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SYSTEMATIC REVIEWS OF
**RESEARCH
IN BASIC
EDUCATION**
IN SOUTH AFRICA

CHAPTER 1

Systematic reviews in basic education in South Africa: The gold standard of evidence for educational decision-making

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Abstract

There is growing evidence based on practice and research-led development that informs decision-making in education in general and basic education in particular in South Africa. Much inspired transformation has happened in education since 1994 with notable improvement of the system. Even though the apartheid regime was discontinued in 1994, we continue to see the existence of two systems of education: one that serves the affluent minority communities and the other that serves the underprivileged majority. Secondly, despite the considerable financial budget spend on education, South Africa continues to be at the bottom of performance league tables, outperformed by countries that spend less on education with substantially limited resources. The purpose of the chapter is to highlight how the following chapters contribute to the knowledge base by conducting systematic reviews in selected areas in basic education. This methodology is most likely to provide the best evidence that is available in South Africa upon which school improvement and learning outcomes can be enhanced. We conclude by giving a synopsis of each chapter's contribution, outlining the purposes and how a systematic review is to be carried out in each.

The overarching concern of this book is to condense the increasing, broad literature base to highlight the best evidence that tells us where the education system is doing well and where it continues to falter. The book is thus purposed at creating a valid basis for future work that can be used to drive qualitative improvements in the basic education sector.

Introduction and context

Basic education in South Africa is designed for learning that takes place in primary and secondary schools over twelve years, from Grade 1 (6 - 7-year-olds) to Grade 12 (18 - 20-year-olds). Learners who succeed in year 12 exit with a matriculation certificate, which enables them to transition to different forms of tertiary level education and into employment.

This book focuses on obtaining the best available evidence on which school improvement and learning outcomes can be further developed and enhanced in South Africa. However, the areas of research included depended, to a large extent, on the availability and willingness of the authors to undertake complex

systematic reviews in the areas. It centres on some of the most enduring issues about basic education in South Africa. We were keen to create a one-stop resource that policymakers, practitioners, researchers and students could use as a reference for the best available evidence that will inform their decisions around improving the quality of teaching and learning, as well as learner outcomes.

There is widespread agreement that systematic reviews provide the best testament to support practise and aid decision-making (Moher et al., 2015). As a team of authors, we decided to follow this protocol to unequivocally direct new areas for research and knowledge generation.

A key reason for undertaking this project is that the South African education system is in crisis (Fleisch and Schöer, 2014). One of the factors contributing to this crisis is that, despite overturning apartheid in 1994 (a system that was based on differentiated access to resources based on race), a bifurcated system persists. Two systems of education exist: one that serves learners of the minority affluent communities and another that serves the majority underprivileged communities. These systems are vastly different in terms of resource endowment, quality of teachers and nearness to factors of poverty. The schools for the privileged, a small segment of the country's schools, contribute nearly 90% of the children who proceed to a university. On the other hand, the majority learn in poorly resourced schools with poorly qualified teachers and deliver the least valuable outcomes for learners, such as the highest numbers of school dropouts, failures, repeaters and children who finish school without being able to read and write.

The chapter begins by providing the context of education under apartheid. With knowledge of how apartheid education degraded the majority, we move on to briefly explore post-apartheid education, both the success in alleviating inequality as well as its failure in doing so. We progress to explore literature that emphasises the need for education improvement. We also focus on the role and significance of education in development. We start with some definitions. We end by giving a synopsis of chapters in this book, justifying the selection of the areas of education represented by each chapter. Before providing the context of education in South Africa, we explore the notion of systematic review as it provides a basis for the work that is reported in the chapters of this book.

What are systematic reviews?

Systematic reviews differ from ordinary reviews of literature in that they provide a comprehensive and unbiased analysis and synthesis of the literature in the area under study. They are undertaken primarily to bring together the state of knowledge and understanding in a given area as a basis for identifying what is well known and less well known. They provide a valid basis for evaluating the quality and efficacy of evidence in an area of research or practice. Traditionally, systematic

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reviews originated in the medical sciences and thus have a quantitative origin. The need to pull together the evidence for the impact of a given intervention, such as a new treatment, is fundamental to decisions about the wider application of those interventions and treatments. Although systematic reviews are now an important part of testing evidence in qualitative research, their use is not as extensive as it is in quantitative research dimensions.

There are multiple definitions of systematic reviews in the literature, which reflect varying emphases and focuses. However, there seems to be general agreement that systematic reviews collate empirical evidence that fits specified eligibility criteria in pursuit of answers to pre-specified research questions (Petticrew and Roberts, 2008). Three critical elements appear to be important in the conceptualisation of systematic reviews. The first is the aspect of drawing evidence from empirical research, not just from random practice guides and sources of good practice. Secondly, systematic reviews are based on eligible evidence. This has to be determined by the reviewers and specifically defined to provide the parameters within which the evidence is collated. The third element of systematic reviews is that they provide evidence for pre-specified questions. It is broadly agreed that systematic reviews are developed around the following assumptions and purposes:

A systematic review:

Answers a focused research question

Employs a comprehensive, reproducible search strategy

Identifies all relevant studies (both published and unpublished)

Assesses all results for inclusion/exclusion and quality

Presents an unbiased, balanced summary of findings.

