

**A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A
GRADE R MATHEMATICS CLASS**

By

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DECLARATION

I, Seipati Lydia Baloyi-Mothibeli, declare that my dissertation, **A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS**, hereby submitted by me for MEd degree at the University of the Free State, is my own, independent work and it has not previously been submitted by me at another university or faculty.

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Signature: 

Date: December 2018

DEDICATION

This dissertation is dedicated to
Samuel Baekwa Baloyi (my late father),
Alice Gladys Malerato Baloyi (my mother)
Keamohetsoe Mothibeli (the heart of my heart)
and
My family at large

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God, in his infinite mercy, lifted me up and placed me on the shoulders of giants, so that I could reach what I could only dream about. I wish to express my sincere gratitude to the following people, on whose shoulders I could stand to complete this dissertation, which marks the end of the journey I undertook.

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ABSTRACT

The aim of the study was to design a strategy to improve professional curriculum practice in a Grade R mathematics class. In order to achieve this aim, the following objectives were highlighted throughout the study: to demonstrate and validate the need to design a proposed strategy, to identify the components necessary for the successful implementation, to explore a conducive environment for the success of the strategy, to anticipate possible threats that may hinder the successful implementation of the strategy, as well as to monitor evidence that the strategy was successful.

Grade R teachers are expected to engage with professional curriculum practice, thus, to improve the performance of learners in mathematics classes. However, they are inadequately qualified, and there is a shortage of teaching and learning resources. Additionally, there is insufficient parental involvement in the education of their children, lack of support from education authorities, and inadequate language of teaching and learning in Grade R mathematics classes. Bricolage as theoretical framework underpinned the study was employed. The theory enabled us as a team to use whatever material was available in the particular context to recreate the new processes and artefacts necessary to achieve a transformational and emancipatory agenda. As a researcher, I realised that I did not have the expertise necessary to design a proposed strategy alone. Therefore, participatory action research (PAR) was employed to generate data. This approach was used because it observes participants as humans, not as objects and aims at improving the lives of people, so that they can fit in and contribute to the education community. During the PAR process, data was gathered from consultative meetings, discussions, audio, audio-visual, photovoice and transect-walk, recordings, and reflections. Critical discourse analysis was used to analyse the generated data, through text and spoken words, social structure and discursive practices, in order to show how power, domination and control can be applied and be resisted in daily communication.

Among the findings are that Grade R teachers seem to be helpless, as their understanding of mathematics is limited, and they are unable to engage with professional curriculum practice in a Grade R mathematics class due to inadequate qualifications. Finally, the main recommendation is for further research is to answer the following question: Why is Grade R class, as the essential year of early childhood

development, is it not part of the bigger picture of when coming to curriculum planning and design?

Keywords: professional curriculum practice, Grade R.

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LIST OF ACRONYMS AND ABBREVIATIONS

CAPS	Curriculum and Assessment Policy Statement
CDA	Critical discourse analysis
CPA	Concrete pictorial and abstract approach
DBE	Department of Basic Education
DCES	Deputy chief education specialist
ECD	Early childhood development
LoLT	Language of teaching and learning
NAEYC	National Association for the Education of Young Children
NCTM	National Council of Teachers of Mathematics
PAR	Participatory action research
PCP	Professional curriculum practice
PLC	Professional learning community
PSSM	Principles and standards for school mathematics
SWOT	Strengths Weakness Opportunities and Threats
Unesco	United Nations Educational Scientific Cultural Organisation
Unicef	United Nations Children's Education Fund

CHAPTER 1: ORIENTATION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

This chapter gives a brief description of the background of the study; provides an overview of the study as a whole, and a short explanation of why I undertook this study, on designing a strategy to improve professional curriculum practice (PCP) in mathematics, with special reference to Grade R. The problem statement, a research question as well as the aim and objectives of the study is discussed. Furthermore, bricolage, as the theoretical framework that underpins the study, is discussed. Participatory action research (PAR) is used to generate empirical data necessary to respond to the research question in the study, and is explained briefly.

1.2 MOTIVATION

As an early childhood development (ECD) teacher, I became interested in ECD in 1997, when I was employed as a Grade R teacher in one of the public schools in my area. My love for teaching young children meant that I enjoyed my career choice. I was later promoted to head of the department responsible for the foundation phase and I continued teaching the same grade until 2002, when I was promoted to deputy principal at the same school. Because of my experience of teaching young children, as deputy principal, I continued to guide and support teachers of the foundation, intermediate and senior phases in curriculum matters, and I was responsible for the general school administration and the support staff.

My interest in teaching young children lead to an opportunity to work for the Free State Department of Education in the provincial office, as a Deputy Chief Education Specialist (DCES) in ECD: Sub-Directorate. My responsibility was to provide support to all primary schools across the province. I was also responsible for coordination and management of Grade R programmes and performed administrative tasks related to the ECD field. These duties involved monitoring and supporting the implementation of the Curriculum and Assessment Policy Statement (CAPS), well as ensuring that unqualified and underqualified teachers/practitioners are provided with the relevant qualifications through teacher development programmes and up-skilling. Currently I

am employed at the University of the Free State as a lecturer responsible for teaching student teachers enrolled for a qualification in early childhood and foundation phase.

During my interaction with different phases and grades, I realised that Grade R teachers face challenges related to inadequate qualifications, limited provisioning of teaching and learning resources, lack of parental involvement, insufficient support from education authorities, as well as barriers caused by language. My study emanated from the aforementioned challenges facing Grade R teachers. All these challenges hinder their engagement with PCP in Grade R mathematics classes, which results in inadequate performance by learners when they reach higher grades – this possibility motivated me to pursue this study. In order to be able to support my study, I review preliminary literature for four countries, namely, Ireland, Nigeria, Botswana and South Africa.

The dawn of a new dispensation in 1994 brought numerous changes to South African school education. These changes led to a paradigm shift that had a direct impact on Grade R teachers. As a result of this paradigm shift, teachers were expected to engage with PCP in Grade R mathematics classes, even though they were inadequately qualified to handle the subject. New teaching and learning approaches instituted after 1994 require that, in order for South African teachers to engage in PCPs for mathematics in Grade R classes, they require at least a Level 6 qualification with 360 credits; however, few teachers meet this requirement (Department of Basic Education, 2011a:6). The revised policy (Republic of South Africa, 2014:51) cautions that all new entrants intending to become foundation phase teachers (that is, to teach Grades R to 3), should register for the qualification, B. Ed Teaching, rather than a Diploma in Grade R teaching. The assumption is that some Grade R teachers are already enrolled for the Diploma in Grade R Teaching programme, and it might be difficult for them to withdraw, even if they meet the B.Ed. Teaching requirements for foundation phase.

Regarding the status of Grade R teachers in the Free State, the provincial Department of Education reported in 2015 that, of 1 375 Grade R teachers employed across the province, only 281 possessed relevant qualifications at Level 6 or National Diploma in Grade R teaching; 1 017 were underqualified, and 77 unqualified (Free State Department of Education, 2015:2). These statistics confirm the need for continuous professional teacher development, as well as academic development. Teachers'

professional development encompasses various facilitated learning opportunities that support the acquisition of professional knowledge, skills and dispositions that Grade R teachers need to have (Egert, Fukkink & Eckhardt, 2018: 402). Dowling and O'Malley (2009:8) believe that, regardless of the setting in which learners are located; an important indication of quality teaching is the skills and qualifications of the teachers involved.

The challenges posed by inadequately qualified Grade R teachers are not an exclusively South African experience - other countries face the same challenge. For instance, in Ireland, research indicates that teachers do not have enough experience or the pedagogical practices necessary to offer mathematics in primary schools (Dunphy, 2009:14). We can deduce from Dunphy's research findings that teachers lack the skills and qualifications necessary to deal with mathematics issues in Grade R classes, which will enable them to engage learners with PCP.

Another challenge that hampers Grade R teachers in their engagement with PCP in Grade R mathematics classes, is the unavailability of teaching and learning resources. Research indicates that structural elements of the classroom, such as material resources and classroom size, are considered to be important for improving the outcomes that promote quality education in the early years (Wolf, Raza, Kim, Aber, Behrman & Seidman, 2018:20). From my interaction with teachers in Grade R, I realised that teaching resources were unavailable in this grade, and this lack could be a reason why learner performance in mathematics has declined (Department of Basic Education, 2014:10). The situation in Nigeria regarding the shortage of teaching and learning resources is particularly worrying. The shortage leaves learners with insufficient knowledge and results in poor performance in early childhood education (Oluwafemi, Nma, Osita & Olugbemba, 2014:124). Botswana is another country that faces shortages of teaching and learning resources in early childhood education mathematics classes (Bose, Tsamaase & Seetso 2013:50); consequently, achievement in the education of young children is very low. This implies that, to stimulate learners to reason and solve problems in mathematics, it is important that teachers provide learners with enough teaching and learning resources.

In Grade R, monitoring and support are vital, as it give teachers direction and guidance. Machaba (2013:2) identified insufficient support from educational

authorities as a challenge facing teachers, since support of Grade R is viewed as peripheral. It seems that Grade R is not taken seriously as part of the foundation phase, as there is a lack of support and guidance in this grade as confirmed in the policy (Department of Basic Education, 2011c:9). The Department of Basic Education (2011c:3) insists that monitoring and an evaluation system that is designed to ensure quality in the foundation phase has to be applied, as Grade R is a part of this phase. My own experience in this grade leads me to agree with the above-mentioned DBE policy. In Grade R, monitoring and evaluation exists on paper; however, in reality, there is no monitoring and support in this grade; hence, Grade R teachers lack behind and learners perform below the required standard in mathematics. I also believe that support from educational authorities goes hand in hand with support from parents. Schools, education officials and families have to work together to support their children's education and must share the common goal of wanting to assist learners to reach their full potential (Lemmer & Meier, 2015:1).

Research has found that, in South Africa, there is a lack of parental involvement in schools, especially in the early years of their children's school attendance. Garrity and Canavan (2017:749) argue that schools, particularly those in townships, experience low parental engagement. Maluleke (2014:1) propose that, when schools, parents and other stakeholders come together and build a relationship, where they support each other to achieve a common goal, namely, effective teaching and learning, their children can succeed at school. Lack of parental involvement is a serious issue in the early years. The new curriculum requires parents to be involved in the education of their children; however, parents fail to support their children with schoolwork at home. The major challenge is that parents are unable to assist their children, as they do not have the expertise to do that; they need guidance from the school and trust in the teachers' expertise. McDowall, Taumoepeau and Schaughency (2017:13) suggest that there are many strategies that teachers can use in an effort to engage parents. Parents play a major role in the education of children, and need to be informed about what is expected of them and how they can assist with and participate in their children's education (Ajayi, Haastrup & Arogundade, 2009:42; Lesupi, 2014:8).

In Grade R, teachers are neglected, or not supported as they should be. Machaba (2013:5) reports that teachers receive little support, while they need continuous

support if they are to implement PCP effectively. Bantwini and Diko (2011:227) point out that the primary mandate of the district is to work closely with local schools and parents, to ensure that local education needs are met. This is not happening in a Grade R mathematics classes, as teachers seem to be neglected and they do not have a support from education authorities especially the foundation phase subject advisors. The biggest proportion of resources that is available, including support, is used for Grade 12, leaving Grade R teachers marginalised and unsupported (Machaba, 2013:11).

Inadequacies regarding the language of teaching and learning (LoLT) is another challenge that faces Grade R teachers and learners in the countries mentioned above. In Ireland, most learners are taught in a language that they do not use at home (Dunphy, 2009:13). Home language is convenient for teachers who teach young children, and for the children themselves. Research shows that, due to mathematics challenges that teachers and children experience in African countries, they opt to use a local language relevant to the region (Chitera, Kasoka & Thomo, 2016:309).

Discussion on challenges facing teachers and learners in Grade R mathematics classes point to a need for a strategy to improve PCP. Implementing this strategy could take several forms, such as workshops, professional development and teacher development activities that empower teachers to improve the performance of learners in Grade R mathematics classes. Meijer, Kuijpers, Boei, Vrieling and Geijssels (2017:820) argue that a collaborative professional development programme can assist teachers to engage with PCP in Grade R mathematics classes. Teachers in Ireland benefited from professional development, curriculum guidelines and in-service work, which helped them to develop interactive types of pedagogy in a diverse setting (Dunphy, 2009:13). Nigeria managed to retrain teachers in ECD, so that they obtained the Nigeria Certificate in Education and acquired knowledge and skills and became specialists in early childhood education (Sooter, 2013:175). Botswana took the initiative to train more teachers and provided enough teaching resources to improve the implementation of PCP in mathematics (Bose, 2008:80). In South Africa, various training and education opportunities were made available through short skills programmes, as well as through full ECD qualifications for teachers, in order to produce quality ECD (Atmore, Van Niekerk & Ashley-Cooper, 2012:29). Regardless

of the interventions mentioned above, Grade R mathematics results Department of Basic Education not yet improved; this was evident in the Annual National Assessment Report (Department of Basic Education, 2014:9).

The following threats were identified as hampering implementation of a strategy to improve PCP in Grade R mathematics classes in South Africa -- these threats are present in the other countries too. In Botswana, like in South Africa, there is a great need for support and professional development of teachers, who have inadequate qualifications to teach learners in a Grade R mathematics class; consequently, teachers are unable to relate effectively in Grade R with reference to the subject mathematics. Andrich, Hill and Steenkamp (2015:1) explain that a quality Grade R programme that delivers improved numeracy education should depend on a progressive model for effective pre- and in-service professional development. This is why teachers need to have a specialised qualification in this grade. Oluwafemi et al. (2014:124) indicate that teachers in Nigeria lack the knowledge to teach young children and this poses a threat to teaching and learning, as teachers are unable to give attention to individual learners, and neglect the implementation of the curriculum for young children. Quality ECE is reliant on staff training and fair working conditions across the sector, which results in careers in this grade being satisfying and respected. In Ireland, the Irish language was identified as a barrier to teaching and learning, as the majority of children speak English at school and Irish at home (Dunphy, 2009:14).

Ireland was successful in introducing a guideline strategy and a wide range of approaches to and methodologies of new thinking regarding support for teachers of early childhood mathematics. Nigeria effectively introduced educational resources for teaching and learning and provided practitioners with avenues for cognitive, affective and psychomotor development of children (Oluwafemi et al., 2014:124). The likelihood of the success of improved strategies to engage in PCP in South Africa depend on teachers' professional development, parents' involvement, and provision of enough resources by the Department of Basic Education and the South African Schools Act. These improvements will provide a conducive and sustainable environment for teaching and learning, in which children can develop holistically.

It is evident that the implementation of PCP in a Grade R mathematics classes requires professionally qualified teachers, enough teaching and learning resources, parental

involvement, support from authorities, as well as adequate knowledge of the language of teaching and learning. In order for teachers to be able to implement the PCP, basic knowledge and skills are required (Fourie, 2014:509).

Section 1.3 will discuss the research problem that was addressed by this study.

1.3 PROBLEM STATEMENT

PCP is a core concern in South Africa. It seems that teachers of Grade R do not know or understand what a Grade R class requires and this has a negative impact on the general performance of learners in mathematics, particularly in Grade R. Mathematics is regarded as one of the critical subjects and, therefore, teachers need to be qualified and well trained (Machaba, 2013:2; NAPTOSA, 2014:5; Rudhumbu, 2014:22; Setlalentoa, 2014:227). This claim is evidenced by the Annual National Assessment results, which show the instability of mathematics performance. This problem necessitated the following research question:

How can a strategy to improve PCP in a Grade R mathematics class be designed?

1.4 AIM AND OBJECTIVES OF THE STUDY

Aim

The aim of the study is to design a strategy to improve PCP in a Grade R mathematics class.

Objectives:

- To corroborate the need for a strategy to improve PCP in a Grade R mathematics class;
- To identify the main components of the strategy;
- To strengthen the environment conducive to the success of a proposed strategy;
- To anticipate possible threats that may hinder successful implementation of the strategy; and
- To monitor the functionality of a strategy to improve PCP in a Grade R mathematics class.

1.5 THEORETICAL FRAMEWORK

This study will use the theoretical lens of bricolage to assist in achieving the aim and objectives of the study. The concept of bricolage refers to making do with whatever is at hand to create something of value (Aagard, 2009:82; Banerjee & Campbell, 2009:474; Desa, 2013:729; Louvel, 2013:669; MacDonald, 2012:34). The term relates to social change, and its etymological foundation comes from a traditional French expression that denotes people involved in crafts, who creatively use material left over from other projects to construct new artefacts (Rogers, 2012:1). The bricolage approach is human-oriented in nature and does not encourage an authoritarian voice. It promotes creativity, collaboration, knowledge, respect, and has a vision. Hence, Mahlomaholo (2013a:392) describes it as a theoretical framework that acknowledges the multiple voices of those who experience the problem under investigation directly and thus, assist in its solution. The metaphor of bricolage can be applied in everyday life, and can be used to encourage teachers to become innovative and creative and to create teaching resources out of “junk” to improve PCP. This will strengthen teaching and learning in a Grade R mathematics classes. Creating something from nothing by exploring physical, social or rejected items demonstrate the socially constructed nature of resource environment and the role of bricolage in construction (Boxenbaum & Rouleau, 2011:275; Baker & Nelson, 2005:1).

1.6 RESEARCH DESIGN AND RESEARCH METHODOLOGY

Participatory action research (PAR) was employed as an approach to generate data in the study, as it allowed me to work collaboratively with co-researchers in order to bring about the desired change in the Grade R mathematics class (Campanella, 2009:4). This approach combines empowerment theory and practice and affords role players an opportunity to voice their views with regard to designing the envisaged strategy (Eruea, 2010:1; Tshelane & Tshelane, 2014:288). Lastly, PAR has the same principles as the theoretical framework of bricolage, which is collaboration.

During PAR, a team was formed from the role players such as, foundation phase head of department, Grade R teachers, school governing body members, foundation phase subject advisors, lecturers who teach ECD and Grade R practitioners from community-based sites including all people who possess community knowledge and are

interested in and support ECD. During the planning phase, we engaged in discourse to determine whether a common problem exists among the role players, we conducted a SWOT analysis (strengths, weaknesses, opportunities, threats), developed a mission statement, and each member was assigned a role according to the plan. Data was generated through face-to-face discussions, audio-visual and photo-voice tools, recordings, deliberations, and reflections. Critical discourse analysis (CDA) was used as a point of departure to sort and sift the data (Van Dijk, 2009:62).

1.7 ETHICAL CONSIDERATIONS

The necessary procedures for obtaining permission to conduct the research were followed, such as an application for clearance from the University of the Free State and requesting permission to conduct the study from the Free State Department of Education and the principal of the school involved. Once ethical clearance had been obtained, the role players were invited to participate, and they were assured that their identities would not be disclosed. Informed consent of participants was obtained and all the information gathered was kept confidential.

1.8 SIGNIFICANCE OF THE STUDY

At the end of the study, a strategy to improve PCP in Grade R mathematics class at participating public schools was available. The quality of learning and teaching in a Grade R mathematics class improved and the Grade R learners benefited from the improved designed strategy.

1.9 LAYOUT OF CHAPTERS

Chapter 1

This chapter provides an overview of the study, which includes the problem statement, a research question as well as the aim and objectives of the study, and a brief explanation of bricolage as theoretical framework underpinning the study. The research design and methodology, which employed PAR to generate empirical data in order to respond to the research question in the study, was explained. Ethical considerations, the value of the study and the layout of the chapters were also discussed.

Chapter 2

This chapter starts with a discussion of bricolage as the theoretical framework that underpins the study. It also explores the origin of bricolage, its formats, principles and objectives. In addition, the epistemology and the ontology grounding the study is explained. The role of the researcher and the relationship between the researcher and the participants is dealt with. The chapter also defines and discusses the operational concepts used in the study, which assisted us as a team to design strategy to improve PCP in a Grade R mathematics class.

Chapter 3

Chapter 3 involves a review of the literature aligned with the objectives of the study, conducted in order to understand and address the research problem. The chapter also demonstrates how other countries, globally, continentally, regionally (Southern African Development Community) and locally designed and engaged strategy to improve PCP in order to increase performance in Grade R mathematics classes. Furthermore, the six overarching principles of early mathematics, published by the National Association for the Education of Young Children (NAEYC) and National Council for Teachers of Mathematics (NCTM) are infused as organising principles, to concretise the constructs further.

Chapter 4

This chapter is divided into two sections. The first section explains, concisely, the theory of PAR, whilst the second section forms the core of the study and demonstrates how data was generated with co-researchers to validate the need for the proposed strategy. I start this chapter with a description of PAR as an approach, including its origins. I also draw attention to its formats, the relevance of PAR to the study, and its objectives, and provide a brief discussion on its epistemology and ontology. Furthermore, ethical considerations are discussed and explained. I discuss the intervention strategy, which involved setting the scene, forming the team, profiling of the co-researchers, developing a team vision and conducting a SWOT analysis. Lastly, I discuss the strategic plan, prioritise activities, and then explain the way data analyses was conducted.

Chapter 5

This chapter focuses on data presentation, analyses, interpretation, and discussion of findings. The chapter presents and analyses the data that had been generated and literature that had been reviewed, to verify whether it connects or refutes the findings of the study. Furthermore, the six overarching principles of early mathematics, published by the National Association for the Education of Young Children (NAEYC) and National Council for Teachers of Mathematics (NCTM) are incorporated in order to make meaning of the data. CDA components are used to show how power, domination, and control can be applied and be resisted in daily communication, which involves text and spoken word, social structure and discursive practices.

Chapter 6

The chapter starts with the problem statement, reports on findings, and provides recommendations and the conclusion regarding a strategy to improve curriculum practice in a Grade R mathematics class.

Chapter 7

This last chapter explores elements of a strategy to improve PCP in a Grade R mathematics class separately and, later on, presents them as a whole for use in the future in a Grade R mathematics class.

1.10 CHAPTER SUMMARY

This chapter provides the introduction to the study, which is followed by my motivation for pursuing the study. It also provides an overview, which includes the problem statement, a research question as well as the aim and objectives of the study. I refer to the theoretical framework underpinning the study, and the research design and methodology that was applied to respond to the research question of the study. Additionally, I refer to ethical considerations and the value of the study and provide the layout of chapters.

The next chapter focuses on the theoretical framework that guided the study. Operational concepts used in the study are defined.

CHAPTER 2: THEORETICAL FRAMEWORK FOR DESIGNING A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS

2.1 INTRODUCTION

The aim of this study was to design a strategy to improve PCP for a Grade R (reception year) mathematics class. This chapter begins with a discussion of bricolage as the theoretical framework that underpins the study, tapping into its origins, formats, principles and objectives. In addition, the epistemological and ontological grounding of the study is explained, and attention is paid to the role of the researcher and the relationship between the researcher and the participants. The chapter discusses operational concepts, such as professional, curriculum, practices, PCP and Grade R. The six overarching principles of early mathematics, published by the National Association for the Education of Young Children (NAEYC) and National Council for Teachers of Mathematics (NCTM), promulgated by Unesco, are infused as organising principles, which are reflected on further in Chapter 3 in order to concretise the constructs further.

I chose bricolage as a theoretical framework that underpins the study, thus, to respond to the research question and achieve the aim and objectives of the study (refer to Section 1.4). The objectives are to corroborate the need for the strategy to improve PCP in a Grade R mathematics class; identifying the main component of the solutions for improving PCP in a Grade R mathematics class; anticipating possible threats that may hinder the successful engagement of a strategy to improve PCP in a Grade R mathematics class; strengthening the environment so that it is conducive to the successful engagement of strategy to improve PCP in a Grade R mathematics class; and, lastly, monitoring the functionality of a strategy to improve PCP in a Grade R mathematics class.

Section 2.2 validates my choice of bricolage as a relevant theoretical stand for designing a strategy to improve PCP in a Grade R mathematics class. I discuss the origins of bricolage, and its formats, principles and objectives, so as to achieve the aim and objectives of the study.

2.2 THEORETICAL FRAMEWORK

This section will deal with the theoretical framework couching the study. In a nutshell, a theoretical framework is defined as a broad overview of a skeleton that can hold or support a theory of a research project (Grant & Osanloo, 2014:13). He further stated that theoretical framework, serves as a blueprint on which to build and support the study, it also provides the structure to define how the researcher will philosophically, epistemologically, methodologically, and analytically approach the study (Grant & Osanloo, 2014:13). Imenda (2014:189) argues that a theoretical framework is the application of a theory or a set of concepts drawn from one and the same theory to offer an explanation of an event or to shed some light on a particular phenomenon or research problem. In the study, bricolage was employed as the theoretical framework couching the study.

2.2.1 The origins of bricolage

The term **bricolage** means making use of whatever is at hand to create something of value. The term was introduced by the French anthropologist Claude Lévi-Strauss in his book, *La Pense (The Savage Mind)*, which dates back to 1962 (Given, 2008:65; Rogers, 2012:1). Even though the book was introduced as anthropology, it found its way into cognitive science. In his, book, *La Pense*, Lévi-Strauss postulates that the cultural domain is enormously complex and unpredictable, which requires bricoleurs to utilise as many tools as possible to understand and respond to this complexity. I believe this complexity as explained by bricolage awards all role players an opportunity to voice their views about assembling or putting together the leftovers of other materials, through multiple methods, and to work towards a common goal, which is to design a strategy to improve PCP in a Grade R mathematics class.

Bricolage was originally presented as an analogy for the way mythical thoughts work, by selecting the fragmented leftovers of previous cultural formations and redeploying them in new combinations (Desa, 2013: 729; Duymedjian & Rüling, 2010:137; Johnson, 2012:355). In bricolage, negotiation skills are exercised to incorporate different methods to create something of value. In a nutshell, the term bricolage is described as the mythical thinking of primitive people, who combine a fixed set of ideas in different ways (Aagard, 2009:82; Denzin & Lincoln, 2011:3; Johnson, 2012:361).

This concurs with Leví-Strauss' conceptualisation of a bricoleur as a kind of researcher who understands the knowledge to be constructed through various modes of orientation towards the world (Given, 2008:65). In bricolage, indigenous knowledge is applied to assist in solving an existing problem at hand and coming up with a constructive solution that is valuable for future use. By indigenous knowledge, we mean knowledge that is used by society or a community to facilitate deliverance and provide a basic solution, as bricoleurs do (Dutt & Tiwari, 2015:1). Bricolage uses a bricoleur to combine all resources to achieve purposes for which they were not originally intended (Senyard, Baker, Steffens & Davidsson, 2014:213).

Bricoleur: A handyman or handywoman who makes use of tools available to complete a task. Given (2008:65) describes bricoleur as an amateur who can turn her or his hand to practical repairs of various kinds. In addition, Sharma (2008:815) describes a bricoleur as someone who improvises with existing resources and constraints, to do or create something valuable. Bricoleurs use any material at hand to solve a real-life challenge they have come across (Rogers, 2012:1). They work freely in their work station in order to construct knowledge and experiment with the available resources at hand to produce useful material.

Metaphor: Metaphor is described as a core component of cognitive processing, the superimposition of a source domain on a target domain (Boxenbaum & Rouleau, 2011:275). It is a technical term for a cognitive and creative process that involves the composition and generation of mythical discourse (Le Loarne, 2005:2). For conceptualising and contextualising the term bricolage, Strauss (1962:5) employed the concept of bricolage as a metaphor in his search for underlying structures that govern human meaning making. "Making do with whatever at hand to create something of value", regardless of its original purpose, is the metaphor that gives a clear understanding of what bricolage is (Houtbeckers, 2013:141; Mair & Marti, 2009:420).

Denzin and Lincoln were inspired by Claude Leví-Strauss's assertion that one could do with whatever at hand to create something of value. This led to the development of what we call the 10 historical moments of qualitative research, which starts from traditional qualitative research, and passes through the golden age, blurred genres, crisis of representation, postmodernist-era, post-experimentalism, methodologically

contested representation, the unnamed moment, the current fractured futures, and the methodological innovation moment (Denzin & Lincoln, 2011:98; Given, 2008:65; Kincheloe, 2008:316; Mahlomaholo, 2013a:386; Mahlomaholo, 2013b:4696; Onwuegbuzie, Leech & Collins, 2010:698). The first nine moments were conceptualised and outlined by Denzin and Lincoln (1994:9), while the tenth moment is the work of Onwuegbuzie et al. (2010:698). I align myself with the 10 historical moments of qualitative research mentioned above by embracing their theoretical stand to help me to dig deeper, to the roots of the problem in question, which is: How can a strategy to improve PCP in a Grade R mathematics class be designed?

2.2.1.1 First moment: The traditional qualitative research moment

This is period lasted from 1900 to 1950 and was the first moment of qualitative research (Denzin & Lincoln, 2005:15). This moment is associated with the post positivist, post-colonial, postmodern constructivist and post structuralist approaches (Rogers: 2012:3). According to positivists, the researcher is concerned with causal relationships, for the purposes of prediction and control of variables. The positivist version and understanding is that there is a reality that is to be studied and captured (Denzin & Lincoln, 2011:98; Given, 2008:65). During the traditional period, the researcher went into the field and returned with stories about strange people and believed that what was studied will never change (Denzin & Lincoln 2005:15). In this period, qualitative research was seen as valid and objective; researchers who entered the field were expected to go and observe and later come back with comments. The results were objective, imperialistic, momenticist and timeless in nature (Denzin & Lincoln, 2011:98; Given, 2008:65).

In my view, this one-size-fits-all approach used in the traditional qualitative research moment, does not accommodate the views of all the participants affected by the problem, but generalised the information that was considered authentic. There was no interaction between the researcher and participants. The researcher was the only person who had power and knowledge about the research problem. During data collection, the researcher observed and commented, without being part of the research project – unlike bricolage, where each and every member of the team is involved in constructing knowledge from the start. With bricolage, no one is an observer and all the team members work collaboratively, and made the decisions as

a collective in this case, in order to design a strategy to improve PCP in a Grade R mathematics class. Bricolage, as a navigator in this study, was about finding many ways and new ways to resolve the real-life problem at hand; unlike the traditional period, which reduced human being to object (Given, 2008:8; Mosia, 2016:30). In this study, the team checked all the avenues that assisted them to design a strategy to improve PCP in a Grade R mathematics class. The traditional qualitative research moment paved way for the second moment, which is the golden age/modernist age moment.

2.2.1.2 Second moment: The golden age/modernist age

The modernist age, as the second moment of qualitative research, existed from 1950 to 1970 and was also labelled the golden age. It was connected to the approach of positivist arguments. New theories, such as ethno-methodology, critical theory, phenomenology, and feminism explored subjects in a specific setting, such as classrooms and society in general (Onwuegbuzie et al, 2010: 698; Denzin & Lincoln, 2011:98; Given, 2008:708). Like in the traditional moment, researchers in the modernist age believed that research could be used to identify casual variables and predict the future behaviour of people (Lewis, 2009:3). In this era, the belief was that validity exists if, and only if, observations are duplicated. The modernist age emphasises phenomenology for exploring lived and shared experiences; this means only those who have experience can share their experience (Mosia, 2016:36).

This moment gave society a chance to voice its problems and advocated for emancipatory ideas for solving the problems. With bricolage, no specific setting for conducting the study is required. Role players are not confined to a specific place, but move around to identify problems, so that they can come up with solutions using whatever is at hand. There is a close working relationship within the team and any setting is suitable for generating data. Different types of tools, such as face-to-face discussions, audio-visual and photo-voice tools, recorded data and transect walk, to mention a few, can be used to generate data in a study. In some instances, informal meetings took place at any time to discuss the findings of the problem in question and suggested the solutions. Subsequent to the modernist age, blurred genres arose.

2.2.1.3 Third moment: Blurred genres

From 1970 to 1986 the third moment, which is called blurred genres, existed (Onwuegbuzie et al., 2010:698). This moment was characterised by pluralism, and open, endless and interpretive approaches, also known as genre diasporas. It involved a wealth of methods, from symbolic interaction to naturalistic enquiry, Neo-Marxist theory to constructivism, positivism and post-positivism (Denzin & Lincoln, 2005:17). Diverse ways of collecting data were available, and created blurred boundaries between the social sciences and humanities. It has provided researchers with diverse strategies and techniques, including narrative, phenomenology and feminist and hermeneutic approaches to collecting data (Higgs, Horsfall & Grace, 2009:7).

This moment proposed various strategies for data collection that correlate with bricolage: “making do with whatever is at hand to create something of value”.

During this era, I collected as much information as possible and evaluated how the definite causes of the problems related to low attainment in mathematics in a Grade R class. I dealt with the roots of the problem and tried to find suitable solutions to address the challenge. I used my personal experiences during the collection of data and employed various approaches for reporting findings. Most importantly, I became a bricoleur and borrowed from diverse disciplines in order to dig deeper into a problem and find a solution. Next, the crisis of representation followed, as the fourth moment.

2.2.1.4 Fourth moment: Crisis of representation

The crisis of representation is the fourth moment and came as a result of blurred genres. The crisis of representation existed from 1986 to 1990 (Given, 2008:709), when it witnessed an increase in reflexive research practice. Even though this moment tried to destabilise the assumption that had previously underpinned qualitative research, it had some loopholes, such as the issues of validity, reliability and generalisability, which caused researchers to struggle to locate themselves and their subjects in reflexive texts.

The social sciences underwent the so-called triple crisis, dealing with representation, legitimation and praxis, which led to a rethinking of validity, generalisability and reliability (Denzin & Lincoln, 2005:26).

The challenge caused by this moment was that researchers struggled to report in the captured data and the experiences of the participants. This created a crisis for interpreting and evaluating the validity and reliability of the data. Even though this moment was the result of the previous moments, the researcher's ability to capture data was queried. The postmodernist followed as the fifth moment.

2.2.1.5 Fifth moment: The postmodernist moment

The fifth moment existed from 1990 to 1995, and it attempted to address the crises that had occurred in the previous period (Denzin & Lincoln, 2005:18). At this moment, an innovative way of writing was introduced and the perception of the distant observer was eroded (Given, 2008:707). This moment caused great excitement, as new and different ways of reporting and writing were established. The ontological position of this moment was that no documents should reflect the reality of a particular context; instead, narrative or storytelling should be considered (Denzin & Lincoln, 2005:20).

In this study, we worked together as co-researchers. Each one of us told a story relating to the experiences and challenges encountered in a Grade R mathematics class. During the sessions we argued, agreed and disagreed with each other, we shared and demonstrated best practices to design a strategy to improve PCP in a Grade R mathematics class. The fact that different people told different stories shows that different methods of collecting data were employed – this is regarded as one of the major features of this period. This moment is in line with bricolage, which emphasises active participation between the researcher and the participants in generating data. The moment of post-experimentalism followed immediately after the postmodernist moment as the sixth moment.

2.2.1.6 Sixth moment: Post-experimentalism

Post-experimentalism, as the sixth moment, lasted from 1995 to 2000. This moment introduced new ways to free society and to express and experience life, including poetry, a performance approach or drama, and multimedia technology (Denzin & Lincoln, 2005:27). Post-experimentalism brought back a powerful wave of blurring between types of social science and the humanities (Given, 2008:311).

This fits into my study, as I attempted to address the way young children have to be taught in a Grade R mathematics class. For instance, children learn to understand

themselves and the environment where teaching is taking place through play, poetry and dramatisation. We live in a technological world, where multimedia technology plays a large role in teaching and learning therefore, it is important that teachers and learners are conversant with multimedia technology usage. Post-experimentalism is a method that promotes collaboration and cooperative work between co-researchers. Through the new ways that post-experimentalism has introduced, we could explore how we can utilise technology best as a team to design a strategy to improve PCP in a Grade R mathematics class. Methodologically contested representation was introduced as the seventh moment.

2.2.1.7 Seventh moment: Methodologically contested representation

This is the seventh moment of qualitative research and lasted from 2000 to 2004 (De Beer, 2003:1 & Given, 2008: 311). It was a period of a great tension, substantial conflict and great methodological retrenchment. During this moment, there was discipline and regulation of inquiry practices, with the aim of conforming to conservation and liberal programmes (Denzin & Lincoln, 2005:27). Regimes made claims regarding truth, and literature explored paradigms, approaches and methods (Onwuegbuzie et al., 2010:698).

In this moment, the value of qualitative research was contested by demands for evidence-based approaches to practice and knowledge, using objective models and experience. This caused a backlash against the development of qualitative research. In this study, one of the objectives was to anticipate possible threats that may hinder successful engagement with a strategy to improve PCP in a Grade R mathematics class. I regard this moment as an eye-opener, which assisted me to mitigate the possible tension, substantial conflict and great methodological retrenchment alluded to by Denzin and Lincoln (2005:27) in designing the envisaged strategy to improve PCP in a Grade R mathematics class. Then followed the unnamed moment.

2.2.1.8 Eighth moment: The unnamed moment

The eighth moment is called the unnamed moment and existed in 2005. It was a period of confronting the methodological ramifications of evidence-based social movements (Onwuegbuzie et al., 2010:696).

I used this moment to reflect on the first to the seventh moments. In this time, the researcher looks back and sees the outcomes of all the approaches. In this study, I reflect on each and every process and procedure, in order to be able to identify gaps and close them in order to be able to design an envisage strategy.

2.2.1.9 Ninth moment: The fractured future moment

This moment also occurred in 2005. It involves two opposing camps, namely, the “gold standard” of science versus socially, culturally, ethnically and racial responsive, communitarian, justice-oriented research (Onwuegbuzie et al., 2010:698). At this moment, scholars were confronted by a methodological backlash associated with “Bush science” and evidence-based social movements. Additionally a sacred and critical conversation about the diversity of human life, including experiences of freedom and control in a global society, were reviewed (Higgs et al., 2009:7).

This study attempts to address a group of Grade R teachers, with their diverse experiences and challenges relating to teaching mathematics to a Grade R class. The combination of their different inputs as co-researchers assisted in the design of a proposed strategy. The multiple methods employed by bricolage in the study to generate data, yield a variation in the team. To be able to “make do with whatever at hand to create something of value”, allows the study to use people with different expertise to help generate data.

2.2.1.10 Tenth moment: Methodological innovation moment

This moment is about the utilisation of flexible, innovative approaches and the latest technology and computer-mediated communication. At this moment, qualitative researchers go beyond the traditional way of collecting primary and reflexive data (Onwuegbuzie et al., 2010:697).

This moment links to the theoretical framework that I chose for the study, which is bricolage. It embraces flexibility and amalgamates multiple disciplines, multiple methodologies and varying perspectives. Through innovation with role players acting as bricoleurs, we constructed knowledge together in order to address the objectives of the study. This process affirmed that, in bricolage, role players work in a way that is collaborative, negotiative and communicative to reach their objectives. Bricoleurs appreciate how ideology and discourse shape the way knowledge is produced. They

seek to avoid univocal research representation and come up with multiple representatives, voices and sources. As stated above, the team in the study was flexible and open to change, we interact with one other and worked together as a team, and we came up with valuable suggestion to design a proposed strategy.

