expression of the learners to know if they understand what the educator is teaching'. (HoD2, head of department, date unspecified)

On the one hand, HoD3's responses as given below indicated the multiple instructional leadership duties that are performed by HoDs:

> 'It will help to intervene on what the educator is teaching. Some cannot teach [...] they might not know the content. When it is worst, I get experts from outside to help the educators. I also ask learners to help one another'.

> 'By making sure that the educators are effectively managed. We must leave them to manage the teaching alone [...] they need support from us as SMTs'.

> 'I check if the teacher is in line with the ATP [...] like check the number of activities and in most cases I advise the teacher on the method and also ask her to improve on the assessment'.

> 'My roles are to monitor the work of the educator, ensure the educator has the required LTSM to teach. I advise her to construct LTSM materials herself that can aid in teaching, ensure the learners have textbooks and also perform some direct observation with the educators'. (HoD3, head of department, date unspecified)

On the other hand, HoD4 responses indicated very few and narrow duties of instructional leadership in school:

> 'I accept it that I am the major actor in the classroom, my rules are my rules, I tell them what to do and they do it'.

> 'Moderate the subject, monitor the subject, and guide the educators to attain their teaching outcomes'. (HoD4, head of department, date unspecified)

Overall responses from HoD5 *and* HoD6 highlighted strategic leadership and curriculum implementation duties that are associated with instructional leadership. HoD5 states that the responsibilities enjoin them:

> 'To jointly develop plans and strategies to improve learners' performance. This can be done through a collaborative effort with all SMTs and educators. One person cannot do the job. Full participation of all responsible parties is critically important'. (HoD5, head of department, date unspecified)

HoD5 further mentions that:

> 'I know the workload is much but if all SMTs can be involved in the teaching and learning in class it will definitely improve our performance'.

> 'To ensure that the curriculum covers what it is expected to cover'. (HoD5, head of department, date unspecified)

HoD6's response suggests that instructional leadership involves:

> 'Ensuring that the curriculum promotes creativity among learners. Learners should be able to construct new ideas from what the teacher is teaching'. (HoD6, head of department, date unspecified)

HoD6 however highlighted the challenge of workload saying that:

> 'It can reduce the workload and pressure placed in carrying out my duties'. (HoD6, head of department, date unspecified)

It is evident that the findings of this study show that principals, DPs and HoDs all hold the perception that different instructional leadership practices are important since they have influence on learner performance in the school. It appears different factors such as experience, belief, leadership style and various other factors determine the instructional leadership practices enacted in the schools. This difference is aligned with the view that instructional leadership that exerts an impact on learner

attainment is exercised at different levels within the organogram of the organisation.

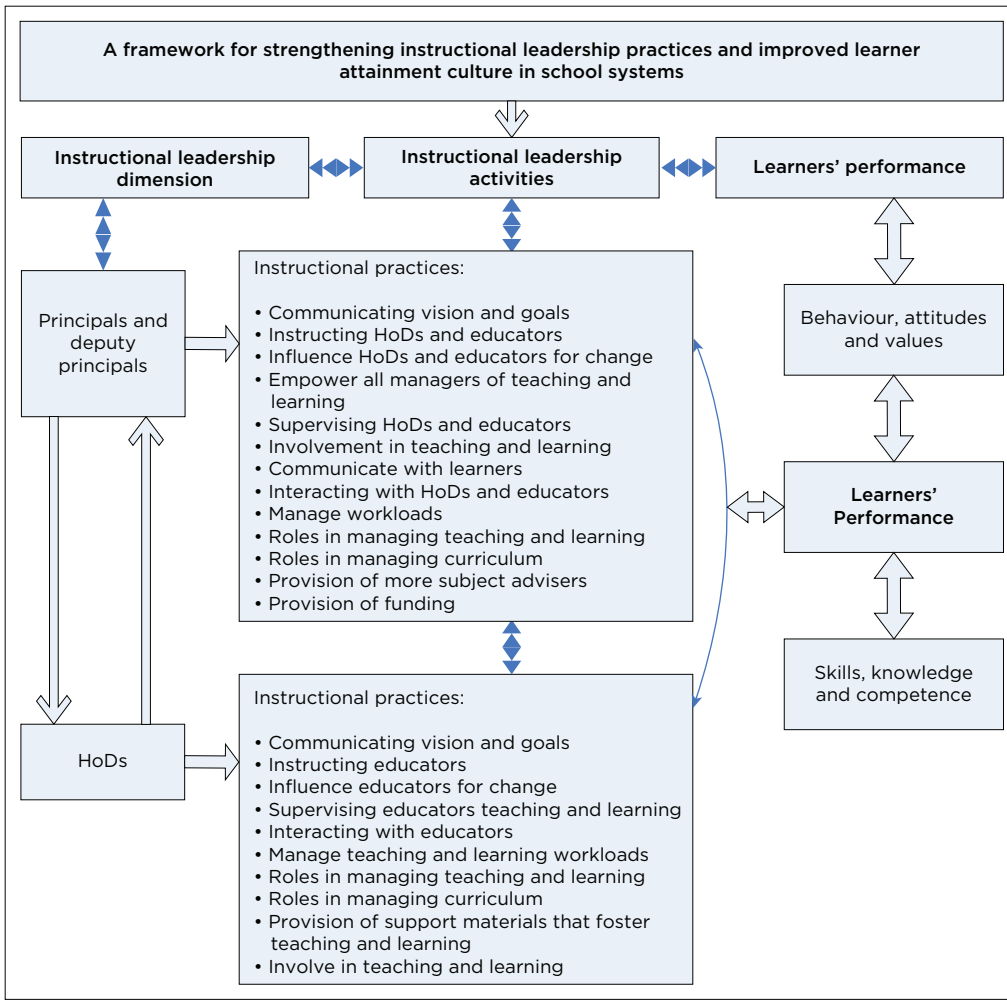
A framework for strengthening instructional leadership practices and improved learner attainment culture in the school system

This section presents the proposed framework for strengthening instructionals leadership practices and improved learner attainment culture in the South African school system.

Figure 10.6 depicts the proposed emerging framework for strengthening instructional leadership practices and improved learner attainment culture in the school system. The framework is designed to ensure that there is a set of common instructional activities that could be adopted. It outlines the roles and responsibilities of the principals and HoDs. The recognition of specific roles, therefore, provides a basis for understanding and strengthening instructional leadership practices performed by principals, DPs as well as the HoDs. There are distinct roles played individually as well as interrelationships between the roles. Principals are at the top level of the instructional leadership hierarchy and they focus on practices that inform every function and decision in the school system. Principals' instructional leadership practices at strategic level should focus on aligning teaching activities across all classrooms within the school to the overall educational outcomes. Principals as instructional leaders affect learner attainment and are therefore obliged to ensure that there is strategic formulation, design and implementation of the curriculum in alignment with the school's vision and mission. The HoDs' instructional leadership practices are at the level of the functionality of different departments as units within the school level. Bush et al. (2010) stated that HoDs have an important part to play in the management of teaching and learning within the school-wide strategy with further support from the principal and DPs.

Communicating the vision and mission of the school

The task of achieving the desired learner attainment involves different stakeholders namely the instructional leaders, educators and the learners themselves; and they all should be actively engaged in the process of teaching and learning. Ng (2019) explained that all stakeholders should conduct their duties and responsibilities in alignment with the broader vision of the school. This implies that principals' focus on aligning and communicating the school vision and mission comprises different activities such as instructing of HoDs and teachers, influencing HoDs for change, supervising HoDs and educators, and involvement in teaching and learning. Instructional leadership practices for principals also include managing teaching and learning, overseeing



HoD, Head of Department.

FIGURE 10.6: A framework for strengthening instructional leadership practices and improved learner attainment culture in the school system.

curriculum implementation, managing workloads and communicating with learners.

Provision of instruction

Learners' performance can be enhanced if instructional leadership offers guidance and leadership on instructional activities of the educators. This entails monitoring their teaching and learning aspects, their instructional materials used in class, their performance plans and strategies, etc. Principals provide instruction to HoDs regarding the implementation of the vision and mission. HoDs provide instructional leadership to educators.

☐ Supporting and monitoring the instruction delivered in the classroom

Monitoring and supporting the instructions delivered in the classrooms creates space for improved learning. Thejane (2015) found that the Principals, DPs and HoDs need to all work collaboratively with educators to achieve superior performance. This offers educators the opportunity to monitor instructions given to the learners.

☐ Influencing educators for change

Educators are directly involved in the implementation of teaching and learning. This study found that the attitude of an educator can negatively or positively influence learners' performance. Yan (2015) pointed out that instructional leadership needs to develop and acquire certain leadership traits such as influencing, motivating and strategic management. Instructional leadership practices should be centred on promoting teaching and learning in the school. Therefore, principals and DPs need to develop leadership traits for enhancing instructional leadership within the schools.

☐ Empowering educators

It was found that empowering educators for change can be done through training geared towards improving learners' performance. Msila (2013) added that the principals should boost educator's morale and commitment through attending training and related PD courses. Principals, DPs and HoDs should identify and support teachers' personal PD as a part of the performance management responsibility.

☐ Developing relevant materials

Strengthening learners' attainment is possible through making available all the materials used by the educators. These should be readily available to foster effective teaching and learning in the classroom. Leithwood, Harris and Hopkins (2020) elucidated that improving the instructional materials used by the educators is one of the responsibilities of instructional leaders. Awesu (2013) argued that some educators do not see the need for instructional materials such as LTSM in teaching some subjects. The lack or inadequate use of LTSM threatens learners' performance.

☐ Interacting with the educators

The HoDs role in managing the curriculum encompasses the performance of the following instructional activities: oversee the curriculum implementation, which is an important management function of supervision, monitoring,

evaluation and taking corrective action and in turn accountability to the principals and DPs. Supervising curriculum implementation involves ensuring that educators use the required materials to achieve the content in the curriculum. This also entails providing guidance and direction for educators to reach the objectives outlined in the curriculum.

☐ Managing workload

Managing the workload is important for avoiding work overload (Ng 2019). Principals are involved in the designing and distribution of the workload for DPs and HoDs in light of the educational goals set by the school. Principals manage and supervise the performance of the HoDs to ensure effective implementation of the school vision and strategy of teaching and learning. The HoDs, in turn, are responsible for managing the workload of the educators. The HoDs engage in planning, organising, coordinating, supervising and monitoring educator's workload related to teaching and learning activities in the school with the aim of enhancing learner attainment.

☐ Resource availability

Collectively the instructional leaders ensure that resources required for effective implementation of teaching and learning are available within the system. They should ensure the availability of LTSM for the PD of teachers. Essentially, they are mandated to recruit and employ qualified employees.

■ Conclusion

This study reaches the conclusion that the perceptions about the influence of instructional leadership practices differ across the schools. Instructional leadership practices are interrelated and interdependent. This study ultimately developed a framework for strengthening instructional leadership practices and improved learner attainment culture in the school system. The framework provides a basis for identifying and understanding instructional leadership practices that affect learner attainment culture in the school system. Policy makers and authorities interested in improving learner attainment culture in school systems should consider using the proposed framework. The framework could assist education administrators in identifying a set of instructional leadership practices applicable to the diverse contexts in the South African schools, all in the spirit of consolidating quality performance within the school system.

References

Chapter 1

Adkins-Sharif, J., 2020, 'The racial challenges facing black male school leaders enacting social justice agendas in environments of privilege', Doctoral dissertation, University of Massachusetts.

Akinlo, T. & Oyeleke, O.J., 2020, 'Human capital formation and economic growth in sub-Saharan African countries: An empirical investigation', *The Indian Economic Journal* 68(2), 249–268. https://doi.org/10.1177/0019466220972848

Akmal, F.F. & Mariyat, A., 2017, 'Humanistic approach in education according to Paulo Freire', *Journal At-Tadib* 12(2), 25–48. https://doi.org/10.21111/at-tadib.v12i2.1264

Atiq-ur-Rehman, M., Ghaffar, S., Shahzadi, K. & Ghazanfar, R., 2020, 'Human capital formation and economic growth in emerging Asia: Empirical evidence using panel data', *Review of Applied Management & Social Science* 3(2), 205–212, https://doi.org/10.47067/ramss.v3i2.54

Anoruo, E. & Elike, U., 2015, 'Human capital-economic growth nexus in Africa: Heterogeneous panel causality approach', *International Journal of Economics and Financial Issues* 5(4), 1017–1023.

Awel, A.M., 2013, *The long-run relationship between human capital and economic growth in Sweden*, MPRA Paper No. 45183, Munich Personal RePec Archive.

Barro, R.J., 1996, *Determinants of economic growth: A cross-country empirical study* (No. w5698), National Bureau of Economic Research, Cambridge, MA.

Becker, G.S., 1992, 'Human capital and the economy', *Proceedings of the American Philosophical Society* 136(1), 85–92.

Booyse, C. & Du Plessis, E., 2018, *Curriculum studies, development, interpretation, plan and practice*, 2nd edn., Van Schaik Publishers, Hatfield.

Burrell, G. & Morgan, G., 1979, *Sociological paradigms and organizational analysis*, Gowe, Aldershot.

Castelló-Climent, A. & Doménech, R., 2021, 'Human capital and income inequality revisited', *Education Economics* 29(2), 1–19. https://doi.org/10.1080/09645292.2020.1870936

Cazden, C.B., 2017, 'A framework for social justice in education', in C.B. Cazden (ed.), *Communicative competence, classroom interaction, and educational equity*, pp. 245–258, Routledge, New York, NY.

Cobb, C.W. & Douglas, P.H., 1928, 'A theory of production', *American Economic Review* 18(1 Suppl.), 139–165.

De Carvalho, R.J., 1991, 'The humanistic paradigm in education', *The Humanistic Psychologist* 19(1), 88–104. https://doi.org/10.1080/08873267.1991.9986754

De Vos, P.W., Freedman, W., Brand, D., Gevers, C., Govender, K., Lenaghan, P. et al., 2014, *South African constitutional law in context*, Oxford University Press SA, Cape Town.

Diebolt, C. & Hippe, R., 2019, 'The long-run impact of human capital on innovation and economic development in the regions of Europe', *Applied Economics* 51(5), 542–563. https://doi.org/10.1080/00036846.2018.1495820

Fainstein, S.S., 2001, 'Competitiveness, cohesion, and governance: Their implications for social justice', *International Journal of Urban and Regional Research* 25(4), 884–888. https://doi.org/10.1111/1468-2427.00349

Fraser, N., 1997, *Justice interruptus: Critical reflections on the 'Postsocialist' condition*, Routledge, London.

Fraser, N., 1998, *Social justice in the age of identity politics: Redistribution, recognition, participation* (No. FS I 98-108), WZB discussion paper, Social Science Research Center, Berlin.

Fraser, N., 2009, *Social justice in the age of identity politics. Geographic thought: A praxis perspective,* viewed 07 November 2020, from https://nbn-resolving.org/urn:nbn:de:0168-ssoar-126247.

Gardner, H., 1999, *Intelligence reframed: Multiple intelligences for the 21st century*, Basic Books, New York, NY.

Gewirtz, S., 1998, 'Conceptualizing social justice in education: Mapping the territory', *Journal of Education Policy* 13(4), 469–484. https://doi.org/10.1080/0268093980130402

Grasha, T., 1990, 'The naturalistic approach to learning styles', *College Teaching* 38(3), 106–113. https://doi.org/10.1080/87567555.1990.10532207

Hanif, N. & Arshed, N., 2016, 'Relationship between school education and economic growth: SAARC countries', *International Journal of Economics and Financial Issues* 6, 294–300.

Hanushek, E.A. & Woessmann, L., 2020, *Education, knowledge capital, and economic growth,* Heinemann, London.

Hayes, M.A., 2009, 'Into the field: Naturalistic education and the future of conservation', *Conservation Biology* 23(5), 1075–1079. https://doi.org/10.1111/j.1523-1739.2009.01302.x

Hornbeck, D.W., & Salamon, L.M. (eds.), 1991, *Human capital and America's future: An economic strategy for the nineties*, Johns Hopkins University, Baltimore, MD.

Hytten, K. & Bettez, S.C., 2011, 'Understanding education for social justice', *Educational Foundations* 25(1–2), 7–24.

Karanika-Murray, M. & Wiesemes, R., 2009, *Exploring avenues to interdisciplinary research: From cross- to multi- to interdisciplinarity*, Nottingham University Press, Nottingham.

Khatib, M., Sarem, S.N., & Hamidi, H., 2013, 'Humanistic education: Concerns, implications and applications', *Journal of Language Teaching and Research* 4(1), 45–51. https://doi:10.4304/jltr.4.1.45-51

Knijnik, J. & Luguetti, C., 2020, 'Social justice narratives in academia: Challenges, struggles and pleasures PETE educators face in understanding and enacting critical pedagogy in Brazil', *Sport, Education and Society* 26(5), 541–553. https://doi.org/10.1080/13573322.2020.1732905

Lee, J.-W. & Lee, H., 2018, *Human capital and income inequality*, ADBI Working Paper, No. 810, Asian Development Bank Institute, Tokyo.

Lucas, R.E., Jr., 2015, 'Human capital and growth', *American Economic Review* 105(5), 85–88. https://doi.org/10.1257/aer.p20151065

Maneejuk, P. & Yamaka, W., 2021, 'The impact of higher education on economic growth in ASEAN-5 countries', *Sustainability* 13(2), 520. https://doi.org/10.3390/su13020520

Mankiw, N.G., Romer, D. & Weil, D.N., 1992, 'A contribution to the empirics of economic growth', *The Quarterly Journal of Economics* 107(2), 407–437. https://doi.org/10.2307/2118477

Marginson, S., 2019, 'Limitations of human capital theory', *Studies in Higher Education* 44(2), 287–301. https://doi.org/10.1080/03075079.2017.1359823

Matashu, M., 2016, 'An integrated corporate governance framework for enhancing economic growth: Evidence from sub Saharan African countries', viewed 14 October 2020, from https://dspace.nwu.ac.za/handle/10394/25398?show=full.

Mohamed, R.A., Abd El-aziz, A.I., Ramadan, H.N., Abd El-Sayed, M.H. & Emam, H.A., 2021, 'Impact of human capital on economic growth in Egypt: An ARDL approach', *European Journal of Economics, Finance and Administrative Sciences* 108, 1450–2275.

Neeliah, H. & Seetanah, B., 2016, 'Does human capital contribute to economic growth in Mauritius?', *European Journal of Training and Development* 40(4), 248–261. https://doi.org/10.1108/EJTD-02-2014-0019

Nussbaum, M., 2002, 'Capabilities and social justice', *International Studies Review* 4(2), 123–135. https://doi.org/10.1111/1521-9488.00258

Nussbaum, M., 2007, 'Human rights and human capabilities', *Harvard Human Rights Journal* 20, 21.