Types of systematic reviews

There is a wide variety of systematic reviews, which sometimes makes this area a rather difficult one to understand. To simplify matters, the multiplicity of systematic review types can be described meaningfully in two broad ways: by the models through which they are conducted and by the functions they serve.

Three broad models representing the three extensive research world views are recognised: quantitative, qualitative and mixed methods models.

Quantitative systematic reviews bring together evidence about a specific topic based on research in the quantitative paradigm. However, just like other broad world views, the quantitative domain is not a monolithic entity, as it shelters several varieties of numerically driven statistical data of a strict measurement type, using valid and reliable measurement tools (Stern et al., 2018). Examples of quantitative research include experimental, quasi-experimental, surveys, amongst others. For instance, a researcher working in the area of educational wastage might wish to

determine the most important causes of school dropout in a specific district based on studies that utilised the questionnaire survey approach to yield quantitative data.

Qualitative systematic reviews pull evidence from more constructivist research (Seber and Lee, 2012) based on observations, interviews, focus group discussions, amongst others. Here the data is open to interpretation and the researcher and the researched are integral to the new knowledge production process and outcome. For example, using the same example of educational wastage, a researcher interested in determining the causes, impact and effects of school dropout interventions might wish to review all research that used in-depth interviews with high school learners to investigate the phenomenon over a stipulated period. Review papers might then be sampled from the pool of qualitative research that sought to explore the three interrelated dimensions.

Mixed methods systematic reviews utilise evidence from research based on combinations of qualitative and quantitative models of data gathering and analysis. Again, using educational wastage as an example, researchers may seek to draw on evidence from studies that utilised surveys and interviews with learners in school. Such studies usually privilege the notion of triangulation as a quality assurance mechanism. Evidence from different research traditions on the same topic is brought together to inform decisions about policy and practice.

Systematic reviews: Approaches and purposes

Within the three models mentioned, three quite distinct approaches are deployed commonly to serve equally distinct purposes. The first approach refers to scoping reviews. These are normally used, as the name suggests, to develop an idea of the nature, types and approaches to researching phenomena, especially in an emerging area. Often, the starting point is that not enough is known about the nature and efficacy of the evidence, how the research was done, who the researchers were, their aims and other unknowns. The major purposes of scoping reviews are to: understand what aspects of a phenomenon seem to be generating interest and why; what methodological approaches seem to characterise the research in the field of interest; what seem to be the convergences and divergences in the evidence; and the identification of what still needs to be done (gaps) and developed in the area (Munn et al., 2018).

The second approach is a meta-review, also known as an integrative review. These tend to be conducted in well-established research areas awash with a wealth of evidence available in peer-reviewed journals. Also, such areas usually have a strong tradition of systematic reviews. In such cases, meta-reviews tend to build on already available evidence to see if, cumulatively, the evidence can be built into theory. Meta-reviews tend to deploy analytic techniques that include the integration of statistical modelling to summarise the results of several studies

(Deeks et al., 2001). Although meta-reviews are more common in quantitative analyses, they are increasingly being used in qualitative research especially for purposes of gathering or integrating evidence from previous systematic reviews in each area (Muka et al., 2020).

The third approach is a diagnostic test accuracy systematic review. As the name implies, these reviews pull evidence from published research based on test measurements of specified phenomena. For example, learner performance in a given subject could be measured through multiple-choice tests, open-ended tests, practical activities and oral presentations, amongst others. The question for educators might have been to determine the most reliable test to verify learner performance and to make decisions about certification and progression. The reviewer might then analyse the reliability and validity of a variety of test regimes to determine which of these score highest in predicting future performance, progression and quality of learning.

We finally examine the major methodological steps in conducting a systematic review.

Key steps in conducting a systematic review

There are a significant number of review publications especially under the ambit of major systematic review organisations such as the Cochrane, the Joanna Briggs Institute for healthcare research, the Campbell Collaboration for social sciences and the impact of social interventions, and PROSPERO, an umbrella organisation for many systematic review entities. Conducting a systematic review is considered a four-step process, although the procedure has been expanded into longer lists in various systematic review protocols. The following is a condensed protocol that is extensively detailed in various places (see for example Higgins et al., 2019; Boland et al., 2014).

1. Putting together a team for the review

A minimum of two or three people is often recommended for a systematic review. This provides an opportunity for cross-checking the findings and collating decisions to enhance the efficacy of the evidence.

2. Defining the question/s for the review

This requires an initial scoping of the literature to determine gaps in the field of interest based on which the question/s can be formulated.

3. Identifying the research or studies to be included in the review

This requires clarity on inclusion and exclusion criteria for admitting studies in the review. Inclusion and exclusion criteria might include when the studies were published, the research models used such as all research conducted using questionnaire surveys, whether gender participation is important, amongst others.

The exclusion and inclusion criteria should reflect gaps in the literature and the research questions set out for exploration.

4. Careful reading of the admitted articles to determine answers to the research questions followed by analysis and conclusions

We now turn to the context of education in South Africa.