In concluding historical moments of qualitative research: The first nine moments were conceptualised and outlined by Denzin and Lincoln in 2005, while the tenth moment was championed by Onwuegbuzie et al. (2010:698). Each of these moments is still operating today, as a set of practices that researchers are still following. The moments are not isolated or unitary, instead, they complement each other and are interrelated. This means qualitative research is no longer bound by objective, positivist perceptions, but can apply a wide range of methods, theories and paradigms. By keeping abreast of the latest technological advances, qualitative research has the potential to transcend the era of methodological contestation and move towards a period of methodological innovation, which, I assume, will lead to the eleventh moment.

2.2.2 The formats of bricolage

In this section, five types of bricoleurs identified by Rogers (2012:4); Freathy, Doney, Freathy, Walshe and Tees (2017:429) and Denzin and Lincoln (2005:4) are discussed. Denzin and Lincoln identified five types of bricoleurs: interpretive, methodological, theoretical, political and narrative. These bricoleurs embraced the belief that there is no one correct telling, instead, each telling, like the light on a surface, reflects a different view.

An interpretive bricoleur believes that the researcher understands the research as an interactive process shaped by own personal history, biography, gender, social class, race, ethnicity and people in that environment (Rogers, 2012:4). As happened in positivist epistemology, interpretive bricoleurs recognised that knowledge is never free from subjective positioning or political interpretation (Rogers, 2012:4). In the study we did not only look at the problem superficially, but went deep, to the root of the problem, and examined its effect as a team; thus, to design a proposed strategy.

A methodological bricoleur is, therefore, a researcher who combines multiple research tools in order to complete the assignment. It is a type of bricoleur who employs multiple methods, multiple perspectives and a multitheoretical approach

(Rogers, 2012:5). This bricoleur works with a large number of diverse tasks in order to solve the problem in question. In this study, methodological bricoleurs' approach was involved, as the team aimed to draw from different angles of the study to examine the challenges faced by Grade R teachers in engaging learners with PCP in a Grade R mathematics class. As bricoleurs, we developed apt creativity to design the proposed strategy. We employed a variety of methods, such as group and peer discussions, transect walk, photovoice, and documents to generate data for the study. These multiple methodologies provided us with more information about the research question and we were in a better position to design a strategy to improve PCP in a Grade R mathematics class.

A **theoretical bricoleur** is a type of a researcher who works through and between multiple theoretical paradigms. This researcher reads widely and is knowledgeable about different interpretive paradigms, such as feminism, Marxism, cultural studies, constructivism and queer theory (Denzin & Lincoln, 1994:3; Rogers, 2012:6). All these multiple theoretical paradigms can be applied to any particular problem and, in this case, it was adopted to assist in designing a strategy to improve PCP in a Grade R mathematics class. I view the theoretical bricoleur as the kind of researcher who will assist in mapping the information and constructing knowledge from different viewpoints, in attempting to respond to the problem in question.

For Denzin and Lincoln (1999:6), a **political bricoleur** is a researcher who is aware of the way knowledge and power are connected. This type of bricoleur aims to produce knowledge that benefits those who are disenfranchised and taken for granted by structures. In this regard, the team adopted a counter-hegemonic approach and strived to achieve the equality that is against oppression. The co-researcher in the study followed the approach of Rogers (2012:6), who demystifies power and circumvents it to achieve balanced power. Team members were equally involved in the study, as equal partners, and all members were given the chance to contribute equally towards the proposed strategy.

A **narrative bricoleur** interprets the way ideologies and discourses shape the way knowledge is produced. This type of researcher seeks to understand his/her influence on the research process and the text, in order to draw techniques from multiple perspectives, voices and sources (Denzin & Lincoln, 1999:5; Mahlomaholo,

2013:385b; Rogers, 2012:7). The aim of the study was to design a strategy to improve PCP for a Grade R mathematics class, and in order to achieve the aim, this bricoleur “narrative” assisted the team to generate data. Various methods were employed in an attempt to respond to the aim and objectives of the study, such as quotes from the team’s conversations, demonstrations and presentations.

As one of the challenges of this study related to the suitability of the qualifications of Grade R teachers to teach mathematics in Grade R, narrative bricoleurs assisted the team to think critically. The team also applied their minds without limits and was hands on during each activity in design a strategy to improve PCP in a Grade R mathematics class. This also paved the way for this type of bricoleur to use the limited resources that are available best, as the limitation impedes the engagement of learners with PCP.

2.2.3 Principles of bricolage

In addition to explaining the historical origins of bricolage, Houtbeckers (2013:145) proposes six principles of bricolage as important for guiding the working team on how things should be done in the study, in order to come up with solution. These principles were (i) making do, (ii) refusing to be constrained by limitations, (iii) improvising, (iv) Creating social value, (v) participation by role players, and (vi) persuading other significant actors to leverage acquisition of new resources and support.

Creating something suitable for the study meant the team had to work together to provide a new service, which I believe is the envisaged strategy. At the same time, they had to improvise with limited resources to pursue the goal of designing a strategy for engaging learners with PCP for in a Grade R mathematics class. In creating social value, as one of the principles mentioned, the team discussed the best way to design opportunities for teachers to be capacitated through teachers development programmes, workshops and training, how to involve all the role players and work towards implementing the strategies. In light of the principles of bricolage explained above, the objectives of bricolage are discussed next, to validate the need for the envisaged strategy.

2.2.4 Objectives of bricolage

The main objective of bricolage is to understand the complexity and unpredictability of everyday life, which relates to the object of the study (Kincheloe, 2004:25). Therefore, the objectives of bricolage in the study gave the team an opportunity to understand the complexity of engaging Grade R learners with PCP in a Grade R mathematics class. The team used multiple methods to work towards the common goal, which was to design a strategy to improve PCP for in a Grade R mathematics class. (Mahlomaholo, 2013a:385; Mahlomaholo, 2013b:4690, Kincheloe & Berry, 2004:2). The team worked cooperatively and collaboratively to dismantle silos and develop close relationships with each other. Other team members were included in decisions about the strategy throughout the process, until the end of the study (Mahlomaholo, 2013a:385). Team members could give their opinions, and their voices were heard and respected.

This approach refers to the epistemic community, which is described by Candler (2008:294) as a network of experts with recognised competence, who share a set of principles, beliefs and values regarding a particular domain or issue. In the study, the epistemic community had to design a strategy to improve PCP in a Grade R mathematics class. According to the principles of bricolage, a large number of voices were heard, and deconstructed the monolithic view. Freedom of expression, as indicated in the Constitution of South Africa (Republic of South Africa, 1997a:1249), was exercised, and team spirit was promoted.

Bricolage advocates bringing together or assembling the materials at hand in order to create something value. Through this metaphor, the role players, who were not on the periphery, but played roles as full co-researchers, were given the opportunity to broaden their areas of operation and use multidimensional methods to design a proposed strategy. The team worked towards achieving their goal, that is, to design a strategy to improve PCP in a Grade R mathematics class. Among the multiple methods used to collect data, were meetings, reflections and deliberations.

2.2.5 Epistemology

Epistemology involves an exploration of how the researcher came to know about the phenomenon being studied, and how this knowledge is constructed and grounded

(Hofer, 210:182). An epistemological understanding is central to the rigor of bricolage (Kincheloe, 2008:339; Rogers, 2012:10). Paulo Freire explains the work of critical pedagogy as always being about constructing and thinking about education equality and social justice (Earl, Hargreaves & Ryan, 2013:17).

Regarding the epistemology of bricolage, knowledge is less about truth, but created by social interaction with one another (Mahlomaholo, 2013a:387). Duymedjian and Rüling (2010:140) maintain that a bricoleur possesses intimate knowledge of the elements of belonging in his/her repertoire, which is not based on an in-depth and complete understanding of what things are, but on how they can relate to one another. Devos, Van Landeghem and Deschoolmeester (2008:84) claim that, in bricolage, knowledge is generated through design and by creating actions that are evaluated to build knowledge. Mahlomaholo (2013a:388) argues that truth is not a single aspect, but is created in discussion with role players who are members of an epistemic community. This demonstrates that the truth can be negotiated through the experiences of the team, not by a member. To the contrary, the knowledge that bricoleurs possess, and the idea of doing more, gives a bricoleur the status of having self-efficacy regarding the way he/she responds to the problem in question (Halme, Lindeman & Linna, 2012:746).

For bricolage, knowledge is broad and flexible and, therefore, the team worked collaboratively to construct knowledge. Whenever we encountered a challenge in the discourse as a team, we reflected on what we did incorrectly and rectified the situation by infusing different ideology in generating data.

2.2.6 Ontology

The word ontology is derived from a Greek term meaning a thin and rational account. It refers to the philosophical study of the nature of being or reality. It is not based on an entity, but on a universal form of existence (Given, 2008:577). The ontology of the empiricist, who does not have equipment to deal with a problem that must be solved, is that reality can differ, be fixed, and be known from the source or knower's perception. For an empiricist to achieve the goal, the researcher must not be part of the research process; as a result, the researcher is not permitted to get close to the subjects. The researcher must remain distant, detached and distinct from the

phenomena of interest. This distance between the researcher and the subject should be maintained. Furthermore, reality is a single, fragmented, universal and independent idea, separate from the researcher (Schnelker, 2008:50).

In contrast to the empiricist, the bricoleur is interested in developing and employing a variety of strategies to solve a problem. This is done through interaction with role players, who work together to achieve the goal. The bricoleur embraces an ontology of relationships and connections, which are inseparable (Shaw & De Forge, 2012:442). The reality of a good working relationship between bricoleurs manifests itself in the end product of the research. In bricolage, the nature of reality is not separate from the perception of singularity, but is interrelated to pluralism, with the team being able to share a common understanding of the structure of information among them, and to develop a strategy to improve PCP in a Grade R mathematics class.

This implies that reality, with bricolage, is not absolute, as co-researchers are attached to the phenomena and create discussion as members of community, not as isolated entities.

2.2.7 The role of the researcher

Critical researchers maintain mutual trust among the role players by adhering to ethical guidelines (Shangase, 2013:15). Ethical issues are principles that guide and protect us from harm when we participate in a research project. It is defined as a way of protecting participants from harm and maintaining their privacy; participants have to provide informed consent to participate (Helgesson, 2015:149; Resnik, 2017:3; Resnik & Randal, 2018:556).

As a role player in this study, I needed to respect and value the views of my co-researchers, while, at the same time, disempowering myself and becoming one of the role players. No blurred line should exist between me and the co-researchers; by avoiding a line between us, we were able to share ownership of this study, as postulated by Kemmis and McTaggart (2007:273). Working on the same level as the co-researchers gave the role players the opportunity to offer their views in an equal position with the researcher, without having to fear of power or dominance.

It is my contention that bricolage is guided by the principles that are essential for working to design a strategy to improve PCP in mathematics in order to improve children's attainment in a Grade R class. Bricolage is about making do and refusing to be constrained by limitations; it is about improvisation, the creation of social values, role players' participation and persuading other significant actors to leverage the acquisition of new resources and support (Houtbeckers, 2013:145). To succeed in this endeavour, we all engaged in the process of achieving the main aim of the study, which was to design a strategy to improve PCP in a Grade R mathematics class and reach the goals we pursued, which were the objectives of this study.

2.2.8 The relationship between the researcher and the participants

Close relationships between role players are one of the objectives of bricolage and this relationship is treated with mutual respect. This means that all role players had to work together and bring their own theories to the study in whatever manner that they were comfortable. Team spirit and harmony are advocated by bricolage in order to bring about the proposed end product. A relationship is described as the way that two or more people are connected or linked. This connection allows the researcher and the role players to work together harmoniously to reach the common goal (Campanella, 2009:2).

A good relationship was evident by shared decisions and balanced power amongst the role players. In the study, I worked together as an equal partner with co-researchers during the whole process to achieve the goal of designing a strategy to improve PCP in a Grade R mathematics class. No one worked in silos; instead, the view was the promotion of social justice, freedom of speech, and peace (Mahlomaholo, 2012:226). I engaged in informal deliberations with the role players to analyse data. In this engagement, I listened to their opinions and experiences and considered them through negotiations and dialogues. Hlomuka (2014:17) indicates that the researcher and participants should engage in discussions under informal conditions, and participants should express themselves in a language most convenient to them.

2.3 DEFINITION AND DISCUSSION OF OPERATIONAL CONCEPTS

It is necessary to define and discuss operational concepts used in the study, which assisted us to design a strategy to improve PCP in a Grade R mathematics class.

2.3.1 Professional

Hawker and Wait (2007:641) define professional as an experienced, skilful, polished and properly fitting person in a particular profession. A professional is a well-trained and competent person, who possesses the teaching approaches, knowledge, values and attitudes (Síolta, 2015:12) to do the job efficiently. The term also refers to the standards of education and training that prepare members of a profession by providing them with the particular knowledge and skills necessary to perform the role of that profession (www.businessdictionary.com).

I considered it necessary to define the term professional for this study, as professionalism is one of the determinants of how teachers engage with PCP in a Grade R class. Teachers are expected to be relevantly qualified and to be professionals in the education sector; this will assist them to excel in what they are doing, especially when they are dealing with young children. The teachers will not only perform well in their classes, but will also be able to identify children who are experiencing problems in relation to teaching and learning in the Grade R mathematics class. In doing so will help in improving teachers' personal and professional development.

2.3.2 Curriculum

The concept curriculum refers to a document concerned with a particular education programme that provides a description of the objectives, contents, educational methods and evaluation methods that substantiate children's learning and development. This document is devised by the teacher for the learners, in order to answer the questions, "what to teach?" and "how to teach it?" (Taguma, Litjens & Makowiecki 2013:12). It also refers to the lessons, academic content taught, and subject modules of a school or in a specific course or programme (Oxford Thesaurus English Dictionary, 2009:189). Furthermore, Kridel (2010:2) defines curriculum as all planned school activities, including extracurricular activities, offered to learners by the

educational institution, and the experiences learners encounter when the curriculum is implemented.

Based on the definitions of curriculum, it is understood, that teachers need to know that there are certain processes that they should follow when engaging with PCP, especially in Grade R mathematics classes, in order for good results to be possible.

2.3.3 Practices

Practices refer to a situation in which a person learns by application and action in order to gain experience of what they are doing (Hawker & Wait, 2007:626). Practices are defined as procedures and processes used in a particular field (www.businessdictionary.com).

Applying the principles of this term assisted us as a team to apply our knowledge and to put it into an action in designing a proposed strategy. We did this repetitively until we had mastered the design and had gained experience in the environment and situation that we were working in.

The term PCP is the new concept, developed by the researcher, from the definitions above.

2.3.4 Professional curriculum practice

PCP refers to standards of education and training that prepare teachers **(professionals)** to engage with all planned activities, including extracurricular ones **(curriculum)**, through application of procedures and process **(practices)** in order to guide learners' attainment (Hawker & Wait, 2007:626; Kridel, 2010:2; Oxford Dictionary, 2010:340; www.businessdictionary.com).

Professional curriculum practice requires that an individual possesses the skills, knowledge, values, and attitudes to fulfil the appropriate roles and responsibilities within a setting. It also requires an attitude that is willing to engage in regular reflection upon practices and engagement (Síolta, 2015:12; www.businessdictionary.com). Briefly, PCP has to do with critical pedagogy.

2.3.5 Grade R

Grade R/reception year is for children aged 5-6 years. According to Republic of South Africa (2017:20), Grade R is an institutionalised year of learning for children who enter Grade 1 and who participated in an accredited reception year programme. Grade R is the year before formal schooling, and it is important for developing young children from age five to six years (Department of Basic Education, 2011a:1).

2.4 CHAPTER SUMMARY

This chapter provides a description of bricolage as a theoretical framework, its principles and objectives. Furthermore, the chapter demonstrates how the 10 historical moments and the formats of bricolage fit in the study. The epistemological and ontological grounding of the study is clearly explained. The epistemology, which involves an exploration of how the researcher come to know about the phenomenon being studied and how this knowledge is constructed, and that the ontological reality can differ, be fixed and be known from the source or knower's perception, is clearly explained. The fact that the study employed PAR as the methodology, and the role of the researcher and his/her relationship with the participants, are comprehensively clarified, as this methodology requires the researcher be a role player and to collaborate with the team. Chapter 2 concludes with definitions of operational concepts and their role in the study.

The next chapter presents a literature review on how other countries, internationally, continentally and regionally, designed strategies to engage learners with PCP to improve mathematics in Grade R classes. Best practices are copied from the mentioned countries to assist in developing the proposed strategy in South Africa.

CHAPTER 3: RELATED LITERATURE ON DESIGNING A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS

3.1 INTRODUCTION

The aim of the study was to design a strategy to improve PCP in a Grade R mathematics class. In this chapter, the literature aligned with the objectives of the study is reviewed in order to address the research problem. Bricolage was used as a lens. The chapter also demonstrates how other countries, globally, continentally, regionally (in the Southern African Development Community) and locally have designed strategies to improve PCP for Grade R mathematics classes. I compared these countries to South Africa and found that poor performance in mathematics is a universal issue. The six overarching Principles and Standards for School Mathematics (PSSM), published by the NAEYC and NCTM, was infused in the literature review as organising principles, in order to concretise the constructs further (NAEYC & NCTM, 2000:1).

First, the chapter provides a summary of the NAEYC and NCTM's six PSSMs that were infused in the study as organising principles. Secondly, I demonstrate and justify the need for designing a strategy. Thirdly, the main components of the solutions, and of the environment, which would make it conducive to the success of a proposed strategy, are discussed. In the fourth place, I refer to threats that could hinder successful implementation of the strategy, and lastly, I discuss evidence that the strategy worked.

3.2 PRINCIPLES AND STANDARDS FOR SCHOOL MATHEMATICS

Teachers need to know and use mathematics for teaching by combining mathematical knowledge and content knowledge (NAEYC & NCTM, 2000:1). This statement implies that teacher development, including academic development, is vital. Teachers should know and understand the PSSMs as outlined by the NAEYC & NCTM, and realise that it is an essential prerequisite for a high-quality mathematics programme (Graham, 2001:319). The prerequisites are: Excellence in mathematics requires equity, high expectations and strong support for all learners, it requires coherence in curriculum

and articulation across the grades, and needs effective teaching and understanding of what the learner knows, and support for the learner. Furthermore, it requires that learners learn with understanding in order to construct new knowledge from previous knowledge. This means that, when teaching mathematics, teachers must ensure that they teach learners from the learners' context. Teachers must develop an assessment that supports learning for the benefit of learners and, lastly, teachers must use the technology that is essential for teaching and learning mathematics (NAEYC & NCTM, 2000:14). All these essentials require that teachers are well articulated regarding mathematics content knowledge and mathematics pedagogical knowledge.

3.3 THE NEED TO DESIGN A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R CLASS

This section will deal with the challenges behind the strategy to improve PCP in a Grade R mathematics class. An outline of these challenges is as follows: insufficiently qualified Grade R teachers, unavailability of teaching and learning resources, insufficient support from authorities, little involvement by parents, and inadequate mathematical language for effective teaching and learning. A literature review of how these challenges obstruct the engagement of teachers with PCS in the mathematics class is presented to emphasise their impact.

3.3.1 Inadequately qualified Grade R teachers

Even though progress has been made in Grade R, there are still considerable challenges relating to inadequately qualified Grade R teachers all over the world (McCoy & Smyth, 2011:3). Moloney and Pope (2015:143) affirm that part of the challenge relating to improving the quality of the education received in Grade R lies in capacity building of teachers, improving their adequate qualifications as well as their knowledge and skills on how to facilitate learning in the class. With regard to learning mathematics and numeracy, in particular, in Ireland, it is generally accepted that certain essential experiences and practices will assist in ensuring that learners have access to engaging and challenging mathematics learning; they should be able to complete and solve problems (Dunphy, 2009:3). The literature indicates that teachers are inadequately qualified to teach young children in early childhood care and education (ECCE). Moloney and Pope (2015:142) propose that all teachers engaged

in education should be appropriately qualified in order to be able to perform their roles and responsibilities in the ECCE¹ field. In Nigeria, retraining teachers so that they have proper understanding and more skills for handling young children is a challenge, particularly for mathematics (Oluwafemi et al., 2014:123). There is a shortage of skilled Grade R teachers as well as a shortage of institutions to upskill teachers' qualifications.

South Africa's auditor general of Education reported that most teachers lack the minimum qualification to teach Grade R (Department of Basic Education, 2013:1). In Botswana, like in South Africa, the quality of teaching in early childhood education is generally low, because teachers are not adequately qualified to teach young children. There are few institutions available that can empower ECD teachers (Atmore, 2013:155). A recent study in Botswana observed that there is an acute shortage of qualified teachers, particularly for Grade R. Training of teachers is still fragmented and few teachers have attained Bachelor's degrees or undergo pre-service training, as required (Bose, 2008:80; Maunganidze & Tsamase, 2014:3).

My interpretation of the situation is that there is a need for qualified teachers who can respond to the research question, as successful teaching depends on teachers' ability to make decisions based on their mathematical knowledge (NAEYC & NCTM, 2000:1). In most cases, as indicated by literature, teachers are recruited even though they lack the professional and academic training to engage with young children. This raises concern for the entire country, as children who enrol in school have gained little or no knowledge at home.

However, even though teachers are not adequately qualified, it does not mean that they should neglect their obligations, which is teaching and learning Grade R mathematics. The South African Constitution (Republic of South Africa, 1997a:14) acknowledges that every child has the right to education. Therefore, teachers must conceptualise the work done by bricoleurs by bringing together a combination of new styles and innovations to engage learners in PCP in mathematics classes. The metaphor of theorising with bricolage will enable teachers, as bricoleurs, to develop a

¹ ECD is called ECCE in Ireland, Nigeria and Botswana.

new and unique way of solving mathematical problems in a Grade R classes (Phillimore, Humphries, Klaas & Knecht, 2016:6).

3.3.2 Lack of teaching and learning resources

Teaching and learning resources that are meant to support teachers and learners engaged with PCP in Grade R mathematics are lacking, especially in the junior cycle, where there is a little systemic evidence of what is happening in the class (McCoy & Smyth, 2011:2). Gogoi (2015:20269) explains that early childhood education aims to achieve total development of the child in a learning environment and to prepare the child for formal learning. This aim can only be achieved when teaching and learning materials, such as workbooks, worksheets and work cards (Department of Basic Education, 2011a:12) are available. In order for the teacher to facilitate the mathematics process in Grade R, children must be given the opportunity to learn using concrete representations of the concepts they are learning about (Setlalentoa, 2014:227).

In South Africa, despite the progress made since 1994, the ECD sector is sinking into a pool of challenges. Some of the main obstacles facing the sector are insufficient teaching and learning material, infrastructure shortages, as well as inadequate outdoor play facilities for Grade R learners (Atmore, 2013:156; Atmore et al. 2012:6). When considering the situation in Nigeria, it is clear that learners are not responding to the engagement of PCP, as a result of insufficient and inappropriate teaching and learning resources, such as furniture and educational toys. In Chanchanga, one of Nigeria's states, few schools have adequate teaching resources to ensure effective teaching and learning (Olaleye, Florence & Omotayo, 2009:685). These resources include television/computer systems, table/corners,² educational toys and even outdoor playing equipment, such as see-saws, which were not available at all (Ball, 2010:5). Shortages of adequate training centres to satisfy the needs of ECCE also face Botswana (Bose, 2008:80). For example, basic teaching resources, such as chalk,

² Tables or corners or areas in a Grade R class refers to the layout in a Grade R class that exposes learners to a variety of activities and learning experiences, to ensure that learners reach their full potential Routledge. (Final Grade R guidelines Harrys 7 April 2008 - EC Curriculum 2008:7).

chalkboards, and photocopiers, which teachers use daily, are very limited or unavailable. As a result of the shortages of qualified teachers who can engage learners with PCP in Grade R mathematics classes, Grade R classes experience challenges regarding ECD curriculum delivery (Maunganidze & Tsamaase, 2014:2).

The constraints mentioned above impact negatively on the quality of teaching and learning, as learners are unable to engage with PCP in the Grade R mathematics class due to lack of teaching and learning resources. Learners learn easily when they see, hear and touch, and when they have a mixture of visual and verbal cues; they prefer using different types of learning styles when they learn diverse activities (Nel, Nel & Hugo, 2016:46). Learners also prefer learning according to a concrete pictorial and abstract approach (CPA) (Leong, Ho & Cheng, 2015:2). This approach emphasises the use of concrete objects before the teacher starts to introduce pictures and mathematical concepts.

It is clear that the quality of teaching and learning is influenced by the availability of teaching and learning resources in ECD (Excell, 2012:8). Grade R provides a foundation for learning and, therefore, there should be enough teaching and learning materials to facilitate learning processes and prepare learners to engage with PCP in the mathematics class. Teachers and learners must be given enough opportunities and resources to enhance their knowledge (NCTM, 2000:2). The Department of Basic Education (Department of Basic Education, 2011a:4) proposes that Grade R classes have to be upgraded in order to accommodate mathematics corners, fantasy corners, creative work corners and reading corners, which form the prescripts for Grade R classes. I realised that bricolage as a lens could be used for creating multiple ways by which Grade R teachers can engage learners with PCP in Grade R classes. Through enacting bricolage-types of actions teachers could enhance their teaching and learning and respond to the research question (Louvel, 2013:675).

3.3.3 Insufficient parental involvement

Parental involvement is defined as participation by parents in the development of education for their children, from birth onwards (Dooley, Dunphy, Shiel, Butler, Corcoran, Farrell et al., 2014:104; Síoita, 2015:3). Parental involvement and support in the education of their children is cause for concern, especially in previously

marginalised schools. Meko (2013:1) indicates that South African schools, especially those in townships, experience low parental involvement. He states, furthermore, that parents do not attend school meetings or teacher-parent conferences. Literature indicates that poor parental involvement in school and educational activities at the level of basic education is a concern that must be disseminated by the government through structures such as parent-teacher associations (Pansiri & Pansiri, 2011:283).

The South African Schools Act states that, in order for learners to be able to engage with PCP in a Grade R mathematics class, parental support and involvement is required (Republic of South Africa, 1996:14). If parents do not have a hands-on approach when dealing with curriculum issues of their children, the parents are neglecting their duty, as they are the first teachers of their children. They are expected to work collaboratively with the school. If they are involved in the school, they are able to share responsibilities with teachers, commit themselves as parents and reach out and support their children, so that the children's performance in mathematics can improve. Supporting the children involves parents and teachers who work together and share information among themselves for the benefit of the children; this intervention improves parenting and parent-child interaction (Moore, Garbacz, Gau, Dishion, Brown, Stormshak et al., 2016:401).

Lack of knowledge about roles and responsibilities that relate to schools means parents feel uncomfortable on school premises, and this leads to limited opportunity for parents to encounter with teachers (Pansiri & Bulawa, 2013:72). Even if parents want to be part of the school, they lack knowledge on how they can become involved and support their children from home. In Kenya, teachers are unable to advise parents on how to assist their children with curriculum matters, as they lack expertise regarding the ECD curriculum (Chikutuma, 2013:24). Disengagement of and failure by parents to attend school activities is a concern in Botswana. Most school activities and meetings are scheduled when the majority of parents are at work, thereby preventing parents from engaging with school activities (Pansiri & Pansiri, 2011:283). Furthermore, parents hesitate to assist their children with schoolwork, as they do not know where and how to start meeting this responsibility; they need capacity and guidance on this matter.

In South Africa, parents, as key components of the school community, are expected to contribute their expertise to the governance of the school. They are also required to support the school and take up responsibility and an interest in their children's schoolwork. South African parents are expected to attend parents' meetings and parents' days, so that they can assist their children with school activities, including curriculum issues. It is imperative that the school informs parents about how their children learn and perform and why parental involvement in school activities is important (Republic of South Africa, 1996:38). By positioning myself in the involvement of parents, through the unfolding of bricolage, I consider parents to be knowledge constructors who possess indigenous knowledge that they can share with their children at home.

3.3.4 Insufficient support by authorities

South African's Policy Framework on universal access to Grade R has set a target for schools to increase the percentage of children who have access to formal Grade R programmes, to 100% by 2019 (Department of Basic Education, 2011a:4). This confirms that there is a need for monitoring and support from authorities, to attain the target set by the Policy Framework, as this will improve performance in Grade R mathematics classes. In Nigeria, provision of ECD was confined to the voluntary sectors, and no support and supervision was given to ECD programmes by authorities. State Ministry officials were also reluctant to visit ECCE sites, due to the unavailability of a monitoring and support plan (Sooter, 2013:174). The situation in Botswana is even worse, as the government has not provided a national framework to guide early childhood curriculum and instruction (teaching and learning);³ as a result, equitable and quality education is limited and unevenly distributed to ECD programmes (Maunganidze & Tsamaase, 2014:1). Moreover, the situation is aggravated by the government failing to participate in and sponsor education at this level (Maunganidze & Tsamaase, 2014:3), by providing neither a standard curriculum nor a set of guidelines for monitoring teaching and learning at this level. My observation is that one of the missing links is the absence of a national framework to guide the structure and

³The researcher does not subscribe to the word instruction, instead preferring terms that are in line with the study.

the content of early childhood curriculum instruction (Maunganidze & Tsamaase, 2014:2). We can conclude that, compared to other countries, Botswana has historically positioned ECD very low in its education priority list.

In South Africa in Free State province, the limited staff at the provincial head office and districts who can provide Grade R support to schools, has resulted in some district officials being overloaded and having to monitor more schools than they can handle. The pool of education officials available at the districts is not only responsible for providing support, as well the implementation and monitoring of the curriculum, including responsibility for other areas of office administration. This heavy load of duties should be guided, however, there is no direction on who should be doing what, due to different directorates in the department (Department of Basic Education, 2011b:3). The absence of guidelines or monitoring tools for this area of concern results in an absence of support for curriculum issues relating to ECD (Free State Department of Education, 2014:3).

Grade R is part of the foundation phase, but is not always serviced in the same way (Department of Basic Education, 2011a:3). Maharajh, Nkosi and Mkhize, 2016:372) indicate that there is a -shortage of skilled and knowledgeable officials to monitor and support curriculum changes that would guarantee success in teaching and learning. NAEYC and NCTM (2000:1) state that excellence in mathematics requires equity, high expectations and strong support for all learners. In an attempt to address these challenges, Pansiri and Pansiri (2011:283) emphasise that parents has to be involved in the education of their children and assist them to succeed in their schoolwork.

3.3.5 Limited knowledge of the language of mathematics

Inadequate knowledge language of teaching and learning in mathematics has also reported in Grade R classes. A language is a primary tool used by teachers to create spaces to respond to, relate, analyse and verbalise what individuals wish to reveal (Soma, 2011:25). The language of teaching and learning is at the school is determined by the school governing body, which represents parents of the school (Republic of South Africa, 1996:5). For the learners to understand the chosen LoLT for mathematics, the process of understanding should start with the teacher, as some children may consider the LoLT to be a foreign language, which is difficult for them to

understand. Machaba (2013:33) reports that some children suffer from dyscalculia, a learning disorder that affects the ability to acquire school-level arithmetic skills, such as number concept, counting, and the concept of time and reading, which results in learners not understanding mathematical concepts (Price & Ansari, 2013:1; Mende, Shaki, & Fischer, 2018:1). For a teacher to teach the learners in her class successfully, she must understand mathematical language herself.

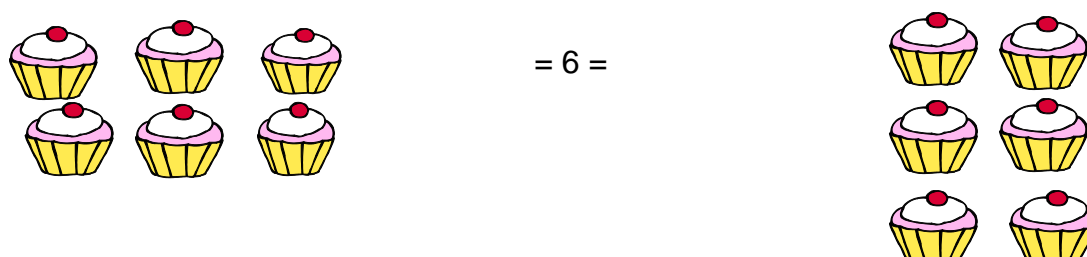


Figure 3.1: Counting objects

Figure 3.1 illustrates that $2+4 = 6$ and $3+3 = 6$; the child with dyscalculia will not be able to deduce that these two calculations give the same answer, due to lack of language and expression. They are unable to see that the total number of the two calculations is the same, regardless of the position of the objects. They find it difficult to understand mathematical symbols and concepts, hence, the teacher should make sure that language is used correctly, as doing so is important for engaging with PCP. In Ireland, language and communication are regarded as essential elements of language learning, particularly in mathematics (Chitera et al., 2016:309). It is vital that teachers ensure that learners are able to spot the difference between home language and LoLT; if two languages are not used consistently, they might hamper the process of engaging with PCP. It is vital that Grade R teachers should teach learners in the language learners are conversant with.

Considering the broad spectrum in teaching and learning, children use various languages. They tend to use home language when they are at home and use environmental language – known as informal language – when they are with their peers, and the usage of these languages impact the teaching and learning of the learners (Liu, 2013:3). Environmental language is a result of the nature of the rainbow environment children find themselves in, as South Africa recognises 11 languages as official. All these languages must enjoy parity and esteem and be treated equally (Republic of South Africa, 1996:5). It is important that teachers teach young learners

in their mother tongue,⁴ because if children are taught in a foreign language, they lose interest. Successful mathematics lessons and activities are those that consider the learning needs of learners (Cameron, 2001:1; Hannan, 2016:24).

3.4 THE MAIN COMPONENTS OF THE SOLUTION

This section will discuss the main components of the solution in an attempt to respond to the needs discussed in Section 3.2. The term component refers to the actions and activities that constitute solutions for the challenges identified (Tlali, 2013:84), and this include adequately qualified Grade R teachers, the availability of teaching and learning resources, sufficient parental involvement, support from authorities, and adequate language for teaching and learning in Grade R. These components are discussed below.

3.4.1 Adequately qualified Grade R teachers

For the purpose of improving children's attainment, the Universal Access to Grade R: Policy Framework stipulates that Grade R teachers must be qualified with a minimum of a Diploma in Grade R teaching (Department of Basic Education, 2011a:6). NAEYC and NCTM (2000) argue that effective teaching of mathematics requires an understanding of what learners know and need to learn. In eliminating the limitations caused by unqualified Grade R teachers in South Africa, the Diploma in Grade R teaching from accredited institutions was recommended as a minimum requirement; alternatively, B.Ed. Foundation Phase Teaching, if the teacher qualifies for admission (Republic of South Africa, 2015:49). New entrants to the sector were urged to enrol for these qualifications, as they would develop into teachers who demonstrate the general principles, knowledge and skills required for Grade R teaching (Republic of South Africa, 2015:52; Department of Basic Education, 2011a:6). Ongoing professional development programmes for ECD teachers were considered to be essential for the provision of high-quality services for children, as these programmes were regarded as a national goal, which emphasises enhancement and development

⁴ The terms "mother tongue" or "mother language" are used for the language that a person learned as a child at home (usually from their parents), hence, the researcher refers to home language or mother tongue.

of teachers (Egert et al., 2018:402). These are educational processes by which members of any profession maintain, improve and broaden the knowledge and skills required for their profession (Khan, 2010:37). It promotes the generation of new ideas, and teachers who participate in the programmes are knowledgeable and have a positive impact on the engagement of PCP.

The state of Grade R teachers' qualifications in Ireland improved when the Irish government introduced a strategy called Workforce Plan in ECCE. Through this plan, teachers in ECCE were profiled and provided with facilities for upskilling and reskilling to ensure that they acquire the knowledge, skills and competency needed in the ECCE sector (Department of Education and Skills, 2010. A workforce development plan for the early childhood care and education sector in Ireland. Dublin: DES.

Department of Education and Skills. 2011. *OECD Project Overcoming School Failure: Policies that Work National Report Ireland*. Dublin: Department of Education and Skills.

, 2010:5). Courses were offered to ECCE teachers in the afternoons and evenings, to fast-track the process and ensure that teachers are on par with the required qualifications. Through professional development, teachers were able to engage learners with PCP confidently; attainment in mathematics also improved. The overarching principle of professional development focuses on changing beliefs and behaviour relating to personal growth and professional identity, hence, the intervention (Meijer et al., 2017:821). Similarly, in Kwara State, the Nigerian government instituted a plan that involves supporting activities with a focus on teacher development (Ijaiya, 2010:2).

Reflecting on these interventions by different countries, it is clear that teacher development is regarded as a mayor tool for equipping teachers with content knowledge and pedagogical knowledge so that they can engage with PCP in a Grade R mathematics class. Research has shown that the number of mathematics courses taken by teachers does not correlate with their effectiveness in the class, as indicated in NAEYC & NCTM. The question remains, what type of content is appropriate for preparing mathematics teachers, and for continuous professional development (Graham, 2001:322)? Through these interventions, teachers become bricoleurs, by

making meaning of whatever they have learned and utilising new knowledge to promote teaching and learning in Grade R mathematics classes.

3.4.2 Teaching and learning resources that are available

Teaching and learning resources refer to the material that the classroom teacher uses to help the learners acquire and understand knowledge, concepts, skills and attitudes that are introduced during the lesson (Mwania & Murithi, 2017:542). Mosia (2016:69) argues that teachers are provided with the platform to be creative and innovative in order to produce their own teaching and learning resources. This statement is in line with bricolage, which advocates creativity. With bricolage, you do not need tools to create something of value, instead, you use any artefact to create something of value (Mahlomaholo, 2013b:379392). Bricolage is a mode of interpreting and adapting existing material to new circumstances or needs (Knepper, 2006:71) – this should happen in Grade R mathematics classes. In Nigeria teaching and learning resources, such as books, drawing and writing materials and educational toys were provided (Ijaiya, 2010:2). Botswana set up a specialised unit for the development of teaching and learning materials; a policy guideline was also developed to guide the use of resources in order to address shortages (Mannathoko, 2017:593). A curriculum for ECD was developed in partnership with Unicef, and this brought hope to the field and practices of ECD (Maunganidze & Tsamaase, 2014:3). Age-appropriate programmes and relevant teaching and learning resources were developed and made available in the early childhood education setting in order to increase advancement of the learners in the class (Bose & Seetso, 2016:2).

In Botswana, Unicef, in partnership with Save the Children, provides physical facilities, such as buildings and teaching equipment, for ECD (Mwamwenda, 2014:1407). This has introduced suitable means of expression for the development of learners through the use of books, educational toys, mathematical games and other teaching and learning material that could facilitate mathematics in classes (Madden, 2012:24). South Africa developed resource packs to support Grade R teachers to implement curriculum. These resources include posters with different themes, storybooks, teachers' guides and lesson plans, as well as assessment frameworks. By so doing it supported teachers in developing day-to-day activities (Department of Basic Education, 2011a:6).