Nussbaum, M.C., 1997, 'Capabilities and human rights', *Fordham Law Review* 66, 273.

Nussbaum, M.C., 2011, 'Capabilities, entitlements, rights: Supplementation and critique', *Journal of Human Development and Capabilities* 12(1), 23–37. https://doi.org/10.1080/19452829.2011.541731

Njoku, J.U. & Onyegbula, J.C., 2017, 'Human capital development as a strategy for sustainable development in the Nigerian education system', *African Research Review* 11(2), 178–189. https://doi.org/10.4314/afrrev.v11i2.13

Olaniyan, D.A. & Okemakinde, T., 2008, 'Human capital theory: Implications for educational development', *European Journal of Scientific Research* 24(2), 157–162.

Organisation for Economic Co-operation and Development (OECD), 2011, *Social justice in the OECD – How do the member states compare?*, viewed 14 October 2020, from https://www.sgi-network.org/docs/studies/SGI11_Social_Justice_OECD.pdf.

Ozoemena, R., 2010, *Poverty alleviation strategies in South Africa: Creating dignified living for women through social justice and development*, viewed 07 October from http://www.consultancyafrica.com/index.php.

Rautenbach, C., 2018, *Introduction to legal pluralism in South Africa*, 5th edn., LexisNexis, Durban.

Rawls, J., 1972, *A theory of justice,* Clarendon Press, Oxford.

Raymon, C. & Holloway, D., 2011, *Qualitative research methods in publishing market communication*, 2nd edn., Routledge, New York, NY.

Republic of South Africa, 1996, *Constitution of the Republic of South Africa no. 108 of 1996*, viewed 20 November 2020, from https://www.gov.za/sites/default/files/images/a108-96.pdf.

Romer, D., 1996, *Advanced macroeconomics*, McGraw-Hill, New York, NY.

Romer, P.M., 1989, *Human capital and growth: Theory and evidence*, National Bureau of Economic Research, Cambridge.

Schultz, T., 1961, 'Investment in human capital', *The American Economic Review* 51(1), 1–17.

Schultz, T.W., 1960, 'Capital formation and education', *Journal of Political Economy* 68(6), 571–583. https://doi.org/10.1086/258393

Sen, A., 1992, *Inequality re-examined*, Clarendon Press, Oxford.

Sen, A., 1997, 'From income inequality to economic inequality', *Southern Economic Journal* 64(2), 384–401. https://doi.org/10.2307/1060857

Sen, A., 1999, *Development as freedom*, Knopf, New York, NY.

Sen, A., 2004, 'Elements of a theory of human rights', *Philosophy and Public Affairs* 32(4), 315–356. https://doi.org/10.1111/j.1088-4963.2004.00017.x

Sen, A., 2005, 'Human rights and capabilities', *Journal of Human Development* 6(2), 151–166, https://doi.org/10.1080/14649880500120491

Sen, A.K., 1990, 'Development as capability expansion', *The community development reader* n.v., 41–58.

Sen, A.K., 1994, 'Well-being, capability and public policy', *Giornale degli economisti e annali di economia* 53(79), 333–347.

Siddiqui, A. & Rehman, A.U., 2017, 'The human capital and economic growth nexus in East and South Asia', *Applied Economics* 49(28), 2697–2710. https://doi.org/10.1080/00036846.2016.1245841

Statistics South Africa, 2019, *General household survey 2018*, viewed 07 November 2020, from https://www.unicef.org/southafrica/education.

Tang, L., Sun, S. & Yang, W., 2021, 'Investments in human capital: The evidence from China's new rural pension scheme', *Research in International Business and Finance* 55, 101345. https://doi.org/10.1016/j.ribaf.2020.101345

Tikly, L.P. & Barrett, A.M., 2011, 'Social justice, capabilities and the quality of education in low income countries', *International Journal of Educational Development* 31(1), 3–14. https://doi.org/10.1016/j.ijedudev.2010.06.001

Uba, N.J. & Chinonyerem, O.J. 2017, 'Human capital development a strategy for sustainable development in the Nigerian education system', *African Research Review* 11(2), 178–189. https://doi.org/10.4314/afrrev.v11i2.1

United Nations, 1948, *The International Bill of Human Rights 1*, viewed 07 October 2021, from https://www.un.org/en/about-us/universal-declaration-of-human-rights.

United Nations, 1969, *Declaration on Social Progress and Development, United Nations Proclaimed by General Assembly resolution 2542 (XXIV) of 11 December 1969*, viewed 07 October 2020, from https://www.ohchr.org/Documents/ProfessionalInterest/progress.pdf.

United Nations, 1995, *Copenhagen Declaration on Social Development and the Programme of Action of the World Summit for Social Development, 6–12 March 1995*, viewed 07 October 2020, from https://digitallibrary.un.org/record/198966?.

United Nations, 2020, *2020 Theme: 'Closing the inequalities gap to achieve social justice'*, viewed 07 November 2020, from https://www.un.org/en/observances/social-justice-day.

United Nations Department of Economic and Social Affairs, 2019, *World Economic Situation and Prospects as of mid-2019*, viewed n.d., from https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf.

United Nation Department of Economic and Social Affairs (UNESA), 2020, *World Social Report 2020 Inequality in a rapidly changing world*, viewed 11 October 2020, from https://www.un.org/development/desa/dspd/world-social-report/2020-2.html.Pdf.

United Nations Development Programme (UNDP), 2018, *2018 Statistical Update: Human Development Indices and Indicators*, New York, NY.

United Nations Development Programme (UNDP), 2019, *Human development reports*, viewed 07 October 2020, from http://hdr.undp.org/sites/default/files/hdr2019.pdf.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2016, *Incheon Declaration and Framework for Action for the Implementation of Sustainable Development Goal 4*, viewed 20 November 2020, from http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2020, *Inclusion and education*, viewed 07 October 2020, from https://en.unesco.org/gem-report/report/2020/inclusion.

United Nations (UN) Economic and Social Council, 2006, *The International Forum for Social Development Social Justice in an open world: The role of the United Nations*, United Nations, New York, NY.

United Nations World Economic Situation and Prospects, 2014, 'Country classification', viewed 11 October 2020, from https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf.

Walster, E. & Walster, G.W., 1975, 'Equity and social justice', *Journal of Social Issues* 31(3), 21–43. https://doi.org/10.1111/j.1540-4560.1975.tb00001.x

World Bank, 2018, *Overcoming poverty and inequality in South Africa: An assessment of drivers, constraints and opportunities, March 2018, International Bank for Reconstruction and Development*, The World Bank, Washington, DC.

World Bank, 2020, *Poverty*, viewed 20 November 2020, from https://www.worldbank.org/en/topic/poverty/overview.

World Economic Forum (WFE), 2019, *The Global Competitiveness Report 2019*, viewed 07 October 2020, from http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

Chapter 2

Archer, M.S., 1995, *Realist social theory: The morphogenetic approach*, Cambridge University Press, Cambridge.

Archer, M.S., 1996, *Culture and agency: The place of culture in social theory*, Cambridge University Press, Cambridge.

Aronowitz, S. & Giroux, H.A., 1993, *Education still under siege*, Greenwood Publishing Group, Westport, CT.

Arnaut, K., Blommaert, J., Rampton, B. & Spotti, M. (eds.), 2015, *Language & superdiversity*, Routledge, London.

Baker, J., & Schuler, N. 2004*, Analyzing urban poverty: A summary of methods and approaches*, Policy Research Working Paper No. 3399*,* World Bank, Washington, DC.

Balfour, R., 2019, 'Gaining momentum as unitary university in 2020', NWU Official Academic Opening in February 2020 Address to the Guests and Staff of the NWU on the Three Campuses.

Bajaj, M., 2018, 'Conceptualizing transformative agency in education for peace, human rights, and social justice', *International Journal of Human Rights Education* 2(1), n.p.

Barbour, V., 2015, 'Perverse incentives and perverse publishing practices', *Science Bulletin* 60(14), 1225–1226. https://doi.org/10.1007/s11434-015-0846-4

Belshaw, D., 2012, 'What is "digital literacy?" A pragmatic investigation', Doctoral dissertation, Durham University.

Benjamin, H.R.W., 1939, *Saber-tooth curriculum, including other lectures in the history of Palaeolithic education*, McGraw-Hill, New York, NY.

Beresford, A., 2016, *South Africa's political crisis: Unfinished liberation and fractured class struggles*, Palgrave Macmillan, Basingstoke.

Blackledge, A. & Creese, A., 2007, *Multilingualism: A critical perspective*, Continuum International, London.

Blommaert, J. & Rampton, B., 2011, *Language and superdiversity*, New Diversities, s.l.

Bloom, D., Canning, D. & Chan, K., 2006, *Higher education and economic development in Africa*, viewed 24 August 2020, from http://www.sciencedev.net/Docs/Higher%20Education%20and%20economic%20developmnet.pdf.

Booyse, C. & Du Plessis, E., 2018, *Curriculum studies: Development, interpretation, plan and practice*, viewed n.d., from http://hdl.handle.net/10500/24983.

Bornmann, L. & Mutz, R., 2015, 'Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references', *Journal of the Association for Information Science and Technology* 66(11), 2215–2222. https://doi.org/10.1002/asi.23329

Boshoff, N., 2009, 'South-South research collaboration of countries in the Southern African Development Community (SADC)', *Scientometrics* 84(2), 481–503. https://doi.org/10.1007/s11192-009-0120-0

Bowles, S. & Gintis, H., 1976, *Schooling in capitalist America*, University of Massachusetts, Amherst, MA.

Bozalek, V. & Boughey, C., 2012, '(Mis)framing higher education in South Africa', *Social Policy and Administration* 46(6), 688–703. https://doi.org/10.1111/j.1467-9515.2012.00863.x

Breet, E., Botha, J., Horn, L. & Swartz, L., 2018, 'Academic and scientific authorship practices: A survey among South African researchers', *Journal of Empirical Research on Human Research Ethics* 13(4), 412–420. https://doi.org/10.1177/1556264618789253

Cooke, M. & Peutrell, R., 2019, *Brokering Britain, educating citizens: Exploring ESOL and Citizenship*, Multilingual Matters, s.l.

Council for Higher Education, 2013, *Annual report*, viewed 03 March 2021, from https://www.dhet.gov.za/Commissions%20Reports/Annual%20Report%202012%20-%202013.pdf.

Creese, A. & Blackledge, A., 2010, 'Translanguaging in the bilingual classroom: A pedagogy for learning and teaching', *The Modern Language Journal* 94(1), 103–115. https://doi.org/10.1111/j.1540-4781.2009.00986.x

Dede, C., 2010, 'Comparing frameworks for 21st century skills', in J.A. Bellanca & R.S. Brandt (eds.), *21st century skills: Rethinking how students learn,* pp. 51–76, Solution Tree Press, Bloomington, IN.

Department of Higher Education and Training (DHET), 2013, *Report of the ministerial committee for the review of the funding of universities*, Department of Higher Education and Training, Pretoria.

Department of Higher Education and Training (DHET), 2019, viewed 10 April 2021, from https://www.gov.za/documents/department-higher-education-and-training-annual-report-20182019-26-aug-2019-0000.

Drèze, J. & Sen, A., 2013, *An uncertain glory: India and its contradictions*, Princeton University Press, Princeton, NJ.

Dürkheim, E., 1960, *Moral education*, The Free Press, New York, NY.

Facione, P.A., 1990, *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction*, American Philosophical Association, Millbrae, CA.

Gambrell, J.A., 2016, 'Beyond personal transformation: Engaging students as agents for social change', *Journal of Multicultural Affairs* 1(2), 1–35.

Garcia, O. & Wei, L., 2014, *Translanguaging*, Palgrave, Basingstoke.

Giroux, H., 1997, *Pedagogy and the politics of hope*, Westview Press, Boulder, CO.

Giroux, H., 2002, 'Neoliberalism, corporate culture, and the promise of higher education: The university as a democratic public sphere', *Harvard Educational Review* 72(4), 425–464. https://doi.org/10.17763/haer.72.4.0515nr62324n71p1

Government Gazette 38116, 1993, *National Qualifications Act (67/2008)*, viewed 15 July 2021, from https://www.greengazette.co.za/notices/national-qualifications-act-67-2008-higher-education-qualifications-sub-framework_20141017-GGN-38116-00819.

Government Gazette 38487, 2015, *Minimum requirements for teacher education qualifications*, viewed 15 July 2021, from https://www.dhet.gov.za/Teacher%20Education/National%20Qualifications%20Framework%20Act%2067_2008%20Revised%20Policy%20for%20Teacher%20Education%20Quilifications.pdf.

Harley, A., 2017, 'Alienating academic work', *Education as Change* 21(3), 1–14. https://doi.org/10.17159/1947-9417/2017/3489

Harrison, T.G., Shallcross, D.E., Norman, N.C., Sewry, J.D. & Davies-Coleman, M.T., 2011, 'Publicising chemistry in a multicultural society through chemistry outreach', *South African Journal of Science* 107(11/12), n.p.

Heugh, K.A., 2020, 'Southern multilingualisms, translanguaging and transknowledging in inclusive and sustainable education', in P. Harding-Esch, & H. Coleman (eds.), *Language and the sustainable development Goals,* pp. 37–47, British Council, London.

Higgins, S.E., 2014, 'Critical thinking for 21st-century education: A cyber-tooth curriculum?', *Prospects* 14(4), 559–574. https://doi.org/10.1007/s11125-014-9323-0

Hove, M.L., 2018, 'Omission statements: Deficit and surplus messages in two universities' strategic development plans in South Africa', *Communicare* 37(1), 1–17.

Jacklin, H. & Vale, P.C. J., 2009, *Re-imagining the social in South Africa: Critique, theory and post-apartheid society*, University of KwaZulu-Natal Press, Scottsville, VA.

Khan, K., 2017, 'Raciolinguistic border-making and the elasticity of assessment and believeability in the UK citizenship process', *Ethnicities*, viewed n.d., from https://journals.sagepub.com/doi/10.1177/1468796820971441.

Kelly, A.V., 1996, *The curriculum: Theory and practice,* Sage, London.

Kerr, J.F., 1987, 'The Problem of curriculum reform', in J.F. Kerr (ed.), *Changing the curriculum*, pp. 13–38, University of London Press, London.

Le Grange, L., 2019, 'On "predatory" publishing: A reply to maistry', *Journal of Education* 75, 20–32. https://doi.org/10.17159/2520-9868/i75a02

Maistry, S.M., 2019, '(Re)counting the high cost of predatory publishing and the effect of a neoliberal performativity culture', *Journal of Education* 75, 5–19. https://doi.org/10.17159/2520-9868/i75a01

Makalela, L., 2016, 'Ubuntu translanguaging: An alternative framework for complex multilingual encounters', *Southern African Linguistics and Applied Language Studies* 34(3), 187–196. https://doi.org/10.2989/16073614.2016.1250350

Makoni, S., 2017, 'A critical analysis of the historical and contemporary status of minority languages in Zimbabwe', *Current Issues in Language Planning* 12(4), 437–456. https://doi.org/10.1080/14664208.2011.615104

Maluleke, R., 2018, 'Statistics South Africa, 2018', in *The South Africa I know: The home I understand*, viewed n.d., from www.statssa.gov.za.

Marcuse, H., 1960, *Actuality of dialectic*, https://doi.org/10.1177/039219216000803106

Mayaba, N.N., Ralarala, M. & Angu, P., 2018, 'Student voice: Perspectives on language and critical pedagogy in South African higher education', *Educational Research for Social Change* 7(1), 1–12. https://doi.org/10.17159/2221-4070/2018/v7i1a1

McGill, M.M. & Settle, A., 2011, 'Computing faculty tenure and promotion requirements at USA and Canadian post-secondary institutions', in *SIGITE '11: Proceedings of the 2011 Conference on Information Technology Education*, New York, NY, United States of America, n.d., 2011, pp. 133–138. https://doi.org/10.1145/2047594.2047632

McKenna, S., Quinn, L. & Vorster, J.-A., 2018, 'Mapping the field of higher education research using PhD examination reports', *Higher Education Research &Development* 37(3), 579–592. https://doi.org/10.1080/07294360.2018.1428178

Mouton, J. & Valentine, A., 2017, 'The extent of South African authored articles in predatory journals', *South African Journal of Science* 113(7–8), 1–9. https://doi.org/10.17159/sajs.2017/20170010

Msila, V., 2017, 'Revival of the university: Rethinking teacher education in Africa', in V. Msila & M.T. Gumbo (eds.), *Africanising the curriculum: Indigenous perspectives and theories,* 1st edn., Sun Press.

Muthama, E. & McKenna, S., 2020, 'The unintended consequences of using direct incentives to drive the complex task of research dissemination', *Education as Change* 24, 1–23. https://doi.org/10.25159/1947-9417/6688

Ntshoe, I.M., 2004, 'Higher education and training policy and practice in South Africa: Impacts of global privatisation, quasi-marketisation and new managerialism', *International Journal of Educational Development* 24(2), 137–154. https://doi.org/10.1016/j.ijedudev.2003.10.006

QS, 2018, *Top universities in Africa*, viewed n.d., from https://www.topuniversities.com/university-rankingsarticles/world-university-rankings/top-universities-africa.

Ramose, M.B., 2002, *African philosophy through Ubuntu*, Mond Books, Harare.

Rampton, B., 2020, 'Education, England and users of languages other than English', in S. Fox (ed.), *Language in the British Isles*, 3rd edn., pp. 1–20, Cambridge University Press, Cambridge.

Santos, B., 2014, *Epistemologies of the South: Justice against epistemicide*, Paradigm, Boulder, CO.

Sen, A., 1999, *Development as freedom*, Oxford University Press, Oxford.

Sen, A., 2009, *The idea of justice*, Penguin Books, London.

Shore, C., 2010, 'Beyond the multiversity: Neoliberalism and the rise of the schizophrenic university', *Social Anthropology, Special Issue* 18(1), 15–29. https://doi.org/10.1111/j.1469-8676.2009.00094.x

Slaughter, S. & Rhoades, G., 2004, *Academic capitalism and the new economy: Markets, state, and higher education*, Johns Hopkins University Press, Baltimore, MD.

Solorzano, D. & Bernal, D.D., 2001, 'Examining transformational resistance through a critical race and LatCrit theory framework: Chicano and Chicana students in an urban context', *Urban Education* 36(3), 308–342. https://doi.org/10.1177/0042085901363002

StatsSA, 2018, *Statistical release P0318 General Household Survey 2018*, viewed 12 July 2021, from www.statssa.gov.za.