The context of education under apartheid

It is important to briefly frame the context by going back to where it all began. Both structurally and legislatively, apartheid was an extremely vicious institution under which the black majority was exposed to the most degrading and excruciating circumstances. The system exerted various forms of violence on local populations, as briefly outlined in the following sub-sections.

Intellectual violence

The primary aim of education under apartheid was to produce a cadre of unambitious and feeble-minded learners who saw themselves only as subservient to the needs of their white masters (Ndlovu-Gatsheni, 2015). Under apartheid, education for blacks was the starkest symbol of separate and unequal development. Government subsidies for education were administered according to race, for example, favouring white schools with educational subsidies that were close to 30 times better than those for black schools (Ndlovu-Gatsheni, 2015).

The purpose of this policy was to develop a vast pool of unskilled labour within the black population whose mental capacities were carefully honed for a life of unquestioning service to the white masters (Ndlovu-Gatsheni, 2015). The virtues and ambitions of education as a desirable pursuit were flagrantly ignored. At no time did the ambitions for educating children of the black majority reflect the intentions of the enlightenment period under which settler regimes were operating. On the contrary, despite the avowed mission of emancipating the 'dark continent', the children of the majority black population were never to be educated to the same levels as their white counterparts. This sustained epistemic violence left a legacy of underdevelopment of the victims of apartheid, and more broadly, of colonialism in South Africa.

Cultural violence

A strategy for capturing the local people's minds was to make sure that blacks viewed their culture as being inferior to that of whites (Galtung, 1990). A sustained campaign through the media, learning materials and books, religion and language policies in schools ensured the decimation of indigenous cultures in favour of white culture (Galtung, 1990). Using local languages in black schools was punishable. For example, black children, despite learning in separate schools from white children, were prevented from using local languages, even for informal communication on

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the school grounds. As language is a cornerstone of any people's culture, denying people the use of their mother tongue is a clear act of violence against their cultural being. In some places in South Africa, there were notices which read 'Dogs and Africans not allowed beyond this point'. This was a clear indication of the lack of value attached to blacks as people and as cultural beings.

The idea that 'white is good' while 'black is bad' was subtly communicated in multiple ways. Skin lightening creams were heavily marketed to influence people to despise their original skin colours in favour of lighter skin colours. For example, a skin lightening product named Ambi was an acronym translated by blacks to mean 'Africans May Be Improved'. In films, black people were always presented as backward and uneducated. In Tsodzo (1981), a textbook that was used in black schools, Zuze was delivering bread from the bakery to a company in the city when he decided to eat one of the loaves because he was hungry. The company wrote back to the bakery indicating that the delivery was one loaf short. Zuze was puzzled as to how a simple letter (that could not 'speak') could land him in so much trouble. He then beat up the invoice with a long stick, blaming it for reporting him. That is how backward – to the point of retardation – blacks were depicted in some books.

Religious violence

To a large extent, African traditional practices, including their religious beliefs, were the subject of immense violation during apartheid. While local people had a strong belief in God, one aspect tried Christianity tried to eliminate from black people's belief systems was the role of spirit mediums in connecting with the Lord (Matheba, 2001). For whites and Christianity in particular, black spirit mediums could not be depicted as conduits of God's purpose for mankind. Instead, the view was that such mediation is possible only through a white representation of Jesus, who would have had blood lineage closer to Africans than to Europeans (Coetzee and Roux, 2003). Until recently, practices such as traditional African weddings were considered as religiously (and even legislatively) invalid, as only a 'white wedding' would be satisfying to the Lord.

Social violence

Apartheid had the effect of disrupting the social organisation of indigenous lives. Due to urbanisation, men, and to a lesser extent women, were drawn to the urban centres, and mining or farming areas to do menial tasks as labourers or domestic workers (Osman and Petersen, 2010). The sophisticated organisation of local people's social lives, which they lived communally, respectfully and with dignity, was replaced by more individualistic lifestyles, based not so much on social cohesion, but on a monetised system of competitive and exploited existence. The entire social fabric of black societies, where entire villages (not only families) had the responsibility of raising children, was fractured as new patterns of settlement grew and new forms of labour developed. In education, such fracturing of the social

fabric continued, as evidenced by the emphasis on individual learning approaches, high stakes assessments and learning content that had little or no relevance to people's everyday experiences.

In short, apartheid sought to destroy the entire essence and value system of local indigenous people, through an orchestrated, epistemicidal process (Grosfoguel, 2007). Schools taught new values, new knowledge and new belief systems while wiping out existing ones that were considered as subhuman, barbaric and underdeveloped.

Table 1.1 summarises the nature, form, purpose and impact of apartheid education on blacks and whites in South Africa. The summary portrays a highly differentiated, divided and unequal education system based on a deliberate racialisation of society, through which advantages and privileges were apportioned along racial lines. This racialisation of privilege became the cornerstone of the apartheid regime, the lens through which the regime sought to be understood and justified.