It is noticeable from the narratives above that teaching and learning resources are key components of teaching and learning in mathematics classes. I concur with Mosia (2016:19) when he says that teachers should work as a collective in order to respond to complex epistemology as advocated by bricolage. This means that teachers in a Grade R mathematics class should be creative and innovative in developing teaching and learning materials. The effective mathematical game-based curriculum was developed in a Grade R mathematics class to assist learners in engaging with PCP. This mathematical game-based curriculum was supported as part of teaching and learning, and to introduce counting strategies using countable objects to supplement teaching and learning resources (Moomaw & Dorsey, 2013:319). Through Project Maths, which was piloted in Ireland, teachers developed their teaching and learning resources collaboratively. In addition, millions of dollars were invested in the development of textbooks aligned with NAEYC and NCTM standards; these textbooks covered various aspects of mathematics, such as algebra, geometry and statistics (Lubienski, 2011:32)

Teachers have to use teaching and learning resources that are at their disposal, such as empty plastic bottles, bottle tops and ice-cream sticks, to teach mathematical concepts, such as basic counting and numbers, as a strategy to assist children to move from concrete to abstract thinking (Michael, 2013:25). When resources are available for early childhood education, it helps a teacher to nurture and support the development of learners and to implement the curriculum successfully (Akinrotimi & Olowe, 2016:34). This also implies that learners will be able to understand a mathematical concept in relation to the object easily. For example, if you want learners to understand counting, providing them with counting objects could help them to count and associate the counters with numbers. Emphasising activities through play is a natural way of learning in a Grade R class. Including concrete objects was found to be a very successful strategy for engaging with PCP in Grade R mathematics classes (Sitati, Kennedy & Mwangi, 2017:44).

3.4.3 Sufficient parental involvement

A child grows up in a family as an institution, which begins from before birth and continues after birth. It is in the family where the child grows and learns – the educational features of the family plays an important role in shaping the future of the

child (Özdamlı & Yıldız, 2014:362). Chikutuma (2013:38) argues that parental involvement in the education of children is an indicator of and motivation for quality education. Connection and transformation should be applied in teaching and learning; both these processes are associated with the home environment, where a child starts to learn mathematics concepts from siblings and the parents, hence, their involvement in the education of their children (Michael, 2013:27).

In order to facilitate parental involvement, strategies were employed by the aforementioned countries. South Africa requires that parents form a majority in school governing bodies. This strategy is an attempt to give power and voices to parents, as a way to advance issues of democracy and social justice in a country that used to be oppressed by racism and authoritarianism (Republic of South Africa, 1996:46). A range of strategies to support communication between the school and parents was designed in South Africa, Botswana and Ireland. These strategies included using digital technology, such as television, smart phones, and computer and electronic circulars and newsletters, to disseminate information through new channels of communication (Wasserman & Zwebner, 2017:2). These strategies were found to be a very effective way of communication between parents and the school, as it enabled a free flow of information between the two parties. Traditional games were also suggested as a strategy that can be valuable to engage learners in PCP in mathematical classes (Dooley et al., 2014:107). Engaging parents as full partners, by affording them the opportunity to appraise the school culture, home-school communication practices, and classroom instruction and organisation make them feel as part of school (Lemmer & Meier, 2015:2)

Research shows that, in order to create successful relationships between families, school and community, several types of involvement are required. These are communication, volunteering, learning at home, decision-making and collaborating with the community (Yaseen, Zaman & Rasheed, 2017:85). To ensure that there was a successful relationship between the parents, the school and the community, Kraft and Rogers (2012:50) indicate that a light-touch communication intervention was introduced. The intervention was aimed at increasing parents' efforts and effectiveness in supporting their children's success in school. Through attending meetings, conferences and parents' days, parents were encouraged to discuss the

progress of their children and they received guidelines on how to assist to their children with schoolwork (Meko, 2013:40). Research indicates that, in every childhood setting, children should experience an effective research-based curriculum and professional practices, which will assist in promoting high quality teaching and learning (NAEYC & NCTM, 2000:1).

Observing the picture painted above, parental involvement is an important aspect of the educational development of the child; hence, the South African Schools Act opened doors for parents to serve as chairs of various committees at schools (Mwinjuma & Baki, 2012:78). Their inclusion in school structures make parents accountable and responsive to the needs of their children (Moles & Fege, 2011:1). Involving parents is not only about improving academic performance, but also about parental care, cultural and human morale, and cultural beliefs that shape the child's social, emotional and cognitive development (Popov & Ilesanmi, 2015:53). The school and parents should improve their collaboration through a variety of interventions, such as communication, and training on what is expected of teachers and parents. The literature reveals that parents need development support programmes that will spell out their responsibilities on how they can support their children with school activities at home.

Monitoring and support of children's schoolwork are important for both teachers and the school, so that they can identify barriers that might impede learners' engagement in PCP. Therefore, all the countries investigated for this study encourage and embrace parents' involvement in schools. Working together with parents and communicating with them, encouraged them to become involved in the education of their children, and parents felt valuable as part of teaching and learning of the school. The involvement of parents in the education of their children motivated the children to learn and understand mathematics effectively. Furthermore, the children became interested in schoolwork, their behaviour was modified and they developed socially and cognitively, and, ultimately, their academic achievement improved. Figure 3.2 presents a model of parental involvement to demonstrate the effects of parental involvement on the education of their children.

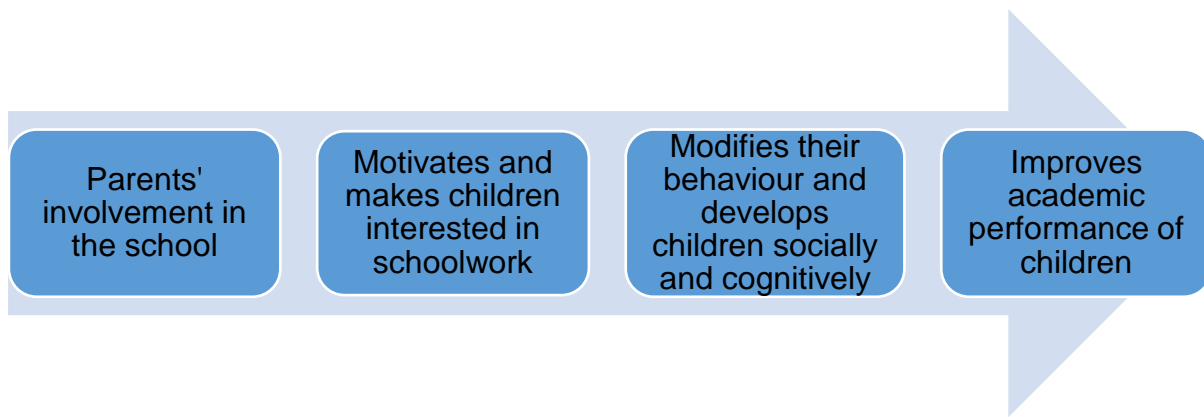


Figure 3.2: Model for parental involvement

3.4.4 Support by authorities

In order to make PCP effective and efficient, a single national education system was established in South Africa in 1994, which was accompanied by universalisation of Grade R in the country. This universalisation was in response to the needs of children, families and communities. However, to strengthen the universalisation of Grade R across the country, it was suggested the Grade R should fall under monitoring and support by district officials, to ensure quality in the foundation phase; this is a practice by education officials worldwide (Department of Basic Education, 2011a:9). It is through government directives that policy initiatives are implemented, thereby ensuring monitoring and support (Nhlapo, 2013:72).

The National Development Plan postulates that the major role of the government is to support early childhood education, specifically in mathematics (Republic of South Africa, n.d.:300). It is for this reason that the former minister of Education, Naledi Pandor, introduced the Foundation for Learning Campaign, which was published in Government Gazette in March 2008. The aim of this campaign was to support mathematics and literacy in South African schools and to support teachers by giving them directives on departmental mandates (Republic of South Africa, 2008:4).

In South Africa, schools were provided with teaching and learning resources and were given support through training and workshops by district officials (Nkambule & Amsterdam, 2018:2). Additionally, the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2025 was launched to support teachers. This plan was monitored and supported by provincial and district

officials (Department of Basic Education, 2011b:8). Bantwini and Diko (2011:227) claim that districts are responsible for the development and enforcement of functions, and achieving education goals, including teacher development. Hence, teaching and learning are improved through district support. Teacher development programmes were developed, including the establishment of professional learning communities (PLCs), as an intervention to support and develop teachers.

Northern Ireland developed a National Standard framework for supporting teaching and learning in schools. This framework covers three elements, which are, supporting teachers, delivering planned activities, and support in evaluating teaching and learning activities (Mavuso, 2013:35). In addition, the role of subject coordinators was modified to include a detailed and significant range of activities for supporting the schools and maintenance of established ECCE services (Department of Education and Skills, 2011:15). Furthermore, two levels of curriculum development were suggested to support schools. These are a conceptualisation of plans and resource provisioning for teachers, and proposing what teachers should do to implement the plans (Dooley et al., 2014:22).

Through the theoretical stance of bricolage, I understand that teaching and learning is complex and multifaceted; as a result, there is a need for a constant monitoring and support of Grade R teachers, so that they are able to engage learners with PCP in a mathematics class. For instance, in Kenya, early childhood education schools were opened to meet the demand for and to support of early childhood education expansion (Mwamwenda, 2014:1407). Value-based education was established to create a strong teaching and learning environment that will support and enhance academic attainment and develop social relationship skills that last throughout life (Amollo & Lilian, 2017:194).

Different strategies have been suggested to support teachers to engage in PCP in a Grade R mathematics class. What is clear is that each country employs strategies that will work for that country, and that can be implemented effectively. What is common to all four countries are development, monitoring and support programmes that involve plans to enhance the advancement of teaching and learning in Grade R.

3.4.5 Adequate language for teaching and learning in Grade R

Language is the process by which children make sense of the words, symbols and information of what they have learned in the first years of life (Golinkoff, Hoff, Rowe, Tamis-LeMonda & Hirsh-Pasek, 2018:1). Children are born with the ability to learn a language, but, at the same time, it is the responsibility of the teacher to ensure that learners learn formal mathematics language in a mathematics class (Chitera et al., 2016:360). Therefore, engaging learners in mathematics thinking makes the thinking of learners visible and encourages their interaction in mathematical games. Nfon (2018:21) maintained that using mathematical games such as tic-tac-toe, dots and boxes, playing cards, dice games, ludo games and so on to teach mathematical concepts that are difficult and abstract enhances socialization amongst learners, class participation, arouse and sustain interest, and achievement in class.

Strategies, such as slowing down the pace of delivery of the teacher when learners are being taught in a language that learners do not understand, have been proposed to ensure that learners follow instructions as required (Croese, 2011:390). Using an language with which the child is familiar results in better learning outcomes, (Trudell, 2016:286). Hence it is vital that the teachers use mathematical concepts familiar to the learner and this can only occur when learners possess adequate levels of the LoLT in Grade R. The research shows that language difficulties have been linked to difficulties with social behaviour and self-esteem. Therefore, if learners are not exposed to an adequate level of the LoLT during their early years, learners fall behind and do not perform well in schoolwork (Machaba, 2013:31). To ensure that learners are stimulated and are responsive to engaging with PCP, South African teachers are trained in addressing diversity and language issues (DoE, 2006:3).

Elsazadeh, Rajendram Portier and Peter (2017:294) proposed that the LoLT be linked with indigenous cultural language and also be respected and incorporated in the classroom curriculum, so that learners can use the language for a wide range of purposes in class. Similarly, it is suggested that dialogic teaching interventions be designed to improve quality of classroom talk and learners' engagement with the curriculum (Jay, Willis, Thomas, Taylor, Moore, Burnett et al., 2017:6). Participation in high quality ECD programmes can serve as an important mechanism for enhancing learners' language skills, particularly in mathematics (Cabell, Justice, McGinty,

DeCoster, Lindsay, Forston, 2015:80). Modelling a specific language affects children's language positively, and modelling plays a role in developing the language of the child (Justice, McGinty, Zucker, Cabell & Piasta, 2013:497).

The research shows that using home language as the LoLT improves the performance of learners in mathematics (Ball, 2010:1). Different language policies in different countries leave space for parents to have a stake in the choice of language they want their children to be taught in. It is commonly agreed that any additional language can be introduced at a later stage, particularly for young children.

3.5 ENVIRONMENT CONDUCIVE TO THE SUCCESS OF A PROPOSED STRATEGY

In this section, the conditions found to be necessary for the success of the proposed strategy to improve PCP in Grade R mathematics are discussed. These are conditions that contribute to the improvement of the engagement of learners with PCP through the participation of different stakeholders, which are discussed in Section 4.1. A conducive environment for adequately qualified Grade R teachers, including a conducive environment for using available teaching and learning resources, re discussed. Additionally, a conducive environment for parental involvement, a conducive environment for support from authorities, as well as a conducive environment for the use of the adequate LoLT, are discussed.

3.5.1 An environment conducive to adequately qualified Grade R teachers

Teacher development and professionalism is a pillar that provides Grade R learners with quality education; thus, it improves engagement with PCP in a mathematics class. Egert et al. (2018:402) argue that there is increased public interest in a professionalised early childhood education workforce, with specific emphasis on the early years, which serves as a foundation for later school success. Professional development that covers a large part of training and development opportunities, ranging from workshops to university degrees, can, if implemented properly, benefit teachers, so that they can engage with PCP in Grade R mathematics classes. Mokhele and Jita (2012: 577) state that continuing professional development programmes are becoming a priority in most countries. This argument is expanded by Tsotetsi and

Mahlomaholo (2015:89), who declare that continued professional development of teachers is a cornerstone for the provision of teaching and learning in a country's education system.

In addition, Maass and Engeln (2018:272) state that continuous professional development involves activities that aim to encourage changing needs and providing quality in education, and to enable teachers to implement the curriculum. Similarly, PLCs, which serve as a platform that gives teachers an opportunity to share and critically interrogate their best practices in a collaborative and reflective way (Pirtle & Tobia, 2014:3; Stoll & Louis, 2007:2), were also established to provide support for teachers to engage learners with PCP in Grade R mathematics classes.

Regardless of whether the introduction of continuing professional development to improve teachers' skills to engage learners with PCP, there is still a need for adequately qualified Grade R teachers, to ensure that the quality of teaching and learning is not compromised, particularly in mathematics. In order for the government to achieve its objectives, teacher training institutions were established to produce specialists in ECCE. Without qualified teachers in this sector, effective teaching and learning cannot take place, because teachers are neither trained to teach, nor do they know how to handle or relate to young children (Sooter, 2013:175). In like in South Africa, it was proposed that teacher development programmes should be coupled with a minimum qualification, of Diploma in Grade R Teaching, and a Bachelor in Education degree for teachers who meet the requirements (Moloney & Pope, 2015:1, Sooter, 2013:176).

In conclusion, continuous professional development, minimum qualifications, of a Diploma in Grade R Teaching, and professional learning communities were found to be effective and conducive to enhancing teachers' PCP to engage with learners in Grade R mathematics classes. Continuous professional development focuses on what learners learn and helps teachers to sharpen their knowledge and skills to teach specific content and integrate it with classroom practices (Maboya, 2014:84).

3.5.2 An environment conducive to using available teaching and learning resources

Research shows that there is a relationship between the use of resources provided and the outcomes of learners and, it is treated as analogous to a general production function in economics, in which output is related to inputs (Mestry, 2014:862). The outputs will only be achieved if teaching and learning resources, such as manipulatives, books, drawing and writing materials and educational toys, are provided (Ijaiya, 2010:2) in order to engage learners with PCP in Grade R mathematics classes. Boggan, Harper and Whitmire (2010:2) define manipulatives as physical objects that are used as teaching tools to engage learners in the hands-on- learning of mathematics. Manipulatives are used for teaching a wide variety of topics, such as problem-solving, communicating, reasoning and estimations. Ensuring that teaching and learning resources are available is not only the responsibility of the school; parents, as partners, should also ensure that there are enough resources to engage learners in PCP in Grade R mathematics classes.

In Grade R, a play-based approach is regarded as a resource that can provide a conducive environment for teaching and learning in Grade R mathematics classes, as learners learn many skills, such as interacting with other people. Play provides enjoyment and recreation, which gives learners opportunities to create and build and think abstractly (Bose & Seetso, 2016:2). Play provides a positive experience and fosters the acquisition of basic mathematics operations (Danniels & Pyle, 2018:4). Gogoi (2015:20269) indicated that planned activities, which include flashcards and charts, create an easy, conducive teaching and learning environment for learners to acquire a variety of skills.

Infusing indigenous games, such as *morabaraba*, *diketo* and *kgati* into play has been suggested as excellent teaching and learning resources in a mathematics class, and provides a conducive environment for teaching and learning for learners (Moloi, 2014: 268; Nkopodi & Mosimege, 2009:378). Furthermore, a specialised unit for teaching and learning materials development has been established and a policy guideline developed, to promote the adequate use of resources and address shortages. Gogoi (2015:20270) indicates that the availability of teaching and learning resources makes teaching and learning easy, and all the learners participate in all the activities. The

curriculum for ECD that was developed in Botswana in partnership with Unicef, brought hope and created an environment conducive to teaching and learning in the field of ECD (Maunganidze & Tsamaase, 2014:3).

Various resources are supposed to be used to ensure effective teaching and understanding of mathematics concepts (Mntunjani, 2016:5). Research shows that play can be included as a teaching and learning resource; this activity contributes positively and provides an environment conducive to teaching and learning in Grade R mathematics classes. Luff (2018: 448) explains that learning through play and active exploration of the environment promotes the process of knowledge construction in specific social and ecological contexts. In order to add flair and make the environment conducive to learning, Moloi (2014:2) introduced indigenous games and culture into a study, thereby contributing to the engagement of PCP in the Grade R mathematics class. This collaboration of different sources links to the post-experimental inquiry moment of bricolage, and produces valuable resources through the use of different artefacts.

3.5.3 An environment conducive to parental involvement

Parental involvement in the education of their children is important across the word (Kraft & Rogers, 2015:49). It is also considered to have a standout role in shaping the children's growth and development, which will be achieved by practicing good parenting skills (Yaseen et al., 2017:84). The good relationship between school and the learners' families is also of outmost importance. The research found that, when the school and family work collaboratively to facilitate teaching and learning of learners, this interaction improves the productivity and the performance of the learners in a Grade R mathematics class.

Effective and continuous communication between the school and the parents is regarded as the most valuable tool for creating a conducive environment for teaching and learning in a Grade R mathematics class. The findings of Lemmer and Meier (2015:2) highlight that the benefit of home-school communication is generally most powerful when it is constantly characterised by mutual respect between parents and teachers; this shows that the school is responsive to parents' concerns. This creates

a culture of frequent communication between parents and teachers, particularly with regard to the teaching and learning of young children (Kisner, 2013:6).

Changing the approach to teaching mathematics may have a negative impact on the involvement of parents in the education of their children. This change may be addressed by the school in order to build confidence in parents so that they are willing to be involved in the education of their children (Dooley et al., 2014:103). If parents serve on committees of the school, such as school governing bodies, parent-teacher associations, and also participate in school events, their involvement facilitates mutual interests in teaching and learning, and they become involved in the decision-making of the school (Yaseen et al. 2017:85). Research shows that some parents face limitations regarding their involvement in their children's education, due to a lack of skills to deal with curriculum issues at home (Meko, 2013:2). Hence, it is important for parents that the roles they are expected to play in the education of their children should be clarified (Maluleke, 2014:2).

It can be concluded that a good relationship between parents and the school, coupled with effective, open communication, provides parents and the school with an opportunity to share ideas and practices on the best way to engage the learners with PCP in Grade R mathematics classes. Through collaboration and communication, a strong relationship can develop between parents and the school (Henderson & Redding, 2011:105; Phori, 2017: 56).

In the same vein, parents need to be empowered on how to deal with matters pertaining to the education of their children. Meko (2013:16) explains that, when parents are skilled, they will know when and how to engage with PCP to assist their children with their schoolwork at home, and children's performance in mathematics will improve. It is through such empowerment that parents can be informed on how to assist their children with schoolwork at home. This empowerment platform promotes a strong relationship between parents and the school, and consequently creates a conducive environment for teaching and learning of the learners.

3.5.4 An environment conducive to support from the authorities

The absence of clearly delegated authority causes intolerance for bureaucratic delays in service delivery, since decisions cannot be taken promptly, but have to be referred

to a higher authority. This creates uncertainty, impedes delivery and hampers quality education in early childhood (Republic of South Africa, 2013:7). The literature confirms that the responsibility of the public sector is to ensure that there is excellent and good quality service delivery, and this should be provided through monitoring and support of teaching and learning (Phuroe, 2011:22). Furthermore, the research indicates that it is the responsibility of the district to ensure that the schools are supported and new mandates and reforms are implemented (Republic of South Africa, 2013:11).

The same policy declares that the district offices are the hub of provincial education departments, and provide a vital line of communication between provincial head offices and the school. This will only be successful if the districts and principals of the schools work together to implement teacher development programmes. This collaboration could also be instrumental in clarifying the duties of district officials (Department of Basic Education, 2013:14). Collaboration should include a range of activities, where content knowledge, pedagogical knowledge as well as teacher development activities are discussed as part of monitoring and support (Bantwini, 2012:522). Monitoring is only possible when plans and programmes are in place and are being implemented correctly (Zerfu & Kebede, 2013:2). Brazer and Peters (2007:1) claim that districts are obliged to implement programme improvement plans and to ensure that schools meet the required standards.

A conducive environment can be seen as an environment that allows the teacher and the child to learn without any obstacles. This will only happen if there is enough and effective support from the education authorities, including the availability of activities that are appropriate for learners, resources, and an outdoor environment. When schools are supported, it enhances the sense of efficacy of teachers and the school management team (Leithwood & Jantzi, 2008:8). The research indicates that there are seven domains of district level support. Figure 3.3 displays these seven domains of what the district should do, in order to create a conducive environment for teaching and learning at the school (Whitehurst, Chingos & Gallaher, 2013:2).

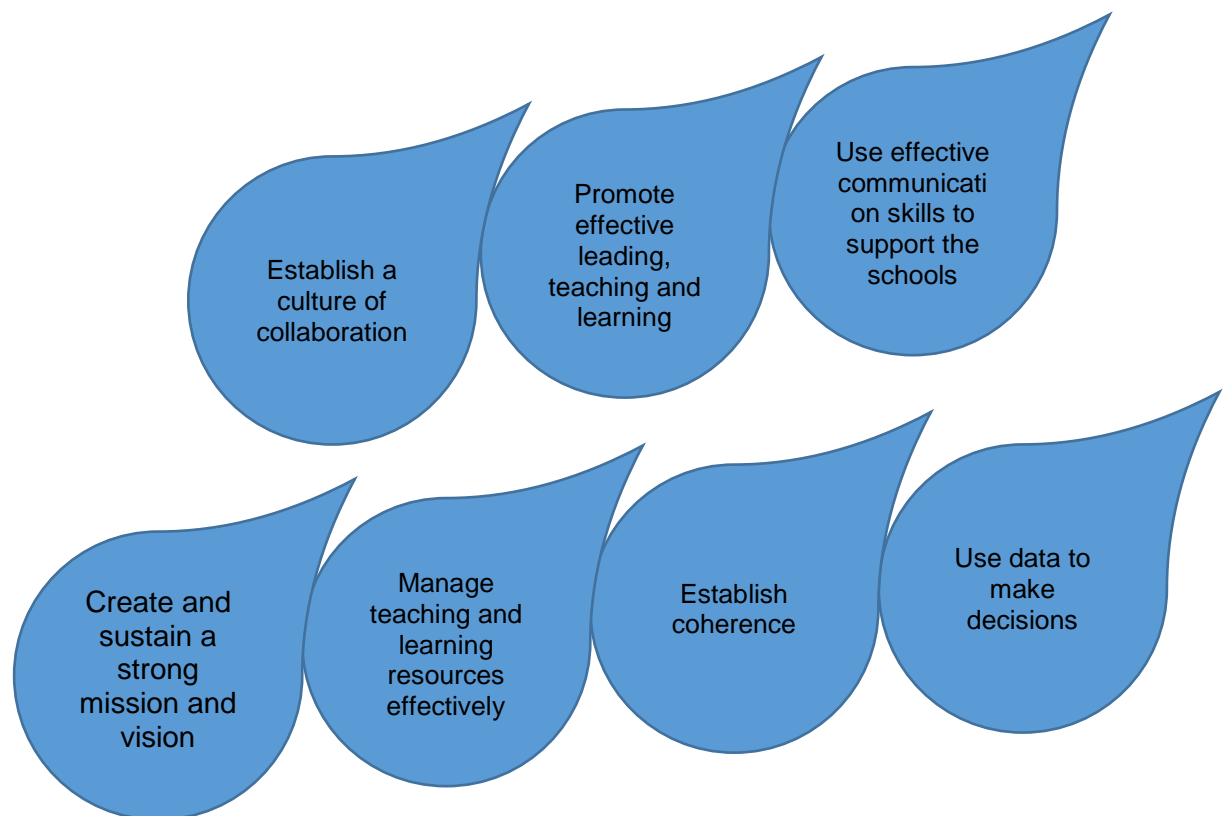


Figure 3.3: Seven domains of an effective district

Source: adapted from Hornung and Yoder (2014)

Literature confirms that the districts are the responsible agent for supporting schools so that learners can perform to the required standards. The district acts as an intermediary between the school and the head office (Mavuso & Moyo, 2015:1084). These authors also indicate that the district's role is to support teachers to improve their instructional practices, which, in this case, is PCP practice in a Grade R mathematics class. Leithwood and Jantzi (2008:1) suggest that district leaders must act to cultivate a collaborative culture of mutual respect, trust, and collegiality among staff to promote the culture of collaboration. In order for the districts to perform their responsibilities, the domains in Figure 3.3 should be promoted.

3.5.5 Conducive environment for the adequate language of teaching and learning

Even though the selection of a language for formal education is finalised in language policies, in South Africa, parents have the advantage of choosing the LoLT for their

children (Republic of South Africa, 1996:6). Language is an important instrument for teaching and learning, and it must be selected with extremely care, as it determines the future of children (Abdullah, Buriro & Panhwar, 2018:78). When children learn, they return to their first language when they seek the solutions to problems; hence, the need to ensure that children are competent in their home language before they start learning any additional languages (Excell & Linington, 2010:25).

Parents believe that, when they assist their children with mathematics activities at home, they can enhance children's mathematical language. Sooter (2013:14) describes the medium of instruction as, principally, the mother tongue or the language of the local community, which the learners will be comfortable using when they learn in class; textbooks should also be produced in the same language. Using a language that is familiar to the learners in a Grade R mathematics class also benefits parents, as they are able to assist their children with their schoolwork at home. This means that the use of home language for teaching and learning should be extended to communication with parents (Mncube, 2007:141).

It is clear that the use of mother tongue in early education is vital, as it contributes positively to the performance of learners. The research reveals that learners who receive classroom instruction through a second language did not perform as well as those who had been taught in their home language. Ball (2011:6) confirm this by reporting that South Africa's performance is amongst the worst when it comes to education, due to the language factor in the teaching and learning environment. The implication is that, if the language used at the school is familiar to both parents and learners, it will boost their morale and they will both participate in the school's academic activities.

3.6 THREATS THAT MAY HINDER SUCCESSFUL IMPLEMENTATION OF THE STRATEGY

In this section, the discussion will centre on threats that could hinder the implementation of the proposed strategy. Factors such as unqualified Grade R teachers, shortage of teaching and learning resources, lack of parental involvement, and insufficient support from authorities, including the inadequate LoLT in a Grade R, are discussed.

3.6.1 Unqualified Grade R teachers

Teachers in Grade R are expected to be qualified so that they can engage with PCP in a mathematics class. Robinson (2016:11) argues that the Revised Teacher Qualification Policy emphasises various types of knowledge that underpin teachers' practice, and encapsulates these types of knowledge in the notion of integrated and applied knowledge. The study, furthermore, lists the competencies that a qualified teacher must possess, including sound subject knowledge, and that the teacher must be able to manage classrooms effectively across diverse contexts in order to ensure a conducive learning environment (Republic of South Africa, 2015:60). These requirements imply that, if teachers are not adequately qualified, they will not know how to apply this knowledge, hence, it is vital that teachers have suitable and adequate Grade R qualifications.

Education provides an interrelated and independent set of human capacities that predispose people to think, to know and to act in social contexts of awareness including values and skills (Mwamwenda, 2014:1403). Thus, if teachers are inadequately qualified, it could compromise the teaching and learning in Grade R mathematics classes. South Africa's National Policy Framework for Teacher Education and Development affirms that the majority of teachers are not sufficiently equipped to meet educational standards (Republic of South Africa, 2007:4). The policy aims to enforce continuous teacher development to improve PCP in Grade R mathematics classes, but this is not happening as planned, due to the low levels of education of teachers in this field (Du Plessis & Eberlein, 2018:2).

The research shows that continuous professional development has little effect on teachers, as districts determine the programmes, their duration and frequency. This leaves the continuous professional development structure fragmented, resulting in limited growth or improvement in teaching and learning (Flint, Albers & Matthews 2018:1). Continuous professional development is not enough to ensure that teachers are able to engage with PCP in mathematics classes. Christiansen (2015:1) indicates that PLCs could offer an additional model to support and empower teachers. PLCs is a model that engages teachers in collaborative inquiry and reflection, to explore new ideas and current practices (Maboya, 2014:83). The challenge is that teachers need

time to discuss and accept a new approach, to see demonstrations and to repeat instructions (Flint et al., 2018:1).

It can be concluded that quality teaching and learning in Grade R must be enhanced through teacher training and support. This is confirmed by Mji and Makgato (2006:254), who state that South Africa is in dire need of adequately qualified mathematics teachers, as the country will not be able to produce learners who perform well in this subject if teachers are not qualified. Furthermore, the development of continuous professional development programmes and establishment of PLCs should involve teachers, so that they can make time and participate in those developmental activities.

3.6.2 Shortage of teaching and learning resources

Research by Mbugua, Kibet, Muthaa and Nkonke (2012:9) points to the low socio-economic status that is associated with lack of resources, as a factor that contributes to disappointing outcomes of learners in mathematics. The use of old methods of teaching and a lack of content knowledge contributes to the poor performance of learners in mathematics (Mbugua et al., 2012 254). Little has been done to examine the cause of good performance in fully resourced schools, and this gap between schools with different levels of resources schools remains unclosed (Ndlovu, 2011:420).

Department of Social Development (2015:1) indicates that in order for learners to be able to perform good, play is an activity that contributes to and supplements teaching and learning resources, can be incorporate in teaching in early grades, especially in Grade R. Research shows that Grade R teachers underestimate the power of play-based enquiry. They have limited understanding of how, in the early years, teaching and learning can be achieved through pedagogy of play (Danniels & Pyle, 2018:4). The study by Excell (2011:50) indicates that the role of teachers is pivotal, as it entails balancing current educational demands and ensuring children are immersed in appropriate play-based early learning programmes. However, Wood (2014:6) affirms that children who have not been enculturated into Western forms of “education” play, experience an early childhood setting that disadvantages them regarding access to the curriculum and negotiating classroom culture when they encounter Grade R

mathematics. The teaching of mathematics in a Grade R class should involve stimulating activities that infuse indigenous games, which have been found to be effective in engaging learners with PCP. If parents, as experts on indigenous games, absent themselves from engaging their children with indigenous games to enhance their understanding of mathematical concepts, parents disadvantage their children regarding improving their performance in mathematics (Moloi, 2014:9). One of the threats facing teaching and engagement with PCP in Grade R mathematics classes is negative attitudes (Mosia, 2016:77). This implies that, when teaching mathematics, teachers' attitudes should be positive, as the subject is generally regarded as being difficult.

The information above indicates that there is a strong relationship between teaching and learning resources. Teachers should not only depend on the teaching and learning resources provided to them; they can infuse indigenous games as a strategy to teach mathematics and maximise learners' participation in the subject (Moloi, 2014:27).

3.6.3 Lack of parental involvement

Schools fail to fully engage parents and provide them with information about what their children are learning and how they are performing (Kraft & Rogers, 2015:49). This failure of schools to engage parents and provide them with information about the progress of their children becomes a threat to parents, as they are unable to assist their children with schoolwork at home. Learners are also affected, as their performance decreases due to lack of information on the side of their parents. Kisner (2013:5) states that teachers must open themselves to children and their parents, show empathy, and truly listen to families. Furthermore, there are fragmented relationships between parents and teachers, which makes it difficult for both of them to work together and make time for communication – unless this happens, the performance of learners in mathematics will not improve. Mannathoko and Mangope (2013:49) suggest that teacher-parent cooperation and relationships should be promoted and supported to enforce a strong connection between homes and schools. The effective contribution of teachers on the building of home-school relationships and involving parents in the school clarify their roles and they are both able to carry out their task successfully (Boyd, 2015:18). The same study states that teachers are not the only ones who lack collaboration skills and that parents may experience the

challenge too (Boyd, 2015:35). Another issue that makes difficult for teachers and parents to work together is lack of communication. There should be clear, open communication between the school and home in order to facilitate teaching and learning in Grade R mathematics classes, if not, performance will remain below expectations (O’Kane & Hayes, 2010:5).

Thus, if the school wants parents to participate in the education of their children, responsibility should be a shared between the two parties, coupled with parents having the capacity and knowledge of how they can assist their children with homework. Delegation and sharing of responsibility between parents and teachers have been found to be necessary for enhancing activities allocated to parents (Mudekanye & Ndamba, 2011:11). Two-way communication between the home and the school improves relationships, consequently teaching and learning in Grade R mathematics classes improves. Lemmer (2012:2) suggests that there should be communication between the two parties to ensure equitable power sharing.

3.6.4 Insufficient support from authorities

Monitoring and support are the responsibilities of district officials, whereby they provide excellent and quality services; it is a collective responsibility of governments and their partners, to ensure that all individuals in all corners of the world receive quality service delivery, which includes education, family care and health services. The school and those in power should be able to identify their weaknesses and their strengths as part of a continuous process (Sheldon, 2011:100). Continuous monitoring and support of schools ensure improved accountability, quality service delivery and collaboration between the education authorities and teachers.

Meko (2013:62) found that lack of communication between schools, parents and district officials hinders the teaching and learning in the class. However, Rasebotsa (2017:59) suggests that good communication between schools and districts may facilitate effective coordination of teaching and learning activities. This implies that there is a need for effective communication between district officials and schools, and that this communication should be cascaded properly to parents at home, to enable them to be involved in the education of their children. The research shows that the officials of the district are unable to support schools, due to insufficient content

knowledge and pedagogical practices, and a lack of understanding of departmental policies applicable to South African education, and this compels district officials to rely on theory – not practice – when they support schools (Tsotetsi, 2013:80). Hornung and Yoder (2014:2) indicate that one of the obligations of district officials is to promote effective and collaborative communication with its constituents. Magumela (2017:20) adds that district officials should provide support and guidance to teachers through teacher development programmes, and demonstrate to them how they can improve PCP in the classroom.

The implementation of teacher development programmes also affects Grade R teachers' engagement with PCP in mathematics classes. Teachers are not adequately qualified to implement programmes. Moreover, teachers' training programmes and curriculum support programmes have not been developed to support teachers (Condy & Blease, 2014:39). In order to enable teachers to perform well, districts have developed professional development programmes that focus on improving teaching and learning in classrooms (Leithwood & Jantzi, 2008:8). However, capacity building encourages district officials to take up a new role, of facilitating educational reform for improvement, and involving teachers to network with one another and support learning at schools (Levin, Datnow & Carrier, 2008:10).

Reflecting on the forgoing, it is clear that education authorities are the leading agents in education. A lack of monitoring and support hampers service delivery, and poor communication between authorities and schools threatens the engagement of teachers with PCP. The education district is expected to develop collaborative programmes that involve all the stakeholders in education, as well as teacher development programmes that foster teachers and encourage them to engage with new ideas and discuss strategies for teaching. By doing so the above-mentioned threats in the teaching and learning environment can be overcome (Parise & Spillane, 2010:327).

3.6.5 Inadequate language of teaching and learning in Grade R

Teaching children in their home language at school gives the children the advantage of understanding what they have been taught and improves their performance (Van Staden, Bosker & Bergbauer, 2016:4). Research confirms that learners learn best

when they learn in their mother tongue and learners' mathematical language increases (Trudell, 2016:3). This argument is expanded by Ball (2010:3), who claims that children's ability to learn additional languages does not suffer when their mother tongue is the language of instruction throughout primary school. The challenge is posed by the inability of the teacher and the school to use adequate LoLT that is understood by both the teacher and the learner. When learners are offered the opportunity to learn in their mother tongue, they are more likely to succeed in school, and their parents are more likely to communicate with the school and participate in the learning of their children (Ball, 2010:2).

Teachers find it difficult to use children's mother tongues as the LoLT, due to the nature of the diverse classroom. Machaba (2013:147) proclaims that it is difficult for teachers to offer teaching and learning in mother tongue when children in the class speak more than three different languages. For example, if there are Sotho, Xhosa and Tswana speaking learners in the class, it is difficult to decide which language to use to meet the needs of learners. Hannan (2016:56) suggests that the language used by the teacher should be adjusted in line with the stage of the knowledge of learners, and the sociolinguist context. Prochazkova (2013:24) believes that teaching mathematics in a different language provides learners with different perspectives and different vocabulary, and it triggers a more active approach to deeper understanding.

Considering these arguments, it seems that teachers need to use teaching approaches that will assist in meeting the diverse needs of learners, as there is often more than one language being spoken by learners in their classes. Hannan (2016:24) claims that each learner needs a language programme approach to teaching, and this causes a problem for teachers, as they are not trained to deal with such cases. Nel et al. (2016:8) suggest that teaching and learning has to be inclusive in order to cater for diverse learners in a Grade R mathematics class. This implies that the teacher should adapt the LoLT to meet the needs of all learners in the Grade R mathematics class.

3.7 EVIDENCE THAT THE STRATEGY WORKED

In this section, indicators that measure whether a proposed strategy to improve PCP in a Grade R mathematics class was successful are discussed. The indicators refer to

qualifications of Grade R teachers, teaching and learning resources, parental involvement, and support by authorities, including the LoLT used in Grade R.