Stenhouse, L., 1975, *An introduction to curriculum research and development*, Heinemann, London.

Stroud, C., 2018, 'Linguistic citizenship', in L. Lim, C. Stroud & L. Wee (eds.), *The multilingual citizen: Towards a politics of language for agency and change*, pp. 17–39, Multilingual Matters, Bristol.

Stroud, C. & Kerfoot, C., 2020, *Decolonizing higher education: Multilingualism, linguistic citizenship and epistemic justice*, Working Papers in Urban Languages and Literacies, Paper 265, pp. 1–21.

Swartz, R., Ivancheva, M., Czerniewicz, L. & Morris, N.P., 2019, 'Between a rock and a hard place: Dilemmas regarding the purpose of public universities in South Africa', *Higher Education* 77(4), 567–583. https://doi.org/10.1007/s10734-018-0291-9

Taba, H., 1968, *Curriculum development: Theory and practice*, Harcourt Brace & World, New York, NY.

Tomaselli, K.G., 2018, 'Perverse incentives and the political economy of South African Academic Journal Publishing', *South African Journal of Science* 114(11–12), 4341. https://doi.org/10.17159/sajs.2018/4341

Tyler, R.W., [1949] 1969, *Basic principles of curriculum and instruction*, University of Chicago Press, Chicago, IL.

Urban, B. & Kujinga, L., 2017, 'Towards social change: South African university students as social entrepreneurs', *South African Journal of Higher Education* 31(1), 243–259. https://doi.org/10.20853/31-1-872

United Nations Development Programme, 2019, *Gender development index & gender inequality index*, viewed 05 September 2021, from https://www.observatorio-das-desigualdades.com/2021/01/28/gender-development-index-gender-inequality-index/?utm_source=rss&print=print.

Vaughan, K., 2008, 'Alternatives to the publication subsidy for research funding', *South African Journal of Science* 104(3–4), 91–96.

Walker, M., 2002, 'Pedagogy and the politics and purposes of higher education', *Arts and Humanities in Higher Education* 1(1), 43–58. https://doi.org/10.1177/1474022202001001004

Williams, Q. & Stroud, C., 2015, 'Linguistic citizenship. Language and politics in postnational modernities', *Journal of Language & Politics* 14(3), 406–430. https://doi.org/10.1075/jlp.14.3.05wil

World Bank, 2018, *Gini coefficients*, viewed n.d., from https://data.worldbank.org/indicator/SI.POV.GINI?locations=ZA.

Zeleza, P. T., 2019, *African universities and globalisation*, viewed 10 October 2019, from https://feministafrica.net/wp-content/uploads/2019/10/fa_1_feature_article_3.pdf.

Chapter 3

Angrist, N., Djankov, S., Goldberg, P.K. & Patrinos, H.A., 2019, *Measuring human capital*, viewed 20 October 2020, from https://openknowledge.worldbank.org/bitstream/handle/10986/31280/WPS8742.pdf.

Astuti, D.S., 2020, 'Promoting inclusive education for social justice in Indonesia', in *2nd International Conference on Social Science and Character Educations (ICoSSCE 2019)*, s.l., February, 2020, pp. 178–183.

Blanden, J., & Machin, S., 2010, 'Changes in equality and intergenerational mobility in early years assessments', in K. Hansen, H. Joshi & S. Dex (eds.), *Children of the 21st century: The first five years*, pp. 153–168, Policy Press, Bristol.

Boouse, C. & Du Plessis, E., 2014, *Curriculum studies development, interpretation, plan and practice*, 2nd edn., Van Schaik, Hatfield.

Carter, S. & Abawi, L.A., 2018, 'Leadership, inclusion, and quality education for all', *Australasian Journal of Special and Inclusive Education* 42(1), 49–64. https://doi.org/10.1017/jsi.2018.5

Department of Basic Education (BDE), 2011, *Curriculum and Assessment Policy Statement. GRADES 7–9 Economic and Management Sciences*, Department of Basic Education, Pretoria.

De Vos, P.W., Freedman, W., Brand, D., Gevers, C., Govender, K., Lenaghan, P. et al., 2014, *South African constitutional law in context*, Oxford University Press SA, Cape Town.

Fraser, N., 1997, *Justice interruptus: Critical reflections on the 'Postsocialist' condition*, Routledge, London.

Gewirtz, S., 1998, 'Conceptualizing social justice in education: Mapping the territory', *Journal of Education Policy*, 13(4), 469–484. https://doi.org/10.1080/0268093980130402

Gillies, D., 2015, 'Human capital theory in education', *Encyclopaedia of educational philosophy and theory*, 15(2), 1–15. https://doi.org/10.1007/978-981-287-532-7_254-1

Hanushek, E. & Woessmann, L., 2009, *Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation*, NBER Working Paper No. 14633, National Bureau of Economic Research, Cambridge, MA.

Hanushek, E.A., 2020, *Education production functions', in The economics of education: A comprehensive overview*, 2nd edn., S. Bradley & C. Green (eds.), pp. 161–170, Academic Press, London.

Hendarmin, H. & Kartika, M., 2019, 'The relationship between human capital and the regional economy productivity', *JEJAK: Jurnal Ekonomi dan Kebijakan* 12(1), 138–152. https://doi.org/10.15294/jejak.v12i1.18396

Hocking, C., 2017, 'Occupational justice as social justice: The moral claim for inclusion', *Journal of Occupational Science* 24(1), 29–42. https://doi.org/10.1080/14427591.2017.1294016

Johnstone, C.J., Schuelka, M.J. & Swadek, G., 2020, *Quality education for all? The promises and limitations of the SDG framework for inclusive education and students with disabilities*, Brill Sense, Leiden. https://doi.org/10.1163/9789004430365_004

Kuka, E., Shenhav, N.A. & Shih, K., 2020, 'Do human capital decisions respond to the returns to education? Evidence from DACA', *American Economic Journal: Economic Policy*12(1), 293–324. https://doi.org/10.1257/pol.20180352

Liasidou, A. & Symeou, L., 2018, 'Neoliberal versus social justice reforms in education policy and practice: Discourses, politics and disability rights in education', *Critical Studies in Education* 59(2), 149–166. https://doi.org/10.1080/17508487.2016.1186102

Macedo, E., Nairz-Wirth, E., Araújo, H.C. & Szalai, J., 2020, 'Drawing lessons from early school leavers in a social justice context: Introductory comments', *European Educational Research Journal* 19(5), 387–397. https://doi.org/10.1177/1474904120951658

Marginson, S., 2019, 'Limitations of human capital theory', *Studies in Higher Education* 44(2), 287–301. https://doi.org/10.1080/03075079.2017.1359823

National Planning Commission, 2012, *National Development Plan 2030 Our Future – Make it work*, National Planning Commission, Pretoria.

Nwokoye, E.S., Onugha, C.B. & Kalu, C.U., 2020, 'Drivers of human capital development: Evidence from Nigeria', *Timisoara Journal of Economics and Business* 13(1), 15–30.

Obeng-Odoom, F., 2019, 'The intellectual marginalisation of Africa', *African Identities* 17(3–4), 211–224. https://doi.org/10.1080/14725843.2019.1667223

Olopade, B.C., Okodua, H., Oladosun, M. & Asaleye, A.J., 2019, 'Human capital and poverty reduction in OPEC member-countries', *Heliyon* 5(8), e02279. https://doi.org/10.1016/j.heliyon.2019.e02279

Organisation for Economic Co-operation and Development (OCED), 2019, *Social Justice in the EU and OECD*, viewed 07 October 2020, from https://www.politico.eu/wp-content/uploads/2019/12/Social-Justice-Index-2019.pdf.

Organisation for Economic Co-operation and Development (OECD), 2020, *OECD Economic Outlook*, Volume 2020 Issue 2: Preliminary version, No. 108, OECD Publishing, Paris. https://doi.org/10.1787/39a88ab1-en.

Parkinson, A. & Kester, K., 2017, *Competing paradigms for basic education: Human capital and human capabilities and what they mean for the World Bank and UNESCO*, CORERJ.

Shaeffer, S., 2015, *Equity in education: An imperative for the post- 2015 development agenda*, Asian Education Futures, Workshop Report, 1, The Head Foundation, Singapore.

Shaeffer, S., 2019, 'Inclusive education: A prerequisite for equity and social justice', *Asia Pacific Education Review* 20(2), 181–192. https://doi.org/10.1007/s12564-019-09598-w

Singal, N., Ware, H. & Bhutani, S.K., 2017, *Inclusive quality education for children with disabilities*, University of Cambridge, Cambridge.

Son, H.H., 2010, *Human capital development*, ADB Economics Working Paper Series No. 225, Asian Development Bank, viewed 07 October 2020, from https://www.think-asia.org/bitstream/handle/11540/1569/economics-wp225.

Statistics South Africa, 2018, *General household survey 2018*, StatsSA, Pretoria, p. 13, viewed 07 November 2020, from https://www.unicef.org/southafrica/education.

Statistics South Africa, 2019, *General household survey 2018*, viewed 07 November 2020, from https://www.unicef.org/southafrica/education.

Tikly, L. & Barrett, A.M., 2011, 'Social justice, capabilities and the quality of education in low income countries', *International Journal of Educational Development* 31(1), 3–14. https://doi.org/10.1016/j.ijedudev.2010.06.001

Vandekinderen, C., Roets, G., Van Keer, H. & Roose, R., 2018, 'Tackling social inequality and exclusion in education: From human capital to capabilities', *International Journal of Inclusive Education* 22(1), 1–20. https://doi.org/10.1080/13603116.2017.1362044

Veletsianos, G., 2020, 'Open educational resources: Expanding equity or reflecting and furthering inequities?', *Educational Technology Research and Development* 69(1), 407–410. https://doi.org/10.1007/s11423-020-09840-y

United Nations, 1948, *Universal Declaration of Human Rights*, United Nations, Geneva.

United Nations, 2015, *Trasforming our world: The 2030 Agenda for Sustainable development*, viewed 07 October, from https://sustainabledevelopment.un.org/post2015/transformingourworld/publication .

United Nations Children's Fund (UNICEF), 2020, *Education. UNICEF is committed to ensuring quality learning for every child*, viewed 20 November 2021, from https://www.unicef.org/southafrica/education.

United Nations Department of Economic and Social Affairs (UNDESA), 2006, *The international forum for social justice in an open world: The role of the United Nations*, United Nations, New York, NY.

United Nations Department Economic and Social Affairs (UNDESA), 2019, *NEWS, Better data, Better Education*, viewed 20 November 2020, from https://www.un.org/development/desa/en/news/statistics/better-data-better-education.html.

United Nations (UN) Department Economic and Social Affairs, 2020, *Annual Highlights Report 2019–2020 UN DESA Annual Highlights Report 2019–2020*, viewed 07 November 2020, from https://www.un.org/en/desa.

United Nations Department of Economic and Social Affairs (UNDESA), 2021, *Sustainable development goals report 2020*, viewed 07 November 2020, from https://unstats.un.org/sdgs/report/2020/goal-04/.

United Nations Development Programme (UNDP), 2020, *SGD Goal 4 quality education*, viewed 07 March 2021, from https://www.undp.org/sustainable-development-goals.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2000, *Inclusive education and education for all: A challenge and vision*, UNESCO, Paris.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2007, *EFA Global Monitoring Report 2007. Strong foundations: Early childhood care and education*, viewed 07 October 2020, from https://en.unesco.org/gem-report/allreports.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2016, *Incheon declaration and framework for action for the implementation of sustainable development Goal 4*, viewed 20 November 2020, from http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf.

United Nations, 2015, The Millennium Development Goals Report, viewed 20 November 2020, from https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf.

World Bank, 2018, *Overcoming poverty and inequality in South Africa: An assessment of drivers, constraints and opportunities*, International Bank for Reconstruction and Development/The World Bank, Washington, DC.

World Bank, 2020, *Human Capital Index 2020 Update in the time of COVID-19*, International Bank for Reconstruction and Development/The World Bank, viewed 20 November 2020, from https://documents1.worldbank.org/curated/en/456901600111156873/pdf/The-Human-Capital-Index-2020-Update-Human-Capital-in-the-Time-of-COVID-19.pdf.

Ziyaviddinovna, M.M., 2019, 'Development of human capital in Uzbekistan by reducing inequality', *American Journal of Economics and Business Management* 2(4), 88–106.

Chapter 4

Aslan, C., 2017, 'Examining epistemological beliefs of teacher candidates according to various variables', *Eurasian Journal of Educational Research* 67, 37–50. https://doi.org/10.14689/ejer.2017.67.3

Bordens, K.S. & Abbott, B.B., 2011, *Research design and methods: A process approach*, 8th edn., McGraw-Hill, New York, NY.

Çetin-Dindar, A., Kırbulut, Z.D. & Boz, Y., 2014, 'Modelling between epistemological beliefs and constructivist learning environment', *European Journal of Teacher Education* 37(4), 479–496. https://doi.org/10.1080/02619768.2014.944614

Chai, C.S., 2010, 'The relationships among Singaporean preservice teachers' ICT competencies, pedagogical beliefs and their beliefs on the espoused use of ICT', *The Asia-Pacific Education Researcher* 19(3), 387–400. https://doi.org/10.3860/taper.v19i3.1849

Chan, K.-W., 2011, 'Preservice teacher education students' epistemological beliefs and conceptions about learning', *Instructional Science* 39(1), 87–108. https://doi.org/10.1007/s11251-009-9101-1

Chan, K.-W. & Elliott, R.G., 2004a, 'Epistemological beliefs across cultures: Critique and analysis of beliefs structure studies', *Educational Psychology* 24(2), 123–142. https://doi.org/10.1080/0144341032000160100

Chan, K.-W. & Elliott, R.G., 2004b, 'Relational analysis of personal epistemology and conceptions about teaching and learning', *Teaching and Teacher Education* 20(8), 817–831. https://doi.org/10.1016/j.tate.2004.09.002

Choi, J. & Kwon, N.R., 2012, 'The general and domain-specific epistemological beliefs of Korean pre-service mathematics teachers', *Asian-Pacific Education Researcher* 21(3), 353–364.

Christie, P., 2016, 'Educational change in post-conflict contexts: Reflections on the South African experience 20 years later', *Globalisation, Societies and Education* 14(3), 434–446. https://doi.org/10.1080/14767724.2015.1121379

Cohen, J., 1988, *Statistical power analysis for the behavioural sciences*, 2nd edn., Academic Press, New York, NY.

Department of Basic Education (DBE), 2011, *Curriculum and assessment policy statement grade R-12*, Department of Basic Education, Pretoria.

Department of Basic Education (DBE), 2019, *Abridged section 4: FET grade 10–11 CAPS amendments*, viewed 26 October 2020, from https://www.education.gov.za/Portals/0/Documents/Publications/FET%20Cap%20draft%2019.pdf?ver=2020-02-07-151915-937.

Deng, F., Chai, C.S., Tsai, C.-C. & Lee, M.-H., 2014, 'The relationships among Chinese practicing teachers' epistemic beliefs, pedagogical beliefs and their beliefs about the use of ICT', *Educational Technology & Society* 17(2), 245–256.

Ertmer, P.A., Ottenbreit-Leftwich, A.T., Sadik, O., Sendurur, E. & Sendurur, P., 2012, 'Teacher beliefs and technology integration practices: A critical relationship', *Computers & Education* 59(2), 423–435. https://doi.org/10.1016/j.compedu.2012.02.001

Felder, R.M. & Brent, R., 1996, 'Navigating the bumpy road to student-centred instruction', *College Teaching* 44(2), 43–47. https://doi.org/10.1080/87567555.1996.9933425

Field, A.P., 2013, *Discovering statistics using IBM SPSS statistics*, SAGE, Los Angeles, CA.

Fives, H. & Buehl, M.M., 2012, 'Spring cleaning for the "messy" construct of teachers' beliefs: What are they? Which have been examined? What can they tell us?', in K. R. Harris, S. Graham, T. Urdan, S. Graham, J.M. Royer & M. Zeidner (eds.), *APA educational psychology handbook, vol. 2. Individual differences and cultural and contextual factors*, pp. 471–499, American Psychological Association, s.l. https://doi.org/10.1037/13274-019

Freire, P., 1976, *Education, the practice of freedom*, Writers and Readers Publishing Cooperative, London.

Groff, J., 2013, *Technology-rich innovative learning environments. OCED CERI innovative learning environment project 2013*, viewed 09 August 2020, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.366.6017&rep=rep1&type=pdf.

Hennessy, S., Harrison, D. & Wamakote, L., 2010, 'Teacher factors influencing classroom use of ICT in sub-Saharan Africa', *Itupale Online Journal of African Studies* 2(1), 39–54.

Hennessy, S., Ruthven, K. & Brindley, S., 2005, 'Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution, and change', *Journal of Curriculum Studies* 37(2), 155–192. https://doi.org/10.1080/0022027032000276961

Hermans, R., Tondeur, J., Van Braak, J. & Valcke, M., 2008, 'The impact of primary school teachers' educational beliefs on the classroom use of computers', *Computers & Education* 51, 1499–1509. https://doi.org/10.1016/j.compedu.2008.02.001

Herrington, J., Reeves, T.C. & Oliver, R., 2009, *A guide to authentic e-learning: Connecting with e-learning,* Routledge, s.l.

Hofer, B.K., 2006, 'Beliefs about knowledge and knowing: Integrating domain specificity and domain generality: A response to Muis, Bendixen, and Haerle (2006)', *Educational Psychology Review* 18(1), 67–76. https://doi.org/10.1007/s10648-006-9000-9

Hofer, B.K., 2008, 'Personal epistemology and culture', in M.S. Khine (ed.), *Knowing, knowledge and beliefs: Epistemological studies across diverse cultures*, pp. 3–22, Springer, Dordrecht.

Hofer, B.K. & Pintrich, P.R., 1997, 'The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning', *Review of Educational Research* 67(1), 88–140. https://doi.org/10.3102/00346543067001088

ITWeb, 2016, *Paperless classrooms hit a snag*, viewed 19 September 2018, from https://www.itweb.co.za/content/APero37ZB4m7Qb6m.