Table 1.1 *Comparing the racial bases of apartheid education in South Africa (own summary)*

Dimension of education	White system and learners	Black system and learners
Philosophy and purpose	To develop leaders of industry and society	To develop cheap labour for menial tasks
Nature of curriculum	Leadership and critical thinking skills Emphasised STEM subjects	Conformity focusing on basic functional competencies Emphasised liberal arts
Teacher capacity	Highly qualified and well paid	Poorly qualified and poorly paid
Subsidy	30 times more than blacks	30 times less than whites
Teacher-student ratio	Small 1:15 (private)	Large 1:45 (public)
Progression routes	Majority proceeded to university and other tertiary institutions	Majority did not succeed and became absorbed in low-paying jobs
Leadership	Well qualified, graduate principals	Poorly trained, non-graduate principals
Educational throughput	Highly efficient	High wastage and poor learning outcomes

Post-apartheid educational reform: Successes and failures

In this section of the chapter, we briefly, but critically review the post-democracy interventions in the basic education sector in South Africa. We refer to the work of Badat (1997), Christie (1996), Fataar (2008), Fleisch (2008), Spaull and Jansen (2019) and Kallaway et al., (1997) to support the argument that while much has

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been achieved to promote physical access to schools, plenty remains to be done to achieve epistemological access across the basic education system in South Africa.

At first, at the dawn of democracy in 1994, there were almost a million black children out of school (Kallaway et al., 1997), so the new government was expected to urgently address the matter. Education became democratised, in that access to schools was no longer based on race. Successive colonial and apartheid governments had excluded black, and to a lesser extent, coloured and Indian children from white schools, in line with the principle of separate and unequal development based on race. Almost overnight, by 1995-6, all school-age children had earned their right to be in school, although often in crowded conditions and sometimes under trees. Today, evidence shows that South Africa has achieved almost 100% participation for school-age children (Government of Education, 2020), accommodated in schools throughout the country. However, legacies of apartheid are still evident, and five legacies are discussed in the following sections.

Basic education in South Africa is a paragon of inequality. The South African basic education system, despite being the most well-funded on the African continent, including being a product of more than 20 years of development following the collapse of apartheid in 1994, is one of the most unequal systems of education in the world. Basic education provision in the country continues to trace the contours of poverty, deprivation and social status. For example, Fleisch (2008) discusses two systems of basic education in South Africa. One is for the rich and serves the needs of approximately 10% of the richest people in the country, most of whom are whites. This system operates in state schools with abundant and modern infrastructure, facilities and resources, including the best teachers in the country. The majority of the children who attend these schools proceed to universities in the country and elsewhere. The remaining 90% of the children in South Africa learn in poorly resourced schools, with poor infrastructure (such as pit toilets, no running water and inadequately trained teachers) and without adequate books and other learning materials. The majority of learners in these schools contribute to the phenomenon of wastage, to which we now turn.

Secondly, basic education in South Africa is blighted by high wastage. Wastage in education is a symptom of an ailing system, manifesting in several ways: schools in South Africa experience some of the highest rates of dropout, failure, repeating and non-completion. In aggregate terms, basic education in South Africa loses approximately 35% of children who do not complete the full 12-year cycle. For example, about 1.2 million children started school in 2007 and only 800 000 registered to write the final matric (NSC) examination in 2019. This means only 67% of learners completed the full 12-year cycle, while close to 35% were unaccounted for. The majority of learners appear to dropout in year 3, when the initial excitement about going to school seems to wane, and in Grade 10, when the schools actively cull out struggling learners from schools, to allow only those with

proven capability to proceed to the final two years of basic education. Evidence for this was found in a large-scale study in 2 000 schools in Mpumalanga in South Africa (Maringe, 2017). In primary schools (Grades 1 to 7), more boys dropout than girls, while, in secondary schools (Grades 8 to 12), more girls dropout than boys. Teenage pregnancies tend to account for the majority of girl child dropouts at secondary level. The majority of boys who drop out tend to do so for academic reasons. In the Mpumalanga study, close to 60% of boys dropped out of secondary school on academic grounds, largely based on the inability to read and write. The Maringe (2017) study also found evidence of over-age learners in many schools. They represented a small, but significant 11% and were mainly the result of poor achievement and the requirement for schools to achieve minimum learner outcomes and targets before they could be progressed to higher levels of learning. The basic school system is a wasteful system.

Thirdly, the basic education system delivers poor literacy and numeracy outcomes. Many studies in South Africa show that learners are generally two to three classes below their expected reading levels. For example, by the time learners leave primary school at the end of Grade 7, close to 60% have reading levels equivalent to those expected of children in Grade 5 (Van der Berg, 2008). Almost 75% of learners in Grade 7 cannot perform basic mathematical operations, such as addition, subtraction, division and multiplication (Spaull and Kotze, 2015). Inadequacies in these two areas are due to a wide range of factors including weaknesses in teachers who are not skilled in teaching reading and writing and lack of resources, especially in schools located in areas of multiple deprivation.