3.7.1 Qualifications of teachers

Teachers must undergo teacher development and skills programmes so that they are able to engage with PCP in Grade R mathematics classes. Building a qualified, professional and sustainable workforce is essential for delivering quality early childhood education and care services and for achieving the best outcomes for children and the broader community. These programmes can serve as a collaborative factor to improve teachers' relationships with colleague (Kelly & Cherkowski, 2015:2). Education should provide people with the opportunity to enjoy human existence (Theoha, 2011:25). Teachers can engage with one another through the establishment of PLCs and share ideas and best practices on teaching and learning specifically in a Grade R mathematics class. Through the information acquired during capacity workshops, teachers can become motivated and committed to their work, which improves the outputs of learners, especially in mathematics. Willingness and commitment to study further shows a positive attitude that contributes to teaching and learning in mathematics.

3.7.2 Teaching and learning resources

The literature discussed in Section 3.4.2 indicated that teachers are able to be innovative and create their own teaching and learning resources by using recycled materials, such as bottle tops, ice cream sticks and shoeboxes of different sizes. Thus in the study, the team was trained to develop self-made teaching and learning resources, so that they become confident and start to develop their own self-made teaching and learning resources to supplement the limited resources that teachers have. The contribution of education authorities on the establishment of PLCs is also appreciated by teachers, as it is during PLCs meetings that they can share best practices and learned from one another (Department of Basic Education, 2011b:2). By infusing indigenous games in the engagement with PCP enabled learners to link their background experiences with the school environment.

3.7.3 Parental involvement

Parental involvement and parents' contribution to the education of their children will determine the ability of teachers to engage learners with PCP-in order for the learners to perform well. Meko (2014:8) argues that most parents, irrespective of their level of education, can provide expert knowledge in the form of cultural and social experiences that can help children to survive in life in general. Another indicator that can serve as a measure for parents' involvement in the education of the children is a clear communication between teachers and parents, which promotes collaboratively work between them. Yaseen et al. (2017:87) state that there should be strong communication between parents and the school in order to improve children's performance. Similarly, conducting the training for parents, which clarifies the role that they should play in the education of their children, is identified as one of the indicators of a successful strategy. The fact that parents serve on some school committees in the school make them feel accepted and part of the education community, as stipulated in Section 20 of the South African Schools Act No. 84 (Republic of South Africa, 1996:17). When parents and the school work together, they embrace the crux of participatory democracy by communication through elected members (Phori, 2017:131).

3.7.4 Support from authorities

Due to the support that the schools receive from the education authorities, they are enthusiastic about engaging learners with PCP in Grade R classes. The fact that the district involves schools when developing continuous professional development programmes, make teachers feel that their contributions are valued; their engagement with learners in the class improves and learner attainment increases. Spaul (2013:4) states that collaboration between different stakeholders in education can make a powerful contribution through sharing of experiences and feelings; hence, it is important for all stakeholders to work together. Effective monitoring and support of schools assist teachers to be prepared to engage learners effectively with PCP in Grade R mathematics classes. Magumela (2017:22) adds that effective and sustainable classroom instruction takes place at the school as a result of commitment and ever-learning teachers, and motivated learners. However, the multiple roles of

district officials in supporting and influencing the work of teachers and learners is key to continuous improvement and visible change in the teaching and learning arena.

3.7.5 The language of teaching and learning in Grade R

Using mother tongue as the LoLT makes it easier for learners to engage with PCP in a Grade R mathematics class. Teachers have a key role to play in providing a model of language that is appropriate in a particular mathematics context (Dooley et al., 2014:37). Hence, it is vital that teachers communicate in the language that the learners understand during teaching and learning. Ball (2011:5) maintains that, when children learn in their mother tongue, they are likely to succeed in their learning and their parents are likely to communicate their children's learning progress with teachers and participate in the education of their children.

Early childhood education is a specialised field that acknowledges the diverse learning needs of all learners (Hannan, 2016:24). The fact that parents are able to choose the language that they want their children to be taught in, improves the performance of learners in mathematics, as it helps them to understand mathematics concepts and participate in all mathematics activities.

3.8 CHAPTER SUMMARY

This study attempted to design a strategy to improve PCP in a Grade R mathematics class. It also sought to answer the research question, how can a strategy to improve PCP in a Grade R mathematics class be designed?

In this chapter, attention is paid to the five objectives of the study. The first section investigates the challenges that justify the need for the study. In the second section, the discussion relates to the components of the solutions. Subsequent to this section, the environment conducive to the success of the proposed strategy is investigated. Following this, the threats that may hinder successful implementation of the strategy, as well evidence that the strategy could work, are discussed. A review of the literature referring to experiences in the countries mentioned in Section 3.1 contributed to the envisaged strategy.

In the next chapter, the focus is on the methodology relating to data collection and analysis.

CHAPTER 4: METHODOLOGY AND DESIGN OF A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICES IN A GRADE R MATHEMATICS CLASS

4.1 INTRODUCTION

The aim of the study was to design a strategy to improve PCP in a Grade R mathematics class. In order to achieve this aim, this chapter focuses on research methodology and design. As a researcher, I realised that I do not have enough expertise of my own to design a proposed strategy to improve PCP in a Grade R mathematics class. Therefore, I employed PAR as an approach to generate data for this study. Working together as co-researchers placed us all in a better position to design a proposed strategy, which was a daily challenge that concerned us. The chapter builds on the reflections of the constructs, which were explored in detail in Chapter 2 and which relate to the five objectives of the study. Furthermore, the theoretical constructs developed in Chapter 3 were amalgamated and put into practice to answer the following research question:

How can a strategy to improve PCP in a Grade R mathematics class be designed?

This chapter is divided into two sections. The first section explains, concisely, the theory of PAR, whilst the second section is the core of the study, where I explain how data was generated with the co-researchers to validate the need for the proposed strategy. I start this chapter with a description of PAR as methodology, including its origins. I also draw attention to the formats of PAR, the relevance of PAR to this study and the objectives of the study; I also discuss epistemology and ontology briefly. In addition, ethical considerations that were applied to sensitise the team to their rights are discussed and explained. The research design is highlighted so as to accomplish the objectives of the study. The intervention strategy, which involved setting the scene; team formation; profiling of the co-researchers; team vision; and a SWOT analysis, are also discussed. Lastly, a strategic plan that prioritises activities, and data analysis are discussed.

4.2 PARTICIPATORY ACTION RESEARCH AS RESEARCH METHODOLOGY

In this section, PAR as an approach suitable for the study, is discussed, including its origins and relevance to the study. To justify the need for the study, PAR formats, objectives, ontology and epistemology are also discussed.

4.2.1 The origins of participatory action research

PAR's origin can be traced back to the work of Kurt Lewin in 1944. Lewin is considered to be the founder of action research. As a psychologist and a refugee from Nazi Germany, his stance was that people would be more motivated about their work if they are involved in decision-making (McNiff & Whitehead, 2006:36). Lewin used the term PAR to address the problems of marginalised and discriminated against communities in dealing with the challenge identified (MacDonald, 2012:35). According to Lewin, PAR is a subset of action research (MacDonald, 2012:35).

In contrast, Jordan (2003:187) indicates that PAR originated from countries that were colonised in the early 1960s and is inspired by anti-colonial struggles. He articulates, furthermore, that scholars began focusing on how to change and improve the lives of those struggling for survival. Therefore, the collaborative analysis of PAR became useful and single perspective was avoided so that the researchers and the participants can work as a team (Reid, Tom & Frisby, 2006:31).

Even though many scholars propose explanations for where and how PAR originated, Lewin's work, which emphasises collaboration with a co-researcher – always part of PAR became prominent. Thus, in this study, the team came together and worked towards designing a strategy to improve PCP for a Grade R mathematics class. Starting from this position, I worked collaboratively with a team comprising teachers, community members and other stakeholders involved in early childhood education. During this period we worked together, we took control of all the processes and procedures for generating knowledge on the problem in question, through engaging in the spiral and cyclical stages adopted from Kemmis and McTaggart (2007:273). We were liberal in decision-making and we spelled out our views regarding the proposed strategy.

Lewin's work influenced scholars, such as Bergold and Thomas (2012:5), who agree with him and indicate that the combination of practice change and collaborative research is possible and makes sense when you employ PAR as an approach. In contrast, Kemmis and McTaggart (2005:563) point out that not all theorists of action research emphasise action and, instead, prefer collaborative research activities. Even though the idea of the action researcher is attributed to Lewin, the research shows that there were earlier actionists, before Lewin (Kemmis & McTaggart, 2001:272). Nevertheless, Lewin's work and reputation gave impetus to action research, of which PAR is considered to be a subset, which had started to be employed as a research approach.

In 1970, a researcher of the Tavistock Institute championed the **second generation** of action research with the Ford Teaching Project, directed by Jon Elliott. This was when critical and emancipatory action research was recognised (Bergold & Thomas, 2012:9). It spread to Australia, and the impulse was paralleled by similar advocacies in Europe in 1980, which heralded the **third generation** of action research (Bergold & Thomas, 2012:12).

Considering the above mentioned generations of PAR, the work of Lewin continued in support of PAR, in the sense that PAR preaches emancipation, which I believe prevailed during my interaction with co-researchers. During the study, we worked freely, as a team, sharing power and working towards solving a problem. This is the advice given by Campanella (2009:5), who states that the researcher and the participants should take into consideration the power differential between them, and make sure that autonomy and responsibility are maintained.

Later, the **fourth generation** emerged from the connection between emancipatory action research and participatory action research (Bergold & Thomas, 2012:11). Research developed in the milieu of a social movement and was pioneered by people such as Paulo Freire, who believes that critical reflection is crucial for personal and social change (MacDonald, 2012:13). Paul Freire argues that every person, no matter how impoverished or illiterate they are, can develop self-awareness, which will free them to be more than simply a passive object in a world over which they have no control (Koch & Kralik, 2006:13). This means that PAR is about empowerment and equality.

During our working sessions, each one of the co-researchers was allocated work according to his/her strengths, with no-one dominating the team. An environment of social change was created and we sat down, as a team, and attempted to address inequality in education, specifically in Grade R mathematics classes. The team worked under the lens of bricolage, which underpins the study, and shared a vision of the pursuit of social change in order to bring about the desired outcome. In brief, the knowledge and experience of the co-researchers were honoured and valued, in order to improve the strategy to engage with PCP in a Grade R mathematics class.

4.2.2 Formats of participatory action research

In this section, the formats of PAR, which include collaboration, community engagement and giving a voice to the voiceless, are discussed.

a) Collaboration

PAR is collaborative in nature; thus, Kemmis (2010:471) indicates that people working together on an action research project might reasonably contest what is valued as the right thing to do at any time. In our team, the goal was to work collaboratively, so as to develop an effective strategy to improve PCP in a Grade R mathematics class. McHugh and Kowalski (2009:117) add that developing strong relationships facilitates the team's engagement in genuine collaborative discourse. Boog (2003:435) argues that, although all the role players make an equal contribution to the project, they all have expertise in different domains.

b) Giving voice to the voiceless

The PAR approach has been applied successfully in a broad array of fields. Chapman and Dold (2009:10), in their response concerning the benefits and drawbacks of PAR, identify "giving voice to the voiceless" as one of the formats of PAR. For the same reason, Kemmis and McTaggart (2007:329) emphasise this comment by postulating that PAR opens communicative space between role players. By so doing, it ensures that role players have a voice in decision-making with regard to the proposed strategy (Mahlomaholo, 2013a:385; Tshelane & Tshelane, 2014:288).

This is a voice that Kock and Kralik (2006:38) agree about, that co-researchers are able to share experiences with one another, to learn to collaborate with one another

and provide a voice for knowledge production. Bergold and Thomas (2012:13), however, oppose this statement by saying that, although PAR requires a great willingness on the part of co-researchers to disclose their personal views, they still have a fear of saying something wrong, and this prevents them from expressing themselves when they appear to contradict what others think.

In this study, the freedom to have a voice encouraged a positive debate, thus, empowering us to construct more knowledge in order to design a strategy to improve PCP in a Grade R mathematics class. The voice offered the team members an opportunity to listen and learn from one another. It is crucial to avoid conflict in a team, thus, ensuring joint discussion, and preventing lasting disagreement. A group that reaches an overall agreement and tolerates one another's views represents the prime principle of social justice.

c) Community-based approach

Participatory Action Research was originally developed for community engagement in developing countries by a pioneer, Paulo Freire. PAR is regarded as a community-based approach that engages the role players and allows their contributions towards knowledge construction (Ozanne & Saatcioglu, 2008:424). PAR involves community members from the beginning, through the discussions and meetings, in order to generate data. During PAR, there is a translation of multiple diverse perspectives, skills and experiences inherent in the community, and this ensures the success of the proposed strategy (Hlalele & Tsotetsi, 2015:143).

Lucero, Wallerstein, Duran, Alegria, Greene-Moton, Israel, Kastelic, Magarati, Oetzel, Pearson and Schulz (2018:56) defined community is set of people who are sharing cultures and values as well as resources or solidarity in a particular context. In this study, PAR created a platform for a diverse group of people who believe they face the same problem (Singinga, Kamungisha & Martin, 2010:696). Thus, Eruera (2010:9) states that PAR creates a discursive space for discussing matters critically, without fear, and gives power to all participants, including the marginalised and oppressed.

4.2.3 The relevance of participatory action research to this study

I chose PAR as methodology, as it considers participants as humans and not objects. It is also of the opinion that people's lives should be enhanced. Unlike the traditional moment, which occurs, in qualitative research, the natural scientific approach reduces human beings to objects, PAR advances social change and a democratic form of interaction and decision-making, which leads to a democratic end and empowers the powerless (MacDonald, 2012:43). During PAR sessions, as a researcher, I worked with co-researchers to construct knowledge. At this juncture, this knowledge construction was used to respond to the research question. which is, How can a strategy to improve PCP in a Grade R mathematics class be designed?

Participatory action research involves interaction with participants and observes events as they occur (Eruera, 2010:3; Elder & Odoyo, 2018:299). Unlike other methods, which limit the connections or face-to-face interaction between the researcher and the participants,⁵ with PAR there is partnership within and cooperative work by the team (Mahlomaholo & Netsandama, 2010:75). These characteristics of PAR suited this study very well. I went to an area where the problem had been identified and met with the school community and other role players in the education of young children in order to come up with a solution to the problem. Getting to the root of the problem caused me to move from the position of being a department official, to take on the position of co-researcher, who was also affected by the problem in question in the community. I worked collaboratively with the team and tried to establish the best way we could work through the challenge that faced us.

Denzin and Lincoln (2000:10) argue that quantitative researchers are seldom able to capture their subjects' perspectives, because they rely on inferential empirical methods and material. Thus, Bergold and Thomas (2012:8) aver that it is important to conduct PAR directly with the immediate, affected person on the site where the problem under study is experienced. Being in the natural setting of the participants entails that both researcher and co-researchers collaborate in sharing responsibilities

⁵The researcher does not subscribe to the word *participants*, and prefers a word that is in line with the study instead, which is *co-researchers*.

and taking charge of the problem as this problem was originated in the community PAR (Mosia, 2016:86).

PAR uses a range of qualitative and quantitative methods, therefore, it relates well to bricolage, which entails finding new ways to resolve real-life problems, using that which is in context, to create something of value (Rogers, 2012:5; Steinberg, 2011:205) thus the problem to be investigated must originate in the community. PAR, as an approach, uses multiple sources of data and, by so doing, it employs multiple perspectives to analyse a situation in order to provide a rich and holistic understanding of the phenomenon under study (Maboya, 2015:101). In this instance, PAR links the fractured future, which is the eighth moment of qualitative research, which commenced in 2004. Researchers, using this moment, moved towards pluralism and employed a combination of multiple methods to generate data that yield different findings to different audiences (Clarke, Willis, Barnes, Caddick, Cromby, McDermott et al. 2015:2; Denzin & Lincoln, 2005:2).

I found PAR to be relevant to the study, as it complements bricolage, which is also about the empowerment of people and knowledge construction through collaboration. In so doing, multiple methods were employed, as each one of us in the team offered our different expertise and opinions, as bricoleurs do. We did not wait for a tool to present itself, but used whatever was available in responding to the challenge, which was to design a strategy to improve mathematics in a Grade R class. We tried to find as many ways as we could to discover the power we had to resolve the problem by using the context.

In this study, different methods and tools, such as photovoice, observations, discussions and transect walks around the schools were used to generate data. The fractured future, which is the ninth moment of qualitative research in the study (see Section 2.2.1.9), believes in using a combination of multiple methods to make meaning out of qualitative data. In the same way, Clarke et al. (2015) argue that using a multi-methodological research approach, multiple theoretical frameworks and multiple data-gathering techniques, yielded a variety of findings in their psychology research, which speak to different audiences.

In the study, the team followed Kemmis and McTaggart by reviewing and reflecting on the work timeously, in order to make meaning out of what of the study was aiming to

achieve. In PAR, the term reflection is used regularly in order to check whether a team is still following the cycle of plan properly. According to Guillemin and Gillam (2004:274), reflection is a process of critical reflection, on both the kind of knowledge produced from research and the way it was generated.

Reflection is another characteristic of PAR that makes it relevant to the study, as I looked back with co-researchers during this process, took stock of what had happened during our meetings and discussions, and scrutinised the data we had generated. During this time, the team closed all the gaps that remained in order to come up with a tangible, collaborative solution. We sorted out what was good from what was bad; in other words, facts were retained, fiction discarded. Cornish et al. (2014:65) assert that, during this time, international collaboration helps the team to reflect upon their own national situation or practices, which would be useful for arriving at a conclusion.

4.2.4 Objectives of PAR

PAR as an approach has objectives that describe it, and which made it popular for generating data. The central goal of PAR is the **empowerment** of marginalised individuals, who participate in critical consciousness to achieve social change (MacDonald, 2012:37). According to Radermacher and Sonn (2007:62), PAR leads to empowerment and social change. It also enables people gain the opportunity to control relevant aspects of their lives and make decisions that affect them. In the study, the co-researchers, through discussion, managed to acquire skills, such as listening, facilitating, presenting and coordinating. Different members served as presenters, coordinators and facilitators every time we met. We took turns, so that we have a sense of what each role was like. During our discourses, one of the co-researchers said,

Jwale re ya hola re ithuta dintho tse ngata re ba bohlale.

[We are now developing and learning more things and becoming wiser.]

PAR is **democratic** in nature and can be carried out under almost any social conditions. This means that it involves all role players⁶ in the decision-making process

⁶ In this case, the role players are the team, which we also refer to as co-researchers.

and takes place in a natural setting (Bergold & Thomas, 2012:21). During decision-making, one of the effective ways of bringing about change in people is to involve them in all the programmes that are initiated (Qhosola, 2016:47).

Schneider (2008:10) opines that PAR is not simply an approach, but a point of reference in research, which is embedded in the **liberal movement**. This means it advances a transformative, **emancipatory agenda** in the study, which seeks to transform knowledge production (Mahlomaholo, 2012:2; Mosia, 2016:89). PAR enables the production of knowledge in an active partnership with the co-researchers, who are affected by that knowledge (Babbie & Mouton, 2001:222). As the affected community, we demonstrated our expertise and created new knowledge, which we applied in order to design a strategy to improve PCP in a Grade R mathematics class. We adopted the principles of bricolage which are, making do; refusing to be constrained by limitations; improvising; and creating social value, in order to design the strategy (Houtbeckers, 2013:145).

Like bricolage, the theoretical stance of the study, PAR is rooted in the social sciences, as part of the shift away from traditional, positivist science, to working towards recognising and addressing complex human and social issues (Eruera, 2010:1; Halme et al., 2012:747). As a social process, PAR happens in the **setting**, such as that of the community, and is done with **mutual respect** for individual needs, differences and the relationship with one another as equal members (Mahlomaholo, 2009:226; Tshelane, 2013:414).

In the quest to answer our research question as a team, we adopted the theory of bricolage, and this lens underpinned the study to a deeper point of development and understanding. During our discourse as a team, we bricolage as a foundation for our debate, to argue, add and compare our points of departure. Starting from the small cycle of the problem, we proceeded to a bigger cycle, still adhering to our motto, which was trust and respect. We acknowledged, listened to and valued one another's views and contributions, thus, creating an opportunity to critically discuss the matter in question without the fear of being oppressed.

Another feature of PAR that makes it unique is that it combines theory and practice and ensures that the role players have a voice in decision-making about the proposed strategy (Mahlomaholo, 2013a:385; Tshelane & Tshelane, 2014:288). This voice gave

the co-researchers a chance to share experiences with one another and collaborate with one another in relation to knowledge production (Kock & Kralik, 2006:38). Bergold and Thomas (2012:13) contest this statement, by stating that, although PAR requires a great willingness on the part of the co-researchers to disclose their personal views, co-researchers are still afraid of saying something wrong, which prevents them from expressing themselves when they appear to contradict what others think. Hence, it is important that, during the discourse, the team should be allowed to engage in a debate that will assist them to come up with the solution to the problem facing the team without fear.

4.2.5 Epistemology and ontology

Epistemology is construed as 'the study of theories about the nature and scope of knowledge, the evaluation of the presuppositions and basis of knowledge, and the scrutiny of knowledge claims' (Kaphagawani & Malherbe 2002:220). In PAR, like bricolage, the theoretical stance of the study is drawn from the diverse knowledge that results from collaborative work and engagement of co-researchers. Thus, Chilisa (2012:103) argues that this approach has various versions, but the core value is that knowledge, and its value, are socially constructed. This knowledge construction evolves through a spiral process, which consists of the following steps: planning; action; observation; and reflection, then, the team re-plan if it is not satisfied with its findings.

Like the epistemological position of PAR, which supports bricolage, the ontology of PAR also supports the idea that reality is complex and multidimensional, and it avoids committing to objectives (Mosia, 2016:91). This means that, in order to deal with the complexity of a strategy to improve PCP in a Grade R mathematics class, the co-researcher should consider that knowledge cannot simply be constructed without going deep into the reality of facts and the social context in which it exists. Even if the co-researchers' views differ; they should subscribe to the idea that their uniquely different contributions are the core of the study and contribute to designing the proposed strategy.

4.3 ETHICAL CONSIDERATIONS

The ethical clearance that I applied for from the University of the Free State was given, and permission to conduct the study at selected schools was granted by the Free State Department of Education. I familiarised myself with departmental policies pertaining to the execution of the research project.

The study was structured in such a way that harmful factors that might affect the role players were avoided. The role players, who are now called co-researchers, were informed about the processes and procedures of the study. A copy of the letter from the Free State Department of Education, giving permission for the study to be carried out, was presented. The consent letter, written into two languages, English and Sesotho (the latter for the sake of learners' parents, who also participated in the study) was read and explained. The co-researchers were made aware that, if they wish to discontinue the study, they were free to withdraw at any point and time.

During the discourse, it was agreed that all deliberations and activities would be recorded using tools including a tape-recorder; video recorder, and transcripts; and confidentiality and anonymity were maintained by applying pseudonyms. Notes written by the team were used and considered as part of the data generated. The co-researchers were informed that CDA would be employed to analyse the extracted text. Later, all the co-researchers sanctioned the consent form, which was also explained in detail.

4.4 RESEARCH DESIGN

In this section, the research design is described, order to show how the study was planned and structured to obtain the data.

In every research project, there are systematic processes to be followed when generating, analysing and interpreting data in order to increase our understanding of the phenomenon in which we are interested (Leedy & Ormrod 2005:2). The term research design refers to the way the study is to be carried out by following a plan and structure (Imenda & Muyangwa, 2006:92). In addition, Welman, Kruger and Mitchell (2011:2) define research design as a process that involves obtaining scientific knowledge by means of various method and procedures. Shangase (2013:41) is of

the opinion that the results of any investigation will be reliable and generally accepted once the proper methodology has been followed. Research design involves several decisions that need to be considered in order to make sense (Creswell, 2009:9). The emphasis in the research setup was on what happened to participants and what method of data gathering was used to attain the objectives (McMillian & Schumacher, 1997:31).

As a team, we reflected on the information we obtained and aligned it with the objectives of PAR. We formulated a research question, established our strengths, weakness, opportunities and threats, as well as the succession plan for how our PAR sessions would be assembled.

4.5 INTERVENTION STRATEGY

In the following section, attention focuses on the interventions that addressed the problem in question.

4.5.1 Setting the scene

Initial visit: I went on my usual official school visit after analysing the results of the Common Quarterly Tasks written by the Grade 1 learners. I met with the school management team, to give them feedback and the findings during my visit, in order to come up with corrective measures. It came to my notice that under performance in mathematics was a concern, especially in the Grade R class.

The foundation phase head of the department (HOD), as a member of the school management team and a fellow researcher, approached me and invited me to give guidance and to conduct my research at the school. I had indicated to them during my interaction with the school that I was concerned about how teachers in Grade R were engaging with PCP with special reference to mathematics. I wanted to develop a strategy that would assist teachers to put into practice what needed to be done in Grade R mathematics classes. I scheduled an appointment with the principal of the school, as we were both faced with the same challenge. During the meeting, I introduced myself as a research student and explained the purpose of the visit. I gave a summary of my research and the approach that I intended to employ, which was PAR. I furthermore explained that this approach involves interaction with participants

and observation of events as they occur in the setting. Unlike other methods, with PAR there is a partnership and cooperative work occurs with the co-researchers. The photograph below illustrates my first meeting with the principal.



Photo 4-1: Information session – first meeting with the principal

Information session: Subsequent to this meeting, a sequence of meetings with the coordinating team followed. We had an information session that involved discussing how to conduct a PAR project, in order to give a sense of what was expected from us as a team. We furthermore shared the achievements, frustrations and challenges we encountered when we engaged with PCP in Grade R mathematics classes. Amongst other things, the following common mathematics challenges were tackled: addition and subtraction, number concept and problem solving. The photograph below illustrates the information session with the co-researchers.



Photo 4-2: Meeting with the coordinating team

We dug deep, to the root of the problem in question, anticipating that we would design a strategy to improve PCP for Grade R mathematic classes. We pursued the approach of bricolage, which is doing it yourself with the material at hand, in order to complete a project (Senyard, 2015:180). By brainstorming the ideas we had, we constructed a useful knowledge base that benefited our proposed strategy. We used a collaborative method to address the problem in question.

For the duration of the deliberations, we sometimes disagreed with one another, but, in the end, we reached consensus. We also respected and listened to each member of the team's point of view and, thus, empowerment and trust prevailed. This corroborates the words of Kemmis and McTaggart (2007:329), that PAR opens communicative space between the co-researchers during the discussions.

During this moment, we identified our strengths, weaknesses, opportunities and threats (SWOT).

SWOT analysis

We looked into the factors that could assist and those that could hinder the process of designing a strategy to improve PCP in in a Grade R mathematics class. We checked the opportunities that could be explored and the threats that could impede the process. In the study, the following are key factors of the school community where the study took place.

Strengths: First, the team analysed the strengths of the school community where the study took place and, later, the strengths of the team were also analysed. The environment of the school was conducive to the study and welcoming for the team members. The team established that the school is a centre of community development, where the community is allowed to have their vegetable gardens for their families. The community also cooks for the children through the School Nutrition Programme. There are community activities at the school, such as church meetings and an adult teaching and learning centre. Lastly, the school is involved in three projects, which are, Brain-Booster; PEP Stores; and Nalibali, and it has four Grade R classes.

With reference to the team, we possessed a variety of strengths, which included group effort, willpower, commitment, respect and broad-mindedness. We also demonstrated our experience, capabilities, unity, and the ability to learn from one another for the purpose of designing a strategy to improve PCP in Grade R mathematics class.

Weaknesses: Firstly, the school does not have a security guard at the gate for school safety, and this results in easy access to the school. All four Grade R teachers employed by the school are underqualified and experience problems when engaging with the learners via PCP for mathematics. The school is under-resourced, which contributes to the teachers' under-performance. Lastly, the school underperforms in mathematics, which has come to the attention of the Free State Department of Education.

Opportunities: Because the school is a centre of community development, parents of the Grade R learners are encouraged to take part in schoolwork. Workshops on parents' involvement and engagement with the school are conducted regularly. Constant monitoring of all the projects involved in the school's improvement of the learners takes place.

Threats: Threats are the issues within and without the school that might hinder the progress on designing the proposed strategy, such as Grade R teachers who are not relevantly qualified. Limited resources and a lack of involvement by all parents in their children's schoolwork are threats that were identified at the school. The fact that the school does not have a security guard at the gate puts the lives of children in danger.

This analysis led to the profiling of the co-researchers according to their competencies, which assisted the team with the delegation of tasks.

4.5.2 The profiles of the co-researchers

In this section, the structure and nature of the research are discussed.

The study co-researchers constituted me; the principal; a school governing body members; the head of the department and the subject advisor responsible for the foundation phase; Grade R teachers; practitioners from the community-based sites; a social development representative; union representatives; and parents from the school community. These members were chosen because they were directly affected by the learners' attainment in Grade R mathematics. They all agreed to work together to develop the proposed strategy, and were guided by the objectives of the study.

My role in the study: Deputy Chief Education Specialist (DCES) Grade R: A DCES is a provincial, office-based teacher who is responsible for curriculum implementation and monitoring in Grade R. A DCES is also responsible for providing professional support and guidance to Grade R teachers and to ensure effective education service delivery across the province (Employment of Teachers Act 76 of 1998, Chapter 2: Sub-section 3.4) (Republic of South Africa, 1998:4). I am included in the study in order to share experiences with regard to PCP in a Grade R mathematics class. My responsibility in the study as a co-researcher was to give guidance and support to the team.

Subject advisor for foundation phase: The subject advisor is an office-based teacher, responsible for staff development and support, from pre-Grade R to Grade 3 of the foundation phase (Employment of Teachers Act 76 of 1998, Chapter 2: Sub-section 3.4) (Republic of South Africa, 1998:4). In the study, the subject advisor was included so that she could share her experiences with regard to PCP in Grade R mathematics classes. Furthermore, she could give guidance and the support needed by Grade R teachers and practitioners in public schools and community-based sites.

The principal: The principal is the head of the school and responsible for managing the school, including human resources, the curriculum and the finances of the school. According to the Employment of Teachers Act (Sub-section 4.2) (Republic of South

Africa, 1998:4), principals are responsible for the professional development programmes of staff, both professional and support staff. The principal should ensure that the vision and mission of education are achieved. The head of the school is also responsible for the orientation of newly appointed, inexperienced teachers at the school. In the study, the principal was included because of concerns she had about the overall performance of the school, and she would assist with staff development.

School governing body member: According to the South African Schools Act (Republic of South Africa, 1996: Chapter 3, Sub-section 20), each school should have a school governing body. The members' role is to ensure the overall governance of the school, that PCPs are taking place and that instructional time is observed by teachers. They represent the community, as well as school parents, and teachers and learners of the school. They were included for their promotion of teaching and learning in Grade R mathematics classes, and to ensure that the needs of Grade R teachers and learners are met, to achieve good performance by Grade R mathematics classes.

Head of the department of foundation phase: The head of the department is the spine of teaching and learning at the school. She was involved in the study due to her competencies in leading foundation phase in the school and her support and dedication to Grade R mathematics classes. She was included for facilitating and capacitating stakeholders around issues concerning curriculum management in the phase allocated to her. The head of the department was also present at the sessions as a co-researcher, to present a report on curriculum implementation and monitoring in the Grade R mathematics classes, and to come up with a strategy for improvement.

Grade R teachers: These teachers are placed in public schools and they are responsible for Grade R teaching. They were invited to take part in the study so that they could be actively involved in endeavours aimed at empowering them. They are experienced and have vast knowledge and skills for teaching in ECD arena. They would be able to contribute positively to the proposed strategy.

A practitioner from the community-based site: A limited number of Grade R practitioners are placed at community-based sites and are responsible for teaching Grade R learners. As teaching is one of the core functions, they were included in the study due to their expertise and knowledge, which would contribute to designing the proposed strategy, as their environment differs from the situation in public schools.

Parents from the school community: Through my interaction with the school, I was introduced to some parents who had an interest in the development of young children at the school, especially Grade R learners. These parents were those who came to the school to share their indigenous knowledge about PCPs with learners through a variety of activities, including fundraising for Grade R teaching and learning resources. Through their involvement with the school, they realised that there is a connection between school and home; hence parents were included in the study to give inputs on the education of their children.

Union representatives: Union representatives were included for the part they play in the development of teachers and the constant support they give their members. They advocate for transparency, fairness and equality and play a role as the legal representatives of their members.

Next, the plan of action is discussed and the priorities for designing a strategy to improve PCP in a Grade R mathematics class is explained in detail.

4.5.3 Plan of action

In the study, we identified three priorities that could be achievable and used these priorities to draw up the plan of action collaboratively, so as to address the aim and objectives of the study. Based on the priorities we identified, our three most powerful activities for each priority were as follows: Firstly, we identified and confirmed the need for the study. Secondly, we came up with strategies to solve the problem in question. The analysis was done to identify any threats that might hinder the design of the proposed strategy. Furthermore, we conducted a visibility study to determine whether the environment was conducive to designing the proposed strategy and, later, to draw up a monitoring plan to check whether the proposed strategy was functional.

PAR was used as an approach by the team, and its cyclical, spiral-like movement was adopted. We started with the first cycle and proceeded to the second, third and fourth, which involved planning, action, observation and reflection. Figure 4.1 presents the cyclical and spiral-like process of PAR that the team adopted from Kemmis and McTaggart. This model was followed and was repeated until the team was satisfied.

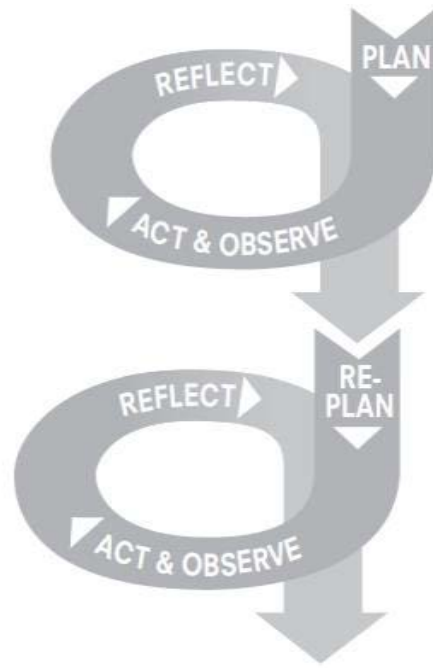


Figure 4.1: The cyclical and spiral process adopted from Kemmis and McTaggart

Source: Denzin and Lincoln (2007:278)

4.5.4 Prioritising activities

At a later stage, once the team understood the nature of the problem, the coordinating team met to decide on matters that needed attention first and prioritised them accordingly. Having completed the three activities, the team drew up a plan of action to operationalise the activities in each of the priorities. For each activity, we assigned a team member to ensure that the activities related to the priority took place. The resources to be used were identified and the timeframe was set; at a later stage, indicators of success were also monitored. The following three priorities were put into action:

Key priority 1: Teacher development

- Workshop: 1 Train Grade R teachers on classroom layout, and planning
- Workshop: 2 Train Grade R teachers on scaffolding Grade R learners from the known to the unknown in mathematics, using Family Maths
- Workshop: 3 Train Grade R teachers on establishing fictional PLCs

Key priority 2: Provision of quality material

- Workshop: 1 Train Grade R teachers in the development of teaching and learning material using recycled material
- Workshop: 2 Train Grade R teachers on the importance of educational toys
- Workshop: 3 Guidelines on purchasing teaching and learning material for a Grade R mathematics class

Key priority 3: Parents' involvement

- Workshop: 1 Train parents on scaffolding Grade R learners from the known to the unknown in mathematics, using Family Maths
- Workshop: 2 Providing a booklet and training parents on minimum expected level of Grade R learners in mathematics from term one to term four
- Workshop: 3 Training parents on managing the transition from informal education to formal schooling at home

4.5.5 Plan of action

Key priority 1: Teacher capacity and professionalism

As tabulated below, the plan of action was to be accomplished in a coherent and structured manner for six facets. The first priority was teacher capacity and professionalism, which is Goal 16 of the Action Plan 2019, towards the realisation of schooling in 2030 (Department of Basic Education, 2015b:34). This key priority responds to one of the challenges of the study, which is that teachers who lack relevant qualifications engage in PCP in Grade R mathematics classes.

Table 4.1: Teacher capacity and professionalism

Activities	Target	Resources	Responsibility	Duration	Monitoring
Empowering teachers on classroom layout, and lesson planning	Grade R teachers	Equipped model Grade R class and CAPS document	Deputy chief education specialist: Curriculum	60 minutes	On-site visit to schools and monitoring tool
Demonstration on scaffolding Grade R learners from known to the unknown using Family Maths	Grade R teachers	Manipulatives ⁷	Representative from Family Maths	45 minutes	Feedback sessions with Grade R teachers and attendance registers
Workshop on establishing sustainable PLC	Grade R teachers	PowerPoint presentation, pens and paper	Provincial subject coordinator: Mathematics	60 minutes	On-site visits and attendance registers from PLC co-ordinators

Key priority 2: Provision of quality teaching and learning material

Priority 2, which is the provision of high quality teaching material, is also prominent in National Strategy for Learner Attainment (Department of Basic Education, 2015b:91). This document is derived from the National Development Plan. It is essential that adequate teaching and learning material is provided for teaching and learning in ECD. The ECD providers, with a focus on Grade R mathematics, need to set priorities when they choose resources, as they need to choose resources that will support the children's development (Mntunjani, 2016:15). Teachers should learn to improvise and develop enough teaching and learning resources from recycled material. Teachers should also be able to use the self-made teaching and learning resources developed from recycled material in order to support Grade R learners in the mathematics

⁷ Manipulatives can come in a variety of forms and they are often defined as "physical objects that are used as teaching tools to engage learners in the hands-on learning of mathematics" (Smith : 2009:20).

classes. We also identified the provision of quality teaching material as one of the key priorities.

Table 4.2: Provision of quality teaching and learning material

Activities	Target	Resources	Responsi- bility	Time frames	Monitoring
Training on developing teaching and learning material using recycled materials	Grade R teachers	Different kinds of recycled material	Representative from Education	60 minutes	On-site visit to schools
Workshop on the importance of educational toys	Grade R teachers	PowerPoint presentation and samples of educational toys	Representative from Brain Booster	60 minutes	Attendance registers
Guidelines on purchasing teaching and learning material for a Grade R mathematics class	Grade R teachers and parents	Learning and Teaching Assessment (LTA): 08 General Education and Training (GET) 2013 (LTA is the circular the is used to communicate with the school)	Deputy chief education specialist: Curriculum	60 minutes	On-site visit to schools

Key priority 3: Parents' involvement

The purpose of this key priority was to encourage parents to be part of the school so that they can support their children with schoolwork. They should not only support their children but also be engaged in other school activities. Parental involvement and engagement are the most important factors that affect the teaching and learning of Grade R learners. Parents can support their children's schooling by attending school

functions and responding to school obligations, such as parent-teacher consultations and school fund raising. O’Kane and Hayes (2010:14) argue that the idea of engaging parents in the education of children is crucial, as is the role that they play in school activities.