Jacobson, M.J., So, H.-J., Teo, T., Lee, J., Pathak, S. & Lossman, L., 2010, 'Epistemology and learning: Impact on pedagogical practices and technology use in Singapore schools', *Computers & Education* 55(4), 1694–1706. https://doi.org/10.1016/j.compedu.2010.07.014

King, P.M., 1978, 'William Perry's theory of intellectual and ethical development', *New Directions for Student Services* 1978(4), 35–51. https://doi.org/10.1002/ss.37119780405

Koehler, M.J., Mishra, P. & Cain, W., 2013, 'What is technological pedagogical content knowledge (TPACK)?', *Journal of Education* 193(3), 13–19. https://doi.org/10.1177/002205741319300303

Kwon, K., Ottenbreit-Leftwich, A.T., Sari, A.R., Khlaif, Z., Zhu, M., Nadir, H. et al., 2019, 'Teachers' self-efficacy matters: Exploring the integration of mobile computing device in middle schools', *Tech Trends* 63(6), 682–692. https://doi.org/10.1007/s11528-019-00402-5

Lee, J., Zhang, Z., Song, H. & Huang, X., 2013, 'Effects of epistemological and pedagogical beliefs on the instructional practices of teachers: A Chinese perspective', *Australian Journal of Teacher Education* 38(12), 120–146, viewed 23 November 2017, from http://ro.ecu.edu.au.

Liu, S.-H., 2011, 'Factors related to pedagogical beliefs of teachers and technology integration', *Computers & Education* 56(4), 1012–1022. https://doi.org/10.1016/j.compedu.2010.12.001

McMillan, J. & Schumacher, S., 2001. *Research in education: A conceptual introduction*, 5th edn., Addison Wesley Longman, New York, NY.

McMillan, J. & Schumacher, S., 2014, *Research in education: Evidence-based inquiry*, 7th edn., Pearson, Essex.

Mikre, F., 2011, 'The roles of information communication technologies in education: Review article with emphasis to the computer and internet', *Ethiopian Journal of Education and Sciences* 6(2), 109–126.

Muis, K.R., Bendixen, L.D. & Haerle, F.C., 2006, 'Domain-generality and domain-specificity in personal epistemology research: Philosophical and empirical reflections in the development of a theoretical framework', *Educational Psychology Review* 18(1), 3–54. https://doi.org/10.1007/s10648-006-9003-6

Myovella, G., Karacuka, M. & Haucap, J., 2020, 'Digitalization and economic growth: A comparative analysis of sub-Saharan Africa and OECD economies', *Telecommunications Policy* 44(2), 101856. https://doi.org/10.1016/j.telpol.2019.101856

North West Province Department of Education and Sports, 2019, *Annual performance plan: Department of Education and Sports Development 2019/20*, viewed 20 July 2020, from http://desd.nwpg.gov.za/?page_id=768.

Olafson, L., Schraw, G. & Veldt, M.V., 2010, 'Consistency and development of teachers' epistemological and ontological world views', *Learning Environments Research* 13(3), 243–266. https://doi.org/10.1007/s10984-010-9078-3

Republic of South Africa, 2004, *Draft white paper on e-Education: Transforming learning and teaching through information and communication technologies (ICTs)*, viewed 28 February 2014, from https://www.gov.za/sites/default/files/gcis_document/201409/267341.pdf.

Şahin, E.A., Deniz, H. & Topçu, M.S., 2016, 'Predicting Turkish preservice elementary teachers' orientations to teaching science with epistemological beliefs, learning conceptions, and learning approaches in science', *International Journal of Environmental & Science Education* 11(5), 515–534.

Schommer, M., 1990, 'Effects of beliefs about the nature of knowledge on comprehension', *Journal of Educational Psychology* 82(3), 498–504. https://doi.org/10.1037/0022-0663.82.3.498

Schommer-Aikins, M. & Duell, O.K., 2013, 'Domain specific and general epistemological beliefs. Their effects on mathematics', *Revista de Investigación Educativa* 31(2), 317–330. https://doi.org/10.6018/rie.31.2.170911

Song, L., 2018, 'Improving pre-service teachers' self-efficacy on technology integration through service learning', *Canadian Journal of Action Research* 19(1), 22–32.

Tabachnick, B.G. & Fidell, L.S., 2014, *Using multivariate statistics*, 6th edn., Pearson, Essex.

Teo, T. & Zhou, M., 2017, 'The influence of teachers' conceptions of teaching and learning on their technology acceptance', *Interactive Learning Environments* 25(4), 513–527. https://doi.org/10.1080/10494820.2016.1143844

Tondeur, J., Van Braak, J., Ertmer, P.A. & Ottenbreit-Leftwich, A., 2017, 'Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence', *Educational Technology Research and Development* 65(3), 555–575. https://doi.org/10.1007/s11423-016-9481-2

Windschitl, M., 2002, 'Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural, and political challenges facing teachers', *Review of Educational Research* 72(2), 131–175. https://doi.org/10.3102/00346543072002131

Yilmaz, H. & Sahin, S., 2011, 'Pre-service teachers' epistemological beliefs and conceptions of teaching', *Australian Journal of Teacher Education* 36(1), 73–88. https://doi.org/10.14221/ajte.2011v36n1.6

Yorulmaz, A., Can, S. & Çokçalişkan, H., 2017, 'The relationship between the pre-service classroom teachers' techno pedagogical instructional competencies and epistemological beliefs', *Journal of Education and Training Studies* 5(9), 27–35. https://doi.org/10.11114/jets.v5i9.2110

Youn, I., Yang, K.M. & Choi, I.J., 2001, 'An analysis of the nature of epistemological beliefs: Investigating factors affecting the epistemological development of South Korean high school students', *Asia Pacific Education Review* 2(1), 10–21. https://doi.org/10.1007/BF03024928

Chapter 5

Abolaji, M.S., 2015, 'Gender positioning through visual images in English language textbooks in Nigeria', in S. Mills & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 150–163, Routledge, Taylor & Francis Group, New York, NY.

Appleby, R., 2015, 'Textual representations and transformations in teacher masculinity', in S. Mill & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 105–123, Routledge, New York, NY.

Bag, E. & Bayyurt, Y., 2015, 'Gender representation in EFL textbooks in Turkey', in S. Mills & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 64–85, Routledge, Taylor & Francis, New York, NY.

Balfour, R. & Meyer, M., 2019, 'Old symbols for new journeys: Re-imagining transdisciplinary collaboration for learning and transformative practice in education', *Africa Education Review* 17(1), 141–158. https://doi.org/10.1080/18146627.2018.1486686

Bantebya, K.G. & Keniston, M.M., 2006, *Women, work and domestic virtue in Uganda*, James Currey, Oxford.

Barton, A. & Sakwa, N.L., 2012, 'The representation of gender in English textbooks in Uganda', *Pedagogy, Culture and Society* 20(2), 173–190. https://doi.org/10.1080/14681366.2012.669394

Butler, J., 2004, *Undoing gender*, Routledge, London.

Coffey, A. & Delamont, S., 2000, *Feminism and the classroom teacher: Research, praxis and pedagogy*, Routledge/Falmer, New York, NY.

Connell, R.W., 2008, *Gender*, 2nd edn., Polity Press, Cambridge.

Davies, B., 2003, *Frogs and snails and feminist tales: Preschool children and gender*, Hampton Press, Cresskill, NJ.

Davies, B. & Kasama, H., 2004, *Gender in Japanese preschools: Frogs and snails and feminist tales in Japan,* Hampton Press Inc., NJ.

Deutsch, F., 2007, 'Undoing gender', *Gender & Society* 21(1), 106–127. https://doi.org/10.1177/0891243206293577

Elgar, A.G., 2004, 'Science textbooks for lower secondary schools in Brunei: Issues of gender equity', *International Journal of Science Education* 26(7), 875–894. https://doi.org/10.1080/0950069032000138888

Emerson, R.M., Fretz, R.I. & Shaw, L.L., 2011, *Writing ethnographic field notes*, The University of Chicago Press, Chicago, IL.

Foucault, M. (ed.), 1980, *Power/knowledge: Selected interviews and other writings (1972–1977)*, Vintage Books, New York, NY.

Foulds, K., 2014, 'Buzzwords at play: Gender, education, and political participation in Kenya', *Gender and Education* 26(6), 653–671. https://doi.org/10.1080/09540253.2014.933190

Francis, B., 1998, *Power plays: Primary school children's constructions of gender, power and adult work*, Trentham Books, London.

Gilroy, P., 1998, *There ain't no black in the Union Jack*, Routledge, London.

Gitleman, L., 2013, *Raw data is an oxymoron,* The MIT Press.

Gee, P.J., 2006, *Social linguistics and literacies: Ideology in discourses,* The Palmer Press, Bristol, PA.

Gonsalves, A.J., 2010, 'Discourses and gender in doctoral physics: A hard look inside a hard science', PhD, McGill University.

Gordon, R., 2020, 'Transformative grassroots leadership: Understanding the role of Rojiroti's Women Leaders in Supporting social change', *Leadership and Political Change in Asia-Pacific* 8(4), n.p. https://doi.org/10.17645/pag.v8i4.3560

Gupta, A.F. & Yin, A.L.S., 1990, 'Gender representation in English language textbooks used in Singapore schools', *Language and Education* 4(1), 25–90. https://doi.org/10.1080/09500789009541271

Hall, S., 2004, 'Race, articulation and societies structured in dominance', in M. Baker, M. Diawara & R. Lindeborg (eds.), *Black British cultural studies*, pp. 16–60, Chicago University Press, Chicago, IL.

Hargreaves, J. & Anderson, E. (eds.), 2014, *Routledge handbook of sport, gender and sexuality,* Routledge, New York, NY.

Hideto, D.H., 2004, 'Sexual bias in an EFL textbook: A case study', in K. Bradford, C. Ikeguchi, & M. Swanson (eds.), *JALT*, pp. 1005–1011, Tokyo.

Hoffman, F.L., 1986, 'Sexual harassment in academia: Feminist theory and institutional practice', *Harvard Educational Review* 56(2), 102–121. https://doi.org/10.17763/haer.56.2.y11m78k58t4052x2

Hove, M.L., 2018, 'Dislocations: The dynamics of memory and perplexities of freedom in John Kani's *Nothing but the Truth*', *Scrutiny2* 23(1), 47–59. https://doi.org/10.1080/18125441.2018.1483417

Hove, M.L. & Maruma, M.W., 2014, 'Mediocrity and the Fraud Called Education: The Case of South Africa's Curriculum Statements in English', *International Journal of Educational Sciences* 7(3), 587–593. https://doi.org/10.1080/09751122.2014.11890220

Hutchinson, E.G., 1997, 'What do teachers and learners actually do with textbooks? Teacher and learner use of a fisheries-based ELT textbook in the Philippines', PhD, University of Lancaster.

Jackson, C.J., 2010, *The effect of single-sex education on test scores, school completion, arrests, and teen motherhood: Evidence from school transitions*, National Bureau of Economic Research, Working Paper 22222, viewed n.d., from http://www.nber.org/papers/w22222.

Jacksona, J., Dempstera, S. & Pollard, L., 2015, '"They just don't seem to really care, they just think it's cool to sit there and talk": Laddism in university teaching-learning contexts', *Educational Review* 67(3), 300–314. https://doi.org/10.1080/00131911.2014.910178

Jancovich, M., 1993, *The cultural politics of the new criticism*, Cambridge University Press, Cambridge.

Jones, M.A., Kitetu, C. & Sunderland, J., 1997, 'Discourse roles, gender and language textbook dialogues: Who learns what from John and Sally?', *Gender and Education* 9(4), 469–490. https://doi.org/10.1080/09540259721204

Jonsson, R., 2014, 'Boys' anti-school culture? Narratives and school practices', *Anthropology & Education Quarterly* 45(3), 276–292. https://doi.org/10.1111/aeq.12068

Kuzmic, J.J., 2000, 'Textbooks, knowledge and masculinity: Examining patriarchy from within', in N. Lesko (ed.), *Masculinities at school*, pp. 105–126, Sage, Thousand Oaks, CA.

Lazar, A., Sagi, A. & Fraser, M.W., 1991, 'Involving fathers in social services', *Children and Youth Review* 13(4), 287–300. https://doi.org/10.1016/0190-7409(91)90065-P

Lawston, J.M. &Meiners, E.R., 2018, 'Ending our expertise: Feminists, scholarship, and prison abolition', *Feminist Formations* 26(2), 1–25. https://doi.org/10.1353/ff.2014.0012

Litosseliti, L. & Sunderland, J. (eds.), 2002, *Gender identity and discourse analysis*, John Benjamins, Amsterdam.

Loewen, J.W., 1995, *Lies my teacher told me: Everything American history textbooks get wrong*, Zinn Education Project.

Mac Ghail, M., 1994, 'Teacher ideologies, representations, and practices', in *The making of men: Masculinities, sexualities, and schooling*, pp. 15–50, Open University Press, London.

Makoe, P., 2012, 'Linguistic ideologies in multilingual South African suburban schools', *Journal of Multilingual and Multicultural Development* 35(7), 653–673. https://doi.org/10.1080/01434632.2014.908889

Maraj, L.M., Prasad, P. & Roundtree, S.V., 2019, '#BlackLivesMatter: Pasts, presents, and futures', *Prose Studies* 40(1–2), 1–14. https://doi.org/10.1080/01440357.2019.1668638

Marshall, C.S. & Reinhartz, J., 1991, 'Gender issues in the classroom', *Gender Issues* 70(6), 333–337.

McLaren, P., 2007*, Life in schools: An introduction to critical pedagogy in the foundations of education*. Routledge, Taylor & Francis.

McLaughlin, H., Uggen, C. & Blackstone, A., 2012, 'Sexual harassment, workplace authority, and the paradox of power', *American Sociological Review* 77(4), 625–647. https://doi.org/10.1177/0003122412451728

Messner, M.A., 2002, *Taking the field: Women, men and sports*, University of Minnesota Press, Minneapolis, MO.

Mitchell, J., 1983, 'Case and situation analysis', *The Sociological Review* 31, 187–211. https://doi.org/10.1111/j.1467-954X.1983.tb00387.x

Mitchell, J., 1984, 'Typicality and the case study', in R. Ellen (ed.), *Ethnographic research: A guide to general conduct*, pp. 237–241, Academic Press, London.

Moore, E., 2015, 'Gender socialisation through literacy texts: A study of two folk tales used in a Russian preschool', in S. Mill & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 164–192, Routledge, New York, NY.

Morrell, R., 2017, 'Youth, fathers and masculinity in South Africa today', in R.W. Connell, J. Hearn & M. Kimmel (eds.), *Handbook of studies on men and masculinities*, pp. 37–48, Sage, New York, NY.

Morrell, R., 2019, *Men, gender equality and the search for gender harmony*, viewed n.d., from https://www.news.uct.ac.za/article/-2020-11-26-men-gender-equality-and-the-search-for-gender-harmony.

Muhwezi, K.M., 2003, *Gender sensitive educational policy and practice, Uganda case study*, Picardo, Paris.

Mustafa, A.S. & Mill, S., 2015, 'Gender representation in learning materials in an international context', in S. Mill & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 9–34, Routledge, New York, NY.

Naipaul, V.S., 1974, *Miguel street*, Heinemann, London.

Namatende-Sakwa, L., 2021, 'Are progressive texts necessarily disruptive? Investigating teacher engagement with gendered textbooks in Ugandan classrooms', *Teachers College Record* 123(1), 1–26.

Nicol, C.C. & Crespo, S.M., 2006, 'Learning to teach with mathematics textbooks: How preservice teachers interpret and use curriculum materials', *Educational Studies in Mathematics* 62(3), 331–355. https://doi.org/10.1007/s10649-006-5423-y

O'Connor, J.P., 2000, *Teachers are the problem in SMT, not girls!*, viewed 17 March 2021, from http://library.unesco-iicba.org/English/.

Oslund, J.A., 2012, 'Mathematics-for-teaching: What can be learned from the ethnopoetics of teachers' stories?', *Educational Studies in Mathematics* 79(2), 293–309. https://doi.org/10.1007/s10649-011-9348-8

Ott, C., 2015, 'Innocent maths? Gender representations in German maths textbooks', in S. Mills & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 52–63, Routledge, New York, NY.

Paechter, C., 2007, *Being boys, being girls: Learning masculinities and femininities*, Open University Press, New York, NY.

Pawelczyk, J. & Pakuta, L., 2015, 'Constructing gender and sexuality in the EFL classroom in Poland: Textbook construction and classroom negotiation', in S. Mills & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 193–211, Routledge, New York, NY.

Phipps, A., 2014, *Politics of the body: Gender in a neoliberal and neoconservative age*, Polity Press, Cambridge.

Popkewitz, T.S., 1998, *Struggling for the soul: The politics of schooling and the construction of the teacher*, Teachers College Press, New York, NY.

Porecca, K.L., 1984, 'Sexism in current ESL textbooks', *TESOL Quarterly* 18(4), 705–724. https://doi.org/10.2307/3586584

Reagan, T., 2002, 'Toward an "archaeology of deafness": Etic and emic constructions of identity in conflict', *Journal of Language, Identity, and Education* 1(1), 41–66. https://doi.org/10.1207/S15327701JLIE0101_4

Rich, A., 1980, 'Compulsory heterosexuality and lesbian experience', *Signs* 5(4), 631–660. https://doi.org/10.1086/493756

Rifkin, B., 1998, 'Gender representation in foreign language textbooks: Case study of textbooks of Russian', *The Modern Language Journal* 82(2), 217–236. https://doi.org/10.1111/j.1540-4781.1998.tb01195.x

Ropers-Huilman, B., 1998, *Feminist teaching in higher education: Handbook of theory and research*, University of Minnesota, MN.

Rule, P. & Nuwagaba, E.L., 2019, 'Navigating the ethical maze in disability research: Ethical contestations in an African context', *Disability & Society* 30(2), 255–269. https://doi.org/10.1080/09687599.2014.998333

Shizha, E., Abdi, A.A., Wilson-Forsberg, S. & Masakure, O., 2020, 'African immigrant students and postsecondary education in Canada: High school teachers and school career counsellors as gatekeepers', *Canadian Ethnic Studies* 52(3), 67–86. https://doi.org/10.1353/ces.2020.0025.

Smithson, J. & Stokoe, E.H., 2005, 'Discourses of work-life balance: Negotiating "genderblind" terms in organizations', *Gender, Work and Organization* 12(2), 147–168. https://doi.org/10.1111/j.1468-0432.2005.00267.x

Sunderland, J., 2000, 'New understandings of gender and language classroom research: Texts, teacher talk and student talk', *Language Teaching Research* 4(2), 149–173. https://doi.org/10.1177/136216880000400204

Sunderland, J., 2004, *Gendered discourses*, Palgrave Macmillan, New York, NY.