Fourthly, the basic education system does not deliver strong outcomes in the STEM subjects, which have stronger relevance to economic development. Both in relation to participation and performance, learners involved with STEM subject learning are significantly fewer and exhibit weaker performances, compared to participation and performance in other subjects of the school curricula (Spaull, 2013). In 2019, the lowest pass rates in Grade 12 were recorded for mathematics, physical sciences and accounting. Fewer students also registered to write examinations in these subjects (Mlachila and Moeletsi, 2019). Further, the evidence suggests that female students tend to shy away from studying these subjects. This perpetuates the gendered nature of careers, where, for example, more males become engineers, while more females tend to join the caring professions in nursing or early grade teaching.

Finally, the basic education school system is led by principals with no formal leadership background. School principals in South Africa are recruited in schools not so much because of their leadership abilities, but because of the length of experience and service as teachers in schools. This delivers several weaknesses to the system. For example, school leadership is wrongly linked to people's length of service as teachers, rather than as a function of people's leadership capabilities

(Mestry and Singh, 2007). In the end, school principals become simple purveyors of other people's bright ideas, as they resort to uncritically replicating what they have learnt from those who led schools before them. They tend to be passive implementers of tacit knowledge exhibiting normative, rather than critical, understanding of ideas and the context of school leadership. Without a theoretical understanding of school leadership, many school principals in South Africa tend to impose solutions that have little or no relevance to the specific contexts of their schools. For example, imposing rules about arriving early at school before dealing with the issue of reliable transport systems in the area constitutes the application of the right solution to the wrong problem. There is a limit to which school leaders in South Africa can be expected to drive meaningful school change and improvement. While a significant amount of research in education is published by South African scholars, compared to scholars in other parts of the continent, the evidence continues to exist in disparate spaces, which are not always accessible to those who work in the school systems. Also, much of the evidence that gets reported in South African peer-reviewed journals tends to be based on small scale research and interventions deemed to be inadequate evidence to support new practices and interventions on their own. This book has been written with the hope of pulling together disparate sets of evidence and assessing the extent to which we could make generalisations to influence teacher action and interventions and to drive school improvement in the country.

This book, thus, aims to identify weaknesses and strengths of the basic education system in South Africa and to become a useful basis upon which meaningful change and transformation can be conceptualised and developed. For a country perpetually languishing at the bottom of performance league tables and which persistently is outperformed by countries that spend much less on education with poor resources, the book will provide a solid base for understanding what works and what does not work in South African schools.

The above scenario paints a picture of a school system with good intentions and with a record of achieving high levels of physical access, but with a shockingly poor record of epistemological access, poor leadership, poor results in STEM subjects, poor numeracy and literacy outcomes, high wastage and inequality. In the following section we explore the literature on school effectiveness and improvement.

The need for education improvement

Much research highlights the need for improving education as a prelude and stimulus for development (Gibbs et al., 2001). Five interlocking elements are closely linked to school improvement research (Gates et al., 2019; Hoachlander et al., 2003). The elements are human capacity development (that includes improving teachers' pedagogical competencies), improving the leadership and management

of schools, deployment and utilisation of educational resources and infrastructure, improving and enhancing the quality of learner-learning time and improving school infrastructure (especially learning and teaching technologies). Amongst the most promising evidence of what works in fostering school improvement, by helping to raise learner outcomes, are the following:

1. Focusing on learner achievement all the times
2. Increasing learner engagement and motivation
3. Providing sustained professional development
4. Focusing strongly on the management of learning
5. Building links between schools and parents, other equally ambitious and interested schools and private organisations
6. Establishing a culture of strong assessment for learning to support learning outcomes
7. Promoting effective school leadership practices that enable school improvement

A key purpose in this work is to evaluate the extent to which the material covered in this book provides further evidence to support the above framework of school improvement recommendations. In the context of South Africa, we need to identify the gaps in school practices in light of the evidence from research. In particular, in this context, many of the current gaps and challenges originated during the apartheid era. Education is considered to be a significant tool in developing countries. The next two sections discuss the role and contribution of the education sector to development.

The role of education in development

The need to improve education has always been at the forefront of all nations' developmental aspirations (Altbach, 2015). This is even more applicable to countries such as South Africa that existed under repressive regimes for many years, where education was used not as an instrument for developing people, but as a strategy for subjugating the majority of the local population into positions of servitude, servanthood and disadvantage (Ndlovu-Gatsheni, 2015). During the apartheid era, education for the black majority was a pale shadow compared to that provided for their white counterparts. Education for black children was delivered separately and it was poorly resourced, financially, materially and in terms of the quality of its teachers. No other factor is more important than education in the development trajectories and ambitions of a country, since the education sector provides the basis for development in any country. To appreciate this notion, we briefly outline some of the key contributions of a solid and effective education sector to the development of nations.

Contribution of the education sector to development

Classical economic theory propounded by Smith (1960), Schultz (1961) and Dennison (1962), amongst others, clearly identifies three facilitators of economic production, namely human capital, financial capital and the land. Education is at the centre of economic and social growth through the development of knowledge, skills and attitudes as fundamental elements of human capital development. Through education, sometimes referred to as schooling or training, albeit with both nuanced and fundamental differences, societies prepare their citizens to participate more broadly in development. Financial capital is best understood from the observation that challenges are not simply resolved if we allocate great amounts of money to them. Financial prudence, namely the judicious allocation and use of monetary capital, occurs only through people who are specially trained for that purpose. Therein lies the central importance of human capital developed through our education systems. The third element, land, is a repository and producer of minerals and agricultural produce, as well as a sanctuary for flora and fauna. Without knowledgeable human capital, land on its own does not provide the added value needed for development, food security and environmental sustainability.