Table 4.3: Parental involvement

Activities	Target	Resources	Responsi- bility	Time frames	Monitoring
Empowerment on scaffolding children from known to unknown using Family Maths at home	Parents	Manipulative	Representative from Family Maths	45 minutes	Feedback sessions with Grade R teachers
Provision of a booklet and training parents on minimum expected level of mathematics for Grade R learners	Parents	Booklets on the minimum expected level of performance for mathematics in Grade R	Deputy chief education specialist: Curriculum	45 minutes	On-site visit to schools
Training parents on managing the transition from informal education to formal schooling.	Parents and Grade R teachers	Presentation on milestones and poster on milestones	Deputy chief education specialist: Curriculum	45 minutes	A follow-up meeting with parents

4.6 DATA ANALYSIS

This section presents a description of the procedures and processes of generating data. To strengthen the study, CDA was employed in its broadest sense, which aims to understand the meaning and making of meaning (Fairclough, 2013:3). CDA focuses on the way language as a cultural tool mediates the relationship of power and privilege in social interaction and in bodies of knowledge (Rogers, 2002:251). CDA also links with bricolage, the theoretical framework of the study, which affirms that research is

always collaborative and is defined by negotiation and communicative spaces among the team (Kwong, Tasavori, & Wun-mei Cheung 2017:609).

4.7 CHAPTER SUMMARY

PAR, as an approach that encourages teamwork, is discussed in detail, with a focus on its origins, formats, relevance, and objectives; and a brief discussion of epistemology and ontology is provided. Furthermore, ethical considerations are addressed and explained in order to sensitise the team about their rights. The research design was explained to the team, especially how the objectives of the study would be achieved. The intervention strategy, which involved setting the scene; team formation; profiling of the co-researchers; team vision; and a SWOT analysis, is formulated. Lastly, the; identification of priorities; development the plan of action; data analysis and a conclusion are also explained.

CHAPTER 5: DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION FOR DESIGNING A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICES IN A GRADE R MATHEMATICS CLASS

5.1 INTRODUCTION

The aim of the study was to design a strategy to improve PCP in a Grade R mathematics class. This chapter focuses on data presentation, analyses, interpretation, and discussion of findings. Information sessions, meetings, workshops, and debriefings are arranged systematically to discuss data, which was empirically generated as described in Chapter 4.

Firstly, the data generated from the discourses of team members during the forum meetings are presented as is. Secondly, the data were analysed in connection with the related literature presented in Chapter 3. Thirdly, based on this analysis, the literature that had been reviewed is verified to determine whether it connects with or refutes the findings of the study. Fourthly, the PSSMs published by the National Council of Teachers of Mathematics NAEYC and NCTM in 2000, are incorporated in the study, to make meaning of the data. In the fifth place, the way discourses were used through text and spoken word, social structure and discursive practices are analysed to show how power, domination, and control can be applied and be resisted in daily communication.

All the above dimensions are considered through the lens of bricolage, which navigates the study. Additionally, in keeping with the commitment made in Section 4.3, confidentiality and anonymity were maintained by applying pseudonyms.

5.2 THE NEED TO DESIGN A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE FOR A GRADE R MATHEMATICS CLASS

This section demonstrates and justifies the need for designing a strategy to improve PCP in a Grade R mathematics class. The following challenges are discussed below: inadequately qualified Grade R teachers; unavailability of teaching and learning

resources; insufficient parental involvement; Insufficient support by authorities; and inadequate LoLT in Grade R.

5.2.1 Inadequately qualified Grade R teachers

In South Africa, like in other countries discussed in the study (see Section 3.1), there is a shortage of qualified Grade R teachers. Some teachers who are available and prepared to engage with PCP in Grade R mathematics classes are either inadequately qualified or unqualified. During our discussion forum, we found that some teachers of Grade R are inadequately qualified for engaging with PCP in mathematics classes. General expressions during the forum indicated that there is a challenge regarding teachers' qualifications, particularly in Grade R. The extracts below demonstrate this view.

Momoza: *I want to understand how to engage with learners in a Grade R class as I have only a minimum required qualification. I really want more understanding on how to integrate all Grade R subjects and plan appropriately in this space.*

Tshidi: *[with disappointment]: You are better off, with the little knowledge I have gained, my understanding of teaching in this field is very limited and I struggled to plan appropriately for these children.*

Wandisa: *I agree with you, ladies, the qualification we have obtained does not guarantee any promotional prospects, particularly, office-based position.*

The extracts above seem to be in line with the research findings of Feza (2016:488), namely, that if teachers do not have adequate qualifications, they will not have a deep understanding of building blocks, particularly when dealing with counting in mathematics. This view is echoed in the literature reported in Section 3.3.1. Moreover, this idea is also emphasised in one of the six PSSMs by NAEYC and NCTM (see Section 3.2), which suggests that effective mathematics teaching requires an understanding of what learners know and need to learn while challenging and supporting them to learn it well.

From the perspective of text and spoken words, the comment, *I want to understand how to engage with learners in a Grade R class as I have only a minimum required qualification*, indicates that inadequate qualifications are causing concern. This may

indicate that Momoza is desperate, and shows signs of frustration that Grade R teachers are inadequately qualified – I deduce this from the words, *want*, and, *I really want*, which indicate the desire and wish to have something of value that will be beneficial for teaching and learning in a Grade R class.

The general view of Grade R teachers is that appropriate qualifications would enable them to be more effective at doing their noble job. Broad spectrum CDA indicates that the major problem requires examination of the nature of social practice and power abuse, in particular, the way dominance is expressed in the text or talk (Tenorio, 2011:187). In the discourse, Grade R teachers reported being dominated. For instance, the statement, *the qualification we have obtained does not guarantee any promotional prospects*, concretises this view. They want to be emancipated and belong to academic society, which would allow them to be part of a democratic environment that is embedded in social justice and conditions for human comfort (Tshelane, 2015:133).

My interpretation of the conversation above points out that Grade R teachers are of the view that they are excluded by educational authorities, as if they are not part of the academic community. This links to the traditional moment of qualitative research, which regards participants as mere research subjects, whose voices and circumstances do not matter (See 2.2.1.1). It is interesting that Grade R teachers seem to be helpless, as their understanding of mathematics is limited and they are unable to plan appropriately for their lessons. Although Grade R is the core of ECD, it is not part of the bigger picture of curriculum planning and design – ECD is not even prioritised by policymakers, as highlighted in the Policy Framework for Universal Access to Grade R (Department of Basic Education, 2013:6).

5.2.2 Unavailability of teaching and learning resources

Unavailability of teaching and learning resources in schools, especially Grade R, is a worrying factor that affects teaching and learning negatively and leads to a decline in achievement of mathematics learners. Provisioning high-quality teaching and learning resources, as well as standardised curriculum practices, strengthens children's problem-solving and reasoning processes, including those used to communicate mathematics ideas (NAEYC & NCTM, 2000:3). Therefore, Grade R learners deserve

access to concrete teaching and learning resources that they will be able to manipulate and learn from; and not only learn, but also see the resources, touch and play with them. These teaching and learning resources should be allocated to schools equally. By doing so, learners will be able to engage with PCP in Grade R mathematics classes, and performance in the subject will improve. During one of the forum meetings, unavailability of teaching and learning resources was mentioned by the team members in vehement terms, and the extract below reports their concerns.

Lwazi: *Surprisingly, we are expected to engage with PCP in a Grade R mathematics class, but there are no teaching resources. Teaching and learning do not only depend on enough teaching and learning resources, but it includes, age-appropriate outdoor equipment, well-structured facilities as well as good infrastructure to meet the diverse needs of children. I am not happy to teach mathematics, as it is a practical subject which requires learners to use manipulatives in a mathematics class. This compromise teaching and learning in this class.*

Sbu: *I have noticed that the department is ever over-resourcing schools that have enough teaching and learning resources and neglect those that are under-resourced. I even took some photos of one of the local schools in our area, this is not fair.*

The photos below were taken by one of the team members as part of the data generated to demonstrate one of the schools that are over-resourced, compared to others.



Photo 5-1: School A (well resourced)



Photo 5-2: School B (well resourced)

Kay: *[holding some papers in her hand] To be honest you have raised a point, the engagement of PCP in a Grade R mathematics class does not only depend on enough teaching and learning resources, but conducive classroom environment, appropriate facilities as well as good infrastructure in order to meet diverse needs of children. Considering these photos I have captured in one of the schools, there is still a lot to be done in our school community.*

The photos below are evidence taken during the transect movement at the school as part of data generated using the PAR approach.



Photo 5-3: Evidential photos of poorly resourced school

Teaching and learning resources bridge the gap between theory and practice and stimulate learners' interest, and this becomes part of their pre-existing knowledge (Ouyang & Stanley, 2015: 166). Literature supports the principle that learners must learn mathematics with understanding and actively build new knowledge on

experience and prior knowledge. This statement refutes Lwazi's utterance that, *teaching and learning do not only depend on enough teaching and learning resources, but it includes, age-appropriate outdoor equipment, well-structured facilities as well as good infrastructure to meet diverse needs of children*. The statement above shows the effect of social representation and explains how they affect personal beliefs and are expressed in the discourse. In this case, policies and legislation were a constraint that dominated Grade R teachers, because they are obliged to teach, regardless of the resource situation.

In addition, Sbu and Kay presented photos demonstrating inequality (see Figures 5.2 and 5.3). Sbu and Kay said the following:

Sbu: *I have noticed that the Department is ever over-resourcing schools that have enough teaching and learning resources and neglect those that are under-resourced.*

Kay: *Considering these photos I have captured in our school, there is still a lot to be done in our school community.*

After listening carefully to what Sbu and Kay said, I deduced that they are aware that the Department pumps more resources into schools that are already fully resourced, causing other schools to be under-resourced. In contrast, the team believes that teaching and learning resources are not all they need, as a conducive environment and age-appropriate outdoor equipment are also necessary. A lack of these resources affects the quality of teaching and learning negatively, resulting in non-performance of learners. This relates to what Van Dijk (2009:18) calls mental control and social influence against power, especially those who are abused their power thus to dominate others.

My reflection above indicates that those teachers are compelled to improve Grade R learners' attainment in mathematics through the engagement of PCPs. However, this is not an easy task, because it requires teaching and learning resources, which are not readily available. To ensure that there is a balance between teaching and learning and learners in a Grade R mathematics class, there should be enough resources to support learners. The disputes arose during the forum meeting, which indicated that teaching and learning resources should be supplemented by a conducive environment as well as age-appropriate outdoor equipment that fulfil the diverse needs of all learners in a Grade R mathematics class.

Although resources contribute to learners' attainment, and resources were lacking at the school, teachers did not relax their efforts to ensure that learners succeed. This relates to the third moment of qualitative research, called blurred genres (Section 2.2.1.3). At this moment, diverse ways of collecting data are available and create a blurred boundary between social sciences and the humanities. Teachers employed this moment and came up with diverse strategies and techniques to break the thin line of unavailable resources and ensure that learners are supported and learn mathematics effectively.

An interesting process that the study used to generate data, is photovoice. Photovoice is a process that can use photographic images to inform policymakers about community asset deficits, in order to achieve social change (Castleden & Garvin, 2008: 1395). The use of photovoice in the study created a platform for teachers to express their feelings that represent their views on a shortage of teaching and learning resources in Grade R mathematics classes. Photovoice also displayed inequality and disparity in the way teaching and learning resources were being distributed, a discrepancy that still prevails.

What I wish to point out in the right-hand picture of Photo 5-3 is evidence of lack of maintenance shown by peeling paint on the walls. My main impression, as a researcher, is of teachers and learners who have not taken the trouble to tidy their classroom (arrange desks and chairs, pick up papers from the floor – doing so does not cost a cent to do, and does not require the allocation of resources).

5.2.3 Insufficient parental involvement

Lemmer and Meier (2015:1) are of the view that the school and the family are partners in the education of children, and their common goal is to assist children to develop their full potential. The same idea is promulgated in the South African School Act No. 84 of 1996 (Republic of South Africa, 1996:14), which states that parental involvement, especially in the education of the parent's children, in policymaking and fundraising committees, is important. This idea is crystallised in literature, as indicated in Section 3.4.4, and the implication is that the school and the parents should share responsibility so that learners can perform well in mathematics in Grade R. Insufficient parental involvement contributes to non-performance of learners and failure to engage with

PCP. Despite these expectations, the reality is that parents are not sufficiently involved in the education of their children. The following extracts point to insufficient parental involvement in the teaching and learning of their children.

Siwe: *[chatting to another team member] There is a known fact that children are not existing in a vacuum, but relate to parents, school and community at large. I believe it is important that parents should be involved in the education of their children so as to bridge the gap between home and schools.*

Lwazi: *Errr... I agree with you, but the challenge is, when we call parents for the meeting or parents' day, they do not turn up, especially on issues related to the performance of their children. They will tell you that they do not have time. They only come running with unfriendly manner, when their children have to repeat a grade and shout at you as a teacher.*

Mampe: *[a parent] This surprises me as I do not even know what is expected from me when I visit my child's class as I do not have an idea on how I can be involved in his education. My question is that the school should tell us their expectations or the role that we should play in the education of our children. Even though I am not educated, I can still ask my neighbour's daughter who is in secondary school to explain to me my expectation from school if I am provided with them by the school.*

Tshidi *[adds to what Lwazi said]: It is true; it is the responsibility of the school to ensure that its parents are empowered and know exactly what is expected from them. We need to train them on their roles and responsibilities.*

The research findings of Castro, Expósito-Casas, López-Martín, Lizasoain, Navarro-Asencio and Gaviria (2016:175) confirm that parents' involvement in the school is related to learners' achievement. Lemmer and Meier (2015:1) continue the argument by claiming that positive involvement by parents in schooling leads to learners improving their academic achievement. The literature reveals that children who come from homes where there is insufficient parental involvement in their schoolwork perform below the required standards of numeracy skills. Hence, one of the universal principles of mathematics states that excellence in mathematics education requires equally high expectations and strong support for all learners by parents.

Drawing from the extracts above, there is an assumption that education of children is a responsibility shared by teachers, parents and the community at large. This

assumption can be identified in Siwe's extract: *There is a known fact that children do not exist in a vacuum, but relate to parents, school and community at large.* The phrase, *shared responsibility*, does not mean that children will perform at a high level, rather, it means that parents and the school must employ a collective effort and hands-on approach, and work for the purpose of achieving the goal; in this instance, the goal of good performance in mathematics.

The team seemed to think that parents were not always visible at school, and are only noticed when their children have to repeat grades and the demand that their children are condoned and can progress to the next grade. The unavailability of parents is evident in this extract by Lwazi:

When we call parents for the meeting or parents' day, they do not turn up especially on issues related to the performance of their children. They only come running when their children have to repeat a grade and shout at you as a teacher.

The extracts above endorse the element of discursive practice, dominance and power. This creates the wrong impression, as the parents seem to be keen to support their children, but they are not sure how they can assist their children.

This shows that teachers were exercising social power over the parents, in order to achieve their goals. The actions of teachers, are in conflict with the objective of PAR, which is mutual respect, giving voices to the voiceless, and empowerment, is discussed in Section 4.2.4. Even though parents are eager to participate in the education of their children, they have no idea how to assist their children with schoolwork. The implication is that parents have a blurred idea of their roles and responsibilities regarding their children's education, and the support parents must provide at home. Parents need guidance from the school; as Mampe indicated: *My question is, did the schools told us their expectations or which role should we play in the education of our children?* The failure of the school to provide guidance to parents portrays unfairness and social inequality on parents. What is surprising is that parents are aware that it is the role of the school to ensure that they are empowered to be involved in the education of their children. Parents as partners in the education of their children were subject to inequality and unfairness practiced by the school. However, it is interesting to hear that parents still hope that they will be trained to support their

children at home. They also want to know what type of workshops and training are available to them, and how this opportunity will be facilitated as part of empowerment.

5.2.4 Insufficient support from authorities

The South African education system has implemented numerous changes that were anticipated to redress the remnants of inequality, which was common during the apartheid regime. One of these changes was the decentralisation of education management tasks, such as curriculum management, to district and circuits. These changes require education managers who can participate democratically in building strong relationships, and ensure that there is effective service delivery (Department of Basic Education, 1996:25).

Each provincial education organogram has, at the apex, the member of the executive council, and the superintendent general for Education, which is the first level in education (Department of Basic Education, 1996:25). Subsequent to this level, there is the provincial office, with curriculum managers and subject coordinators and curriculum designers. The third level is that of district officials, which include circuit managers and subject advisors. This last level is what we call foot soldiers. They are the people on the ground, who are responsible for school governance and management, as well as curriculum implementation, support and monitoring thereof.

Despite all these levels of education management, teachers still experience lack of guidance, support and monitoring from authorities regarding engagement with PCP, particularly in Grade R mathematics classes. The idea that support and guidance are important for Grade R teachers to successfully engage in PCP is evident from the following extracts of the team.

Momoza: *[expressing disappointment] I am really not impressed with the work that the district officials are doing when they come to our school. They harass us without even giving us directions. When you call them at the comfort of their offices, they will tell you that they do not have transport or kilometres to travel to your school. I really need support so that I can engage with professional curriculum practice in my class.*

Kay: *[aggressively] This support should start from the school, if the school management team [SMT] does not support the Grade R classes, what more about the people from outside. The school management team should have a plan on how we can be supported*

on curriculum matters as Grade R teachers. The last time I saw a subject advisor in my schools was last year at the beginning of the year.

Lwazi: *I agree with Momoza, we really need the support from our education authorities. My understanding is that teacher development and provision of resources and goes with, guidance, support and monitoring, without all these, there is no teaching and learning at all.*

Tshidi: *[with confidence] As far as I know these people [meaning the officials of the district] are responsible for monitoring, support, guidance on management and governance of the school including curriculum matters such as the correct implementation of Curriculum and Assessment Policy Statement. When they are at some schools, they are ever considering the mistakes instead of assisting and supporting teachers. As teachers, we need to be provided with motivating reports not discouraging ones, really, we are not adequately supported.*

Sbu: *[subject advisor, in defence] Your points are valid, you know what, as Subject Advisors [SAs] we are also facing the challenge as we are allocated many schools and we also do not have more support from the provincial education department. We struggle to get more SAs and this is really a challenge, hence, the quality of teaching in Grade R is compromised.*

The extracts above seem to be in agreement with the research finding of Polly, Martin, McGee, Wang, Lambert and Pugalee (2017:665), who report that teachers who attended workshops, and who were guided and supported, showed a slight increase in content knowledge and increased professional growth. This opinion is verified by other literature reported in Section 3.2 and is also emphasised in the universal PSSM, (NAEYC and NTCM, 2000:5), which proposes that teachers need to be well prepared and well supported in order to present high-quality mathematics content effectively for all learners.

Momoza's comment, that, *When they come to school, they harass us without even giving us directions*, this indicates fear and oppression that Grade R teachers faced. The use of the word, *harass*, expressed the feeling of dominance and power imposed by education authorities on the Grade R teachers. However, Kay justified Momoza's words by saying, *they are ever considering the mistakes*. The word, *mistakes*, could refer to inaccuracies, which means that, whatever teachers do, is not correct. This implies that education authorities undermine teachers, which demoralises teachers,

who feel belittled and unimportant. The education authorities should empower and increase opportunities for professional growth of teachers.

On the other hand, Tshidi raised concerns about the responsibility of education authorities, by saying that, *As far as I know, these people are responsible for monitoring, support, guidance on management and governance of the school including curriculum matters such as the implementation of Curriculum and Assessment Policy Statement*. These words contain an accusation of incompetency directed to those in power, as teachers need support to learn new teaching strategies and succeed in the classroom (Krasnof, 2015:6).

Reflecting on the extracts above, I conclude that co-researchers expect officials from the district office to support and guide Grade R teachers, so that the latter are able to engage with PCP in mathematics classes in orders to improve performance in mathematics. Even though inadequate support is provided, the teachers still hope that they will be provided with adequate support and teacher development opportunities. This hope links to one of the principles of bricolage, which is a refusal to be constrained by limitations. The teachers believe that, with the limited knowledge they have, they can support the learners to engage with PCP. What is interesting is that teachers mentioned that support goes hand-in-hand with quality teaching and learning resources. They also believe that, if education authorities would take charge of their responsibilities, teachers will benefit from the exercise of these responsibilities, and teaching and learning in Grade R mathematics classes will improve.

5.2.5 The inadequate language of teaching and learning in mathematics

Language as a means of communication plays a major role in teaching and learning mathematics; hence, it is vital for Grade R learners to understand the spoken as well as the written language (Department of Basic Education, 2011b:9). Language is also viewed as a social representation of social systems, which places learners in a better position to interact with others and use language to accomplish personal and social purposes (Elsazadeh et al., 2017:297).

For learners to master the mathematics vocabulary, it is paramount that the teacher has mastered the language first. The questions that one can ask are: Is there any specific LoLT in a Grade R class? Is there any guidance on how the Grade R learners

should be taught in terms of the LoLT, especially for mathematics? During the forum meeting, the opinions of the team pointed to the inadequate LoLT in Grade R classes.

Sbu: *It is not easy to engage these learners with PCP in a Grade R mathematics class as we have children who speak different languages. These children come from the nearby squatter camps [meaning informal settlements]. They struggled to understand Setswana mathematical concept such as sikadikwe [meaning circle]. It becomes a problem for me to teach this learner as the medium of instruction in our school is Setswana this becomes a barrier to us.*

Thabo: *The way I understand, the South African language policy, learners, children should be taught in their home language but the problem is multilingualism that is facing our school. As a result, teachers do not know exactly which language to use in order to engage with learners, especially in mathematics. I wish there should be a solution to this.*

Dineo: *Another challenge is, at home parents speak to their children with their own home language trying to inculcate the same mathematical concepts learned at the school but due to a clash of different languages, learners become confused and opted to keep quite as they do not know which language they can express themselves.*

The extracts above seem to be in line with research findings by Unicef (2016:65), which indicate that using a language that a learner does not understand impedes learning significantly. This view is also discussed in detail in Section 3.2.5. The principle of mathematics alluded to the fact that mathematical ideas are linked to and based on one another, so that learners' understanding and knowledge deepen over time. It seems that this progress will only be achieved if learners are taught in their own language. Considering the statement uttered by Sbu, multilingualism is a challenging issue that affects the school. The school is situated in a predominately Setswana-speaking community; most of the children are from a nearby informal settlement and some speak isiXhosa and others Sesotho as their home languages.

This implies that Thabo agreed with Sbu, that multilingualism made it difficult for teachers to teach diverse learners in a Grade R mathematics class. This can also be interpreted as discrimination against those learners who speak a different language from the one used in the school. Exclusion of learners who do not speak the LoLT of that school is in conflict with Education White Paper 6 (Department of Basic Education, 2001:5), which advocates for inclusion, social justice and integration of all. Dineo

pointed out that, *parents speak to their children with their own home language trying to inculcate the same mathematical concepts learned at the school*. This confuses learners further, and they stop articulating themselves in class and, consequently, exhibit language impairments when they perform mathematical tasks (Morin & Franks, 2009:111).

Reflecting on the above, it is important that learners must first understand and grasp their home language before they can learn mathematics concepts. Employing a language that learners understand places them in a better position to understand and relate well to the teaching and learning environment. In this instance, parents, as first educators, must work collaboratively with teachers to ensure that adequate LoLT is used effectively in Grade R mathematics classes.

5.3 COMPONENTS OF THE SOLUTION

In this section, I will discuss the components of the challenges that were identified by the team, as reported in Section 5.2. For each identified challenge, I will discuss the component of the solution that we came up with during the forum. These components of the proposed strategy, which are discussed below, are adequately qualified Grade R teachers, availability of teaching and learning resources, parental involvement, support by authorities, and adequate LoLT in Grade R.

5.3.1 Adequately qualified Grade R teachers

Grade R teachers' qualifications and specialisation in the ECD field influence the quality of teaching and learning in this class. The findings of the Policy Framework for Universal Access to Grade R (Department of Basic Education, 2013:1) indicate that part of the challenge of improving the quality of Grade R lies in capacity building directed at teachers, and a gradual improvement of the level of formal qualifications of teachers. This implies that, for Grade R teachers to be able to engage with PCP, there is a need for extensive teacher professional and academic development. In order to mitigate the above-mentioned challenge, the team came together and suggested solutions that could contribute significantly to the engagement of PCP by teachers of Grade R mathematics classes. The following are exacts relating to solutions contributed by the team:

Kay: Yes family. Firstly, as members of the education community, we need to be taken step by step on how best we can be equipped in order to be able to engage with PCP in a Grade R class. I feel we are somehow deceived with the proper information by our leaders but with the little information we have, we can be able to use an integrated approach in planning.

Lele: I agree with Kay, that before the training takes place, induction then we can be introduced to Grade R teachers to help them to understand the teaching in this area and be able to plan appropriately. Later on, a series of teacher development activities should be introduced, equipping us with knowledge and skills that will assist in making the Grade R learners are ready for formal school.

Lwazi: [interrupting] Teach using one-size-fits-all approach, it is not fair for our Grade R learner. I suggest that we have workshops, which will assist us to understand how to teach and integrate all the Grade R subjects in a daily programme.

Tshidi: Mmmm... mh [nodding their heads] I think we are left out as I heard one of my colleagues from the neighbouring school talking about professional learning communities and how it helped them to plan and implement Curriculum and Assessment Policy in Grade R especially in mathematics.

The extracts indicate that Kay and Tshidi agree with the research findings that indicate that it is the responsibility of the school's leaders is to develop professional learning plans relevant for and applicable to teachers, so that teachers can improve their practices (Barbour, 2018:10). The literature reported in Section 3.3.1 provides detailed information on how those in power can plan in order to empower teachers to engage with PCP in Grade R mathematics classes. The PSSM, published in NCTM and NAEYC (2000:2), highlights that teachers must be supported by ample opportunities and resources to enhance and refresh their knowledge. In addition, Gomez Zaccarelli, Schindler, Borko and Osborne (2018:3) argue that changing practice requires a carefully designed learning environment for teachers, that meets certain criteria of quality.

Taking this argument further, research found that it is the responsibility of the district office and school management team to ensure that teacher development takes place at schools (Department of Basic Education, 2013:13); this is confirmed by literature reported in Section 3.3.1. During the forum meeting, this responsibility was confirmed by the co-researchers, as indicated by the following extracts.

Lele: *I heard one of my colleagues from the neighbouring school talking about professional learning communities and how they helped them to plan and implement the curriculum.*

Tshidi: *Later on, a series of teacher development activities, should be introduced, equipping us with knowledge and skills that will assist in making the Grade R learners are ready for formal school.*

A PLC is a community that provides the setting and necessary support for a group of classroom teachers, school managers and subject advisors, who participate collectively in determining their own trajectories and who set up activities that will drive their development. In suggesting this, co-researchers are of the opinion that, if the education department and school management teams can establish PLCs and ensure that a series of teacher development activities take place, teachers will be able to engage with PCPs in Grade R classes.

My opinion is that the responsibility for the professional development of teachers lies with district officials and the school management team of the school, as amplified in Section 3.3.1. If these parties are to succeed in empowering teachers, they must develop plans to help teachers engage with PCPs in Grade R classes. Furthermore, Grade R teachers seem to feel that they are being deceived and left out from capacitation opportunities by policymakers. From the discursive practice perspectives, the words, *deceived and left out*, demonstrates the element of dominance and power relation and inequality. Hence, Van Dijk (2011:93) maintains that the legitimate voices of the voiceless should be heard through questioning those in power and revealing their hidden agendas. In this instance, power is in the hands of policymakers, who are not sharing it with the marginalised group of teachers. However, the same teachers seem to be humble and hope to use whatever little information at hand to ingrate all the subjects in Grade R to achieve continuity in teaching and learning in Grade R mathematics.

From the discussion above, it is clear that teachers are consciously aware that the district and school management team are responsible for their professional development and growth, in as indicated by the DBE (2003:13). Co-researchers seem to suggest that, for them to be able to engage with PCP, there should be a teacher development plan in place, and this plan should be coupled with the establishment of PLCs. The aim of these planned activities should focus on improving teachers'

pedagogical content knowledge and their practice (Tsotetsi, 2013:13). It was interesting to learn that teachers took responsibility for their development and empowerment by taking it upon themselves to use whatever available resources were at hand and engaging with learners in Grade R classes.

As a team, we acknowledged that performance in mathematics, especially in Grade R, is below standard, and this results from the fact that Grade R teachers are not adequately qualified to teach mathematics in Grade R. Machaba (2013:5) indicates that it is important to develop teachers' numeracy skills, because, with training, children can gradually develop numeracy skills. The research shows that Grade R teachers were exposed to training to prepare them to be able to engage with PCP in Grade R. All these efforts were fruitless, as most of the teachers are still struggling to engage with PCP in Grade R, and declare that they needed intensive training. It is imperative to establish what type of support has been provided to Grade R teachers, as they need hands-on support, which should not provide only an overview of the latest curriculum developments, but also include mathematical content, knowledge and skills, as well as approaches to teaching Grade R mathematics (Department of Basic Education, 2003:14). In attempting to close the gap between what teachers' know and what they do not know, a well-structured teacher development programme has to be developed.

5.3.2 Available teaching and learning resources

Teaching and learning not only depend on enough teaching and learning resources, including age-appropriate outdoor equipment, furnishings, well-structured facilities and good infrastructure for young children to learn optimally. Gogoi (2015:20269) asserts that young children need teaching and learning resources that are appropriate in size, ideas, and feeling, so that learners can learn manually and verbally and also learn lessons of life from both people and objects. Hence, is vital for teachers to integrate teaching and learning resources as integral parts and components of the classroom. In order to respond to the challenge identified in Section 5.2.2, we created an opportunity to learn from each other during our forum meeting, by creating a platform to share knowledge and skills about engaging with PCP in a Grade R mathematics class. This is what co-researchers had to say:

Sbu: *[Thinking aloud] I have learned something that assists me to engage with PCP, especially when teaching number operations and relationships as an important area in mathematics. As teachers, I know we are struggling to introduce these mathematical concepts such as counting to our Grade R learners. Firstly, we need to ensure that our teaching and learning resources range from concrete, pictorial to abstract.*



Adapted from Rivergums Primary School

Figure 5.1: Demonstration of CPA (concrete, pictorial, abstract) approach

For example [demonstrating], when teaching counting and a number from 1 to 5 teach your learners to count real objects. This can start with what they brought to school. Keep on emphasising the numbers. Also, teach them that the number stays the same regardless of its position.

Figures 5.2, 5.3 and 5.4 demonstrate the use of the principles of concrete, pictorial and abstract in a Grade R class to count and introduce the number 5.



Figure 5.2: Concrete level

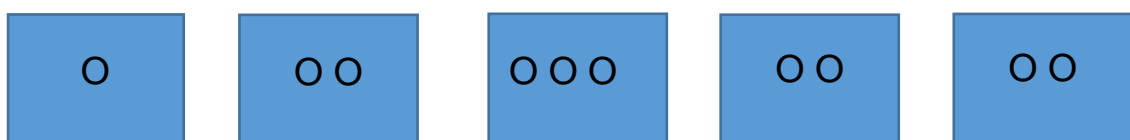


Figure 5.3: Pictorial level

1 2 3 4 5

Figure 5.4: Abstract level

Kay: *[Adding to Sbu's comment] This is a good Idea, I also use a CPA approach to teach them the same concept but using a game approach [demonstrating. I requested my learners to play bowling in the class using self-made empty toilet paper rolls as well as putting one roll on top of the other and count them. My intention with these games was to develop their counting skills, eye-hand coordination and fine-motor skills, balancing.*



Figure 5.5: Concrete, pictorial and abstract in the Grade R class. Counting and introducing a number using self-made teaching and learning resources

Momoza: *I usually prefer to sit with my learners to sit on a carpet when teaching them. They only go to the table for writing and I also use the group for that activity This allows me to interact with them well on their eye level and also to reduce the challenge of not having enough tables and chairs for all of them to work on. During outdoor play, I encouraged my learners to use skipping ropes as well as old painted tyres and scoops for the sandpit. These activities assist them in developing their gross motor skills and me also emphases counting while skipping and going through the tunnel tyres.*



Figure 5.6: A grade R teacher uses the carpet as teaching corner to counteract the shortage of furniture for teaching and learning



Figure 5.7: Concrete, pictorial and abstract that can be used in and outside the Grade R mathematics class

The equipment illustrated in Figure 5.7 was used to introduce counting and numbers, for example, how many big and small, how many red, yellow or green tyres, how many times the learners crawled through the tyres, how many scoops of sands does the

learner pour into the bucket. Numbers were introduced using self-made teaching and learning resources.

The extracts above seem to be in line with the CAPS, which indicates that, in order for the teacher to engage with PCP in a Grade R class, teaching and learning resources are an important part of teaching and learning. These resources can be bottle tops, ice-cream sticks, empty boxes of different sizes, plastic bottles, balls, mathematics games, skipping ropes, apparatus for climbing and balance, the sand and water area, and different shapes that teachers can make. The CAPS indicates that acquisition of emergent skills and related mathematical concepts should adhere to the three stages of learning. These stages are, a) the kinaesthetic stage, during which the child experiences concepts with the body and senses, b) the concrete stage, when the child uses real objects, and c) the abstract-representation stage, when the child uses drawings. This information is demonstrated in Figures 5.2, 5.3 and 5.4.

The implication is that learners learn easily and quickly when they associate what they have learned with what they see. They are able to develop a mental picture of how a number looks like and how they can be, write the numbers. The comment by Sbu confirmed this, *Firstly, we need to ensure that our teaching and learning resources range from concrete, pictorial to abstract.* The use of the phrase, *Firstly*, indicates the order of priority, meaning first things first, while the word, *we*, shows collectiveness and a joint effort that will assist teachers to engage; thus, to increase mathematics performance in Grade R. Teachers seem to be aware of teamwork, which is important for collective survival (Kemmis, 2010:10). The words of Kay, *I requested my learners to play... using self-made empty toilet paper rolls and my intention with these games*, depicts independence and interpersonal cognitive thinking by an individual. The co-researcher portrays singularity and a silo approach, which differs from the approach contained in the objective of PAR, namely collaboration and equal contributions by all team players, which balances the power between the team members.

Reflecting on the above, teachers are of the opinion that introducing mathematical concepts, such as counting, should follow a pathway, that is, it should involve a concrete, pictorial and abstract approach. They seem to regard number operations and relationship as the most important content area and the foundation of the subject content. Through demonstrations to other team members using self-made teaching

and learning resources, they took turns to share their best practices and learn from one another. They also shared ideas on how to develop their own teaching and learning resources and how the carpet could be used for teaching and learning. Teachers tried to bridge the gap by improvising, which is what a bricoleur does. Useful teaching-learning resources are required if learners are to understand mathematical concepts. These resources will help teachers to identify how their learners learn, why they perform poorly in mathematics and how the teachers can improve their engagement with PCP in a Grade R class.

5.3.3 Parental involvement

It is recognised internationally that parents are the first teachers of their children, and that it is parents' responsibility to promote their children's development and well-being (Republic of South Africa, 2015:25.) The research confirms that children's achievement improves when parents are engaged in the education of their children. This does not only benefit the children's achievement, but also creates a safe and secure environment for both teachers and learners (Park, Stone & Holloway, 2017:196). The literature confirms that, when there is a collaboration between the school and the parents, children receive a better quality education (see Section 3.3.3). This quality education can be obtained through parents' capacity development, school and home visits, teacher-parent-conferences and school meetings. This view is evident in the following extracts, which represent a discussion during forum meetings.

Tshidi: *It is a high time that as parents and teachers we should support each other and work as a teamwork like an athlete, chasing baton. We should take responsibility as parents and have a stake in the education of our children.*

Thabo: *We need to support and work together with the school in developing guidelines on how we can assist our children with their schoolwork at home and beyond as part of decision makers. Remember unity is a strength.*

Dineo: *[interrupts] I am able to help my grandchildren with their schoolwork at home especially in mathematics. I always use my indigenous knowledge by playing with them diketo and kgati, morabaraba, hopscotch and hula-hoop to inculcate and enhance their counting skill. This has improved their performance, especially in mathematics.*



Figure 5.8: Demonstrating using indigenous games to teach counting in mathematics

Tshidi indicated that *it is a high time that as parents and teachers we should support each other*, and Lemmer (2012:83) confirms that collaboration between teachers and parents, give teachers and parents an opportunity to address a particular topic related to the child, such as academic progress or behaviour. This matter is also discussed in the literature reported in Section 3.3.3. My conclusion in this regard is that it could be that Tshidi realised that there is a gap between teachers and parents; she suggested team spirit and a collaborative effort from the team for designing a proposed strategy. Teamwork created an environment for teachers and parents to work together and share ideas on how they can work towards an ultimate goal, which is to improve the mathematics skills of their children. It is through this togetherness that they gained access to each other and engaged on a professional and social footing. The interaction broke a blurred line that existed between them and which prevented them from realising their full potential; this approach enabled them to overcome their social inequality and to work as partners (Stoecklin & Bonvin, 2014:83).

Thabo expressed the same sentiments as Tshidi: *we need to support and work together in developing guidelines on how we can assist our children with their schoolwork at home and beyond as part of decision-makers*. Dineo intercepted by saying, *I always use my indigenous knowledge by playing with them diketo and kgati, hopscotch and hula-hoop to inculcate and enhance their counting skill. This has improved their performance, especially in mathematics*. She introduced cultural games to teach mathematics. The team believed that indigenous knowledge, in general, can be used to promote and concretise the teaching of mathematics content in a multicultural classroom, for enjoyment and for the promotion of mathematics

(Moloi, 2014:187; Nkopodi & Mosimege, 2009:377). The above statement is confirmed by Van Dijk (2015:64), who states that peoples' social situations are influenced through social interaction with each other and their environment.

Both Tshidi and Dineo encourage parents and the school to work together and value their teamwork. Teamwork will enhance democracy and social justice and empower the powerless, marginalised community. It was interesting to learn that teachers and parents were eager to collaborate as partners to design a strategy to improve PCP for Grade R mathematics classes; this collaboration is likely increase the performance of the children in the subject. Collaboration planning was established as a component of parents' involvement. In return, interaction with their children at home increased and released the positivity of being involved in the education of their children; teachers also had the opportunity to work side by side with parents (Lemmer, 2012:87).

5.3.4 Support by authorities

In order for education decentralisation to function, enough support and monitoring are required at the school level to achieve quality education. This requirement is in agreement with research findings, that decentralisation of education should improve the quality of learning (Sayed, 2000: 38). As it accompanies societal transformation, capacity building and support are expected to be provided by the provincial level (Samuels, Taylor, Shepherd, Van der Berg, Jacob, Deliwe et al., 2015:2). The literature reveals that the primary role of the education district remains important: the district is the buffer between the provincial office and the school (Section 3.3.4). This implies that the district should ensure that there is adequate support for schools. During the forum meeting, the team members interpreted this support and provided suggestions.