Sunderland, J., 2015, 'Gender (representation) in foreign language textbooks: Avoiding pitfalls and moving on', in S. Mills & A.S. Mustafa (eds.), *Gender representation in learning materials: International perspectives*, pp. 19–34, Taylor and Francis, New York, NY.

Sunderland, J., 2002, 'New understandings of gender and language classroom research: Texts, teacher talk and student talk', *Language Teaching Research* 4(2 2000), 149–173. https://doi.org/10.1177/136216880000400204

Sunderland, J., Cowley, M., Rahim, F.A., Leontzakou, C. & Shattuck, J., 2001, 'From bias "In the text" to "teacher talk around the text": An exploration of teacher discourse and gendered foreign language textbook texts', *Linguistics and Education* 11(3), 251–286. https://doi.org/10.1016/S0898-5898(00)00034-6

Tainio, L. & Karvonen, U., 2015, 'Finnish teachers exploring gender bias in school textbooks', in S. Mills & A.S. Mustafa (eds.), *Gender representation in learning materials*, pp. 125–149, Routledge, New York, NY.

Thorne, B., 1993, *Gender play: Girls and boys in school*, Rutgers University Press, New Brunswick, NJ.

Walkerdine, V., 1984, 'Some day my prince will come', in A. McRobbie & M. Nava (eds.), *Gender and generation*, pp. 37–47, Macmillan, London

Walkerdine, V., 1990, *School girl fictions*, Verso, New York, NY.

Walkerdine, V., 1998, *Counting girls out: Girls and mathematics*, Falmer Press, London.

Wortham, S., 2006, *Learning identity. The joint emergence of social identity and academic learning*, Cambridge University Press, New York, NY.

Yin, R.K., 2003, *Case study research: Design and methods*, Sage, Thousand Oaks, CA.

Youdell, D., 2006, *Impossible bodies, impossible selves: Exclusions and student subjectivities*, Springer, Dordrecht.

Chapter 6

Abell, S.K., 2008, 'Twenty years later: Does pedagogical content knowledge remain a useful idea?', *International Journal of Science Education* 30(10), 1405–1416. https://doi.org/10.1080/09500690802187041

Adam, F., 2009, 'Curriculum reform in higher education: A humanities case study', Doctoral dissertation, University of the Witwatersrand.

Almazroa, H. & Alshamrani, S., 2015, 'Saudi science teacher professional development: Trends, practices, and future directions', in N. Mansour & S. Alshamrani (eds.), *Science education in the Arab Gulf States: Visions, sociocultural contexts and challenges*, pp. 1–21, Sense Publishers, Rotterdam.

Anderson, S.E., 2003, 'The school district role in educational change: A review of the literature', *International Centre for Educational Change* 34(2), 25–45.

Attride-Stirling, J., 2001, 'Thematic networks: An analytic tool for qualitative research', *Qualitative Research* 1(3), 385–405.

Bantwini, B.D., 2010, 'How teachers perceive the new curriculum reform: Lessons from a school district in the Eastern Cape Province, South Africa', *International Journal of Educational Development* 30(1), 83–90. https://doi.org/10.1016/j.ijedudev.2009.06.002

Bantwini, B.D., 2012, 'Primary school science teachers' perspectives regarding their professional development: Implications for school districts in South Africa', *Professional Development in Education* 38(4), 517–532. https://doi.org/10.1080/19415257.2011.637224

Bantwini, B.D., 2017, 'Analysis of teaching and learning of natural sciences and technology in selected Eastern Cape Province primary schools, South Africa', *Journal of Education* 67, 39–64.

Berisha, F., 2020, 'Chemistry education in Kosovo: Issues, challenges and time for action', *CEPS Journal* 10(1), 125–144, viewed 20 July 2021, from http://nbn-resolving.org/urn:nbn:de:0111-pedocs-202577.

Cauet, E., Liepertz, S., Borowski, A. & Fischer, H.E., 2015, 'Does it matter what we measure? Domain-specific professional knowledge of physics teachers', *Schweizerische Zeitschrift für Bildungswissenschaften* 37(3), 462–479. https://doi.org/10.24452/sjer.37.3.4963

Chan, K.K.H. & Hume, A., 2019, 'Towards a consensus model: Literature review of how science teachers' pedagogical content knowledge is investigated in empirical studies', in A. Hume, R. Cooper & A. Borowski (eds.), *Repositioning pedagogical content knowledge in teachers' knowledge for teaching science*, pp. 3–76, Springer, Singapore.

Centre for Development and Enterprise, 2007, *Doubling for growth: Addressing the Maths and Science challenge in South Africa's schools*, The Centre for Development and Enterprise, Johannesburg.

Christie, P. & Collins, C., 1982, 'Bantu education: Apartheid ideology or labour reproduction?', *Comparative Education* 18(1), 59–75. https://doi.org/10.1080/0305006820180107

Cohen, L., Manion, L. & Morrison, K., 2011, *Research methods in education*, 7th edn., Routledge, New York, NY.

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B. & Osher, D., 2020, 'Implications for educational practice of the science of learning and development', *Applied Developmental Science* 24(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

DeCarlo, M., 2018, *Scientific inquiry in social work*, viewed 15 June 2021, from https://scientificinquiryinsocialwork.pressbooks.com/front-matter/welcome/.

Denscombe, M., 2010, *The good research guide*, 4th edn., Open University Press, Berkshire.

Department of Basic Education, 2011, *Question & answer for the advocacy of the implementation of the National Curriculum Statement (NCS) Grades R-12*, Department of Basic Education, Pretoria.

Desimone, L.M., 2011, 'A primer on effective professional development', *Phi Delta Kappan* 92(6), 68–71. https://doi.org/10.1177/003172171109200616

Drori, G.S., 2000, 'Science education and economic development: Trends, relationships, and research agenda', *Studies in Science Education* 35(1), 27–57. https://doi.org/10.1080/03057260008560154

Dudu, W.T., 2014, 'The changing roles of South African natural sciences teachers in an era of introducing a "refined and repackaged" curriculum', *International Journal of Science Education* 7(3), 547–558. https://doi.org/10.1080/09751122.2014.11890216

Du Plessis, E. & Marais, P., 2015, 'Reflections on the NCS to NCS (CAPS): Foundation phase teachers' experiences', *The Independent Journal of Teaching and Learning* 10(1), 114–126.

Fischer, H.E., Borowski, A. & Tepner, O., 2012, 'Professional knowledge of science teachers', in B.J. Fraser, K. Tobin & C. McRobbie (eds.), *Second international handbook of science education*, pp. 435–448, Springer, Dordrecht.

Garira, E., 2020, 'Needs assessment for the development of educational interventions to improve quality of education: A case of Zimbabwean primary schools', *Social Sciences & Humanities Open* 2(1), 100020. https://doi.org/10.1016/j.ssaho.2020.100020

Gudyanga, R. & Jita, L.C., 2019, 'Teachers' implementation of laboratory practicals in the South African physical sciences curriculum', *Issues in Educational Research* 29(3), 715–731.

Gudyanga, R. & Jita, L.C., 2018, 'Mapping physical sciences teachers' concerns regarding the new curriculum in South Africa', *Issues in Educational Research* 28(2), 405–421.

Guerriero, S., 2017, 'Teachers' pedagogical knowledge: What it is and how it functions', in S. Guerriero (ed.), *Pedagogical knowledge and the changing nature of the teaching profession*, pp. 99–115, OECD Publishing, Paris.

Gillies, D., 2017, 'Human capital theory in education', in M. Peters (ed.), *Encyclopaedia of educational philosophy and theory*, pp.1–5, Springer, Singapore.

Hanushek, E.A. & Wößmann, L., 2007, *The role of education quality for economic growth*, The World Bank, s.l.

Koopman, O., Le Grange, L. & De Mink, K.J., 2016, 'A narration of a physical science teacher's experience of implementing a new curriculum', *Education as Change* 20(1), 1–23.

Kulgemeyer, C. & Riese, J., 2018, 'From professional knowledge to professional performance: The impact of CK and PCK on teaching quality in explaining situations', *Journal of Research in Science Teaching* 55(10), 1393–1418. https://doi.org/10.1002/tea.21457

Lee, Y.J., Kim, M. & Yoon, H.G., 2015, 'The intellectual demands of the intended primary science curriculum in Korea and Singapore: An analysis based on revised Bloom's taxonomy', *International Journal of Science Education* 37(13), 2193–2213. https://doi.org/10.1080/09500693.2015.1072290

Leu, E. & Price-Rom, A., 2006, *Quality of education and teacher learning: A review of the literature*, p. 1., USAID Educational Quality Improvement Project, Washington, DC.

Maharajh, L.R., Nkosi, T. & Mkhize, M.C., 2016, 'Teachers' experiences of the implementation of the curriculum and assessment policy statement (CAPS) in three primary schools in KwaZulu-Natal', *Africa's Public Service Delivery & Performance Review* 4(3), 371–388. https://doi.org/10.4102/apsdpr.v4i3.120

Mayne, H., 2019, 'Pedagogical content knowledge and social justice pedagogical knowledge: Re-envisioning a model for teacher practice', *Research in Educational Administration & Leadership* 4(3), 701–718. https://doi.org/10.30828/real/2019.3.9

Megowan-Romanowicz, C., 2016, 'Whiteboarding: A tool for moving classroom discourse from answer-making to sense-making', *The Physics Teacher* 54(2), 83–86. https://doi.org/10.1119/1.4940170

Merriam, S.B., 2002, 'Introduction to qualitative research', *Qualitative Research in Practice: Examples for Discussion and Analysis*, 1st edn., pp. 1–17, Jossey-Bass, Hoboken, NJ.

Mnguni, L., 2018, 'Citizenship education and the curriculum ideologies of natural sciences and life sciences curriculam in South Africa', *Curriculum Perspectives* 38(2), 97–106. https://doi.org/10.1007/s41297-018-0044-z

Mnguni, L., 2019, 'A theoretical framework for training socially accountable science teachers', *Journal for the Education of Gifted Young Scientists* 7(2), 159–175. https://doi.org/10.17478/jegys.529459

National Planning Commission, 2012, *National development plan 2030: Our future–make it work*, The Presidency, Pretoria.

Nowak, A.Z. & Dahal, G., 2016, 'The contribution of education to economic growth: Evidence from Nepal', *International Journal of Economic Sciences* 5(2), 22–41. https://doi.org/10.20472/ES.2016.5.2.002

Pandor, N., 2008, *Statement by Mrs Naledi Pandor MP, Minister of Education, on the release of the 2008 National Senior Certificate examination results, Sol Plaatje House, Pretoria*, viewed 20 October 2009, from http://www.education.gov.za/dynamic/dynamic.aspx?pageid=306&id=8276.

Ramaila, S., 2020, 'A comparative analysis of school physics curriculum content in selected countries', *Journal of Physics: Conference Series* 1512(1), #012011. https://doi.org/10.1088/1742-6596/1512/1/012011

Rambuda, C.M., 2019, 'Implementing the curriculum and assessment policy statement: A case study of the Vhembe West District, South Africa', *Journal of International Education and Practice* 02(2&3), 45–57.

Ramnarain, U.D., 2014, 'Teachers' perceptions of inquiry-based learning in urban, suburban, township and rural high schools: The context-specificity of science curriculum implementation in South Africa', *Teaching and Teacher Education* 38, 65–75. https://doi.org/10.1016/j.tate.2013.11.003

Reddy, V., 2005, 'State of mathematics and science education: Schools are not equal: Conversations', *Perspectives in Education* 23(1), 125–138.

Reddy, V., Juan, A., Isdale, K. & Fongwa, S., 2019, 'Mathematics achievement and the inequality Gap: TIMSS 1995 to 2015', in N. Spaull & J.D. Jansen (eds.), *South African schooling: The Enigma of Inequality*, *Policy Implications of Research in Education 10*, pp. 169–187, Springer, Cham. https://doi.org/10.1007/978-3-030-18811-5_9)

Rollnick, M., Bennett, L., Rhemtula, M., Dharsey, N. & Ndlovu, T., 2008, 'The place of subject matter knowledge: A case study of South African teachers teaching the amount of substance and chemical equilibrium', *International Journal of Science Education* 30(10), 1365–1387.

Rollnick, M. & Mavhunga, E., 2015, 'The PCK Summit and its effect on work in South Africa', in A. En Berry, P. Friedrichsen & J. Loughran (eds.), *Re-examining pedagogical content knowledge in science education*, pp. 135–146, Routledge, New York, NY.

Samuel, K.B., 2020, 'Strengthening Grade 9 Natural Science teachers' pedagogic competencies in the implementation of the CAPS: A case of Ngaka Modiri Molema district in the North West Province North South Africa', PhD thesis, North-West University.

Sayed, Y., 2002, 'Changing forms of teacher education in South Africa: A case study of policy change', *International Journal of Educational Development* 22(3–4), 381–395. https://doi.org/10.1016/S0738-0593(01)00062-1

Shulman, L.S., 1986, 'Those who understand: Knowledge growth in teaching', *Educational Researcher* 15(2), 4–14. https://doi.org/10.3102/0013189X015002004

Shulman, L.S., 1987, 'Knowledge and teaching: Foundations of the new reform', *Harvard Educational Review* 57(1), 1–21. https://doi.org/10.17763/haer.57.1.j463w79r56455411

South African National Planning Commission, 2011, *National Development Plan. Vision for 2030*, The Presidency of the Republic of South Africa, Johannesburg.

Soguel, N.C. & Jaccard, P., 2008, *Governance and performance of education systems*, Springer, Berlin.

Spaull, N., 2015, 'Schooling in South Africa: How low-quality education becomes a poverty trap', *South African Child Gauge* 12, 34–41.

Thijs, A. & Van den Akker, J., 2009, *Curriculum in development*, SLO–Netherlands Institute for Curriculum Development, Enschede.

Timperley, H., Wilson, A., Barrar, H. & Fung, I., 2007, *Teacher professional learning and development: Best evidence synthesis iteration*, Ministry of Education, Wellington.

United Nations Educational, Scientific and Cultural Organization (UNESCO), I., 2008, 'International Bureau of Education', *2013a: Key Curricular and Learning Issues in the Post-2015 Education and Development Agenda. Document prepared for the UNESCO IBE International Experts' Meeting,* pp. 23–25.

Van Driel, J.H., Verloop, N. & De Vos, W., 1998, 'Developing science teachers' pedagogical content knowledge', *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching* 35(6), 673–695. https://doi.org/10.1002/(SICI)1098-2736(199808)35:6%3C673::AID-TEA5%3E3.0.CO;2-J

Chapter 7

Adler, J., 1998, 'A language of teaching dilemmas: Unlocking the complex multilingual secondary mathematics classroom', *The Learning of Mathematics* 18(1), 24–33.

Adler, J. & Pillay, V., 2016, 'Mathematics education in South Africa', in J. Adler & A. Sfard (eds.), *Research for educational change*: *Transforming researchers' insights into improvement in mathematics teaching and learning*, pp. 21–36, Routledge, New York, NY.

Bieda, K.N., Bowers, D.M. & Küchle, V.J.M.R.J., 2019, 'The genre (s) of argumentation in school mathematics', *Journal of Mathematics Education* 51(2), 10.

Bonotto, C., 2010, 'Realistic mathematical modeling and problem posing', in R.A. Lesh (ed.), *Modeling students' mathematical modeling competencies. ICTMA (13)*, pp. 399–408, Springer, Dordrecht.

Bowman, M., 1994, *Using video in research*, Scottish Council for Research in Education, Edinburgh.

BusinessTech, 2020, *Subject and curriculum changes for schools in South Africa*, viewed 15 July 2020, from https://businesstech.co.za/news/government/410709/subject-and-curriculum-changes-for-schools-in-south-africa/.

Carnoy, M. & Garcia, E., 2017, *Five key trends in US student performance: Progress by Blacks and Hispanics, the take-off of Asians, the Stall of Non-English Speakers, the Persistence of Socio-economic Gaps, and the Damaging Effect of Highly Segregated Schools*, Economic Policy Institute, Washington DC.

Checkley, K., 1997, 'The first seven… and the eighth a conversation with Howard Gardner', *Educational Leadership* 55, 8–13.

Cohen, L., Manion, L. & Morrison, K., 2018, *Research methods in education*, 8th edn., Routledge, London.

Creswell, J.W., 2003, *Research design: Qualitative, quantitative, and mixed methods approaches*, 2nd edn., Sage, Thousand Oaks, CA.

Creswell, J.W., 2014, *Research design: Qualitative, quantitative, and mixed methods approaches*, 4th edn., Sage, Thousand Oaks, CA.

Department of Basic Education, 2011, *National Curriculum Statement (NCS): National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, Government Printer, Pretoria.

Department of Basic Education, 2013, *Annual National Assessment: 2013 Diagnostic Report and 2014 Framework for Improvement*, Government Printer, Pretoria.

Department of Education, 2004, *International outcomes of learning Mathematics literacy and problem-solving: PISA 2003 Results from the US perspective highlights*, pp. 1–49, U.S. National Center for Education Statistics, Washington, DC.

Doolittle, P.E., 1997, 'Vygotsky's zone of proximal development as a theoretical foundation for cooperative learning', *Journal of Excellence in College Teaching* 8(1), 83–103.

Erbaş, A.K., Kertil, M., Çetinkaya, B., Çakiroglu, E., Alacaci, C. & Bas, S., 2014, 'Mathematical modeling in mathematics education: Basic concepts and approaches', *Educational Sciences: Theory and Practice* 14(4), 1621–1627.

Essien, A.A., 2018, 'The role of language in the teaching and learning of early grade mathematics: An 11-year account of research in Kenya, Malawi and South Africa', *African Journal of Research in Mathematics, Science and Technology Education* 22(1), 48–59. https://doi.org/10.1080/18117295.2018.1434453

Field, A.P., 2013, *Discovering statistics using IBM SPSS statistics: And sex and drugs and rock 'n' roll*, 4th edn., Sage, Los Angeles, CA.

Ge, X., Ifenthaler, D. & Spector, J., 2015, 'Moving forward with STEAM education research', in X. Ge, D. Ifenthaler & J. Spector (eds.), *Emerging technologies for STEAM education. Educational Communications and Technology: Issues and Innovations*, pp. 383–395, Springer, Cham.

Geesa, R.L., Izci, B., Song, H.S. & Chen, S., 2019, 'Exploring factors of home resources and attitudes towards mathematics in mathematics achievement in South Korea, Turkey, and the United States', *Eurasia Journal of Mathematics, Science and Technology Education* 15(9), em1751. https://doi.org/10.29333/ejmste/108487

Glaser, B.G., 2007, 'Naturalist inquiry and grounded theory', *Historical Social Research/Historische Sozialforschung* 19(Suppl), 114–132.