Although (as we shall see below) South Africa allocates and spends extensive sums of money on its education systems, such large-scale investment does not seem to yield commensurate dividends. For example, according to Cohen (2017), in relative terms, South Africa allocates a higher proportion of its budget toward education than do the United States, United Kingdom and Germany. Yet in terms of outputs and performance, measured via several international instruments such as the Programme for International Student Assessment (PISA), South Africa performs poorly compared to the rest of the world, including countries with a lower GDP and those whose education budgets are a fraction of that it is in South Africa (Mlachila and Moeletsi, 2019). An OECD (The Organisation for Economic Co-operation and Development) report, for example, shows that South Africa's school children are ranked 75th out of 76 countries in the world in maths and science, better only than Ghana (Keeley, 2015). Relatively poor countries outperform South Africa, such as Kazakhstan (ranked 49), Tunisia (ranked 64), Botswana (ranked 70), and Morocco (ranked 73). Even though the amount spent on education can be viewed as a criterion of educational performance, based on the assumption of a link between resources and outcomes (Fourie, 2006), the inverse relationship between education financing and performance in South Africa provides a hard-to-explain case and calls for serious review.

Hierarchies of knowledge from research

To begin with, there is widespread belief that quantitative research provides better and more robust evidence. For us, this is an over-generalisation, which should be

treated with caution. Research evidence is only as good as the questions it seeks to answer. If the question is about the comparison of performance in different treatment groups, then we will be the first to admit that a quantitative approach to the comparisons would be the best way to handle this question. However, one may be interested in knowing stories told and the feelings that people have about a new intervention, how they have experienced it and what they think needs to be done for better impact. Thus a qualitative design would be best suited to the purpose of finding the answers. We are the least likely to be persuaded by the idea of hierarchies of knowledge, as we know them, except to say that there remains a strong view that quantitative research provides more efficacious answers to research questions (Table 1.2).

Table 1.2 *Hierarchies of knowledge from research*

The most highly valued knowledge form	Systematic reviews	Most highly valued knowledge, as it represents the best knowledge in any area for a given time	Select best research from both traditions to estimate the state of knowledge in needed areas
Quantitative knowledge approaches that are highly valued	Randomised control experiments	Designed to test whether treatment effects differ significantly from control effects	Often utilised for high-stake decisions, such as when people want to know if a newly discovered treatment is effective
	Quasi-experimental	Designed to conduct experiments with no control effects	Used in situations where, for ethical and social justice reasons, groups cannot be separated
	Surveys	Administered via questionnaires, anonymously and in confidence	Capacity to reach out to large populations and, therefore, the potential for high representativeness
Qualitative knowledge approaches that are highly valued	In-depth interviews	One-on-one encounters	Valued for their in-depth nature, rather than for generalisability of findings
	Narratives/biographies	Stories told by participants	Valued for the interpretive nature of the data and the personally meaningful accounts
	Focus group interviews	Small groups that share understandings and opinions about broad social issues	Valued for their social constructivist potential to knowledge generation
	Ethnographic studies	Observing people in their natural environments over time, involves living with the research participants	Valued for its socio-cultural embeddedness

Knowledge obtained through quantitative approaches is valued for its:

- Predictive value
- Generalisability
- Representativeness across relevant segments of society
- Relative ease and ability to be turned into visually meaningful representations

On the other hand, knowledge obtained from qualitative approaches is valued for its:

- Specificity and in-depth nature
- Ability to present opportunities for unsolicited knowledge to emerge
- Value in being context-specific rather than in being generalisable
- Capacity to be turned into stories, as they comprise of people's views and perceptions

The Quantitative/Qualitative debate

There is no question that quantitative knowledge has exerted dominance and significance over qualitative evidence for the reasons listed above. There is a general belief that numbers do not lie, whereas words can mean anything. Quantitative knowledge is thus associated with universal truths, which can be generalised and applied more broadly, while qualitative knowledge is of more specific and particularistic relevance (Bryman et al., 2008).

Despite the obvious advantages associated with each, the approaches to evidence gathering have their weaknesses too. Quantitative research depends on the possibilities of gathering representative samples, from which the relevant generalisations are made (Polit and Beck, 2010). Establishing truly representative samples is notoriously difficult at the best of times. Individual's responses to questions can be influenced by environmental conditions. For example, if a company wanted to launch a new drink, participants tasting the drink in hot and cold climates may react differently to the question of how refreshing the drink is. Even if the responses are consistent within the different groups, the decisions could very well be skewed by the influence of an external environmental issue. Further, the statistical modelling required tends to frighten people who have minimal mathematical skills. So, quantitative knowledge has the potential to be inaccessible to the majority of the population and because of that, it can be considered as exclusionary and/or exclusive or elitist. Because of the large size of audiences and participants, quantitative research can be quite resource-intensive and expensive to conduct. This also contributes to its exclusiveness, where only the financially privileged can utilise these knowledge systems.