***Kuta:** [E... eee] I think it is the responsibility of the district office to ensure that there are effective support and monitoring of the school governance as well as the implementation of PCP for quality education but if there is no district support team to coordinate this functions, this is really not possible for us to succeed.*

***Thabo:** [disagreeing no...]. We cannot wait for the district to establish or send a supporting structure to our school, as they are aware that is their responsibility to monitor and support the schools. In the meantime, I will suggest that we form a structure with them, which will*

assist us, especially in engaging with learners. This study has equipped us enough to work together and share best practices this can help us a lot.

Lwazi: *Equal distribution of workload among the circuit managers and subject advisors as they are responsible for different areas at the schools. This will contribute to quality management, assurance as well as the quality implementation of the curriculum in schools.*

The education district plays a pivotal role in ensuring that all learners have access to education of high quality, since the district offices are the link with the provincial educational department; furthermore, the districts represent the education community and public (Department of Basic Education, 2013:4). This claim is amplified in the literature, which expands the district's role to include the responsibility for overseeing management and governance of the school, as well as the implementation of the curriculum (Section 3.3.4). The above extract suggests that Kuta believed that, for effective support and monitoring, and for the implementation of curriculum, there should be a coordinated district support team that deals with these functions. This implies that this team should serve as a mentoring tool to ensure that there is an improvement in engaging learners with PCP in mathematics classes. This can be achieved through a shared vision between the district officials and the school. In order to ensure quality, a shared vision and commitment are required from the concerned officials, so that they can provide effective support for teachers (NAEYC & NTCM, 2000:5).

Thabo seems to disagree with Kuta, by saying that, *We cannot wait for the district to establish or send a supporting structure*, Thabo seems to believe that the study gave the co-researchers direction on how they can work together and develop a structure that could assist their work. The formation of the structure will assist the team to share best practices and complement each other. This is confirmed by Schreiber and Valle (2013:396), who maintain that collaboration serves as a vehicle for appreciation of diverse cultures.

My reflection lead me to conclude that members of the team assume that they are not receiving enough support and monitoring from education authorities. This is clear from the statement by Thabo, *We cannot wait for the district to establish or send a supporting structure to....* There seems to be hope, as Thabo is encouraging the team to be independent and to start creating something, like a methodological bricoleur

would, so that they can engage with PCP in Grade R mathematics classes. The exacts from the discursive perspective refer to issues of domination, power and inequality, which impede support for the growth and development of teachers. In this case, teachers reclaimed their profession by self-empowerment, as the methodology employed in the study, PAR, is about bringing hope to the hopeless and empowering those who are powerless (Chilisa, 2012:250). The formulation of the team will give the co-researchers a say in the development of the structure of the strategy to improve PCP in Grade R mathematics classes. However, quality education is associated with effective teacher capacity, and support for Grade R in schools (Department of Basic Education, 2011-2025:14).

5.3.5 Adequate language of teaching and learning in Grade R

Using mother tongue in the classroom enhances learners' participation and increases learners' engagement in teaching and learning, especially in mathematics. The research shows that using the language spoken by the child at home significantly enhances learning outcomes, compared to when the teacher uses a language of instruction that the child does not speak (Trudell, 2016:3). The literature confirms that effective, learner-centred learning requires that learning takes place in the language of the learner (see Section 3.3.5). This implies it is equally important that the teachers possess skills and competencies for teaching diverse learners and catering for their needs when engaging with PCP in Grade R mathematic classes.

During the forum meeting, members of the team shared their different ideas and strategies on how to engage Grade R learners with PCP in their home language in mathematics classes.

***Dineo:** I always encourage my learners to speak their home language in the mathematics class. I use design simple activities using a concrete material such as blocks, counters, beads and buttons to help them with counting, classification, sequencing and they should be able to their reason for doing those mathematical activities. This helps them to grasp basic mathematics concepts in their home language through experimentation and manipulation.*

***Tshidi:** Stories, songs and poems work brilliantly for me as I teach them songs our home language to count and build numbers and these activities help them to understand numbers*

and their representation at home. I involve them in sharing her story or poem and talk about his ideas in our language and this increases their vocabulary.

Momoza: *I plan a lesson that includes numbers operations and relationships to engage my learners in a variety of mathematical games inside and outside the classroom and I always use their mother tongue to give them instructions. We also walk around the school to identify different geometrical shapes and observe shapes and basic colours on them.*

Considering the extracts above, it is clear that Dineo's learners benefited from being taught in their mother tongue, and they managed to grasp mathematical concepts relating to manipulatives. The words, *This helps them to grasp basic mathematics concepts*, indicate the confidence and liberality that the learners in Dineo's class experience. The social context is depicted in the choice that learners have when engaging with PCP in the Grade R class. Co-researchers took turns to demonstrate their strategies. After Dineo, Momoza demonstrated her suggestion for how they can engage with PCP by walking around the school and letting learners identify shapes, *we also walk around the school to identify... shapes*. The equal distribution of power amongst the team members was clear, and it was also evident in the words of Tshidi, a parent who shared her success story by saying that, *Stories, songs and poems work brilliantly for me as they increase their vocabulary and I teach them in our home language*. This flow of the conversation indicated the degree of tolerance and equality in sharing best practices. The power was located in everyone equally, and the team was willing to share and work together.

My reflection of this narrative is that it is interesting to see that parents also assist their children at home, by engaging them in mathematical activities, and communicating in the mother tongue, as partners of the school. This partnership demonstrates that parental involvement involves two-way communication between home and school, and it is essential (Lemmer & Meier, 2015:1). This implies that home-school and school-home communication benefits children and improves their performance in mathematics. Though children are born with the ability to learn languages, a quality learning environment is essential to help them develop optimally. This quality environment will only exist if there is a good relationship between the home and the school (Loughlin-Presnal & Bierman, 2017:69). I deduce from the strategies that co-researchers suggested that there is a strong link between the language of instruction and the participatory, or learner-centred, nature of the classroom. Learners need to

commit what they have learned to memory and reproduce it when needed (Machaba, 2013:30).

5.4 ENVIRONMENT CONDUCIVE TO THE SUCCESS OF A PROPOSED STRATEGY

In order for Grade R teachers to participate with PCP in mathematics classes, a conducive environment is required, which should be created for teaching and learning. Therefore, the next section will discuss the environment conducive to making the above strategies successful. These environments are the environments conducive to parental involvement, the environment made conducive by the availability of teaching and learning resources, the environment conducive to support by authorities, and the environment conducive to the use of adequate LoLT.

5.4.1 Conducive environment for adequately qualified Grade R teachers

The Policy on Minimum Requirements for Programmes Leading to Qualifications in Higher Education for Early Childhood Development Educators was approved by the minister and published on 31 March 2017 (Republic of South Africa, 2014:8). The policy treats Grade R qualifications separately from other qualifications, as it has a specialised purpose, and focuses on one specific grade. The policy acknowledges that the provision of quality ECD services relies on the availability of a cadre of committed, appropriately qualified and passionate employees. Hence, during the forum meeting, the team members suggested that the following would qualify as a conducive environment for Grade R teachers to engage with PCP in Grade R mathematics:

Lwazi: *We are aware of the stipulations of the policy concerning ECD qualifications. I think we must start to be innovative and establish an integrated plan which was suggested earlier on. This integrated plan will assist us with guidance on how we can empower ourselves for the benefit of our learners.*

Lele: *All these suggestions will be realised only if we can establish the fictional PLC with neighbouring schools. We should also request the help from experts in the Department of Education, as they understand the procedure for establishing such structures.*

Lwazi suggested encouraging the team members to be innovative and to draw up an integrated plan, as he believes that, by working together they can answer the research

question. In Lwazi's words, *we must start to be innovative and establish an integrated plan*, the word *innovation* denotes a new way of doing things, with the objective of resolving a problem, and involving knowledge creation by an individual, and crystallising the knowledge (Akbar & Tzokas, 2013:247). This collaborative effort by the team is also referred to in Section in 3.4.1. My implication is that the study created an opportunity for the team to demonstrate freedom and a willingness to share, without fear of being oppressed; they expressed their freedom in thought and speech (Republic of South Africa, 1996:1243). The word *we* in the extracts signifies the unity that the team had; they seemed to believe that, if they developed a collaborative plan, it will provide them with guidance to work towards the implementation of the mentioned strategies. This can be seen in the extract of Lele: *all these suggestions will be realised only if we can establish*. The word *we* came through repeatedly and strongly from the team, and it implies professional learning within the community context, where collaboration by teachers is enhanced (Voelkel & Chrispeels, 2017:505). My conclusion is that the team worked together to achieve one common goal, which is to establish a common, integrated plan to guide them.

The view of teachers seems to be that, even though they are not adequately qualified to engage with PCP for Grade R mathematics, developing a common, integrated plan and establishing PLCs will guide them and give them the platform to share and demonstrate best practices. The element of collaboration in the study promotes open practice in the same way as it encouraged sharing and reflecting on the team's contributions (Vescio, Ross & Adams, 2008). In addition, the PSSM encourages this unity and togetherness, to promote quality in the subject of mathematics (NCTM, 2000:1).

Reflecting on the presentation above, it seems that teachers are passionate about working as a team. They are also aware that working as a team is about knowledge construction and readiness to share and empower others. This cooperation is built on the principle of PAR that is about social justice, empowerment and emancipation (Kemmis & McTaggart, 2005). The team engaged in creating an environment that is conducive to the development of a common, integrated plan, without fear of supremacy or dominance; instead, team members worked as equal partners. Regardless of the fact that they were not adequately qualified to engage with PCP in

Grade R mathematics classes, they seemed to believe that establishing PLCs can benefit them. PLCs are regarded as providing a platform where a deep understanding of learning is maintained and dialogue and discussion are encouraged while the power is defused and democracy prevails.

5.4.2 Conducive environment using available teaching and learning resources

In order for teachers to ensure that the use of available teaching and learning resources contributes to a proposed strategy, it is necessary to create a conducive environment for this to happen. This statement is in line with the research findings of Mongillo (2017:331), namely, that early childhood education teachers may find that incorporating strategies that can lay the foundation for deeper understanding of mathematics in young children can be achieved through the creation of a conducive environment. This was discussed in detail in Section 3.4.3 and is amplified in NAEYC and NCTM (2000:4), which states that, through instructions, learners not only learn about the interrelatedness of mathematics but also about the utility of the subject. In one of the forum meetings, the team discussed the conducive environment for using available teaching and learning resources:

Dineo: *I think we have apparatuses such as self-made teaching and learning resources as well as indigenous games. Now it is up to us engage our learners with PCP, the only way is to learn how do engage ourselves in these tools and make our hands dirty for the benefit of our children*

Momoza: *If we can always use back to a basic approach where stories and poems were used as resources to teach and engage learners in the variety of mathematical activities inside and outside the classroom this can guide us in a good direction.*

Tshidi. *I only need cooperation and collaboration from all of us to make this variety of suggestions work for our learners, otherwise, all this will be a futile exercise.*

These excerpts point out that the team had now gathered enough apparatus and professional practices, and what it was left was the implementation and utilisation of the apparatus. The extract of Dineo, *we have apparatuses and now it is up to us engage our learners*, indicates the team seems to agree that they need to create a conducive environment that will enable them to use whatever resources are at hand,

and ensure that their learners benefit from them in a relaxed and safe atmosphere built up in a socially empowered space. In this space, learners will be able to learn and socialise with the environment and their peers (Urban, 2017:4). In addition, Tshidi indicates her concern about teamwork, by saying, *I only need cooperation and collaboration from all of us*. This statement indicates a willingness to team up. This means that, when the team is working together, their performance will increase due to mutual help that is based on friendship, flexibility, hard work and personal character (Sedaghat, 2018:1).

It is interesting that the team demonstrated both mutual help to create an environment conducive to the utilisation of the self-made material, and the idea of using indigenous games to engage learners with PCP in a Grade R mathematics class. The team showed cooperation and teamwork. They seemed to feel that it is important that they work together as a team and constructed knowledge and contributed equally to the proposed strategy. My interpretation is that the team felt strongly that using the available teaching and learning resources for classroom interaction made the environment more joyful and interesting for the children, and also enabled teachers to work towards achieving their goal, especially if they can join hands as a team to achieve the success of the strategy. Success will also increase learners' participation and academic development.

5.4.3 An environment conducive to parental involvement

Working together and developing a guideline to guide teachers and parents to help learners with their education, was deemed necessary to create the conducive environment. This gave teachers and parents an opportunity to share experiences and jointly prioritise activities that need attention. Maluleke (2015:1) proposes that, when schools, parents, children and other stakeholders work together to achieve a common goal, it yields positive results in teaching and learning. This is also in line with the literature reported in Section 3.4.2.

Thabo: *I think if Tshidi can share the strategy on how she used indigenous games to assist teach her grandchildren to learn some of the mathematical concepts with you. This will enable us to work together with the school in the education of our children.*

Dineo: *You should also bear in mind that the school is also using parents as their stepping stone to gain the fame. They want to appear at the top of the ladder of the education department.*

Wandisa: *We should fully support the school and engage in the activities that are planned so that our children can succeed with their schoolwork.*

When teachers and parents share ideas and responsibilities, the learners benefit (Ibrahim & Jamil, 2012:38). These authors confirm the sentiment expressed in the extract above, and which is emphasised in Section 3.1.3. Parents seem to believe that, through sharing indigenous knowledge, they can become involved in the education of their children and provide the support needed. This was also emphasised by NAEYC and NCTM (2000:1), which states that everyone needs to understand mathematics and give the necessary support to all learners to learn significant mathematics with depth and understanding.

The extracts above show that teachers are eager to support the school and share ideas that will assist children to attain high marks in mathematics. This can be seen in the extract of Thabo, *I think if Tshidi can share the strategy on how she used indigenous games*. The phrase, *I think*, indicates Thabo's assumption that, if he and Tshidi can share the ideas with the team members, the collaboration will be possible. From the textual and the spoken word, sharing is an effective way of improving performance (Hassan, 2018:2). In the study, sharing was important for improving performance as well as promoting teamwork; it also encouraged and flattened the power difference, thereby enhancing parental involvement (Meko, 2013:166). Furthermore, Wandisa is in agreement with Thabo, and said that, if parents can give their full support to the school, their children will succeed with their schoolwork. This reflects back to the responsibility of parents as partners in education, as promulgated by the South African Schools Act (Republic of South Africa, 1996:14). Considering the statement made by Dineo: *the school is also using parents as... their stepping stone to gain the fame. They want to appear at the top of the ladder*, it is clear there is an element of power involved. Dineo seemed to think the school is overpowering parents by requesting their involvement. This is not the case with Thabo, who was convinced that, that if Tshidi could share her strategy on how to assist children at home, parents will be able to be involved in the education of their children.

From my reflection above it appears that parents need to be part of the education of their children; however, they need to be certain that they are accepted as the part of the school community. Parents show commitment and believe that their cooperation with the school could bear positive fruits, which will be seen in the improved learner performance. The parents are willing to share their ideas and indigenous expertise with the school for the benefit of their children. Without the support and cooperation of the parents and teachers, the goal of this study, which is developing a strategy to improve PCP in a Grade R mathematics class, will not be achieved. This goal will only be achieved through cooperation and commitment. Even though there was still resistance from some members, which is evident in Dineo's extract, there is still hope amongst them too.

5.4.4 An environment conducive to support by authorities

One of the responsibilities of the education authority is to support teachers by creating an environment conducive to their engagement with PCP in Grade R classes. Provincial and district officials play a critical role in monitoring school performance, providing support where appropriate and making systemic improvements to increase the quality of education outcomes over time (Van der Berg, Taylor, Gustafsson, Spaul & Armstrong, 2011:12). The literature reveals that the purpose of the education district is to support the delivery of curriculum and to ensure that learners are afforded an opportunity to receive quality education in order to perform well; in mathematics (see Section 3.3.4) (Mavuso & Moyo, 2014:1083). This matter was discussed in relation to the PSSM (NAEYC & NCTM, 2000) in Section 3.1.

***Lwazi:** If the district team can hold regular meetings, give effective support through monitoring and conduct workshops on governance and curriculum implementation, we will be able to engage in PCP.*

***Kuta:** I think that if we can ensure that we have a proposed structure in place where we learn from one another as district officials and the school, this approach will assist us a lot.*

***Thabo:** One other thing is that if the districts can ensure that all district officials that are working with schools are allocated the schools equal, the support will also be even and we will be functional.*

The extracts above capture the conversation between team members contemplating to contribute to realising an ideal environment conducive to receiving support from authorities. It was during this forum meeting that Lwazi suggested that the best way to engage with PCP would be for the education authorities to have constant interaction with them through support and monitoring, and conducting workshops. He said, *If the district team can hold regular meetings, give effective support through monitoring and conduct workshops*.

Lwazi is of the view that, if education authorities can ensure that there is appropriate support in the form of workshops, meetings and monitoring, Grade R teachers will be able to engage with PCP. Leading, managing and creating an enabling environment for schools to operate effectively, requires full support from the education authorities. This support will bridge the gap between theory and practice and promote a partnership between the school and the district (Bantwini & Diko, 2011:226). Regardless of Lwazi's view, Kuta seems to believe that the only suggestion that will assist them, as a team, is to establish a supporting structure to collaborate with the education district: *if we can ensure that we have a proposed structure in place where we learn from one another*. This shows that the team needs self-empowerment; they seem to believe that, if they can collaborate with the district, they will achieve good results in mathematics. Magumela (2017:24) asserts that the support that is given to teachers provides them with the opportunity to use their existing knowledge and their experience gained from life experiences.

From the social perspective point of view, the language used by Lwazi in the extract demonstrates a wish to have good relationships with other people and other institutions. Such good relationships could also provide a good platform for the team members and the district officials to work together. Thabo says that the workload should be distributed equally among all district officials. This suggestion demonstrates the principle of equality, which is characterised by freedom and empowerment (Republic of South Africa, 1996:1247). This statement is in line with CDA, which deals with the relationship between discourse and power, with the aim of understanding, exposing and resisting social inequality. The implication is that all people must be equal, and have equal opportunities to share good ideas and build one another up.

My reflection is that the discussion above indicates that the team believed that twinning with district officials would have fruitful outcomes, which would benefit learners. This confirms the research finding by Magumela (2017:17) that the role of officials of the district is to enhance the quality of teaching and learning through working closely with schools. Co-researchers' proposal that workshops should be conducted and monitoring and support provided indicate that they hope to gain a better understanding of how to design a strategy to improve PCP for Grade R mathematics classes.

5.4.5 An environment conducive to the use of adequate language of teaching and learning

According to Language Education Policy of South Africa (Republic of South Africa, 1997b:1), the right to choose a LoLT is vested in the individual, who must choose from the 11 official languages. Children are more comfortable and start to excel when they speak their home language regularly (refer to Section 3.4.5). This statement is also in line with the research findings of Al-Darwish (2013:46), who confirms that, when children learn in their home languages, they produce phonemes necessary to be speakers of that language. It is important for the school to use a language the learners can articulate in and use to take part in teaching and learning. Creating an environment conducive to encouraging learners to use an adequate LoLT were discussed by the team:

Momoza: *If we can always encourage our learners to speak their home language they will be able to know the CPA [concrete, pictorial, abstract] approach and language as a barrier will be curbed.*

Dineo: *Our learners will be able to learn and understand mathematical concepts if they learn in their first language. I always give them activities that promote and encouraged them to use their mother tongue.*

Tshidi: *Even though English gives advantages to our children, I still maintain that if they can learn mathematical concepts in English they will be able to increase their performance when they are in high grades.*

Research confirms that children learn best in their mother tongue, which is a prelude to the complement of bilingual and multilingual education (Ball, 2010:6). Ball's research findings are in line with the quote above: *If we can always encourage our*

learners to speak their home language they will.... Momoza seems to concur with Ball's research findings and, furthermore, believes that doing so will avert the challenges posed by language barriers. I agree with the empirical data, as I believe that, if children can be taught in their first language, which is the language they understand best, their performance in mathematics will improve. This is also the recommendation of the National Development Plan, that learners' home language be used first and English should be introduced later (Department of Basic Education, 2015b:5).

Tshidi, one of the team members, disagreed with the idea of teaching learners using mother tongue. She seems to believe that English provides learners with an advantage later in life when they would be able to communicate internationally. Considering Tshidi's extract from the discursive point of view, it seems that language can be used as a tool to dominate other languages, especially home language. This can be concluded from the statement, *English gives advantages to our children*. From a critical analysis discourse perspective, English is given a greater status than other languages, which is a sign of power and dominance of other 10 official languages. Van der Walt, Evans, and Kilfoil (2014:6) argue that English is pervasive and its dominance is an important factor in relation to accessing higher education and professional jobs, because it has a very high status in South African society.

My reflection is that the team members believe that home language is the best language for learners to use to learn mathematics concepts – home language will make learners feel comfortable. It is interesting that one of the members seems to believe that the best way to engage in mathematics is to use English. My concern is that, if learners are taught in English when is not their home language, they might not be able to connect to their culture, because language in its context creates meaning and interprets meaning within a cultural context (language, culture and learning). Another argument against using English is that parents could be disadvantaged, and their involvement in helping their children with schoolwork limited due to parents' inadequate knowledge of English. Van der Walt et al. (2014:5) explain that if learners learn in a dominant language outside the home, a dominance in that language will probably develop.

5.5 THREATS THAT MAY HINDER SUCCESSFUL IMPLEMENTATION OF THE STRATEGY

In this section, some of the possible threats that might hinder the operationalisation of a proposed strategy are discussed. These possible threats are unqualified Grade R teachers, shortage of teaching and learning resources, lack of parental involvement, insufficient support from authorities and inadequate language of teaching in a Grade R mathematics class.

5.5.1 Unqualified Grade R teachers

In South Africa, the recently registered qualification, National Diploma in Grade R Teaching, is the proposed initial qualification (Department of Basic Education, 2013:3). However, the revised policy for teachers argues that all the applicants intending to become teachers in foundation phase, including Grade R, should register for a B.Ed. in Foundation Phase (Republic of South Africa, 2015:49). The current status is that many Grade R teachers are not qualified, which might result in them being unable to engage with PCP in Grade R mathematics classes. During the forum meeting, the issue of unqualified teachers was identified as a challenge that could hamper the performance of learners in mathematics. The following comments by the team confirm that teachers who are not qualified pose a threat in relation to engaging with PCP in Grade R mathematics classes.

Wandisa: *We should understand that as long as we still have teachers who are not qualified in the system, the education of our children is really in trouble. We should also remember that we should have a minimum requirement to teach in Grade R.*

Momoza: *I agree with you we have to obtain the required qualification for teaching in a Grade R class. This is why in most cases our learners are hitting the rock when coming to mathematics in higher grades.*

Tshidi: *This is not a threat to our learners only but to our society, we need to be quick to decide what can be done in the meantime.*

The comment by Wandisa is in line with the research findings of Sibley, Dearing, Toppelberg, Mykletun and Zachrisson (2015:4), who advise that the mandatory quality standard requires teachers to have at least a 3-year degree in early childhood education. This view is confirmed by the literature reported in Section 3.3.5. The

principles and standards require that teachers take up opportunities for professional growth, hence, qualified Grade R teachers are prerequisite in this grade. The implication is that, if Grade R teachers are not qualified, they will face the challenge of imparting knowledge they have constructed and acquired throughout their teaching experience. Researchers, experts and policy makers have reached consensus that the quality of early childhood development and the outcomes of the children depend on competent staff (Peeters, Sharmahd & Budginaité, 2018:57).

Considering co-researchers' comments above from a text and spoken words perspective, we should understand that as long as we have teachers who are not qualified in the system, the education of our children is in trouble, and teachers have to obtain the required qualification for teaching in Grade R. This indicates the urgency of obtaining the required qualifications. It seems that the team believed that, if this matter is not resolved, education will be jeopardised. They support the idea that social justice should not be compromised; inadequately qualified teachers affect not only the learners, but also society at large. It was also pointed out that the rights of the child in education, internationally, are compromised by the education system, as it cannot produce enough teachers qualified in early childhood education (Mukeredzi, 2016:84). This conclusion is clear from Tshidi's comment, *this is not a threat to our learners only but also to our society*. Momoza said, *This is why in most cases our learners are hitting the rock when coming*. The idiomatic expression, *hitting the rock*, denotes the worst situation the learners can find themselves in, as it will be difficult for them to gain an understanding of mathematical concepts when their teachers are not qualified (Horvath & Siloni, 2002:109).

In reflection, it appears that the qualifications of teachers of Grade R are a matter of concern, as it affects the quality of teaching and learning in this grade. For teachers to be able to engage Grade R learners with PCP, it is important that teachers possess skills and knowledge relevant to performing that job. It is also argued that the staff need to be well educated with directly relevant qualifications to teach early childhood education and care, as there is a strong link between competent and motivated staff and learner performance (Peeters, Sharmahd et al., 2018 55). From the discussions above, we can deduce that a Grade R qualification is a societal concern and it affects

everyone in society. Therefore, Grade R teachers have to be qualified in order to succeed in teaching learners in Grade R.

5.5.2 Shortage of teaching and learning resources

Provisioning of quality teaching and learning resources is very important for supporting learners during their engagement with PCP in a Grade R mathematics class. NAEYC and NCTM (2000:2) states that teachers must be supported with sufficient opportunities and resources to enhance and refresh their knowledge. The question that one can ask is whether teachers are able to utilise those teaching and learning resources appropriately and in a sustainable manner. Gogoi (2015:20270) argues that most schools do not have sufficient teaching and learning resources and that teachers are not trained on preparing and using teaching and learning resources. This challenge is amplified in Section 3.3.2. Below are extracts of comments by the team, indicating their fears with regard to shortages of teaching and learning resources.

Siwe: *Our fear is that with the limited resources that we have at our disposal, we do not know how we use them economically as we are even not sure whether they will be supplemented by our leaders.*

Sbu: *I think stories work effectively in teaching mathematical concepts, the challenge is our young children learn better if they see and touch teaching and learning resources. How are they going to be able to do that as they are not enough for the whole class?*

Mampe: *Really the education department does not have cooperation, they forget that this learner belongs to the society and they need to be properly educated.*

When supporting learning and teaching activities, teachers need to deliver those activities as directed, use appropriate support strategies and adapt the learning activities to meet the learning objectives (Killen, 2012:4). This author's findings link to the comment by Sbu, *the limited resources that we have at our disposal, we do not know how we use them*. This implies that, even though there are resources available, teachers cannot make use of them, as they do not know how to use it. It appears that this heightens the threat, as they do not seem to know how they can ensure that the resources that are available last longer, as they are not trained on this aspect.

Furthermore, the team seems to feel hopeless, and that the education department does not cooperate and care for the young child, who represents the future. This is

clear from the following extracts: *really the education department does not have cooperation, and, they forget that this learner belongs to the society and they need to be properly educated.* Considering these comments from a social practices perspective, there is an element of power and oppression, and the learners are denied their right to education, which is guaranteed by South African Schools Act (Republic of South Africa, 1996). It is apparent that teaching and learning are compromised, as learners are not receiving quality teaching and learning. Ojimba (2013:47) explains that mathematics is an abstract subject, and additional effort by teachers is essential to enable learners to understand its concepts, principles and applications.

Reflecting on the discussion above, teachers seem to experience a fear of being unable to utilise the resources at hand in appropriately, because they lack knowledge on how to use resources successfully and resourcefully. This implies that teachers have the idea that they should be trained to how to use the limited teaching and learning resources that are available and to ensure effectiveness that will be reflected in learners' performance. Nhlapo (2014:235) confirms that learners need adequate and appropriate resources in order to learn efficiently and effectively. Similarly, the team painted a picture of the education department working in a silo and failing to take the education of young children into consideration. Collaboration between schools and the education department and teachers is important to ensure that teachers know how to use teaching and learning resources. In this way, they can identify gaps that exist between a shortage of resources and the sustainability of those that are available.

5.5.3 Lack of parental involvement

Parents play a major role in the education of their children. If there is no relationship or cooperation between parents and the school, learners are likely to perform poorly in all aspects of teaching and learning. The research shows that the education role of the family is an important factor in shaping the future of a child's life (Özdamlı & Yıldız, 2014:362). This topic was also discussed in the literature review, in Section 3.33. This relationship, which should be fostered between the two parties to ensure success for the learners, and that is entrusted to both teachers and parents, should be based on communication and information sharing. Unfortunately, neither party is working in harmony, as they blame each other for the poor performance of learners. Below I report on a discussion during the forum meeting.

Mampe: *In most cases, teachers are instructing us when they want things to be done at the school, they fail to engage us as. They treat us as if we are not part of them.*

Sbu: *What is very sad is that the school want us to assist and be involved in the education of our children but they do not train us as parents. They do not give us new information on the new trends of curriculum matters, really there is no transparency in the school as such.*

Lele: *In most cases, the school is not communicating with us constantly they want things to be done with immediate effect without being negotiating with us as a parent. So how can we support them?*

From the extracts above, it is apparent that parents are threatened when teachers give them orders regarding parents' involvement in their children's schoolwork. Parents seem to believe that they are being ill-treated by the school. This can be gathered from the comment, *in most cases, teachers are instructing*. From a social practice perspective, this shows the power that teachers have over parents; teachers treat parents as objects, and not partners. This treatment places parents in a difficult situation, as they seem to feel worthless and unwelcome in the education community. Wasserman and Zwebner (2017:1) confirm that parent involvement occurs in a positive manner when there is continuous and efficient communication between parents and teachers. This implies that the dialogue that occurs between parents and the school should benefit both, and should not be characterised by prejudice or oppression. It should be open, as parents report that there is no transparency on the side of the school. Sbu's utterance confirms this claim: *really there is no transparency in the school as such*. The other threat experienced by parents is a lack of constant communication. Wasserman and Zwebner (2017:2) explain that parents become involved when there is continuous and efficient communication between parents and teachers.

Reflecting on the extracts above, I conclude that teachers exercise power over parents, especially when teachers want certain tasks to be performed. Teachers seem to forget that, in order for learners to perform well, parental support is required. Furthermore, teachers forget that parents rely on them for information regarding the learners' performance and education. Teachers tend to practice a closed-door policy and neglect being transparent to parents. Teachers' actions and behaviour undermine freedom, peace and social justice, as advocated by the South African Constitution

(Republic of South Africa, 1997a). Teachers deny parents the opportunity to voice their views and be part of the education of their children. When parents assist their children with homework, review schoolwork, and talk about what happened at school, children appreciate the importance of education and their performance improves (Chindanya, 2011:24; Maluleke, 2014:11).

5.5.4 Insufficient support by authorities

One important means of ensuring effective engagement of learners with PCP is to provide comprehensive support and to monitor the support. Research indicates that many teachers report that they need more and consistent support for implementing standards-based mathematic pedagogies (Polly et al., 2017:669). In order to improve the quality of teaching and learning, continuous monitoring and support is essential and should be done timeously by education authorities (see Section 3.3.4). The fact that there is limited support and monitoring of schools, means that even though there is a section in the district that is responsible for this task, it does not work and plan with the teachers, and this creates a problem at schools (Mavuso & Moyo, 2014:1086). The excerpts below indicate the threats that were discussed by the team during the forum meeting:

Sbu: *This people, they do not involve us when they develop their training schedules and their monitoring sites visits.*

Siwe: *The problem is that they always convene a meeting which they do not even pitch up the next thing they will tell us about the other engagement they had to attend to, it makes us lose interest.*

Mampe: *Our subject advisor is ever cancelling her visit to our school, from there she will take a decade to come and monitor our performance. They really lack interpersonal skills to deal with people.*

Co-researchers expressed their fear of and disappointment regarding the insufficient support from education authorities, as well as authority figures' lack of interpersonal skills. Interpersonal skills involve the ability to work with colleagues and to develop their confidence in the subject and to liaise with outsiders (Mcgarvey, Marriott, Morgan, & Abbott, 1997:376). Grade R teachers seem to know and understand that, if they are not fully supported by officials from district and provincial offices, they are unlikely to

succeed when engaging with PCP in Grade R mathematics classes. Bantwini (2012:525) argues that, if subject advisors are too busy to assist teachers, teachers will lose confidence and the performance of learners will decrease. Furthermore, teachers have a fear of being left out when the training plan is developed by those in power. In the extract, *this person, they do not involve us when they develop their training schedules*, Sbu's term, *this person*, in reference to the education authorities, seems to imply that he has lost respect for the authority, as he believes that the rights of teachers are being denied. Mampe seems to fear that they will never have a site visit by the district official, as the official is always cancelling her appointment with Mampe's school. This fear can be deduced from the following extract: *Our subject adviser she is ever cancelling her visit to our school*. The term, *decade*, actually means 10 years, however, in this statement it is used to indicate a longer period, which will pass before education officials return to visit that school again.

Looking at and reflecting on the extracts above, it is clear that there is a great deal of uncertainty and fear hovering around the teachers; they believe that they are being treated unfairly by education authorities. It is also apparent that teachers have no power over those in power, as teachers are supposed to wait until authority figures are available to come and assist the teachers. Teachers feel powerless and voiceless, as they are dependent on the education authority to provide information, also regarding new trends in curriculum. In the meantime, teachers' frustrations affect learners, who, in turn, rely on their teachers to share and engage them with PCP.

5.5.5 Inadequate language of teaching and learning in a Grade R

The LoLT in Grade R seems to be an obstacle, as teachers in this grade are expected to teach learners in a language that is familiar to learners. If teachers communicate in a language that is unknown to learners, the learners are prevented from communicating and sharing mathematical concepts with other learners, and even from participating in mathematics activities. Using mother tongue in the classroom enhances participation and increases the likelihood of family and community involvement in the learning of the child (Trudell, 2016:3). This claim is confirmed by Siyepu and Ralarala (2014:327), who state that proficiency in the LoLT is a prerequisite for understanding and making sense of the language of mathematics. DBE (2014) reiterates the issue of the LoLT in Grade R. Furthermore, the literature

indicates that language should serve as a tool for mediating between the learner and what the learner is doing (Mntunjani, 2016: 35). The following extracts demonstrate the team's fears regarding inadequate LoLT in Grade R classes:

Thabo: *At times I ask myself whether my child will ever be able to express herself in her home language as she mixes different languages when she tries to explain some activities in mathematics.*

Dineo: *I also fail to understand why the school is using difficult words for us to understand when they write to. This means it is worse when they are teaching our learners in the class, they must keep instructions simple.*

Lele: *Even sometimes when I am attending the meeting I always keep quiet because the level of language usage is too high for me to understand and make some contributions.*

From the comment, *at times I ask myself whether my child will ever be able to express herself*, it is evident that Thabo is afraid, and he asks himself whether his child will be able to express herself in her home language. This could mean that if children are using an additional language or second language that parents does not understand, causes fear in the parents, as they were more concerned about the home language which the children are communicating with at home. Lele indicates that the school is using difficult words that she hardly understands. She indicates that if these words are daunting to her, it means that it is worse for learners: *I also fail to understand why the school is using difficult words for us*. This complaint has an element of dominance, as those in power do not take into consideration the level of understanding of learners or their parents. The use of a different language from the one understood by parents and learners creates barriers, which might impact a strategy to improve PCP in Grade R mathematics classes. This language use is what Meko (2013:175) describes as being a way of preserving power by those who hold institutional power against the marginalised parents.

Reflecting on the discussion, I conclude that parents seem to doubt the quality of the education their children are receiving. Furthermore, they are concerned that their children will be unable to practice their cultural activities, as they cannot express themselves in their home language. Children execute certain types of mathematical activities at home and in their community, and if they learn in a language they are not used to at the school, it may cause a barrier to the learners. Elszadeh et al.

(2017:296) report that contributions to a conversation about classroom practices should provide space for children to talk about and draw from indigenous knowledge and cultural practices.

5.6 EVIDENCE THAT THE STRATEGY WORKED

This section considers the applicability of a strategy to improve PCP in a Grade R mathematics class. The application of the proposed strategy is in line with the main components of the solution, which were prominent during the forum meeting. The components of the solution referred to are qualifications of Grade R teachers, teaching and learning resources, parental involvement, support by authorities and LoLT in Grade R.

5.6.1 Qualifications of teachers

The following is a discussion of what the team accomplished regarding success indicators, which were traced back to when teachers were motivated and agreed to study and upskill their qualifications to a minimum required qualification, which is a Diploma in Grade R Teaching. In addition, the team agreed to develop a plan in partnership with the district officials that will assist Grade R teachers to empower themselves professionally and academically. The plan was coupled with the establishment of a PLC, as a platform that would enable teachers to work together and share best practices. Teachers felt self-empowered by the creation of good quality self-made teaching and learning resources (see Section 5.3.1).

5.6.2 Teaching and learning resources

The use of innovative strategies during the forum meeting, such as the development of self-made teaching and learning resources from recycled materials, enabled teachers to engage learners with PCP in the Grade R mathematics class. Teachers managed to share best practices on how learners can use the developed teaching and learning resources in the class in order to understand mathematical concepts. In addition, parents contributed by demonstrating how indigenous games can be used to teach Grade R mathematics and assist learners to learn and enjoy mathematics at the school. The information was shared among the team and the team found it very

interesting and helpful, especially for teaching learners mathematics at home. Teachers indicated that the learners understood the lesson better, as learners were able to relate the mathematical concepts with the manipulatives and learners were able to touch those manipulatives and do sums as directed by the teacher, using the concrete, pictorial and abstract approach. Teachers also acquired a new, alternative way of supplementing their teaching and learning resources in Grade R mathematics classes. They hoped that that this exercise, of developing teaching and learning resources from recycled material, would be shared with other Grade R teachers across the province (Section 5.3.2).

5.6.3 Parental involvement

Parents, as part of the team, contributed successfully to the strategy, as they have a thorough knowledge of indigenous games that can contribute to improving learners' performance in mathematics. This was evident when one of the parents demonstrated how she used indigenous games to teach her grandchildren mathematics concepts. The team were keen to accept this solution, as it will assist learners to visualise mathematics concepts. Parents were proud to be part of the team and contributed what they could to the benefit of both teachers and learners (Section 5.3.3). Parents believed that their participation would assist young children, as they learn through play-based activities. The relationship and partnership between parents and the school were established as an indicator of success, and it was of great help to both parties. The strategy worked, as there was an attitude change in the parties and this levelled the power that teachers had over parents.

5.6.4 Support by authorities

The team successfully developed a structure, consisting of a school management team member, a district support team member and Grade R teachers, who will assist in monitoring and providing support to Grade R curriculum programmes. The team was supportive of teachers and committed to monitoring them timeously. This team investigated the curriculum and professional development of Grade R teachers. They maintained constant communication with the district office regarding workshops and teacher development activities. The establishment of collaboration between teachers,

parents and district officials made it possible for the structure to be established successfully.