Guyotte, K.W., Sochacka, N.W., Costantino, T.E., Walther, J. & Kellam, N.N., 2014, 'STEAM as social practice: Cultivating creativity in transdisciplinary spaces', *Art Education* 67(6), 12–19. https://doi.org/10.1080/00043125.2014.11519293

Hanley-Maxwell, C. & Bottge, B.A., 2006, 'Reconceptualising and recentering research in special education', in C.F. Conrad & R.C. Serlin (eds.), *The Sage handbook for research in education*, pp. 175–195, Sage, Thousand Oaks, CA.

Hanley-Maxwell, C. & Bottge, B.A., 2006, 'Reconceptualizing and recentering research in special education', in C. Conrad & R.C. Serlin (eds.), *The Sage handbook for research in education: Engaging ideas and enriching inquiry*, pp. 175–196, Sage, Thousand Oaks, CA.

Hanushek, E.A. & Woessmann, L., 2020, 'Education, knowledge capital, and economic growth', in S. Bradley & C. Green (eds.), *The economics of education*, 2nd edn., pp. 171–182, Elsevier, Academic Press, Cambridge, MA.

Huang, H.M.E., 2004, 'The impact of context on children's performance in solving everyday mathematical problems with real-world settings', *Journal of Research in Childhood Education* 18(4), 278–292. https://doi.org/10.1080/02568540409595041

Ilany, B.S. & Margolin, B., 2010, 'Language and mathematics: Bridging between natural language and mathematical language in solving problems in mathematics', *Creative Education* 1(3), 138–148. https://doi.org/10.4236/ce.2010.13022

Imam, A., Mohammed, U. & Moses Abanyam, C., 2014, 'On consistency and limitation of paired t-test, sign and Wilcoxon sign rank test', *IOSR Journal of Mathematics* 10(1), 1–6. https://doi.org/10.9790/5728-10140106

Jaafar, R., 2015, 'Can group discussions and individualized assignments help more students succeed in developmental mathematics?', *Journal of College Teaching & Learning* 12(3), 209–222. https://doi.org/10.19030/tlc.v12i3.9312

Jacobs, M., Vakalisa, N.C.G. & Gawe, N., 2016, *Teaching-learning dynamics*, 5th edn., Pearson Education South Africa, Cape Town.

Jacob, S.M. & Sam, H.K., 2008, 'Measuring critical thinking in problem solving through online discussion forums in First Year University Mathematics', in *Proceedings of the Internationals Multiconference of Engineers and Computer Scientists (IMECS)*, Hong Kong

Jamil, F.M., Linder, S.M. & Stegelin, D.A., 2018, 'Early childhood teacher beliefs about STEAM education after a professional development conference', *Early Childhood Education Journal* 46(4), 409–417. https://doi.org/10.1007/s10643-017-0875-5

Jitendra, A.K., Petersen-Brown, S., Lein, A.M., Zaslofsky, A.F., Kunkel, A.M., Jung, P. et al., 2015, 'Teaching mathematical word problem-solving: The quality of evidence for strategy instruction priming the problem structure', *Journal of Learning Disabilities* 48(1), 51–72. https://doi.org/10.1177/0022219413487408

Johnson, B. & Christensen, L.B., 2017, *Educational research: Quantitative, qualitative, and mixed approaches*, 6th edn., Sage, Thousand Oaks, CA.

Jojo, Z., 2019, 'Mathematics education system in South Africa', in G. Porto Jr. (ed.), *Education systems around the world*, pp. 129–140, IntechOpen, London.

Khasawneh, O., Khaled, A. & Al Momani, M., 2016, 'The implications of naturalism as an educational philosophy in Jordan from the perspectives of childhood education teachers', *Journal of Education and Practice* 7(11), 45–54.

Kiwanuka, H.N., Van Damme, J., Van Den Noortgate, W., Anumendem, D.K. & Namusisi, S., 2015, 'Factors affecting mathematics achievement of first-year secondary school students in Central Uganda', *South African Journal of Education* 35(3), art. #1106. https://doi.org/10.15700/saje.v35n3a1106

Kosko, K.W. & Zimmerman, B.S., 2019, 'Emergence of argument in children's mathematical writing', *Journal of Early Childhood Literacy* 19(1), 82–106. https://doi.org/10.1177/1468798417712065

Kozulin, A., Gindis, B., Ageyev, V.S. & Miller, S.M., 2003, 'Introduction: Sociocultural theory and education: Students, teachers, and knowledge', in A. Kozulin, B. Gindis, V.S. Ageyev & S.M. Miller (eds.), *Vygotsky's educational theory in cultural context*, pp. 1–14, Cambridge University Press, Cambridge.

Krummheuer, G., 2007, 'Argumentation and participation in the primary mathematics classroom: Two episodes and related theoretical abductions', *The Journal of Mathematical Behavior* 26(1), 60–82. https://doi.org/10.1016/j.jmathb.2007.02.001

Kunene, N. & Sepeng, P., 2017, 'Rural learners' views and perceptions about their experiences in word problem solving', *Journal of Social Sciences* 50(1–3), 133–140. https://doi.org/10.1080/09718923.2017.1311728

Kunene, N.T., 2019, 'A case study of selected Grade 7 learners using argumentative frames for solving word problems', PhD thesis, North-West University.

Landsberg, E., Krüger, D. & Swart, E., 2016, *Addressing barriers to learning: A South African perspective*, 3rd edn., Van Schaik, Pretoria.

Marks, G. & Hooghe, L., 2000, 'Optimality and authority: A critique of neoclassical theory', *JCMS: Journal of Common Market Studies* 38(5), 795–816.

Maree, K., 2007, *First steps in research*, Van Schaik, Pretoria.

Mehta, C.R. & Patel, N.R., 2012, *IBM SPSS exact tests*, p. 199, IBM, Armonk, NY.

Mercer, N. & Sams, C., 2006, 'Teaching children how to use language to solve maths problems', *Language and Education* 20(6), 507–528. https://doi.org/10.2167/le678.0

Merriam, S.B., 2002, *Qualitative research in practice: Examples for discussion and analysis*, Jossey-Bass, San Francisco, CA.

Norenes, S.O., & Ludvigsen, S., 2016, 'Language use and participation in discourse in the mathematics classroom: When students write together at an online website', *Learning, Culture and Social Interaction* 11, 66–84. https://doi.org/10.1016/j.lcsi.2016.05.003

Nussbaum, E.M., 2011, 'Argumentation, dialogue theory, and probability modeling: Alternative frameworks for argumentation research in education', *Educational Psychologist* 46(2), 84–106. https://doi.org/10.1080/00461520.2011.558816

Oke, A. & Fernandes, F.A.P., 2020, 'Innovations in teaching and learning: Exploring the perceptions of the education sector on the 4th Industrial Revolution (4IR)', *Journal of Open Innovation: Technology, Market, and Complexity* 6(2), 31. https://doi.org/10.3390/joitmc6020031

Okeke, C. & Van Wyk, M., 2015, *Educational research: An African approach*, Oxford University Press, Cape Town.

Petersen, B., McAuliffe, S. & Vermeulen, C., 2017, 'Writing and mathematical problem solving in Grade 3', *South African Journal of Childhood Education* 7(1), 1–9. https://doi.org/10.4102/sajce.v7i1.483

Planas, N., 2014, 'One speaker, two languages: Learning opportunities in the mathematics classroom', *Educational Studies in Mathematics* 87(1), 51–66. https://doi.org/10.1007/s10649-014-9553-3

Quigley, C.F., Herro, D. & Jamil, F.M., 2017, 'Developing a conceptual model of STEAM teaching practices', *School Science and Mathematics* 117(1–2), 1–12. https://doi.org/10.1111/ssm.12201

Rawson, B., 1997, 'Working with writing frames in mathematics', *Education* 3–13, 25(1), 49–54. https://doi.org/10.1080/03004279785200111

Reddy, V., Visser, M., Winnaar, L., Arends, F., Juan, A., Prinsloo, C.H. et al., 2016, *TIMSS 2015: Highlights of Mathematics and Science Achievement of Grade 9 South African Learners*, Human Sciences Research Council, HSRC Press, Cape Town.

Reed, M. & Walker, R., 2015, *A critical companion to early childhood*, Sage, Los Angeles, CA.

Reikerås, E.K., 2009, 'A comparison of performance in solving arithmetical word problems by children with different levels of achievement in mathematics and reading', *Investigations in Mathematics Learning* 1(3), 49–72. https://doi.org/10.1080/24727466.2009.11790286

Republic of South Africa, 1996, *Constitution of the Republic of South Africa*, South African Government, Pretoria.

Ross, D., Fisher, D. & Frey, N., 2009, 'The art of argumentation', *Science and Children* 47(3), 28–231.

Salemeh, Z. & Etchells, M.J., 2016, 'A case study: Sources of difficulties in solving word problems in an International Private School', *Electronic International Journal of Education, Arts, and Science (ElJEAS)* 2(special issue), 149–163.

Schäfer, M., 2010, 'Mathematics registers in indigenous languages: Experiences from South Africa', Paper Presented at the 33rd Annual Conference of the Mathematics Education Research Group of Australasia, Fremantle, Australia, July 03–07, 2010, pp. 525–530.

Seidlitz, J., 2010, *Navigating the ELPS*, Seidlitz Education, San Antonio, TX.

Sepeng, P., 2013, 'Using concept cartoons and argumentative writing frames in mathematical word problem solving', *Mediterranean Journal of Social Sciences* 4(11), 129. https://doi.org/10.5901/mjss.2013.v4n11p129

Sepeng, P., 2014, 'Use of common-sense Knowledge, language and reality in mathematical word problem solving', *African Journal of Research in Mathematics, Science and Technology Education* 18(1), 14–24. https://doi.org/10.1080/10288457.2014.890808

Sepeng, P. & Madzorera, A., 2014, 'Sources of difficulty in comprehending and solving mathematical word problems', *International Journal of Educational Sciences* 6(2), 217–225. https://doi.org/10.1080/09751122.2014.11890134

Sepeng, P. & Sigola, S., 2013, 'Making sense of errors made by learners in mathematical word problem solving', *Mediterranean Journal of Social Sciences* 4(13), 325–333. https://doi.org/10.5901/mjss.2013.v4n13p325

Setati, M. & Adler, J., 2000, 'Between languages and discourses: Language practices in primary multilingual mathematics classrooms in South Africa', *Educational Studies in Mathematics* 43(3), 243–269. https://doi.org/10.1023/A:1011996002062

Setati, M., Molefe, T. & Langa, M., 2008, 'Using language as a transparent resource in the teaching and learning of mathematics in a Grade 11 multilingual classroom', *Pythagoras* 2008(1), 14–25. https://doi.org/10.4102/pythagoras.v0i67.70

Shabani, K., 2016, 'Applications of Vygotsky's sociocultural approach for teachers' professional development', *Cogent Education* 3(1), #1252177. https://doi.org/10.1080/2331186X.2016.1252177

Sibanda, L., 2017, 'Grade 4 learners' linguistic difficulties in solving mathematical assessments', *African Journal of Research in Mathematics, Science and Technology Education* 21(1), 86–96. https://doi.org/10.1080/18117295.2017.1291476

Steele, M., 2002, 'Strategies for helping students who have learning disabilities in mathematics', *Mathematics Teaching in the Middle School* 8(3), 140–143. https://doi.org/10.5951/MTMS.8.3.0140

Subramaniam, K., 2010, 'Integrating writing frames into inquiry-based instruction', *Science Educator* 19(2), 31–34.

Valero, P., 2017, 'Mathematics for all, economic growth, and the making of the citizen-worker', in T.S. Popkewitz, J. Diaz & C. Kirchgasler (eds.), *A political sociology of educational knowledge: Studies of exclusions and difference*, pp. 117–132, Routledge, London.

Van de Walle, J.A., Karp, K.S. & Bay-Williams, J.M., 2013, 'Teaching mathematics in the 21st century', in J.A. Van de Walle, K. Karp & J.M. Bay-Williams (eds.), *Elementary and middle school mathematics: Teaching developmentally*, 8th edn., pp. 1–8, Pearson, Boston, MA.

Venkat, H., 2013, 'Curriculum development minus teacher development in mathematics education', Paper presented at the 19th Annual National Congress of the Association for Mathematics Education of South Africa, University of the Western Cape, Cape Town.

Verschaffel, L., De Corte, E. & Lasure, S., 1994, 'Realistic considerations in mathematical modeling of school arithmetic word problems', *Learning and Instruction* 4(4), 273–294.

Verschaffel, L., Schukajlow, S., Star, J. & Van Dooren, W., 2020, 'Word problems in mathematics education: A survey', *ZDM (Zentralblatt für Didaktik der Mathematik) Mathematics Education* 52, 1–16. https://doi.org/10.1016/0959-4752(94)90002-7

Vygotsky, L.S., 1978, *Mind in society: The development of higher psychological processes*, transl. M. Cole, Harvard University Press, Cambridge, MA.

Wagner, W.E., 2017, *Using IBM SPSS statistics for research methods and social science statistics*, 6th edn., Sage, Los Angeles, CA.

Warwick, P., Stephenson, P., Webster, J. & Bourne, J., 2003, 'Developing pupils' written expression of procedural understanding through the use of writing frames in science: Findings from a case study approach', *International Journal of Science Education* 25(2), 173–192. https://doi.org/10.1080/09500690210163251

Wass, R. & Golding, C., 2014, 'Sharpening a tool for teaching: The zone of proximal development', *Teaching in Higher Education* 19(6), 671–684. https://doi.org/10.1080/13562517.2014.901958

Webb, P., Williams, Y. & Meiring, L., 2008, 'Concept cartoons and writing frames: Developing argumentation in South African science classrooms', *African Journal of Research in Mathematics, Science and Technology Education* 12(1), 5–17. https://doi.org/10.1080/10288457.2008.10740625

Wertsch, J.V. & Tulviste, P., 1992, 'L.S. Vygotsky and contemporary developmental psychology', *Developmental Psychology* 28(4), 548–557. https://doi.org/10.1037/0012-1649.28.4.548

Woolfolk, A., 2007, *Educational psychology*, 10th edn., Pearson/Allyn and Bacon, Boston, MA.

Chapter 8

Anderson, J. & Barnett, M., 2011, 'Using video games to support pre-service elementary teachers learning of basic physics principles', *Journal of Science Education and Technology* 20(4), 347–362. https://doi.org/10.1007/s10956-010-9257-0

ASSAf, 2008, *STEM education*, viewed 21 October 2020, from www.assaf.org.za.https://www.assaf.org.za/index.php/programmes/policy-advisory-programme/stem-education.

Australian Department of Employment, Skills, Small and Family Business, 2020, *STEM jobs growing almost twice as fast as other jobs | Department of Education, Skills and Employment*, viewed 18 October 2020, from https://www.employment.gov.au/newsroom/stem-jobs-growing-almost-twice-fast-other-jobs.

Baik, Y., Kim, Y., Nho, S., Lee, J., Jung, J. & Han, H., 2012, *STEAM: A study on the action plans for STEAM education*, KOFAC, Seoul.

Berlin, D.F. & White, A.L., 2009, 'Preservice mathematics and science teachers in an integrated teacher preparation programme for grades 7–12: A 3-year study of attitudes and perceptions related to integration', *International Journal of Science and Mathematics Education* 8(1), 97–115. https://doi.org/10.1007/s10763-009-9164-0

Breiner, J.M., Harkness, S.S., Johnson, C.C. & Koehler, C.M., 2012, 'What Is STEM? A discussion about conceptions of STEM in education and partnerships', *School Science and Mathematics* 112(1), 3–11. https://doi.org/10.1111/j.1949-8594.2011.00109.x

Bybee, R.W., 2013, *The case for STEM education: Challenges and opportunities*, National Science Teachers Association, Arlington, VA.

China State Council, 2006, *National Mid- and Long-term Science and Technology Development Framework*, China State Council, Beijing.

Chiu, M.-H. & Duit, R., 2011, 'Globalization: Science education from an international perspective', *Journal of Research in Science Teaching* 48(6), 553–566. https://doi.org/10.1002/tea.20427

Department of Basic Education, 2017, *The SACMEQ IV Project in South Africa: A Study of the Conditions of Schooling and the Quality of Education- The SACMEQ IV Project in South Africa: A Study of the Conditions of Schooling and the Quality of Education*, viewed 21 October 2020, from http://www.sacmeq.org/sites/default/files/sacmeq/reports/sacmeq-iv/national-reports/sacmeq_iv_project_in_south_africa_report.pdf.

Department of Education, 2001, *National strategy for mathematics, science and technology education in general and further education and training*, Government Printing Works, Pretoria.

Dewey, J., 1909, *How we think*, Heath, London.

Education Council, 2015, *National STEM school education strategy, 2016–2026*, viewed 15 September 2020, from http://www.educationcouncil.edu.au/site/DefaultSite/filesystem/documents/National%20STEM%20School%20Education%20 Strategy.pdf.

English, L.D., 2016, 'STEM education K-12: Perspectives on integration', *International Journal of STEM Education* 3(1), 3, https://doi.org/10.1186/s40594-016-0036-1

Fedderke, J., 2002, 'Technology, human capital, growth and institutional development', *Theoria* 49(100), 1–26, https://doi.org/10.3167/004058102782485367

Freeman, B., Marginson, S. & Tytler, R., 2015, *The age of STEM: Educational policy and practice across the world in science, technology, engineering and mathematics*, Routledge, London.

Freeman, B., Marginson, S. & Tytler, R., 2019, 'An international view of STEM education', in A. Şahin & M. Schroeder (eds.), *Myths and truths: What has years of K-12 STEM education research taught us?*, Brill, Rotterdam.

Hartzler, D., 2000, 'A meta-analysis of studies conducted on integrated curriculum programs and their effects on student achievement', Doctoral thesis, Indiana University.

Honey, M., Pearson, G. & Schweingruber, H., 2014, *STEM integration in K-12 education: Status, prospects and an agenda for research,* National Academies Press, Washington, DC.

Hong, S., Hwang, Y., Bae, Y., Hong, S., Jung, S., Lee, S. et al., 2010, *Role of science and technology in leading the economic development of Korea and its implications for developing countries*, Science and Technology Policy Institute, Seoul.

Howitt, P., 2010, 'Endogenous growth theory', in S. Durlauf & L. Blume (eds.), *Economic growth. The New Palgrave Economics Collection*, Palgrave Macmillan, London.