On the other hand, while qualitative knowledge brings depth to our understanding of issues, it cannot be generalised to the population in the same way quantitative evidence can be (Rahman, 2017). Equally, qualitative research generally utilises small samples, which may not always be truly representative of the population under study. There is also a great deal of investment needed to develop a personal relationship with the participants, since the extended and repeat interviews have to be negotiated on trust. It is also notoriously difficult to judge the quality and authenticity of data from qualitative interviews.

Kuhn's paradigm wars have highlighted the debates and controversies surrounding quantitative and qualitative research. However, emerging from these debates is a third way of looking at research from a mixed-method perspective. Although the term 'mixed-method perspective' seems easy to grasp, it has become a broad church of ideas, which seek integration, rather than isolation and exclusion; pluriversality, rather than universality; and a preoccupation with a holistic understanding of phenomena, rather than understanding driven by single perspectives (Fetters et al., 2013). Several designs have been developed to represent mixed-method approaches. These include iterative mixed-method designs, which are based on the dynamic interplay of quantitative and qualitative approaches in a spiral way, aimed at creating interpretive value to the research; and embedded, or nested, mixed-method designs, in which some methods are located or interlocked within other approaches. For example, one may seek to determine the number of times an issue is raised by different interviewees in a quantitative way. Such approaches value complementarity of knowledge designs. Holistic designs utilise independent research approaches to explore single phenomena to bring a better understanding of complex phenomena.

The authors were invited to a launch meeting, where these ideas about systematic reviews and basic education were explored first. In particular, the meeting required participants to go away with a carefully crafted question around agreed themes in basic education in South Africa. The following section gives a synopsis of the chapters of the book.

A synopsis of chapters in the book

Chapter 2 is titled *Interventions to improve learner achievements in South Africa: A systematic meta-analysis*. Besharati, Fleisch and Tsotsotso argue that non-achievement of learners is one of the significant concerns in basic education. Some literature indicates that 90% of the learners in South Africa underperform because they learn in poorly resourced schools, with poor infrastructure and without adequate books and other reading materials (Spaull, 2013). As discussed previously in this chapter and elsewhere, all the international comparative education performance measurements indicate that overall, South Africa's education system

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performs relatively poorly, particularly in science and mathematics, and reading and comprehension tests, compared to similar education systems in the world (Fleisch, 2010 Spaul, 2013). Thus, this chapter conducted by Besharati, Fleisch and Tsotsotso is very necessary. They completed a review of 165 effects of 37 education interventions implemented in South Africa post-1994. The review appraises 35 impact evaluations and conducts a comparative meta-analysis of rigorous experimental and quasi-experimental studies implemented in South African schools. The chapter aims to explore the various contextual factors and internal design features that influence the magnitude of the effects reported in various impact studies. It provides a synthesis of 20 years of empirical evidence from post-apartheid South Africa. Through the use of multiple treatment meta-analysis, the study analysed the impact of some of the major interventions implemented in public schools over the past twenty years. The South African education system continues to suffer from a weak public school system. In comparison with regional and international learner assessments, South Africa's underperformance is well documented and despite the numerous interventions, the challenges remain apparent.

Chapter 3 is titled *The impact of poverty on basic education in South Africa: A systematic review of literature*. Authors Chikoko and Mthembu examine how poverty has impacted on basic education in South Africa, even long after the apartheid regime. As discussed earlier and elsewhere, there is an enduring phenomenon of poverty that afflicts the majority of schools in the country and that is an indictment of a systemic paralysis of unprecedented proportions in the sector. This phenomenon is exacerbated by the unabated widening of school and educational inequalities and deepening poverty differentials between schools that serve different racial and socio-economic groups in South Africa. While there is a substantial body of research on the impact of poverty in education, there remains a dearth of evidence that evaluates the impact of post-democracy interventions introduced to circumvent the effects of poverty on schooling. This chapter therefore reviews the literature on how poverty has impacted basic education in post-apartheid South Africa. The authors have established the gap that, although some necessary steps to eradicate poverty are evident in the extant literature, the impact thereof is not sufficiently evident. The methodology involved a three-stage systematic literature review process to select work for review and subsequent inclusion in the chapter. The three stages involved a search of a wide variety of literature through Google Scholar, EBSCOhost, Sabinet and ERIC. From the wide choice in stage one, the authors selected peer-reviewed journals in stage two and working papers presented by academics in stage three, to use for the systematic review, which covered ten years, from 2009 to 2019.

Chapter 4 is titled *School effectiveness and improvement: Review and evaluation studies in South Africa: A systematic and critical appraisal*. There is a real need to

review the literature on school effectiveness and improvement because despite several studies that inform school improvement, there is a far more resilient legacy from the past that is the low quality of education within the formerly disadvantaged parts of the school system (Taylor, 2007). De Clercq and Shalem critically analyse eight reviews and evaluation studies of school effectiveness and improvement interventions conducted in South Africa from 2000 up to recent. The chapter aims to explore and understand what exists in the extant literature about learner improvement and theories of change. This is achieved by answering the following questions: What do these studies tell us about school effectiveness and school improvement factors associated with better learner performance? How and why may these factors improve school effectiveness? The chapter argues that current studies on review and evaluation do not engage with any theories of change. It further argues that they largely bracket out how chronic poverty, in which most learners in South Africa live, affects knowledge acquisition.