5.6.5 The language of teaching and learning in Grade R

Even though South Africa's language policy clearly indicates which language should be employed in foundation phase, of which Grade R is part, it also stipulates that it is the responsibility of parents to choose a LoLT for their children.

There was a clear communication between the parents and the school, which made it easy for both parties to reach consensus on what language should be used in Grade R. The school committed itself to starting to use a language that is familiar to the learners, namely, mother tongue. They reflected successfully on the national language policy and developed the school policy from it. This development made it possible for the team to know and understand what will happen in the future in relation to the LoLT applicable to their children.

5.7 CHAPTER SUMMARY

This chapter presents data, analyses, interpretation, and discussion of findings. Information sessions, meetings, workshops, and debriefings that were arranged systematically to discuss data that had been generated empirically and presented in Chapter 4. Furthermore, this chapter pays attention to the way the data is presented, analysed and discussed in relation to literature. Based on this analysis, the literature that had been reviewed is verified to determine whether it confirms or refutes the findings of the study. The study employed PSSM by NAEYC and NCTM (2000) as an organising principle to make meaning of the data. Lastly, discourses, through text and the spoken word, social structure and discursive practices, are used to show how power, domination, and control can be applied and resisted in daily communication.

During the forum meeting, the team had an extensive brainstorming sessions jointly. These meetings considered the components of the solution to the challenges identified in Section 5.2. An environment conducive to the success of a proposed strategy, as well threats that may hinder successful implementation of the strategy, were discussed. Lastly, evidence that the strategy worked was presented.

The next chapter presents guidelines for the proposed strategy to improve PCP in a Grade R mathematics class.

CHAPTER 6: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS FOR A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS

6.1 INTRODUCTION

The aim of the study was to design a strategy to improve PCP in a Grade R mathematics class. The chapter reports on the findings and recommendations and draw conclusions concerning the anticipated strategy. The findings, recommendations and conclusions are organised according to the study objectives, its theoretical framework and the methodology used to generate data in the study. The chapter, furthermore, discusses the limitations and the implications of the study and conclude by giving a summary of the chapter.

6.2 BRICOLAGE AS THE THEORETICAL FRAMEWORK COUCHING THE STUDY AND PARTICIPATORY ACTION RESEARCH AS A METHOD FOR GENERATING DATA

Section 2.2 clearly stated that bricolage is the theoretical framework underpinning the study, and Section 4.2, that PAR was the method employed to generate data. Furthermore, the study indicated the way in which bricolage and PAR are relevant to the study. The reason for using bricolage is that it has objectives that are important for the study, and for assisting the team to come up with solutions and design a strategy to improve PCP in a Grade R mathematics class. It also gave voices to the voiceless. Bricolage's metaphor, "making do with whatever at hand to create something of value", assisted the team to assemble leftover materials through multiple methods and to work towards a common goal, which was to design a strategy to improve PCP in a Grade R mathematics class (Kincheloe, 2001:686; Mahlomaholo, 2013a:385). It is also an active, rather than a passive process, which assisted us to actively construct something of value using tools at hand, rather than passively choosing one technique to analyse challenges that prevail in a Grade R mathematics class.

PAR was used in the study and it is regarded as a best and popular approach in generating the data. In using PAR, we worked as a collective, as co-researchers, not

participants, as we were insiders of the given situation (Cammorata & Fine, 2008:5). The central goal of PAR is the empowerment of marginalised individuals, so that they can participate in critical consciousness to achieve social change (MacDonald, 2012:37). It fosters empowerment for the co-researchers and allows them to construct knowledge for the benefit of the learners (Boog, 2003:103). Groot, Vink, Haveman, Huberts, Schout and Abma (2018:6) argue that, when co-researchers work together, sharing power and valuing experience, doing so assists the team to learn about self and others. In addition, PAR is emancipatory in nature, which means that co-researchers worked freely to achieve the objectives of the study (Tshelane, 2013:3).

6.3 RESEARCH FINDINGS AND RECOMMENDATIONS

In this section, the findings in relation to designing a strategy to improve PCP in a Grade R mathematics class are discussed. The negative impact of inadequately qualified Grade R teachers and their inconsistencies in engaging learners with PCP in a mathematics class were revealed in Sections 3.1 and 5.1 of the study.

6.4 THE NEED TO DESIGN A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R CLASS

This section will present the findings in relation to the challenges identified by the study, which emerged from the literature reported in Section 3.1 and during the analysis reported in Section 5.1. These challenges are Grade R teachers who are inadequately qualified, teaching and learning resources that are insufficient, parents who are not involved in the education of their children, authorities who do not support the school, and use of the inadequate LoLT.

6.4.1 Grade R teachers who are inadequately qualified

As reported in Sections 3.1.1 and 5.2.1, Grade R teachers are unable to engage learners when dealing with new trends in early childhood education. Without adequate qualifications to teach this grade, teaching and learning become cumbersome and daunting for teachers and this results in poor performance of learners in Grade R mathematics classes.

Research should be conducted to determine why, if Grade R is the core of ECD, teachers are inadequately qualified, why Grade R is not part of the bigger picture regarding curriculum planning and design, and why it is not prioritised by policymakers, as highlighted in the Policy Framework for Universal Access to Grade R (Republic of South Africa, 2013:6).

6.4.2 Teaching and learning resources that are inadequate

Teaching and learning resources facilitate teaching learning in Grade R classes. They also assist learners to understand mathematics concepts, and increase thinking, so that learners are able to solve mathematics problems. Lack of teaching and learning resources hold teachers back from engaging learners with PCP in Grade R mathematics classes, and this has a negative impact on teaching and learning. There are insufficient teaching and learning resources available for teachers to engage learners with PCP in Grade R mathematics classes, as a result, learners are unable to use manipulatives – as they learn through concrete, pictorial and abstract approach.

The unsuitability of infrastructure and lack of age-appropriate outdoor equipment were discussed in Sections 3.3.2 and 5.3.2, as proof that, without enough teaching and learning resources, young children are unlikely to engage with PCP in a Grade R mathematics class. Their mathematics knowledge is limited, as they cannot explore mathematics concepts.

Therefore, research has to be conducted on inequality and disparity in relation to teaching and learning resources, and how resources are distributed amongst schools with Grade R classes, to explore why schools are not provided with equal levels of teaching and learning resources. This research should indicate how teaching and learning resources are allocated to schools.

6.4.3 Parents who are not involved in the education of their children

Parental involvement promotes quality teaching in Grade R. Parents who are not involved in the education of their children are not designated as members of school committees. Their relationship and communication with the school are limited, resulting in poor performance by their children in schoolwork. Parents lack skills relating to ways to assist their children with schoolwork at home. However, parents

insist that it is the responsibility of the school to ensure that there is collaboration between parents and teachers. Furthermore, the literature reveals that it is the responsibility of both parties, parents and the school, to ensure that there is collaboration between them. They both play a leading role in the development of young children.

The literature reported in Section 3.3.3 and empirical data quoted in Section 5.3.3 are very clear on the roles and responsibilities of the parents in the education of their children. Parents seem to lack knowledge on how to become involved in the education of their children and appeal to be trained in this regard. Poor communication, which affects the relationship between the school and parents, was also a concern. Developing strong relationships facilitates the team's engagement in genuine collaboration (Section 4.2.2). Parents also seem to think that teachers are imposing on them and oppressing them, instead of working as partners.

Due to this complex role that parents should play in the education of their children, I recommend that research is done on the type of workshops and training that could be offered for parents, and how this could be facilitated as part of empowerment. The way these training programmes should be conducted so that all parents, even those who cannot read or write, are able to benefit from it, should also be investigated.

6.4.4 Authorities that do not support schools

The role of education officials, as the district office, is to support and monitor the quality of teaching and learning at schools, as they work directly with schools. Teachers seem to be unhappy about the level of support they receive from district officials. There is evidence that teachers are not receiving enough support – even teacher development programmes that are offered are not helping teachers, who struggle to engage with PCP in Grade R mathematics. All these findings point to the education district officials failing to do their work well. Teachers feel that the support that they should get from district officials has to be accompanied by guidance, enough resources, including monitoring, which is lacking from the side of the education authorities.

Section 3.3.4 of the literature review indicates clearly that there is a lack of support for teachers and insufficient monitoring of teaching and learning at schools. The empirical data confirms that teachers are not getting enough support in the form of teacher

development programmes and monitoring of quality teaching and learning (Section 5.2.5). There is no collaboration with regard to the development of plans to assist in the monitoring schools. When people work together, they share experiences with one another, learn to collaborate with one another and develop a voice for the production of knowledge (Section 4.2.4), and this is what should happen in teaching and learning, to the benefit of young children.

Therefore, I suggest that further research is done on whether education authorities are taking charge of their responsibilities in term of monitoring and support of schools, to the benefit of learners. I also suggest that further research is conducted to establish whether school management team members can support their schools without having been empowered by district officials.

6.4.5 Inadequate language of teaching and learning in Grade R

With the increasingly diverse nature of learners enrolled in Grade R, it becomes more and more difficult for teachers to engage them in PCP, particularly in the mathematics class. The policy stipulates that, in foundation phase, learners have to be taught in their mother tongue, and this presents a challenge to teachers, as they have to meet the needs of all learners in the class, who have different home languages. Teachers do not know which LoLT to employ in the Grade R class to ensure that learners can learn mathematics effectively and perform at the required standard. This is the most challenging situation for teachers, learners and parents, as it causes poor communication in class. Furthermore, the performance of learners in mathematics is affected, and parents are unable to assist their children with schoolwork, because parents lack knowledge of the LoLT in Grade R.

The study found that there is the inadequate LoLT in Grade R, especially in the mathematics class. Both the literature (Section 3.3) and the data generated (Section 5.2.4), confirm that there is inadequate LoLT in Grade R, and this presents a barrier to learners. Some teachers are of the opinion that the prescripts of the language policy are not practical, due to the diversity of the learners in a Grade R class, who speak different languages at home.

Therefore, the study recommends that research should be conducted on which LoLT to be used in Grade R so that the needs of all learners are met. The unclear

explanation by policy makers regarding the LoLT in this area is frustrating and causes barriers in mathematics classes.

6.5 THE MAIN COMPONENTS OF THE SOLUTIONS

This section provides solutions to the challenges that were mentioned in Section 6.4, which prevent Grade R teachers from engaging with PCP in Grade R mathematics classes. This hurdle was also revealed by the literature reported in Section 3.3 and the evidence gathered during the data analysis reported in Section 5.2. The findings that emerged from the study relating to shortcomings are inadequately qualified Grade R teachers (Section 6.5.2), insufficient teaching and learning resources, lack of involvement by parents in the education of their children, insufficient support by authorities, and inadequate LoLT.

6.5.1 Adequately qualified Grade R teachers

The role of the teacher is pivotal for ensuring quality teaching and learning in Grade R. In order for teachers to understand their role in the teaching and learning of young children, teacher development programmes, which include curriculum as well as professional development, must be in place. In the same way, teachers have to ensure that they are adequately qualified to engage learners in PCP, particularly in the mathematics class, to ensure that Grade R learners perform well in mathematics.

As discussed in Section 3.1.1, teachers are required to possess a minimum qualification of a Diploma in Grade R Teaching, because effective mathematics teaching requires an understanding of what learners know and need to learn. Through this qualification, teachers will be able to engage learners with PCP in Grade R mathematics classes. Republic of South Africa (2014:49) argues that, if they meet required standards, a B.Ed. in Foundation Phase is an adequate qualification for Grade R teachers. Teachers seem to believe that, if they can be guided step-by-step and could receive proper information, they will succeed in engaging learners with PCP. They also believe that the management team of the school has to offer professional development and establish PLCs, as a strategy that could help them to engage effectively with learners in a mathematics class (Section 5.3.1).

I propose that research is conducted to establish who is responsible for ensuring that Grade R teachers undergo professional development and growth, as required by the DBE (2003:13). Further research is required into the provisions that have been made by those in power to ensure that teachers obtain adequate qualifications that will enable them to teach in this field.

6.5.2 Sufficient teaching and learning resources

Comprehensive planning is one of the responsibilities of teachers and this planning has to be coupled with teaching and learning resource, so that learners can learn from the known to the unknown, and from the concrete to the abstract. Teachers have to meet these needs of learners in mathematics classes. However, this can only be achieved if teaching and learning materials are available. Availing these teaching materials enables learners to engage with PCP in mathematics classes; they will also be able to manipulate and learn more about the use of the teaching and learning resources that have been provided. It is during this engagement that learners learn collaboratively, socialise and share teaching and learning resources with others. Teachers, as knowledge constructors, have to be able to create their own teaching and learning resources to complement currently available teaching and learning resources.

The literature discussed in Section 3.3 indicates that the provision of teaching and learning resources to schools supports teachers in developing day-to-day activities. The section, furthermore, indicated that teachers are provided with the opportunity to be creative and develop their own teaching and learning resources. This section is in line with the data analysis (Section 5.3), which indicates that using recycled materials, such as bottle tops, empty toilet paper rolls, empty plastic bottles and boxes, adds value in the development of teaching and learning resources (Figure 5.5). This was also revealed in Figure 5.7, which shows how old tyres can be used to complement outdoor teaching and learning resources.

The study recommends that research has to be conducted on how learners learn and why they perform poorly in mathematics. Furthermore, research should determine how teachers can improve their engagement with PCP in Grade R classes.

6.5.3 Involvement of parents in the education of their children

Involving the parents in the education of their children will improve learners' performance in mathematics. The involvement of parents will also provide opportunities for them to develop a relationship with the school and work collaboratively as partners. In the study, parental involvement does not only allude to teaching and learning, but also to the advancement of more comprehensive activities, among which continuous and effective communication, sharing ideas with other parents, serving on school committees, such as school governing bodies, and supporting children at home and at school, so that children can develop to their full potential. In order to achieve all this, positive and effective parental involvement is necessary.

The study revealed that parental involvement is important because it improves the performance of learners. The study also indicates that children whose parents are involved in their education, are motivated and perform well in their schoolwork (Section 3.3.3). This is the result of these children starting to learn mathematical concepts from their parents. Parents, furthermore, introduce the element of indigenous knowledge, which assists learners to relate what they have learnt at school with what their families taught them. Section 5.3.3 demonstrates how parents can be involved in the education of their children through supporting and working as a team with teachers. Guidelines have to be developed to assist parents to help learners with their schoolwork at home. Both Section 3.3.3 and 5.3.3 indicate that, through the involvement of indigenous games, such as *diketo*, *morabaraba* and hopscotch, learners' counting skills will be inculcated and improved.

The study found that there is a need for a partnership between the school and the parents and that this partnership would enhance the performance of learners. The research that should be conducted should investigate whether the interaction between the school and parents increases the positivity of learners to perform well and affords parents the opportunity to work together with teachers in the school.

6.5.4 Sufficient support by authorities

In the study, monitoring and support of teachers emerged as a serious need; this support is supposed to be carried out by education authorities. Teachers indicated that

support and monitoring should start at the school even before education authorities are involved. To the contrary, I believe that support should start with that of education authorities, and then, later, when the school is well developed, the school management team can start providing in-house support. Arguably, it is the responsibility of both the provincial office and the district office to ensure that teachers are supported properly so that they can engage with PCP in Grade R mathematics classes.

Support by the authorities was discussed in detail in Section 3.3.4, which states that the monitoring and support of teachers have to be provided through district officials who work directly with schools. The literature also indicates that teachers should have access to a variety of teacher development programmes, so that they can engage learners with PCP in Grade R mathematics classes. Furthermore, provisioning of quality teaching material and the development of support structures, such as the district support team, were mentioned as part of monitoring and support of teaching and learning. The provision of teaching and learning resources alone does not lead to a good performance by learners – the effective application of these materials has to be considered too. Empirical data reported in Section 5.3.4 concurs with the literature discussed in Section 3.3.4; societal transformation and capacity building are expected to be promoted from the district level, as the district is the custodian of schools.

However, to confirm these findings, research has to be done to establish whether there is a relationship between teacher capacity and school monitoring and support. In addition, the way the monitoring and support should be carried out is not clear, and this can also be researched, to clarify this issue.

6.5.5 Adequate language of teaching and learning

The findings reported in Section 3.3.5 of the literature confirms that children learn best in their mother tongue, as this links their learning to the indigenous language that learners use at home. Furthermore, when learners are engaged with PCP in their mother tongue throughout primary school, they tend to learn a second language easily in the higher grades. Learning through a familiar language motivates learners, builds self-esteem and makes learners interested in teaching and learning; thus, increasing participation. The empirical data in Section 5.3.4 supports the literature, by indicating

that using the language spoken by the child significantly enhances learning outcomes, compared to using a language of instruction that the child does not speak (Trudell, 2016:3).

Hence, it is vital that, in the early years, the mother tongue should be used as the LoLT. This does not only benefit learners, but it also gives parents the opportunity to communicate effectively with the school, as partners on the same level of understanding.

The study recommends that research has to be conducted to ensure that, if there is good communication between the school and parents, this benefits the children, and that their performance in mathematics improves.

6.6 ENVIRONMENT CONDUCTIVE TO THE SUCCESS OF A PROPOSED STRATEGY

The study had demonstrated earlier (Sections 3.4 and 5.4) that a conducive environment has to prevail for designing a strategy to improve curriculum practice in a Grade R mathematics class. In this section, the findings regarding an environment conducive to designing a proposed strategy are discussed. These include delivery of appropriate teacher development programmes, provision of quality teaching and learning resources, effective parental involvement, provision of effective support by authorities, and familiarity with the LoLT.

6.6.1 Delivery of appropriate teacher development programmes

The literature described in Section 3.4 revealed that there is a need for teachers to be adequately qualified to enable them to engage learners with PCP in a Grade R mathematics classes. Teacher development programmes, coupled with the establishment of PLCs, were identified as crucial factors that support the functioning of teachers (Section 3.1.4). Teacher development programmes cover a large part of training and development opportunities, ranging from workshops to university degrees; in their turn, PLCs afford teachers the opportunity to share best practices and learn from one another – this was realised during the analysis of the empirical data (Section 5.4.1) when teachers seemed to agree that implementing teacher

development programmes could serve as an enabling factor for engaging learners with PCP.

The conclusion drawn from the findings above is that, in order for Grade R teachers to engage learners in PCP, they need to have access to teacher development programmes and PLCs.

The study recommends that, in order for teachers to engage with a PCP in Grade R mathematics classes, an integrated teacher development programme could respond to the challenge posed by inadequately qualified teachers (Section 3.4.1 and Section 5.4.1). Furthermore, the study recommends the establishment of PLCs that are functionally appropriate to the needs of Grade R teachers, so that they can engage in collaborative enquiry and reflection to explore new ideas and current practices (Section 3.4.1 and Section 5.4.1).

6.6.2 Provision of quality teaching and learning resources

The findings of the literature reported in Section 3.4.2 reveal that provision of teaching and learning resources is a condition under which a strategy to improve PCP in a Grade R mathematics class can be implemented successfully. This is supported by the view, expressed in Section 5.4.2, that a strategy needs to be supported by self-made teaching and learning resources, indigenous games, as well as a back-to-basics approach, which could incorporate poems and stories in teaching and learning in a Grade R mathematics class.

The conclusion drawn from the findings above indicates that the adequate provisioning of teaching and learning resources, which includes self-made resources, will aid teachers to engage learners with PCP in Grade R mathematics classes. However, the inclusion of indigenous games, which is contributed by parents, introduces an element of teamwork to the relationship between the school and the parents.

In order for teachers to engage in PCP in Grade R mathematics classes, the study recommends that PAR, as an approach that encourages collaboration and empowerment, should be employed to respond to the lack of teaching and learning resources (Section 4.2.3). Through collaboration and mutual help, a variety of teaching

and learning resources, including outdoor equipment, can be made available for Grade R mathematics. Above all, equal allocations of teaching and learning resources have to be done; thereby, making it possible for learners to manipulate and explore these resources (Section 3.4.2 and Section 5.4.2).

6.6.3 Effective parental involvement

The findings reported in Section 3.4.3 of the study shows that schools lacked a training plan to empower parents on how to become involved in their children's education, as stipulated in the South African Schools Act 84 of 1996 (Republic of South Africa, 1996). The school principal and department officials should empower parents to perform their duties, of which one is to assist their children with schoolwork at home. Furthermore, a good relationship between the school and the parents is lacking, resulting in a lack of support and communication on the side of parents (Section 3.4.3 and Section 5.4.3). The failure of parents to be involved in the education of their children could be due to teachers deceiving them and keep information for themselves, instead of sharing it with parents. On the other hand, it could also result from parents who are uninformed and do not know their rights as partners in the school.

The **conclusion** that can be drawn from the above is that capacitating parents will enable them to assist their children with schoolwork at home and to be involved in school committees and perform duties allocated to them by the school well. Unnecessary conflict will be avoided, as parents' responsibilities will be streamlined.

The study **recommends** that parents be provided with training that will enable them to be fully involved in the education of their children, and to fulfil their role as members of education communities. This recommendation is in line with bricolage, the lens of the study, which promotes empowerment and giving voices to the voiceless (Section 2.2.1.2), so as to ensure that parents' contributions are valued by the school.

6.6.4 Provision of effective support by authorities

In Section 3.4.4, the study found that education authorities monitor and support schools through site visits. The visits include one-to-one interaction with teachers, as well as conducting teacher development programmes as part of monitoring and support. Clear communication through regular meetings with education authorities will

help teachers to understand how to implement the curriculum in Grade R classes better, particularly in mathematics. Section 5.4.4 reports on the establishment of a structure of collaboration with education authorities for the purpose of self-empowerment, which will assist the school as part of support provisioning.

In conclusion, full support and monitoring should be provided to schools, as should teacher development programmes as part of monitoring and support, to enable teachers to engage learners with PCP in Grade R mathematics classes.

The study recommends that monitoring and support have to be conducted by education authorities as part of development; however, it should not take the form of a fault-finding exercise that will demotivate teachers.

6.6.5 Familiarity with the language of teaching and learning

The literature reported in Section 3.4.5 indicates that, when learners learn and solve mathematics problems, they go back to their first language to seek the solution; hence, the need for competency in the mother tongue. Information in Section 3.4.5 is refuted by Section 5.4.4, which indicates that using English as the LoLT gives learners an opportunity to communicate internationally. Regrettably, if English is used at the school as the LoLT, it disadvantages parents' involvement in the education of their children, as parents seem to be more comfortable when expressing themselves in a language that is familiar to them (Section 5.4.4).

The conclusion drawn from the findings above is that using language that is unfamiliar to learners and parents excludes the latter from taking part in school activities, as they are unable to communicate and express themselves.

The study recommends that research is conducted to clarify which language should be used as the LoLT in Grade R mathematics classes, to ensure that learners are comfortable expressing themselves. An additional recommendation is that any school activities, including communication with parents, should be in the language that is familiar to parents and learners.

6.7 THREATS THAT MAY HINDER SUCCESSFUL IMPLEMENTATION OF THE STRATEGY

This section gives a summary of possible threats that might hinder the implementation of the proposed strategy. These threats are low levels of teacher qualifications, insufficient teaching and learning resources, poor parental involvement, ineffective support by authorities, and unfamiliar LoLT.

6.7.1 Low level of teacher qualifications

The literature reported in Section 3.6.1 indicates that teachers have low levels of qualifications, which hampers their engagement of learners with PCP in Grade R mathematics classes. The section also reports that teacher development programmes that are conducted by education authorities have little impact on teachers, as the planning and the duration is determined by the district and, thus, the programmes leave teachers with limited scope, because they still need to study towards the qualifications that are required for working with for Grade R learners. Equally, Section 5.5.1 reports that there is a need for teachers to possess adequate qualifications; if they don't, the education of young children is threatened by the type of Grade R teachers that are in the system.

In conclusion, Grade R teachers have to be developed to obtain full qualifications that will help them cope with new trends in the education of young children, as well as excelling when teaching in this field. This will not only benefit teachers, but society at large too.

The study recommends that there should be more emphasis on adequate qualifications, such as Diploma in Grade R Teaching and B.Ed. Foundation Phase, to enable teachers to provide quality education for young children, as a low quality education serves as a trap that is not easy to manoeuvre from.

6.7.2 Insufficient teaching and learning resources

Section 3.6.2 and Section 5.5.2 explain that a lack of teaching and learning resources makes it difficult for teachers to engage learners effectively with PCP in a Grade R mathematics class. A lack of play-based activities to supplement teaching and learning in this field makes it impossible for learners to engage with PCP in a class, because

children learn through play. Section 3.6.2 and Section 5.5.2 report that teachers are unable to utilise teaching and learning resources that are provided to them, and this poses a threat, as they are unable to engage learners in PCP in Grade R mathematics classes.

The conclusion is drawn from the findings above point to the implications of a lack of teaching and learning resources, or training on how to use these resources. This could pose a threat to learners, as they usually have to learn with concrete objects before they can be introduced to abstract concepts.

The study recommends that, in order to engage Grade R learners with PCP, self-made teaching and learning resources have to be constructed, thereby assisting learners to touch and manipulate resources. Indigenous games, as the expertise of parents, are also commended, especially reading and telling stories to learners. This will stimulate learners and they will be able to learn mathematics effectively.

6.7.3 Poor parental involvement

In Section 3.6.3, the study found that schools fail to fully engage parents in matters pertaining to the education of their children, including school activities and parental empowerment. The section, furthermore, reports that the relationship between parents and the school is fragmented, and that there is poor communication between the two parties. The same threats were found by this study and reported in Section 5.5.3. Parents were excluded, and not trained on how to assist their children with schoolwork at home. Additionally, poor relationships and lack of communication and cooperation between parents and the school were found to be factors that hamper the engagement of PCP in Grade R mathematics classes.

The conclusion drawn from the findings above is that parents seem to think that they are being excluded from the education of their children, leading to poor performance by learners in mathematics. However, teachers have the idea that parents are neglecting their responsibilities in relation to the education community.

The study recommends that parents are brought on board regarding matters that affect the education of their children, to enable them to contribute positively to school activities and to assist their children with their schoolwork at home. As education is a

shared responsibility, teachers and parents have to contribute equally to stimulating young children to participate positively in school activities, particularly in mathematics. In addition, further research has to be conducted on the type of training that should be conducted for parents with regard to their involvement in the school and in school activities.

6.7.4 Ineffective support by authorities

Lack of support by the authorities is documented in Section 3.6.4, where it was reported to be a factor that contributes negatively to engaging learners with PCP in Grade R mathematics classes. Poor communication from the side of education authorities was also identified as a threat to the teaching and learning environment. The same applies to Section 5.6.4 of the empirical data, which found that there are inadequate monitoring and support by subject advisors; they do not do enough in terms of site visits and communicating important information to the school and maintaining personal relationships with teachers.

The conclusion that can be drawn from the above is that clear communication between education authorities and the school serves as a starting point for monitoring and support of the school. Therefore, the channel of communication has to be improved to achieve effective monitoring and support of the schools.

The study recommends that a collaborative developmental plan between the education authorities and the school is drawn up. This plan should entail the expectations of both the school and the education authorities in relation to monitoring and support. Additionally, communication has to be cascaded clearly to schools, in order to facilitate the process of teachers in engaging learners in PCP in Grade R mathematics classes.

6.7.5 Unfamiliarity with the language of teaching and learning

The study found that using a language that is unfamiliar to learners during engagement with PCP has a negative impact on teaching and learning in Grade R mathematics classes (see Section 3.6.5). Language becomes a barrier, as learners cannot relate well to mathematical concepts. The section, furthermore, points out that using an unfamiliar language does not affect only learners; this is also a problem on the side of

parents, which prevents them from assisting learners with schoolwork at home, and leads to poor communication between parents and the school. Section 5.5.5 reports that using mother tongue in the classroom enhances participation by all learners, leading to an increase in mathematics performance because learners understand better in their home language.

In conclusion, using an unfamiliar language excludes learners from engaging with PCP in Grade R mathematics classes, and excludes parents from assisting their children with their schoolwork at home. This also impacts negatively on collaboration between the school and the parents in the education of young children as a shared responsibility (Section 3.6.3).

It is recommended that learners are engaged with PCP in a Grade R mathematics class in the language that is most familiar to them; thus, improving their performance. However, research has yet to be conducted to consider the language to be employed for teaching and learning of Grade R learners.

6.8 EVIDENCE THAT THE STRATEGY WORKED

In this section, I will report on evidence that the proposed strategy was functional. This evidence includes suitable teacher development programmes, relevant, quality teaching and learning resources, maximum parental involvement, supportive authorities and familiarity with the LoLT.

6.8.1 Suitable teacher development programmes

The findings discussed in Section 3.7.1 and Section 5.6.1 indicate that Grade R teachers who attended teacher development programmes, which included professional development, were found to be fully engaged with their learners in PCP in Grade R classes. Therefore, the performance of learners improved, as these programmes heightened the teachers' expertise and helped them to fulfil their roles. Through the establishment of PLCs, teachers managed work together and share best practices with other teachers of Grade R.

6.8.2 Relevant, quality teaching and learning resources

Findings in Section 3.7.2 and Section 5.3.2 demonstrated how the provisioning of relevant teaching and learning resources enables teachers to engage learners with PCP in a Grade R mathematics class. Resources give learners the opportunity to practise numerical skills, which will help them with computation and comprehension of mathematics concepts, and how to use them in their daily lives.

6.8.3 Maximum parental involvement

The findings reported in Section 3.7.3 and Section 5.5.3, on parental involvement, indicated that most of the parents demonstrated an interest in supporting their children with their schoolwork at home. Parents' extensive knowledge of indigenous games can help their children to conceptualise mathematical concepts. Those parents who attended the training were able to communicate and collaborate well with the school. Spending more time at the school provided them with an opportunity to be empowered and serve as members of school committees, and their relationship with the school improved.

6.8.4 Supportive authorities

Section 3.7.4 and Section 5.5.4 reported that effective monitoring and support provided by the education authorities was evident, as teachers were motivated to engage learners with PCP in Grade R mathematics classes. Consultations, communication and regular support of schools took place. Meetings were convened for feedback and guidance to teachers, and teachers were involved in the development of a plan for the curriculum and teachers' professional development.

6.8.5 Familiarity with the language of teaching and learning

The finding in Sections 3.7.4 and 5.4.4 indicated that learners who were taught in their home language performed well, particularly in mathematics. By using the language that learners were familiar with, and examples that relate to the learners' context, their understanding was stimulated and their performance in mathematics improved. Through using mother tongue, teachers were able to help children to gain knowledge of mathematics procedures and concepts.

6.9 LIMITATIONS OF THE STUDY

The study was conducted in one of the schools in a township in Motheo district, but was not tested in other districts (the Free State province has five districts). The reason for conducting the study in this area is that was within reach of the researchers. The area was also identified as one of the areas that face challenges, such as inadequately qualified Grade R teachers, lack of teaching and learning resources, insufficient parental involvement, and lack inadequate LoLT. All these challenges prevented teachers from engaging learners fully with curriculum practice in Grade R mathematics classes. However, it was difficult for the team to meet weekly, as most of the team members were adult students, and they were busy with their assignments and other matters related to their studies. The time suggested for the meeting was twice a month on Friday afternoons. In most cases, some of the co-researchers had to leave early, before the meeting adjourned, in order to attend to personal family matters.

6.10 IMPLICATIONS FOR FURTHER RESEARCH

Since the study was conducted in one district of the five districts in the Free State province, I recommend that the same study be done in well-resourced districts and other provinces in the country, to determine whether the challenges identified in Motheo district apply to other districts, or whether it is limited to certain districts and provinces.

6.11 CHAPTER SUMMARY

In this chapter, attention is paid to the findings, recommendations and conclusions relating to a strategy to improve PCP in a Grade R mathematics class; thus, to achieve the aim and the objectives of the study. Furthermore, the chapter discusses the limitations of the study and concludes by providing, briefly, the implications of the study and a summary of the chapter.

In the next chapter, I present a proposal for the strategy that was discussed throughout the previous chapters, with the aim of assisting teachers to engage learners in PCP in a Grade R mathematics class.

CHAPTER 7: A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS

7.1 INTRODUCTION

The aim of the study was to design a strategy to improve PCP in a Grade R mathematics class, and this chapter presents the anticipated strategy. The chapter starts by explaining how the strategy was designed. Secondly, I provide a description of the different elements comprising the strategy. Thirdly, I specify conditions for the successful implementation of the strategy. In the fourth place, a comprehensive illustration of the strategy to improve PCP in a Grade R mathematics class is presented. Lastly, I summarise the chapter.

7.2 ELEMENTS OF THE STRATEGY

In this section, the elements of a proposed strategy, which consists circles, are discussed. Figure 7.1 portrays the interrelatedness of the components, to give readers an insight of how the different elements are related and how they worked together to lead to the design a strategy to improve PCP in Grade R mathematics.

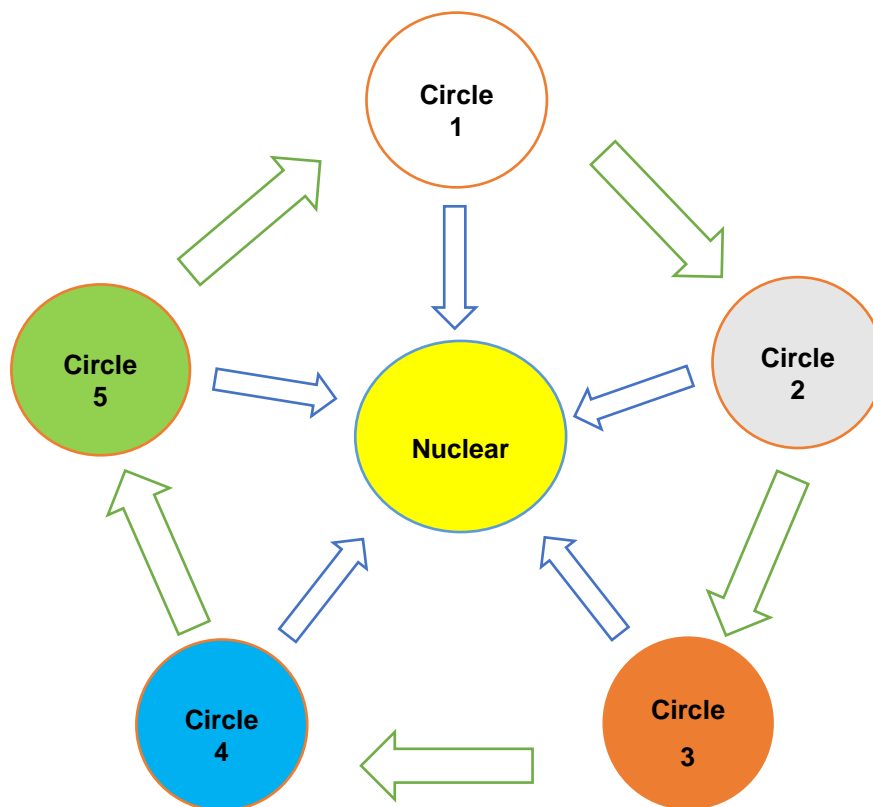


Figure 7.1: Graphic representation of the interrelatedness of a proposed strategy

7.3 CIRCLES OF THE STRATEGY

In this section, components of a strategy to improve PCP are discussed individually.

7.3.1 Circle1: The Grade R learner

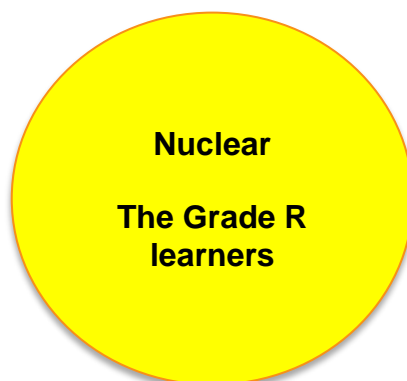


Figure 7.2: Circle 1: Nuclear

In the study, the circle termed Nuclear represents the learner, who is the nucleus of the teaching and learning environment. Learners bring into the classroom aspects of their individual lives that have an influence on how they respond to and interact with the learning and teaching environment, particularly in Grade R mathematics. It is important to remember that these individual aspects may be influenced by families and the school environment in which learners find themselves. Hence, it is crucial for the teachers to know and understand these challenges that are faced by learners in the teaching and learning environment. This will enable teachers to adapt their teaching plans to engage learners effectively with PCP in a Grade R mathematics class.

7.3.2 Circle 2: Grade R teachers

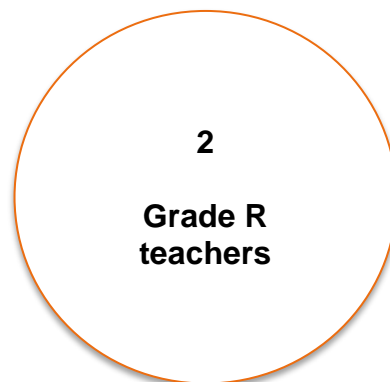


Figure 7.3: Circle 2: Grade R teachers

Teachers, as one of the elements of the strategy, were included and are represented by Circle 2. Their inclusion in the study ensures that, through their adequate qualifications, they share their strategies and best practices on how to engage learners with PCP in Grade R mathematics classes. Teacher development programmes include a range of workshops and training events, including the teaching diploma or degree, which offers teachers opportunities for curriculum and academic development. Through these teacher development programmes, teachers ensure that they have adequate qualifications, and are able to engage learners with PCP in a Grade R mathematics class.

7.3.3 Circle 3: Teaching and learning resources



Figure 7.4: Circle 3

Circle 3 represents teaching and learning resources. When teachers use teaching and learning in a mathematics class, they make it easier for learners to participate fully in classroom activities. Teaching and learning resources, provide an opportunity for learners to manipulate objects and learn mathematics concepts related to the concepts taught in the class. When a Grade R teacher uses teaching and learning resources appropriately, she/he creates a conducive environment for the learners to learn mathematics practically. Including indigenous games as well as self-made teaching and learning resource in the strategy promotes a collaborative culture of learning and teaching, which helps learners relate to their cultural environment. By using teaching and learning resources in a Grade R mathematics class, learners acquire skills, such as sharing, waiting your turn, and socialisation, as well as problem-solving. To ensure that there are a variety of teaching and learning resources, teachers should constantly rotate the resources in the mathematics class and search for new teaching and learning resources that could stimulate and challenge learners cognitively and develop them holistically.