John, M., 2019, 'Physical sciences teaching and learning in Eastern Cape rural schools: Reflections of pre-service teachers', *South African Journal of Education* 39(suppl. 1), S1–S12. https://doi.org/10.15700/saje.v39ns1a1660

Jon, J. & Chung, H., 2012, *Securing Australia's Future STEM: Country Comparisons. STEM Report – Republic of Korea*, viewed 10 October 2020, from https://acola.org/wp-content/uploads/2018/12/Consultant-Report-Korea.pdf.

Kang, N.-H., 2019, 'A review of the effect of integrated STEM or STEAM (science, technology, engineering, arts, and mathematics) education in South Korea', *Asia-Pacific Science Education* 5(1), 6. https://doi.org/10.1186/s41029-019-0034-y

Kelley, T.R. & Knowles, J.G., 2016, 'A conceptual framework for integrated STEM education', *International Journal of STEM Education* 3(1), n.p.

Koehler, C., Binns, I. & Bloom, M., 2015, 'The emergence of STEM', in C. Johnson, E. Peters-Burton & T. Moore (eds.), *STEM road map: A framework for integrated STEM education*, pp. 13–22, Routledge, New York, NY.

Korea Foundation for the Advancement of Science and Creativity (KOFAC), 2011, *A 2010 report on Koreans' understanding of science and technology*, KOFAC & Gallup Korea, Seoul.

Lesseig, K., Firestone, J., Morrison, J., Slavit, D. & Holmlund, T., 2019, 'An analysis of cultural influences on STEM schools: Similarities and differences across K-12 contexts', *International Journal of Science and Mathematics Education* 17(3), 449–466. https://doi.org/10.1007/s10763-017-9875-6

Marginson, S., Tytler, R., Freeman, B. & Roberts, K., 2013, *STEM: Country comparisons*, pp.1–178, Australian Council of Learned Academies, Melbourne.

Moore, T., Stohlmann, M., Wang, H.-H., Tank, K., Glancy, A. & Roehrig, G., 2014, 'Implementation and integration of engineering in K-12 STEM education', in J. Strobel, S. Purzer & M. Cardella (eds.), *Engineering in precollege settings: Research into practice*, pp. 35–59, Purdue University Press, West Lafayette.

Mukundu, C.K., Chineka, R. & Madzudzo, A., 2017, 'The framing and reframing of science education, training and research in Zimbabwe', in F.S. Otulaja & M.B. Ogunniyi (eds.), *The world of science education: Cultural and historical perspectives on science education: Handbooks*, Sense Publishers, Rotterdam. https://doi.org/10.1007/978-94-6351-089-9_9.

Mullis, I.V.S., Martin, M.O., Foy, P. & Arora, A., 2012, *TIMSS 2011 international results in mathematics*, TIMSS & PIRLS International Study Center, Cop., Boston, MA.

NDP, 2011, *The National Development Plan: Vision for 2030 (NDP) of South Africa*, Government Printing Works, Pretoria.

NSTF, 2018a, *National strategy for mathematics, science and technology MST education in GET & FET (2019–2030)*, viewed 21 October 2020, from http://www.nstf.org.za/wp-content/uploads/2018/07/2-AUGUST-NSTF-STEM-EDUCATION-FORUM.MsKhembopptx.pdf.

NSTF, 2018b, *STEM Education | National Science and Technology Forum*, viewed 21 October 2020, from http://www.nstf.org.za/discussion-forum/stem-education/#:~:text=(STEM%20stands%20for%20science%2C%20technology%2C%20engineering%20and%20mathematics.)&text=South%20Africa%20continues%20to%20suffer.

Onyimadu, C.O., 2015, 'An overview of endogenous growth models: Theory and critique', *SSRN Electronic Journal* 5(3), 498–514. https://doi.org/10.2139/ssrn.2685545

Organisation for Economic Co-operation and Development (OECD), 2020a *OECD estimates based on OECD Main Science and Technology Indicators Database, August 2020*, viewed 21 October 2020, from http://oe.cd/msti.

Organisation for Economic Co-operation and Development (OECD), 2020b, *OECD Main Science and Technology Indicators Database*, viewed 21 October 2020, from http://oe.cd/msti.

Pempek, T.A. & Lauricella, A.R., 2017, 'The effects of parent-child interaction and media use on cognitive development in infants, toddlers, and preschoolers', in F.C. Blumberg & P.J. Brooks (eds.), *Cognitive development in digital contexts,* pp.53–74, Academic Press. https://doi.org/10.1016/B978-0-12-809481-5.00003-1.

Romer, P.M., 1994, 'The origins of endogenous growth', *Journal of Economic Perspectives* 8(1), 3–22. https://doi.org/10.1257/jep.8.1.3

Sasol, 2018, *Delivering social value committed to our communities*, viewed 10 October 2020, from https://www.sasol.com/sites/default/files/content/files/SASOL_Delivering%20Social%20value_0.pdf.

Schmidt, H.G., Machiels-Bongaerts, M., Hermans, H., Ten-Cate, T.J., Venekamp, R. & Boshuizen, H.P., 1996, 'The development of diagnostic competence', *Academic Medicine* 71(6), 658–664. https://doi.org/10.1097/00001888-199606000-00021

Shell, K., 1966, 'Towards a theory of inventive activity and capital accumulation', *American Economic Review* 56(1), 62–68.

Smithsonian Science Education Centre, 2015, *The STEM Imperative*, viewed 15 October 2020, from https://ssec.si.edu/stem-imperative.

So, W.W.M., Zhan, Y., Chow, S.C.F. & Leung, C.F., 2018, 'Analysis of STEM activities in primary students' science projects in an informal learning environment', *International Journal of Science and Mathematics Education* 16(6), 1003–1023. https://doi.org/10.1007/s10763-017-9828-0

Spring, J., 2008, 'Research on globalization and education', *Review of Educational Research* 78(2), 330–363. https://doi.org/10.3102/0034654308317846

Stohlmann, M., 2018, 'A vision for future work to focus on the "M" in integrated STEM', *School Science and Mathematics* 118(7), 310–319. https://doi.org/10.1111/ssm.12301

Stohlmann, M., Moore, T. & Roehrig, G., 2012, 'Considerations for teaching integrated STEM education', *Journal of Pre-College Engineering Education Research* 2(1), 28–34.

Tikly, L., Joubert, M., Barrett, A.M., Bainton, D., Cameron, L. & Doyle, H., 2018, *Supporting secondary school STEM education for sustainable development in Africa*, University of Bristol, Bristol.

Tytler, R., Williams, G., Hobbs, L. & Anderson, J., 2019, 'Challenges and opportunities for a STEM interdisciplinary agenda', in B. Doig, J. Williams, D. Swanson, R. Borromeo-Ferri & P. Drake (eds.), *Interdisciplinary mathematics education ICME-13 Monographs*, pp. 51–81, Springer, Cham.

UNESCO, 2017, *Global education monitoring report*, viewed 21 October 2020, from https://en.unesco.org/gem-report/taxonomy/term/197.

UNESCO, 2020, *Global investments in R&D A snapshot of R&D expenditure*, viewed 05 November 2020, from http://uis.unesco.org/sites/default/files/documents/fs59-global-investments-rd-2020-en.pdf.

UNICEF, 2018, *Education budget brief South Africa*, viewed 13 October 2020, from https://www.unicef.org/esaro/UNICEF-South-Africa-2018-Education-Budget-Brief.pdf.

United Kingdom, 2011, *Success through STEM: STEM Strategy. In response to the "Report of the STEM Review"*, viewed 06 October 2020, from https://www.economy-ni.gov.uk/sites/default/files/publications/del/STEM%20Strategy-Success%20through%20STEM.pdf.

United States, 2018, *Charting a course for success: America's strategy for STEM education*, viewed 17 September 2020, from https://www.whitehouse.gov/wp-content/uploads/2018/12/STEM-Education-Strategic-Plan-2018.pdf.

Van der Berg, S. & Hofmeyr, H., 2018, *Education in South Africa: Background note for the South Africa systematic country diagnostic*, World Bank, viewed 20 October 2020, from http://documents.worldbank.org/curated/en/339291529320964248/Education-in-South-Africa-background-note-for-the-South-Africa-systematic-country-diagnostic.

Vodacom, 2016, *The Vodacom Foundation – Education*, viewed 21 October 2020, from https://vodacomfoundationsa.co.za/education/.

Wang, H.H., Moore, T., Roehrig, G. & Park, M.S., 2011, 'STEM integration: Teacher perception and practice', *The Journal of Pre-College Engineering Education Research* 1(2), 1–13.

Wei, B. & Chen, Y., 2020, 'Integrated STEM education in K-12: Theory development, status, and prospects', in *Theorizing STEM Education in the 21st Century*, viewed 20 October 2020, from https://www.intechopen.com/books/theorizing-stem-education-in-the-21st-century/integrated-stem-education-in-k-12-theory-development-status-and-prospects.

Westbrook, J., Durrani, N., Brown, R., Orr, D., Pryor, J., Boddy, J. et al., 2013, *Pedagogy, curriculum, teaching practices and teacher education in developing countries*, viewed 02 October 2020, from https://eppi.ioe.ac.uk/cms/Portals/0/PDF%20reviews%20and%20summaries/Pedagogy%202013%20Westbrook%20report.pdf?ver=2014-04-24-121331-867.

World Bank, 2018, *Government expenditure on education, total (% of GDP) – South Africa*, viewed 28 September 2020, from https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS.

World Economic Forum, 2020, *Jobs of tomorrow: Mapping opportunity in the new economy*, viewed 20 October 2020, from http://www3.weforum.org/docs/WEF_Jobs_of_Tomorrow_2020.pdf.

Chapter 9

Ameen, E.C., Guffey, D.M. & Jackson, C., 2002, 'Evidence of teaching anxiety among accounting educators', *Journal of Education of Business* 78(1), 16–22. https://doi.org/10.1080/08832320209599692

Anderman, E.M. & Anderman, L.H., 2020, *Classroom motivation: Linking research to teacher practice*, Routledge, New York, NY.

Azuma, R., Baillot, Y., Behringer, R., Feiner, S., Julier, S. & MacIntyre, B., 2001, 'Recent advances in augmented reality', *IEEE Computer Graphics and Applications* 21(6), 34–47. https://doi.org/10.1109/38.963459

Beattie, V., Collins, B. & McInnes, B., 1997, 'Deep and surface learning: A simple or simplistic dichotomy?', *Accounting Education* 6(1), 1–12. https://doi.org/10.1080/096392897331587

Black, P. & Wiliam, D., 2009, 'Developing the theory of formative assessment', *Educational Assessment, Evaluation and Accountability (formerly: Journal of Personnel Evaluation in Education)* 21(1), 5–31. https://doi.org/10.1007/s11092-008-9068-5

Bloxham, S. & West, A., 2007, 'Learning to write in higher education: Students' perceptions of an intervention in developing understanding of assessment criteria', *Teaching in Higher Education* 12(1), 77–89. https://doi.org/10.1080/13562510601102180

Bonner, S.E., 1999, 'Choosing teaching methods based on learning objectives: An integrative framework', *Issues in Accounting Education* 14(1), 11–39. https://doi.org/10.2308/iace.1999.14.1.11

Booth, P., Luckett, P. & Mladenovic, R., 1999, 'The quality of learning in Accounting education: The impact of approaches to learning on academic performance', *Accounting Education: An International Journal* 8(4), 277–300. https://doi.org/10.1080/096392899330801

Borja, P.M., 2003, 'So you've been asked to teach principles of accounting', *Business Education Forum* 58(2), 30–32.

Borkar, V.N., 2016, 'Positive school climate and positive education: Impact on students' well-being', *Indian Journal of Health & Wellbeing* 7(8), 861–862.

Botha, N., 2014, 'Measuring student perceptions about the use of a computer programme as a teaching aid in auditing', Doctoral dissertation, North-West University.

Buckhaults, J. & Fisher, D., 2011, 'Trends in accounting education: Decreasing accounting anxiety and promoting new methods', *Journal of Education of Business* 86(1), 16–22. https://doi.org/10.1080/08832321003720692

Bratten, B., Gaynor, L.M., McDaniel, L., Montague, N.R. & Sierra, G.E., 2013, 'The audit of fair values and other estimates: The effects of underlying environmental, task, and auditor-specific factors', *Auditing: A Journal of Practice & Theory* 32(sp1), 7–44. https://doi.org/10.2308/ajpt-50316

Brown, R. M. & Mazzarol, T.W., 2009, 'The importance of institutional image to student satisfaction and loyalty within higher education', *Higher Education* 58(1), 81–95. https://doi.org/10.1007/s10734-008-9183-8

Calderhead, J., 1991, 'The nature and growth of knowledge in learner teaching', *Teaching and Teacher Education* 7(5/6), 531–535. https://doi.org/10.1016/0742-051X(91)90047-S

Camp, J.M. & Schnader, A.L., 2010, 'Using debate to enhance critical thinking in the accounting classroom: The Sarbanes-Oxley Act and U.S. Tax policy', *Issues in Accounting Education, American Accounting Association* 25(4), 655–675. https://doi.org/10.2308/iace.2010.25.4.655

Capar, G. & Tarim, K., 2015, 'Efficacy of the cooperative learning method on Mathematics achievement and attitude: A meta-analysis research', *Educational Sciences: Theory and Practice* 15(2), 553–559.

Carter, F.L. & Hogan, P.T., 2013, 'Integrating active learning and assessment in the Accounting classroom', *Journal of Instructional Pedagogies* n.v., n.p.

Cochran-Smith, M. & Zeichner, K., 2005, *Studying teacher education: The report of the AERA panel on research and teacher education*, Lawrence Erlbaum, Mahwah, NJ.

Costa, A. & Kallick, B., 2009, *Learning and leading with habits of mind: 16 essential characteristics for success*, Hawker Brownlow Education, Melbourne.

Creswell, J.W., 2009, *Educational research: Planning, conducting and evaluating quantitative and qualitative research*, 3rd edn., Pearson, New York, NY.

Crotty, J., 2002, *Seizing the days: Engaging all learners*, viewed 30 September 2020, from http://www.aea267.k12.ia.us/cia/motivation/climate.html.

Darwin, D.Y.U., 2011, 'How much study habits, skills and attitudes affect learner performance in introductory college Accounting courses?', *New Horizons in Education* 59(3), 1–15.

Davidson, R.A., 2002, 'Relationship of study approach and exam performance', *Journal of Accounting Education* 20(1), 29–44. https://doi.org/10.1016/S0748-5751(01)00025-2

Dhawan, S., 2020, 'Online learning: A panacea in the time of COVID-19 crisis', *Journal of Educational Technology Systems* 49(1), 5–22. https://doi.org/10.1177/0047239520934018

Diener, E. & Chan, M.Y., 2011, 'Happy people live longer: Subjective well-being contributes to health and longevity', *Applied Psychology: Health and Well-Being* 3(1), 1–43. https://doi.org/10.1111/j.1758-0854.2010.01045.x

Diener, E., Lucas, R.E. & Scollon, C. N., 2009, 'Beyond the hedonic treadmill: Revising the adaptation theory of well-being', in E. Diener (eds.), *The science of well-being. social indicators research series*, vol. 37, pp. 103–118, Springer, Dordrecht.

Diener, E. & Tay, L., 2012, *A scientific review of the remarkable benefits of happiness for successful and healthy living. Report of the Well-Being Working Group, Royal Government of Bhutan: Report to the United Nations General Assembly, Well-Being and Happiness: A New Development Paradigm*, UN General Assembly, New York, NY.

Donald, D., Lazarus, S. & Lolwana, P., 2010, *Educational psychology in social context*, Oxford University Press, Oxford.

Dweck, C.S. & Cohen, G.L., 2016, 'Instructional interventions that motivate classroom learning', *Journal of Educational Psychology* 108(3), 295–299. https://doi.org/10.1037/edu0000124

Facione, P.A., 2009, *Critical thinking: What it is and why it counts*, viewed 28 September 2020, from www.insightassessment.com/pdf_files/what&why98.pdf.

Farrell, B. & Farrell, H., 2008, 'Learner satisfaction with cooperative learning in an Accounting curriculum', *Journal of University Teaching and Learning Practice* 5(2), 39–54.

Fernandes, C., Ross, K. & Meraj, M., 2013, 'Understanding student satisfaction and loyalty in the UAE HE sector', *International Journal of Educational Management* 27(6), 613–630. https://doi.org/10.1108/IJEM-07-2012-0082

Fisher, R., 2005, *Teaching children to think*, 2nd edn., Nelson Thornes, Boston, MA.

Fletcher, D., 2005, '"Mental toughness" and human performance: Definitional, conceptual and theoretical issues', *Journal of Sports Sciences* 23, 1246–1247.

Fortin, A. & Legault, M., 2010, 'Development of generic competencies: Impact of a mixed teaching approach on learners' perceptions', *Accounting Education* 19(1), 93–122. https://doi.org/10.1080/09639280902888195

Guerriero, S., 2016, *Teacher's pedagogical knowledge and the teaching profession (background report and project objectives)*, viewed 23 September 2020, from http://www.oecd.org/education/ceri/Background_document_to_Symposium_ITEL-FINAL.pdf.

Hall, M., Ramsay, A. & Raven, J., 2004, 'Changing the learning environment to promote deep learning approaches in first-year accounting students', *Accounting Education* 13(4), 489–505. https://doi.org/10.1080/0963928042000306837

Hallinger, P. & Lu, J., 2013, 'Learner-centred higher education in East Asia: Assessing the effects on student engagement', *International Journal of Educational Management* 27(6), 594–613. https://doi.org/10.1108/IJEM-06-2012-0072

Harks, B., Rakoczy, K., Hattie, J., Besser, M. & Klieme, E., 2013, 'The effects of feedback on achievement, interest and self-evaluation: The role of feedback's perceived usefulness', *Educational Psychology* 34(3), 269–290. https://doi.org/10.1080/01443410.2013.785384

Hattie, J., 2009, *Visible learning: A synthesis of over 800 meta-analysis relating to achievement*, Routledge, London.

Hattie, J.A.C. & Yates, G.C.R., 2016, *Using feedback to promote learning*, Routledge, London.

Helgesen, Ø. & Nesset, E., 2007, 'What accounts for students' loyalty? Some field study evidence', *International Journal of Educational Management* 21(2), 126–143. https://doi.org/10.1108/09513540710729926

Holmes, K. & Papageorgiou, G., 2009, 'Good, bad and insufficient: Students' expectations, perceptions and uses of feedback', *Journal of Hospitality, Leisure, Sports and Tourism Education (Pre-2012)* 8(1), 85.