Chapter 5 is titled *Leadership research on basic education in South Africa: A systematic review*. Leadership is acknowledged to be critical for school improvement and success. However, it seems that school leadership in South Africa remains devoid of training for incumbents. Thus, this research conducted by Bush and Glover is crucial. The authors explore the policy background to school leadership from 1996 to 2007. The chapter argues that this was a period of radical change and it consequently aimed to ascertain how policy and practice are reflected in existing research outputs. The chapter performs a systematic literature review and also builds on the authors' previous research and writing on school leadership in South Africa. Through general search engines, 473 references were considered, but the fine-grained selection identified 138 sources. The chapter acknowledges the growing body of empirical evidence, but also notes that data is still uneven and research remains underdeveloped in some areas. Moreover, the available literature takes a normative stance, which often has weak empirical underpinnings.

Chapter 6 is titled *A Systematic review of trends in teaching and learning research*. Teaching and learning are significant ways that move societies out of poverty, yet we lack substantive research that examines it. Dison and Kearney report on the findings of a systematic review of studies on teaching and learning in Basic Education and Training (BET) and Further Education and Training (FET) in South Africa over the past twenty-five years, to discern and expand the existing knowledge base. This chapter also aims to provide a conceptual framework for critiquing the assumptions and criteria used by researchers to select their sources of evidence. The authors were prompted by a lack of extensive research that examines teaching and learning in the classroom. In the systematic literature review, the gathering of literature was done using various search engines and identified 38 articles that met the eligibility criteria. These were determined using the analytical tool developed by the authors.

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Chapter 7 is titled *Science teacher professional development in post-apartheid South Africa: A systematic review of the literature on basic education*. Learners from historically disadvantaged communities perform poorly in science subjects that contribute more to the development of the country. Vhurumuku conducts a systematic review that involves analysing and synthesising existing research on science teacher professional development, from 1994 to 2019. Twenty articles were identified and selected, using various search engines. The purpose of this chapter is to identify the models that had a positive impact on science teachers, hence the potential to improve teacher effectiveness.

Chapter 8 is titled *Dealing with differences: A scoping review of disability in education in South Africa*. Authors McKenzie, Watermeyer and Meyerson utilise the inclusive education policy framework to examine access and participation of children with disabilities in basic education in South Africa. The purpose of the chapter is to explore the effects of the implementation of the inclusive education policy, as expressed in EWP6, in relation to the right to education and reasonable accommodation of children with disabilities, rights mandated in the Constitution and the United Nations Convention on the Rights of Persons with Disabilities (Republic of South Africa, 1996; Mégret, 2008). The literature, which was systematically reviewed specifically using the scoping review, has shown that these children's needs are largely subsumed within inclusive education research. Using various search engines, the chapter identified a total number of 1 281 records and 47 articles that were selected and included in the analysis. The chapter has indicated that there is very little research on the role or effectiveness of special schools in attaining desired outcomes.

Chapter 9 is titled *Research on mathematics teacher knowledge in Southern Africa: A 2010–2018 systematic review*. Despite the interventions, learners still perform badly in mathematics. Makonye conducted a systematic review, using Ball et al.'s (2008) research theme of mathematics knowledge for teaching (MKT). The purpose is to explain how pedagogical content knowledge (PCK) can be extended to the teaching of mathematics. The articles reviewed are from between 2010 and 2018 and the MKT framework was used to code articles. The literature reviewed showed that knowledge for content and student (KC & S) and knowledge of content and teaching (KC & T) are well-researched areas, but there is very little research on specialised content knowledge (SCK) and common content knowledge (CCK).

Chapter 10 is titled *A Systematic literature review of literacy and reading in South Africa* and reports on a critical literature review of scholarship in literacy and reading in South Africa from 2010 to 2020 that draws on critical discourse analysis. Key issues, trends and criticisms in the field are discussed. A three-staged methodology was used, which starts with searching educational databases to locate literature focused on literacy and reading scholarship. Each article and data were

categorised. Motilal examines literacy-focused empirical studies and theoretical papers in scholarly journals to reveal trends in the questions that researchers find interesting enough to pursue, the theories they find useful and the kinds of interactions that capture their attention.

Chapter 11 is a conclusion chapter titled *Imperatives for educational improvement in South Africa's basic education system*. Maringe and Chiramba conclude that there is still a crisis in the South African education system, despite the post-apartheid interventions. We highlight the complexity of the education process and its numerous interacting influences, the limitations and potential strength of research and the particular research challenges experienced when seeking evidence to guide educational decisions in South Africa.

Furthermore, we attempt to synthesise the evidence for what needs to be done to enhance the quality of several aspects of basic education in South Africa. We deduced and summarised some significant factors emanating from evidence from critical reviews in this book and propose interventions using insights from the evidence and conclude by highlighting ideas for policy review and further research.

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