Hounsell, D., McCune, V., Hounsell, J. & Litjens, J., 2006, 'Investigating and enhancing guidance and feedback to undergraduate students', Paper Presented at the 3rd Biennial Northumbria/EARL SIG Assessment Conference, Northumbria, 30th August–01 September.

Jackling, B., 2005, 'Perceptions of the learning context and learning approaches: Implications for quality learning outcomes in Accounting', *Accounting Education: An International Journal* 14(3), 271–291. https://doi.org/10.1080/06939280500036364

Jacobs, N. & Harvey, D., 2010, 'The extent to which teacher attitudes and expectations predict academic achievement of final year learners', *Journal of Educational Studies* 36(2), 195–206. https://doi.org/10.1080/03055690903162374

Jansen, J., 2014, 'Africa Check: Why the matric pass rate is not a reliable benchmark of quality education', *Daily Maverick*, 07 January.

Jayaprakash, J.C.M., 2005, 'Strategies in teaching accounting in higher education', *TL Forum* 2005, 1–8.

Jevsikova, T., Berniukevičius, A. & Kurilovas, E., 2017, 'Application of resource description framework to personalise learning: Systematic review and methodology', *Informatics in Education* 16(1), 61–82. https://doi.org/10.15388/infedu.2017.04

Kermis, G.F. & Kermis, M.D., 2010, 'Improving soft skills and professionalism of accounting learners: The case for intervention', *The BRC Journal of Advances in Business* 1(1), 43–54.

Ku, B.K.M. & Haider, A., 2012, 'Information technology skills and competencies – A case for professional accountants', in W. Abramowicz, J. Domingue & K. Węcel (eds.), *In International Conference on Business Information Systems*, pp. 81–87, Springer, Berlin.

Kurilovas, E., 2016, 'Evaluation of quality and personalisation of VR/AR/MR learning systems', *Behaviour & Information Technology* 35(11), 998–1007. https://doi.org/10.1080/0144929X.2016.1212929

Kurilovas, E., 2020, 'On data-driven decision-making for quality education', *Computers in Human Behaviour* 107, 105–774. https://doi.org/10.1016/j.chb.2018.11.003

Lake, J., 2009, *Math memories you can count on: A literature-based approach to teaching mathematics in the primary classes,* Pembroke Publishers, Markham.

Lien, T.B. & Yu, C.C., 2001, 'An integrated model for the effects of perceived product, perceived service quality, and perceived price fairness on customer satisfaction and loyalty', *Journal of Consumer Satisfaction Dissatisfaction, and Complaining Behaviour* 14, 125–140.

Littlefield, J., 2018, *The difference between synchronous and asynchronous distance learning*, viewed 27 September 2020, from https://www.thoughtco.com/synchronous-distance-learning-asynchronousdistance-learning-1097959.

Lyke, J. & Young, A., 2006, 'Cognition in context', *Research in Higher Education* 47(4), 477–490. https://doi.org/10.1007/s11162-005-9004-1

Maree, K., 2010, *First steps in research*, 5th edn., Van Schaik, Pretoria.

Maree, K. & Van der Westhuizen, C., 2007, 'Planning a research proposal', in K. Maree (ed.), *First steps in research*, pp. 31–41, Van Schaik, Pretoria.

McCoy, A., 2011, 'Specialized mathematical content knowledge of preservice elementary teachers: The effect of Mathematics teacher efficacy', Unpublished Doctoral thesis, University of Missouri.

McFarland, D.J. & Hamilton, D., 2006, 'Adding contextual specificity to the technology acceptance model', *Computers in Human Behavior* 22(3), 427–447. https://doi.org/10.1016/j.chb.2004.09.009

McVay, G.J., Murphy, P.R. & Yoon, S.W., 2008, 'Good practices in accounting education: Classroom configuration and technological tools for enhancing the learning environment', *Accounting Education: An International Journal* 17(1), 41–63. https://doi.org/10.1080/09639280600843369

Mangieri, J. & Collins, C., 2004, *Power thinking: How the way you think can change the way you lead*, Jossey-Bass, San Francisco, CA.

Merriam, S.B., 2009, *Qualitative research: A guide to design and implementation*, 3rd edn., Jossey-Bass, San Francisco, CA.

Ngwenya, J.C., 2014, 'Accounting teachers' understandings and practices of teaching and assessment in a context of curriculum change', *School of Education, University of KwaZulu-Natal* 21(1), 171–189.

Oliveira, C.G., Oliveira, P.C. & Costa, N., 2012, 'Students' and teachers' perspectives about quality of engineering education in Portugal', *European Journal of Engineering Education* 37(1), 49–57. https://doi.org/10.1080/03043797.2011.653551

O'Neill, S., 2014, *Effective teaching. An initiative of the director general's classroom first strategy*, Department of Education and Training, Western Australia.

Ozgur, O., 2004, 'Constructivism in Piaget and Vygotsky', *The Fountain Magazine* 48(4), 1–3.

Pace, C.R. & Kuh, G.D., 1998, *College student experiences questionnaire*, Centre for Postsecondary Research and Planning, Indiana University, Bloomington, IN.

Phillips, E.M. & Graeff, T.R., 2014, 'Using an in-class simulation in the first accounting class: Moving from surface to deep learning', *Journal of Education of Business* 89, 241–247. https://doi.org/10.1080/08832323.2013.863751

Piaget, J., 1953, *The origin of intelligence in the child*, Routledge & Kegan Paul, London.

Pickford, R. & Brown, S., 2006, *Assessing skills and practice*, Routledge, London.

Pintrich, P.R. & Schunk, D.H., 2002, *Motivation in education. Theory, research and applications*, 2nd edn., Merrill Prentice Hall, Upper Saddle River, NJ.

Pournara, C., Hodgen, J., Adler, J. & Pillay, V., 2015, 'Can improving teachers' knowledge of mathematics lead to gains in learners' attainment in Mathematics?', *South African Journal of Education* 35(3), 1–10. https://doi.org/10.15700/saje.v35n3a1083

Qhosola, M.R., 2016, 'Creating sustainable learning environments for a grade 10 Accounting classroom: A critical Accounting approach', Unpublished doctoral thesis, University of the Free State.

Radu, I., 2014, 'Augmented reality in education: A meta-review and cross-media analysis', *Personal and Ubiquitous Computing* 18(6), 1533–1543. https://doi.org/10.1007/s00779-013-0747-y

Ramsden, P., 1992, *Learning to teach in higher education*, Routledge, New York, NY.

Rebele, J.E., Apostolou, B.A., Buckless, F.A., Hassell, J.M., Paquette, L.R. & Stout, D.E., 1998, 'Accounting education literature review (1991–1997), Part I: Curriculum and instructional

approaches', *Journal of Accounting Education* 16(2), 179–245. https://doi.org/10.1016/S0748-5751(98)00010-4

Schunk, D.H., 2004, *Learning theories: An educational perspective*, 4th edn., Pearson/Merrill/Prentice Hall, Upper Saddle, NJ.

Shangase, B.B., 2013, 'Strategies for the implementation of further education and training learner attainment improvement plan', Doctoral dissertation, University of the Free State.

Sharma, P., 2010, 'Blended learning', *ELT Journal* 64(4), 456–458. https://doi.org/10.1093/elt/ccq043

Sharp, C., George, N., Sargent, C., O'Donnell, S. & Heron, M., 2009, *International thematic probe: The influence of relative age on learner attainment and development*, National Foundation for Educational Research, The Mere, Upton Park, Slough, Berkshire.

Singh, V. & Thurman, A., 2019, 'How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018)', *American Journal of Distance Education* 33(4), 289–306. https://doi.org/10.1080/08923647.2019.1663082

South Africa, Department of Education (DoE), 2008b, *Learning programme guidelines: Accounting grades 10–12 (general)*, Government Printer, Pretoria.

South Africa, Department of Basic Education (DBE), 2013, *Curriculum assessment policy statements (CAPS) for accounting*, viewed n.d., from http://www.education.gov.za/Curriculum/CurriculumAssessmentPolicyStatements/tabid/419/Default.aspx.

South African Institute of Chartered Accountants (SAICA), 2009, *Competency Framework. Competencies of a Chartered Accountant (SA) at entry point to the profession*, viewed 03 September 2020, from http://www.saica.co.za/Portals/0/LearnersStudentDocuments/Integritas-292277pdf.

Spaull, N., 2011, *A preliminary analysis of SACMEQ III South Africa*, Stellenbosch University, Stellenbosch.

Stegmann, N., & Malan, M., 2016, 'Accounting students' experience of an improved strategy of feedback on assessment', *Journal of Economic and Financial Sciences* 9(3), 769–788.

Telford, R. & Masson, R., 2005, 'The congruence of quality values in higher education', *Quality Assurance in Education* 13(2), 107–119. https://doi.org/10.1108/09684880510594364

Thomas. G., 2009, *How to do your research project*, Sage, Los Angeles, CA.

Ubogo, R., 2020, 'Supervision of instruction: A strategy for strengthening teacher quality in secondary school education', *International Journal of Leadership in Education* 24(4). https://doi.org/10.1080/13603124.2020.1829711

Vygotsky, L.S., 1978, *Mind in society*, Harvard University Press, Cambridge, MA.

Walton, G., 2010, 'From online discourse to online social networking, the e-learning Holy Grail?', in D. Parkes & G. Walton (eds.), *Web 2.0 and libraries: Impacts, technologies and trends*, pp. 33–65, Chattos &Windus Publishing, Oxford.

Wu, A.J., 2008, 'Integrating the AICPA core competencies into classroom teaching', *The CPA Journal* 78(8), 64–67.

Chapter 10

Ali, F. & Botha, N., 2006, *Evaluating the role, importance and effectiveness of heads of department in contributing to school improvement in public secondary schools in Gauteng*, MGSLG, Johannesburg.

Awesu, F., 2013, 'Assessment of instructional materials in teaching and learning', *Journal of Financial Accounting* 1(1), 1–17.

Babbie, E.R., 2010, *The practice of social research*, 12th edn., Wadsworth Cengage, Belmont, CA.

Bambi, A., 2012, 'The role of head of departments as instructional leaders in secondary schools: Implications for teaching and learning', Doctoral dissertation, University of Johannesburg.

Bhengu, T.T. & Mkhize, B.N., 2014, 'Principals' instructional leadership practices in improving learner achievement: Case studies of five secondary schools in the Umbumbulu area', *Education as Change* 17(1), 333. https://doi.org/10.1080/16823206.2014.865989

Bush, T. & Glover, D., 2003, *School leadership: Concepts and evidence*, viewed 20 March 2020, from www.ncsl.org.uk/literaturereviews.

Bush, T., Joubert, R., Kiggundu, E. & Van Rooyen, J., 2010, 'Managing teaching and learning in South African schools', *International Journal of Educational Development* 30(1), 162–168. https://repository.up.ac.za/handle/2263/11085

Creswell, J.W., 2016, *Research design: Qualitative, quantitative and mixed method approaches,* 4th edn., University of Nebraska-Lincoln, Sage.

Department of Basic Education (DBE), 2015, *Annual Report*, viewed 15 October 2020, from https://nationalgovernment.co.za/department_annual/84/2015-department:-basic-education-(dbe)-annual-report.pdf.

DiPaola, M. & Hoy, W.K., 2013, *Principals Improving Instruction. Information age publishing*, viewed n.d., from https://www.amazon.com/Principals-Improving-Instruction-Supervision-Professional/dp/1623960975.

Edmond, C.P.A., 2009, 'Accounting experiences in collaborative learning', *American Journal of Business Education 2*(7), 97–108.

Ezeagba, C.E., 2014, 'The problems in the teaching and learning of Accounting as a vocational subject in Nigeria secondary schools', *An International Journal of Science and Technology 3*(2), 208–226.

Field, A., 2009, *Discovering statistics using SPSS*, 2nd edn., Sage, London.

Gowpall, Y., 2015, 'School principals' instructional leadership practices: A case study of two schools in the Pinetown District', Master's dissertation, University of KwaZulu-Natal.

Hallinger, P. & Murphy, J., 1985, 'Assessing the instructional leadership behaviour of principals', *Elementary School Journal* 86(2), 217–248. https://doi.org/10.1086/461445

Hanushek, E.A., 2013, 'Economic growth in developing countries: The role of human capital', *Economics of Education Review* 37(2), 204–212. https://doi.org/10.1016/j.econedurev.2013.04.005

Hanushek, E.A. & Weismann, L., 2007, *The Role of Education Quality for Economic Growth (February 1, 2007)*, viewed 03 October 2020, from https://ssrn.com/abstract=960379.

Hoadley, U., Christie, P. & Ward, C.L., 2009, 'Managing to learn: Instructional leadership in South African secondary schools', *School Leadership and Management* 29(4), 373–389. https://doi.org/10.1080/13632430903152054

Hompashe, D., 2018, 'Instructional leadership and academic performance: Eastern Cape educators' perceptions and quantitative evidence', Research on Socio-Economic Policy, Stellenbosch Economic Working Papers, Ideas Publishers, viewed n.d., from https://ideas.repec.org/p/sza/wpaper/wpapers306.html.

Kisanga, D.H. & Ireson, G., 2016, 'Test of e-Learning Related Attitudes (TeLRA) scale: Development, reliability and validity study', *International Journal of Education and Development using Information and Communication Technology (IJEDICT)* 12(1), 20–36.

Leithwood, D., Harris, A. & Hopkins, D., 2020, 'Seven strong claims about successful school leadership revisited', *School Leadership & Management* 40(1), 5. https://doi.org/10.1080/13632434.2019.1596077

Lunenburg, F.C., 2010, 'The principal and the school: What do principals do?', *National Forum of Educational Administration & Supervision Journal* 24(4), 12–26.

Maree, K., 2010, *First steps in research*, Van Schaik, Pretoria.

Mestry, R., 2017, 'Principals' perspectives and experiences of their instructional leadership functions to enhance learner achievement in public schools', *Journal of Education* 69(3), 257–280.

Msila, V., 2013, 'Instructional leadership: Empowering teachers through critical reflection and journal writing', *Journal of Social Sciences* 35(2), 81–88. https://doi.org/10.1080/09718923.2013.11893149

Muijs, D., 2004, *Doing Quantitative Research in Education with SPSS*, viewed n.d., from https://methods.sagepub.com/book/doing-quantitative-research-in-education-with-spss.

National Association of Secondary School Principal NASSP, 2018, *Developing a shared vision is key to success*, viewed 09 September 2019, from https://www.nassp.org/publication/principal-leadership/volume-19-2018-2019/principal-leadership-september-2018/instructional-leadership-teams-to-the-rescue/.

National Association of Elementary School Principals (NAESP), 2019, *10 strategies to improve instructional leadership*, viewed 03 October 2019, from https://blog.nassp.org/2019/08/07/10-strategies-to-improve-instructional-leadership/.

National Senior Certificate, 2017, *Diagnostic report,* viewed 30 January 2018, from https://www.education.gov.za/Portals/0/Documents/Reports/2017%20NSC%20Diagnostic%20Report%20Part%201.pdf?ver=2018-01-30-140924-883.

Ng, D., 2019, 'Instructional leadership', *Instructional Leadership Journal of Educational Administration* 45(1), 1–43.

Ngwenya, J.C., 2014, 'Accounting teachers' understandings and practices of teaching and assessment in a context of curriculum change', *University of KwaZulu-Natal* 21(1), 171–189.

Rigby, J.G., 2014, 'Three logics of instructional leadership', *Education Administration Quarterly* 50(4), 610–644. https://doi.org/10.1177/0013161X13509379

Romer, P.M., 1989, *Human capital and growth: Theory and evidence (No. w3173)*, National Bureau of Economic Research, NBER Publishers, viewed n.d., from https://www.nber.org/papers/w3173.

Seyedeh, S., Seyedinejat M., Ebrahim, R. & Morteza, D., 2014, 'Prioritizing managerial skills based on Katz's theory cast study', *Journal of Sport Sciences* 5(1), 33–47.

Spring, S., 2015, *Values-based leadership*, viewed 03 October 2019, from https://scholar.valpo.edu/jvbl/vol8/iss1/1.

Tang, G.Q., 2009, *Freedom and harmony: Cai Yuanpei's five ways of life*, Bashu Publishinghouse, Sichuan.

The Curriculum and Assessment Policy Statement (CAPS), 2012, *The Intermediate Phase (Grades 4 to 6) and Grade 11*, Department of Basic Education, Pretoria.

Thejane, E.N., 2015, 'Designing an instructional leadership framework for underperforming secondary schools in the Free State Province', Doctoral dissertation, University of South Africa.

Uba, J.N. & Chinonyerem, O., 2017, 'Human capital development as a strategy for sustainable development in the Nigerian Education System', *African Research Review* 11(2), 178.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 2007, *EFA Global Monitoring Report 2007. Strong foundations: Early childhood care and education*, viewed 07 October 2020, from https://en.unesco.org/gem-report/allreports.

World Economic Forum (WFE), 2019, *The Global Competitiveness Report 2019*, viewed 07 October 2020, from http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

Wyatt, T., 2017, *Enhancing instructional leadership: Lessons from the NSW literacy and numeracy action plan*, Research Conference Paper, viewed n.d., from https://research.acer.edu.au/research_conference/RC2017/28august/4/.

Yan, G., 2015, 'Strategies of enhancing nstructional leadership competence of principals', *US-Education Review* 5(2), 109–117. https://doi.org/10.17265/2161-6248/2015.02.005

Yong, G. & Pearce, S., 2013, 'A beginner's guide to factor analysis: Focusing on exploratory factor', *Journal of Quantitative Methods for Psychology* 9(2), 79–94. https://doi.org/10.20982/tqmp.09.2.p079

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This book investigates the intersections between education, social justice, gendered violence and human rights in South African schools and universities. The rich and multifarious tapestry of scholarship and literature emanating from South African classrooms provides a fascinating lens through which we can understand the complex consequences of the economies of education, social justice imperatives, and gendered violence on the lives of women, children and marginalised communities. The scholarship in the chapters challenges readers to imagine alternative futures predicated on the transformational capacity of a democratic South Africa. Contributors to this volume examine the many ways in which social justice and gendered violence mirrors, expresses, projects and articulates the larger phenomenon of human rights violations in Africa and how, in turn, the discourse of human rights informs the ways in which we articulate, interrogate, conceptualise, enact and interpret quality education. The book also wrestles with the linguistic contradictions and ambiguities in the articulation of quality education in public and private spaces. This book is essential reading for scholars seeking solid grounding in exploring quality education, the instances of epistemic disobedience, the political implications of place and power, and human rights in theory and practice.

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