7.3.4 Circle 4: Parental involvement

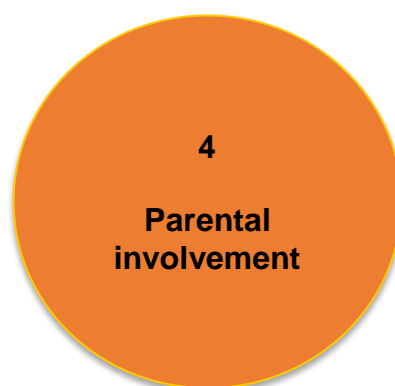


Figure 7.5: Circle 4

Circle 4 represents parents, who are an important element of the strategy. They are regarded as pillars of strength for both learners and the school. They are the providers of support and the muscle of the school, due to their financial contributions. Including parents in the education of learners provides parents with the opportunity to voice their views and to form a stable relationship with the school; hence, they are part of the strategy. Their presence in the strategy also helps to neutralise the power dynamic between the school and the family. Parents have the capacity to serve on the school's committees, such as parent teacher associations and school governing bodies, in order to have a say in the democratic education community. Doing so strengthens the relationship and communication between the school and the parents. Constant communication with parents is associated with the teacher-parent interaction, which is crucial for determining the development of young children in teaching and learning in Grade R mathematics.

7.3.5 Circle 5: Support by authorities



Figure 7.6: Circle 5

Circle 5 of the strategy represents provincial and district officials in the education department. They are included as part of the strategy due to their expertise and experience of the education of young children. Their skills and knowledge are critical for supporting and monitoring schools' implementation of curriculum programmes. They are also expected to develop integrated teacher development programmes that address the needs of Grade R teachers. Authorities are expected to assist teachers with coping strategies for dealing with new education trends in ECD. Through their continuous school visits, they are able to observe teachers' teaching practices, give feedback, and implement positive corrective measures to facilitate teachers' progress in teaching, learning and reflection. In-house training, as well as monitoring and support by school management teams, cluster meetings, and the establishment of PLCs, are also vital as parts of the strategy.

7.3.6 Circle 6: Language teaching and learning

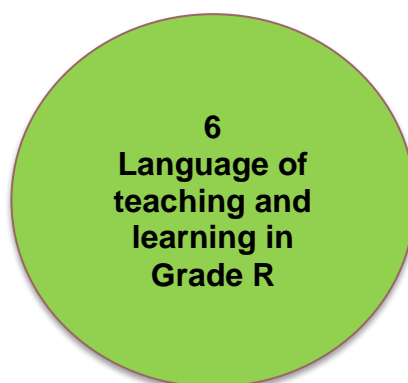


Figure 7.7: Circle 6

The LoLT is included in the strategy as one of the elements, because, in ECD, teachers are encouraged to teach using indigenous languages or a language that is known to the children. Using home language as the LoLT helps learners to communicate well what they have learned at home and at school. It provides learners with an opportunity to learn new vocabulary or mathematics concepts, construct mathematics sentences, particularly word sums, and it leads to success in teaching and learning. Using indigenous language as a LoLT at the school also enables parents to be part of the education of their children and to assist children with their schoolwork. Communicating in the mother tongue or a language that is known to learners brings teachers and parents closer in their attempt to address the needs of the children. It also enables parents to interpret and understand what the school is requesting from them, and what action they should take to respond to the needs of the school.

7.4 CONDITIONS FOR THE SUCCESSFUL IMPLEMENTATION OF A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS

The conditions needed for the successful implementation of the strategy proposed to improve PCP in a Grade R class are discussed below.

7.4.1 Adequately qualified Grade R teachers who can teach in Grade R mathematics classes

A well-trained teacher is one who is adequately qualified, and who knows how to engage young children with PCP in a Grade R mathematics class. Hence, in Grade R, teachers have to be adequately qualified to teach diverse learners in a mathematics class. The teacher in this field needs to be able to coordinate with parents and promote quality teaching in Grade R. Mandating qualified teachers with tertiary education may improve learners' performance, particularly in mathematics. It will also add value to teaching and learning, and the interaction between teachers and learners should improve significantly. This will give learners an opportunity to explore and learn in a play-based approach. The implementation of continuous teacher professional development will provide teachers with more insight into how to engage learners with PCP in a Grade R mathematics class. An integrated plan that is developed by teachers and subject advisors, and which prioritises teacher development activities that are suitable for meeting the needs of teachers, has a positive impact on teaching and learning. It also empowers teachers to work independently during the PLC meetings and to share their best practices on how to deal with young children, particularly in a mathematics class.

7.4.2 Sufficient teaching and learning resources

Using good quality teaching and learning resources is accepted practice in early childhood education, particularly in mathematics classes. Thus, a well-resourced school is a key element of a strategy, as resources enhance teaching and learning in a Grade R mathematics class. To ensure that there is equilibrium in early childhood teaching, a well-designed infrastructure, that is, buildings, toilets and outdoor equipment, coupled with enough provisioning of quality indoor teaching and learning materials, which include blocks, geometric shapes, base 10 blocks, unifix cubes, bottle tops, plastic counting cubes, puzzles and storybooks, enhance the quality of ECD programmes and the workforce satisfactorily, as required by the strategy. Sufficient experience of teaching and learning resources provide learners with opportunities to connect mathematical theory with practices done in class. Learners are able to manipulate the resources and learn from concrete to abstract perspectives. This means that including teaching and learning resources as an element of the strategy,

will provide an opportunity for learners to apply basic mathematical concepts in their daily life. Learners will develop logical thinking and problem-solving skills, as well as how to explore and cooperate in learning.

7.4.3 Full parental involvement

Parental involvement is an excellent way to share indigenous knowledge and utilise synergy to the benefit of both the school and children. When parents are involved in the education of their children, the learning environment is found to be more effective and the relationship between the teacher and parents is enhanced. This relationship is important, as it streamlines the roles that parents have to play in the education of their children. The learning environment for children becomes more effective when their parents are meaningfully engaged in school programmes, both at the school and home, hence, their involvement in the education of the children is crucial. Parents are key components of teaching and learning, and the strategy will only be successful if they are involved. Their inclusion in the education of their children shifts their position, from being passive receivers of what the school imposes on them, to being active and equal partners. Parental involvement motivates and encourages full participation of learners in PCP in Grade R mathematics; hence, parents are regarded as a support structure for teaching and learning in the school. Collaborating, respectful and empowering parents will strengthen their involvement in the education of the children.

7.4.4 Effective support by authorities

A well coordinated partnership between the school and the education authorities promotes quality education and leads to improvement in learners' attainment. In the view of the findings in the study, the support should start with the school's own management team, before departmental officials are involved, hence, monitoring and support of the school are included as elements of the strategy. Education district officials, as part of the strategy, are expected to roll out teacher development programmes as part of monitoring and support. They serve as both administrators and professionals, as they have to monitor the implementation of education policies, including curriculum policies. Their main role is to manage the running of the school effectively by providing professional support to schools.

7.4.5 Familiarity with the language of teaching and learning

In the study, familiarity with the LoLT is regarded as an important element of teaching and learning. Language is a cultural way of sending a message to a receiver. A language is a social tool for communication, a technique that learners use to engage in PCP in Grade R mathematics. Through their mother tongue, learners are able to respond adequately to mathematics challenges that they face in this subject. It is the only language through which school beginners become fully involved in the teaching and learning environment. However, it is important that teachers ensure that learners are taught in a language that learners are able to communicate in and understand well. Teaching learners in their mother tongue are also beneficial to parents, as they can interact easily with the school, and they are able to assist their children with schoolwork at home. Parents are able to communicate freely and support all school activities by contributing to their home culture and traditional knowledge, such as *ditsomo*, *diketo*, *morabaraba* and *kgati*, which make valuable contributions to teaching and learning. This contribution also makes easier for learners to form mathematics concepts and logical thinking, which leads to improved performance, particularly in mathematics. Mother-tongue-based education offers learners the opportunity to interact well with the mathematics environment they find themselves in.

7.5 PRESENTATION OF A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE IN A GRADE R MATHEMATICS CLASS

In this section, the strategy to improve curriculum practice in a Grade R mathematics class is represented. The strategy is in line with what the team promised throughout the study. The strategy comprises a collaboration of different elements, and the Grade R learner is the nucleus of the strategy. The reason behind placing the learner in the centre is to confirm the proverb that it takes a village to raise a child. The inclusion of all these elements is based on the objectives of PAR, namely, collaboration, communication, empowerment and mutual respect. This synergy enabled all the team members to play vital roles in sharing responsibility, promoting ownership and sharing best practices for the best interests of the learners. Figure 7.8 demonstrates the collaboration effort of the team during the forum meeting, where members brainstormed the elements of the strategy, and Figure 7.9 provides a graphical representation of the strategy.



Photo 7.8: Co-researchers brainstorming the elements of the strategy

**A STRATEGY TO IMPROVE PROFESSIONAL CURRICULUM PRACTICE
IN A GRADE R MATHEMATICS CLASS**

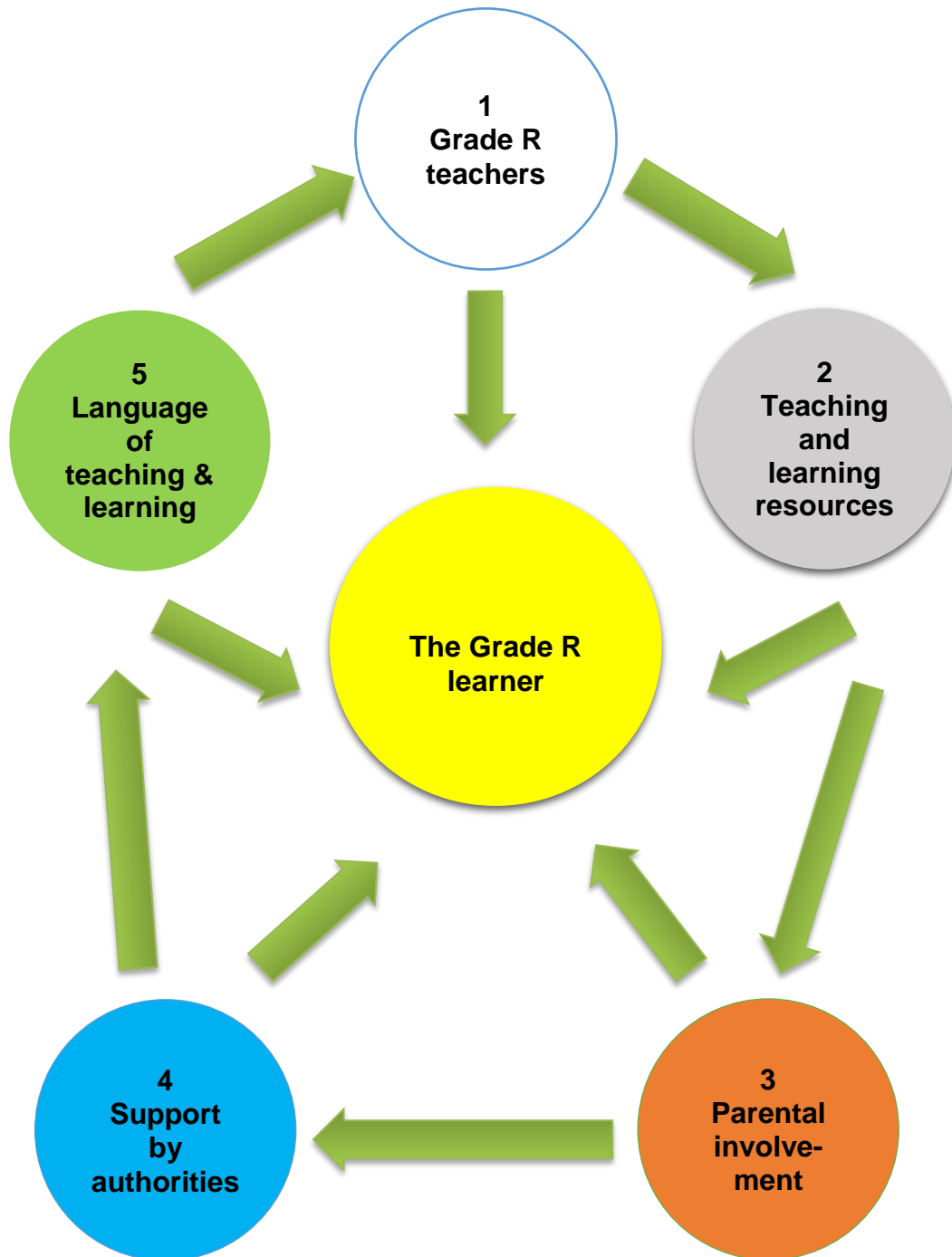


Figure 7.9: Illustration of the strategy

7.6 CHAPTER SUMMARY

The factors contained in the objective and that have been referred to throughout the study, led the team to design a strategy to improve PCP in a Grade R mathematics class; this strategy is illustrated in Figure 7.9. This strategy is composed of five circles, each representing a different stakeholder involved in the education of young children. In addition, the strategy is compatible with the prescripts of the PSSM as advocated by the NAEYC and NCTM (2000) and are suitable for all grades, including ECD. This PSSM comprises equality, curriculum, teaching, learning, assessment and technology. These principles were used to guide the discussions in Sections 3.1 and 5.1. The depiction of this strategy serves as confirmation of what the team promised during the forum meetings that were held during data generation. Figure 7.8 illustrates the collaborative effort of all team members who contributed to designing the strategy.

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AMMENDED ETHICAL CLEARANCE LETTER



Faculty of Education

11-Sep-2018

Dear Mrs Seipati Baloyi-Mothibeli

Ethics Clearance: A Strategy To Improve Professional Curriculum Practice in A Grade R Mathematics Class

Principal Investigator: Mrs Seipati Baloyi-Mothibeli

Department: School of Education Studies Department (Bloemfontein Campus)

APPLICATION APPROVED

With reference to your application for ethical clearance with the Faculty of Education, I am pleased to inform you on behalf of the Ethics Board of the faculty that you have been granted ethical clearance for your research.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2016/0183**

This ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the ethics office to ensure we are kept up to date with your progress and any ethical implications that may arise.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours faithfully

Prof. MM Mokhele Makgalwa
Chairperson: Ethics Committee

Education Ethics Committee

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ETHICAL CLEARANCE LETTER



Faculty of Education

25-May-2016 Dear

Mrs Seipati Baloyi-Mothibeli

Ethics Clearance: To design strategies to improve professional curriculum practice in a Grade R mathematics class in Mangaung.

Principal Investigator: Mrs Seipati Baloyi-Mothibeli

Department: School of Education Studies (Bloemfontein Campus)

APPLICATION APPROVED

With reference to your application for ethical clearance with the Faculty of Education, I am pleased to inform you on behalf of the Ethics Board of the faculty that you have been granted ethical clearance for your research.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2016/0183**

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We request that any changes that may take place during the course of your research project be submitted to the ethics office to ensure we are kept up to date with your progress and any ethical implications that may arise.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours faithfully

Dr. Juliet Ramohai

Chairperson: Ethics Committee

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APPENDIX C

APPROVAL TO CONDUCT RESEARCH FREE STATE DEPARTMENT OF EDUCATION

Enquiries: BM Kitching
Ref: Research Permission: SL Balyoi-Mothibeli
Tel. 051 404 9283 / 9221
Email: berthakitching@gmail.com and B.Kitching@edu.fs.gov.za



SL Balyoi-Mothibeli
3 Fauna Park
Korhaan Street,
Fauna, Bloemfontein, 9301

Dear Ms Balyoi-Mothibeli

APPROVAL TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION

1. This letter serves as an acknowledgement of receipt of your request to conduct research in the Free State Department of Education.

Research Topic: The strategy to improve professional curriculum practices in a Grade R mathematics class in Mangaung.

2. Approval is herewith granted to conduct research in Kgato Public School in Motheo District.

Target Population: 4 Foundation Phase Teachers, 4 Grade R Practitioners, 1 HOD Foundation Phase, 2 Subject Advisors, 1 Learning Facilitator for Special Needs.

3. **Period of research:** For three months from the date of signature of this letter. Please note the department does not allow any research to be conducted during the fourth term (quarter) of the academic year.
4. Should you fall behind your schedule by three months to complete your research project in the approved period, you will need to apply for an extension.
5. The approval is subject to the following conditions:
 - 5.1 The collection of data should not interfere with the normal tuition time or teaching process.
 - 5.2 A bound copy of the research document or a CD, should be submitted to the Free State Department of Education, Room 319, 3rd Floor, Old CNA Building, Charlotte Maxeke Street, Bloemfontein.
 - 5.3 You will be expected, on completion of your research study to make a presentation to the relevant stakeholders in the Department.
 - 5.4 The attached ethics documents must be adhered to in the discourse of your study in our department.
6. Please note that costs relating to all the conditions mentioned above are your own responsibility.

Yours sincerely

DR. M. SEKOLANYANE
CHIEF FINANCIAL OFFICER

2014/06/17.
DATE:

RESEARCH APPLICATION BALYOI-MOTHIBELI PERMISSION 15 JUNE 2016

Strategic Planning, Policy & Research Directorate

Private Bag X20565, Bloemfontein, 9300 - Room 318, Old CNA Building, 3rd Floor, Charlotte Maxeke Street, Bloemfontein

Tel: (051) 404 9283 / 9221 Fax: (086) 6678 678

APPENDIX D

NOTIFICATION TO SCHOOLS REGARDING RESEARCH FREE STATE DEPARTMENT OF EDUCATION

Enquiries: BM Kitching
Ref: Notification of research:
Tel. 051 404 9221 / 082 252 1519
Email: berthakitching@gmail.com and B.Kitching@fseducation.gov.za



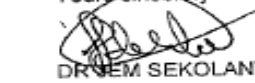
The Acting District Director
Motho District

Dear Mr Moloi

NOTIFICATION OF A RESEARCH PROJECT IN YOUR DISTRICT BY SL BALOYI-MOTHIBELI

1. The abovementioned candidate was granted permission to conduct research in your district as follows:
Topic: The strategy to improve professional curriculum practices in a Grade R mathematics class in Mangaung.
Schools involved: Kgato Public School
Target Population: 4 Foundation Phase Teachers, 4 Grade R Practitioners, 1 HOD Foundation Phase, 2 Subject Advisors, 1 Learning Facilitator for Special Needs.
Period: From the date of signature of this letter until the end of September 2016. Please note the department does not allow any research to be conducted during the fourth term / academic quarter of the year.
2. **Research benefits:** The research will assist in identifying challenges that impedes the engagement of professional curriculum practices for Grade R teachers/practitioners. The envisaged strategy will be designed in order to benefit teachers and learners in a Grade R mathematics class and the performance will be increased.
3. Logistical procedures were met, in particular ethical considerations for conducting research in the Free State Department of Education.
4. The Strategic Planning, Policy and Research Directorate will make the necessary arrangements for the researcher to present the findings and recommendations to the relevant officials in your district.

Yours sincerely


DR. M. SEKOLANYANE
acting CFO

2016/06/17.
DATE:

APPENDIX E

LETTER TO FREE STATE DEPARTMENT OF EDUCATION REQUESTING PERMISSION TO CONDUCT RESEARCH

Fauna
Bloemfontein
9300
2 August 2016

The Director
Strategic planning, policy Developments & Research
Room 301/ 109/110
Old CNA Building
Charlotte Maxeke
BLOEMFONTEIN
9300

REQUEST FOR PERMISSION TO CONDUCT RESEACH IN SCHOOLS

Dear Sir/Madam

My name is Seipati Baloyi-Mothibeli and I am a research students at the University of Free State. The research I wish to conduct for my Masters` dissertation involves the following officials: Subject advisor coordinators, Subject Advisors and teachers in Grade R as well as Deputy Chief Education Specialist at Provincial office.

My title is '**A strategy to improve Professional Curriculum Practice in a Grade R mathematics class**'. The project will be conducted under the supervision of Dr Tshelane from the University of Free State.

I am hereby seeking your permission to conduct a research together with the officials and teachers. Upon my completion of the study. I undertake to provide the Department with a full copy of the research report .If you require any further information, please do

not hesitate to contact me on 084 500 1269. Thank for your time and consideration in this matter.

Yours sincerely

Seipati Baloyi-Mothibeli

APPENDIX F

**LETTER TO THE PRINCIPAL REQUESTING PERMISSION TO CONDUCT
RESEARCH AT THE SCHOOL**

Faunapark 3
Korhaan Street
Bloemfontein
9301
10 August 2016

The Principal

Dear Sir/Madam

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

The aim of the study is to design strategies to improve PCPs in a Grade R Mathematics class.

The participation in the research will be voluntary and I promise to treat all the information gathered and used in this study with strictest confidentiality and electronic devices will be used for protection of. Your name will not be mentioned in the study and the information can also be made available to you on request. Since your participation in the study is voluntarily, no payment should be expected and should you wish to withdraw from the project you may do so at any stage of the project and no consequence would be experienced due to your withdrawal.

The contact sessions and meetings of the study will be administered during non-teaching hours. You will be expected to participate in contact sessions that will be done from 14h00 to 16h00 twice on the dates agreed upon.

Yours Faithfully

Seipati Lydia Baloyi-Mothibeli

Research Student

084 500 1269

APPENDIX G

CONSENT LETTER TO HEAD OF DEPARTMENT FOUNDATION PHASE

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

Participation in this research will require you to partake in face-to-face discussions, deliberations, transect walk and reflection. Photovoice and instruments such as audio-visual devices will also be used in order to generate data. The contact sessions and meetings of the study will be take place during non-teaching hours, weekends and holidays as agreed. This will only take 60 to 90 minutes. On completion, all the recordings will later be transcribed into text and Critical discourse analysis (CDA) will be used as point of departure to sort and sift the data.

However your participation in the research is voluntary. Your name will not be mentioned in the study only numbers or pseudonym will apply in transcript. Should you wish to withdraw, you may do so at any stage and no consequence would be experienced due to your withdrawal. No payment should be expected and no physical or psychological wellbeing will be affected. I promise to treat all the information gathered and used in this study with strictest

confidentiality and locked in a strong room where the electronic devices with a code will be used for protection. I will be the only person who have access to recordings and transcribed and it will made available to you on request.

You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

APPENDIX H

CONSENT LETTER TO SOUTH AFRICAN CONGRESS

3 Faunapark
Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

APPENDIX I

CONSENT LETTER TO COMMUNITY BASED SITI

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

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you may do so at any stage and no consequence would be experienced due to your withdrawal. No payment should be expected and no physical or psychological wellbeing will be affected. I promise to treat all the information gathered and used in this study with strictest confidentiality and locked in a strong room where the electronic devices with code will be used for protection. I will be the only person who have access to recordings and transcribed and it will made available to you on request.

You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also I agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

CONSENT LETTER TO EARLY CHILDHOOD DEVELOPMENT FORUM

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

Participation in this research will require you to partake in face-to-face discussions, deliberations, transect walk and reflection. Photovoice and instruments such as audio-visual devices will also be used in order to generate data. The contact sessions and meetings of the study will be take place during non-teaching hours, weekends and holidays as agreed. This will only take 60 to 90 minutes. On completion, all the recordings will later be transcribed into text and Critical discourse analysis (CDA) will be used as point of departure to sort and sift the data.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

APPENDIX K

CONSENT LETTER TO EARLY CHILDHOOD DEVELOPMENT LECTURER

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

Participation in this research will require you to partake in face-to-face discussions, deliberations, transect walk and reflection. Photovoice and instruments such as audio-visual devices will also be used in order to generate data. The contact sessions and meetings of the study will be take place during non-teaching hours, weekends and holidays as agreed. This will only take 60 to 90 minutes. On completion, all the recordings will later be transcribed into text and Critical discourse analysis (CDA) will be used as point of departure to sort and sift the data.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

CONSENT LETTER TO PRACTITIONER

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

CONSENT LETTER TO GRADE R TEACHERS

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

APPENDIX N

CONSENT LETTER TO FOUNDATION PHASE SUBJECT ADVISOR

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

Participation in this research will require you to partake in face-to-face discussions, deliberations, transect walk and reflection. Photovoice and instruments such as audio-visual devises will also be used in order to generate data. The contact sessions and meetings of the study will be take place during non-teaching hours, weekends and holidays as agreed. This will only take 60 to 90 minutes. On completion, all the recordings will later be transcribed into text and Critical discourse analysis (CDA) will be used as point of departure to sort and sift the data.

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you may do so at any stage and no consequence would be experienced due to your withdrawal. No payment should be expected and no physical or psychological wellbeing will be affected. I promise to treat all the information gathered and used in this study with strictest confidentiality and locked in a strong room where the electronic devices with code will be used for protection. I will be the only person who have access to recordings and transcribed and it will made available to you on request.

You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

CONSENT LETTER TO SOCIAL DEVELOPMENT

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

Title: 'A strategy to improve Professional Curriculum Practice in a Grade R mathematics class'.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname)
confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

CONSENT LETTER TO SADTU

3 Faunapark Korhaan Street
Bloemfontein
9301
30 August 2016

To: _____

Dear Sir/Madam

RESEARCH INFORMATION SHEET

My name is Seipati Lydia Baloyi-Mothibeli, and I am an M ED student at the University of the Free State Main Campus in Bloemfontein. I am currently studying towards a Master's Degree in Education (M. Ed) with University of the Free State. I have secured permission from Free State Department of Education to conduct research.

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You may contact me for any question you might have regarding this research.

Sincerely

Name: Seipati Baloyi-Mothibeli

Cell number: 084 500 1269

Email: S.Baloyimothibeli@fseducation.gov.za

You are therefore requested to complete the informed consent form below and submit it to the researcher.

I(participant's name and surname) confirmed that the person asking consent to take part in this research has told me about the nature and procedure, and potential benefits in this study.

I read and understood the study as explained to me and aware that the findings will be anonymously processed into report. I also agree to all mentioned methods and instruments used to generate data.

Name of Participant:

Signature of Participant: Date:

Name of Researcher:

Signature of Researcher: Date:

FORUM MEETINGS

Forum Meeting 1

Greetings and welcome by one of school management team members of the school. I introduced myself as it was my first meeting with the team and I indicated my visit to the school as it was clearly indicated in the invitation.

One of the members of the team who was also a fellow M Ed student, gave a concise description of the approach that the team will follow throughout the preceding forum meeting.

Below is the presentation of Participatory Action Research as an approach used in the study.



What is Participatory Action Research (PAR)

- PAR is an approach from the social sciences which views participants as human beings not objects.
- It pays careful attention to power relationship and advocating that power be shared between the co-researchers.
- It aims to achieve empowerment of those involved and strive for equity.
- In PAR the researcher works collaboratively with the co-researchers in order to solve the problem in question.
- Networking with others is a skill that can be acquired and refined through your involvement with PAR.
- PAR provides the opportunity to meet and learn from individuals who have lived through experiences with similar issues to your own.

What is PAR

- It is as a social process followed in setting such as that of the community.
- PAR is done with mutual respect for individual needs, difference and relationship with one another as equal members.
- Gathering information and seeking to improve current issues within a community leads to a greater understanding and knowledge of that community.

Benefits of PAR

- Through PAR, people gain support from others facing similar issues and challenges.
- Empowerment and skills acquired lead to growth and development as a person.
- Voicing out your concern which makes the voice to be heard
- Emancipated oppressed and marginalised communities.

Principles of PAR

- Everybody is equal
- Promotes collaborative work
- Engages the community
- It is based on relationship
- Multi-methods are used
- It advocates mutual respect
- It is democratic in nature
- It occurs where the problem exists
- It requires knowledge production

The cyclical and spiral process of PAR

- The process is cyclical, it is not always possible to know the end from the start as each cycle is partly determined by the previous one.
- Stages overlaps and may also return to an earlier stage most importantly there is no time allocated for each stage.

Conclusion

- The process is cyclical, it is not always possible to know the end from the start as each cycle is partly determined by the previous one.
- Stages overlaps and may also return to an earlier stage most importantly there is no time allocated for each stage.
- This means the team may deal with the problem in question at a certain stage until they are satisfied,
- The success of PAR depends on collaborative participation amongst all it involves co-researchers, originality of facts, education and collaborative action.
- The collaboration of individuals with diverse knowledge, skills and expertise fosters the sharing of knowledge development.

Forum Meeting 2

During the second forum meeting we looked at the need for the study.

The need for the study

Momoza: I want to understand how to engage with learners in a Grade R class as I have only a minimum required qualification. I really want more understanding on how to integrate all Grade R subjects and plan appropriately in this space.

Tshidi: (with disappointment): You are better off, with the little knowledge I have gained, my understanding of teaching in this field is very limited and I struggled to plan appropriately for these children.

Wandisa: I agree with you ladies, the qualification we have obtained does not guarantee any promotional prospects particularly, office-based position.

Lwazi: Surprisingly, we are expected to engage with PCP in a Grade R mathematics class, but there are no teaching resources. Teaching and learning does not only depend on enough teaching and learning resources, but it includes, age-appropriate outdoor equipment, well-structured facilities as well as good infrastructure to meet diverse needs of children. I am not happy to teach mathematics, as it is a practical subject which requires manipulates class. This compromise teaching and learning in this class.

Sbu: I have noticed that, the department is ever over resourcing schools that have enough teaching and learning resources and neglect those that are under-resourced. I even took some photos of one of the local schools in our area, this is not fair.

Kay: (holding some papers in her hand) to be honest you have raised a point, the engagement of PCP in a Grade R mathematics class does not only depend on enough teaching and learning resources, but conducive classroom environment, appropriate facilities as well as good infrastructure in order to meet diverse needs of children. Considering these photos I have captured in our school, there is still a lot to be done in our school community

Siwe: (chatting with another team member) There is known fact that children are not existing in a vacuum, but relate to parents, school and community at large. I believe it

is important that parents should be involved in the education of their children so as to bridge the gap between home and schools.

Lwazi: Errr..... I agree with you, but the challenge is, when we call parents for the meeting or Parents' Day, they do not turn up especially on issues related to performance of their children. They will tell you that they do not have time. They only come running with unfriendly manner, when their children have to repeat a grade and shout at you as a teacher.

Mampe: (a parent) This surprises me as I do not even know what is expected from me when I visit my child's class as I do not have an idea on how I can be involved in his education. My question is doing the schools told us their expectations or which role should we play in the education of our children? Even though I am not educated, I can still ask my neighbour's daughter who is in the secondary school to explain to me my expectation from school is I am provided with them.

Tshidi (add on what Lwazi said): It is true; it is the responsibility of the school to ensure that its parents are empowered and know exactly what is expected from them. We need to train them on their roles and responsibilities.

Momoza: (expressing their disappointed) I am really not impressed about the work that the district officials are doing, when they come to our school. They harass us without even giving us directions. When you call them at their comfort of their offices, they will tell you that they do not have transport or kilometres to travel to your school. I really need support so that I can engage with professional curriculum practice in my class.

Kay: (aggressively) this support should start from the school, if the school management team does not support the Grade R classes, what more about the people from out site. school management team should have a plan on how we can be supported on curriculum matters as Grade R teachers. The last time I saw a Subject Advisor in my schools was last year at the beginning of the year.

Lwazi: I agree with Momoza we really need the support from our education authorities. My understanding is that teacher development and provision of resources and goes with, guidance, support and monitoring, without all these, there is no teaching and learning at all.

Tshidi: (with confidence) As far as I know these people (meaning the districts officials) are responsible for monitoring, support, guidance on management and governance of the school including curriculum matters such as implementation of Curriculum and Assessment Policy Statement (CAPS) is correctly and cons. When they are at some schools, they are ever considering the mistakes instead of assisting and supporting teachers. We need motivating reports not discouraging one really, we are not adequately support.

Sbu: (Subject Advisor trying to defend) Your points a valid, you know what, as SAs we are also facing the challenge as we are allocated many schools and we also do not have more support from the Provincial Education Department (PED). We struggle to get more SAs and this is really a challenge hence the quality of teaching in Grade R is compromised.

Sbu: It is not easy to engage these learners with PCP in a Grade R mathematics class as they we have children who speak different languages. These children come from the nearby squatter camps meaning (informal settlements) and struggled to understand Setswana mathematical concept such as sikadikwe, (meaning circle and this is complicated as thatharo means the number six in tswana) and as they are diverse. It becomes a problem for me to teach this learner as the medium of instruction in our school is setsawan this become a barrier to us.

Thabo: The way I understand, the South African Language policy learners, children should be taught with their home language but the problem is multilingualism that is facing our school. Like she said, teachers do not know exactly which language to use in order to engage with learners especially in mathematics. I wish there should be a solution to this.

Dineo: Another challenge is, at home parents speak to their children with their own home language trying to inculcate the same mathematical concepts learned at the school but due to clashed of different languages, learners become confused and opted to keep quite as they do not know which language they can express themselves.

Forum meeting 3

The main components to the solutions

Kay: Yes family. Firstly, as members of the education community, we need to be taken step by step on how best we can be equipped in order to be able to engage with PCP in a Grade R class. I feel we are somehow deceived with the proper information by our leaders but with the little information we have, we can be able to use an integrated approach in planning.

Lele: I agree with Kay, that before the training takes place, induction then we can be introduced to Grade R teachers to help them to understand the teaching in this area and be able to plan appropriately. Later on, series of teacher development activities should be introduced, equipping us with knowledge and skills that will assist in making the Grade R learners are ready for formal school.

Lwazi: (Interrupting) Teach using one-size fits all approach; it is not fair for our Grade R learner. I suggest that we have workshops, which will assist us to understand how to teach and integrate all the Grade R subjects in a daily programme.

Tshidi: Mmmm.....mh (nodding their heads) I think we are left-out as I heard one of my colleagues from the neighbouring school talking about Professional Learning Communities and how it helped them to plan and implement Curriculum and Assessment Policy in Grade R especially in mathematics.

Sbu: (Thinking aloud) I have learned something that assists me to engage with PCP especially when teaching number operations and relationships as an important area in mathematics. As teachers, I know we are struggling to introduce these mathematical concepts such as counting to our Grade R learners. Firstly, we need to ensure that our teaching and learning resources range from concrete, pictorial to abstract (CPA).

Kay: (Adding to Sbu) This is a good Idea, I also use a CPA approach to teach them the same concept but using a game approach, (demonstrating) I requested my learners to play bowling in the class using self-made empty toilet paper rolls as well as putting one roll on top of the other and count them. My intention with these games was to develop their counting skills, eye-hand coordination and fine-motor skills, balancing.

Momoza: I usually prefer to sit with my learners to sit on a carpet when teaching them. They only go to the table for writing and I also use the group for that activity. This allows me to interact with them well on their eye level and also to reduce the challenge of not having enough tables and chairs for all of them to work on. During outdoor play, I encouraged my learners to use skipping ropes as well as old painted tires and scoops for the sandpit. These activities assist them in developing their gross motor skills and me also emphasizes counting while skipping and going through the tunnel tires.

Tshidi: It is a high time that as parents and teachers we should support each other and work as a teamwork like an athlete, chasing baton. We should take responsibility as parents and have a stake in the education of our children.

Thabo: We need to support and work together with the school in developing guidelines on how we can assist our children with their school work at home and beyond as part of decision makers. Remember unity is a strength.

Dineo: (intercepts) I am able to help my grandchildren with their schoolwork at home especially mathematics. I always use my indigenous knowledge by playing with them diketo and kgati, morabaraba, hopscotch and hula-hoop to inculcate and enhance their counting skill. This has improved their performance, especially in mathematics

Kuta: (E...eee) I think it is the responsibility of the district office to ensure that there are effective support and monitoring of the school governance as well as the implementation of PCP for quality education but if there is no district support team (DST) to coordinate this functions, this is really not possible for us to succeed.

Thabo: (disagreeing no...). We cannot wait for the District to establish or send a supporting structure to our school, as they are aware that is their responsibility to monitor and support the schools. In the meantime, I will suggest that we form a structure with them, which will assist us, especially in engaging with learners. This study has equipped us enough to work together and share best practices this can help us a lot.

Lwazi: Equal distribution of workload among the circuit managers and subject advisors as they are responsible for different areas at the. This will contribute to quality management, assurance as well as the quality implementation of the curriculum in schools

Dineo: I always encourage my learners to speak their home language in the mathematics class. I use design simple activities using a concrete material such as blocks, counters, beads and buttons to help them with counting, classification, sequencing and they should be able to their reason for doing those mathematical activities. This helps them to grasp basic mathematics concepts in their home language through experimentation and manipulation

Tshidi: Stories, songs and poems work brilliantly for me as I teach them songs our home language to count and build numbers and these activities help them to understand numbers and their representation at home. I involve them in sharing her story or poem and talk about his ideas in our language and this increases their vocabulary.

Momoza: I plan a lesson that includes numbers operations and relationships to engage my learners in a variety of mathematical games inside and outside the classroom and I always use their mother tongue to give them instructions. We also walk around the school to identify different geometrical shapes and observe shapes and basic colours on them

Forum Meeting 4

In this forum, the discussions was around the environment conducive to the success of a proposed strategy.

Lwazi: We are aware of the stipulations of the policy concerning ECD qualifications. I think we must start to be innovative and establish an integrated plan which was suggested earlier on. This integrated plan will assist us with guidance on how we can empower ourselves for the benefit of our learners.

Lele: All these suggestions will be realised only if we can establish the fictional PLC with neighbouring schools. We should also request the help from experts in the department of education, as they understand the procedure for establishing such structures.

Dineo: I think we have apparatuses such as self-made teaching and learning resources as well as indigenous games. Now it is up to us engage our learners with PCP, the only way is to learn how do engage ourselves in these tools and make our hands dirty for the benefit of our children

Momoza: If we can always use back to a basic approach where stories and poems were used as resources to teach and engage learners in the variety of mathematical activities inside and outside the classroom this can guide us in a good direction.

Tshidi. I only need cooperation and collaboration from all of us to make this variety of suggestions work for our learners, otherwise, all this will be a foetal exercise.

Thabo: I think if Tshidi can share the strategy on how she used indigenous games to assist teach her grandchildren to learn some of the mathematical concepts with you. This will enable us to work together with the school in the education of our children.

Dineo: You should also bear in mind that the school is also using parents as their stepping stone to gain the fame. They want to appear at the top of the ladder of the education department.

Wandisa: We should fully support the school and engage in the activities that are planned so that our children can succeed with their school work.

Forum meeting 5

Environment conducive towards support from the authorities was discussed

Lwazi: If the district team can hold regular meetings, give effective support through monitoring and conduct workshops on governance and curriculum implementation, we will be able to engage in PCP.

Kuta: I think that if we can ensure that we have a proposed structure in place where we learn from one another as district officials and the school, this approach will assist us a lot.

Thabo: One other thing is that if the districts can ensure that all district officials that are working with schools are allocated the schools equal, the support will also be even and we will be functional.

Momoza: If we can always encourage our learners to speak their home language they will be able to know the CPA approach and language as a barrier will be curbed.

Dineo: our learners will be able to learn and understand mathematical concepts if they learn in their first language. I always give them activities that promote and encouraged them to use their mother tongue.

Tshidi: Even though English gives advantages to our children, I still maintain that if they can learn mathematical concepts in English they will be able to increase their performance when they are in high grades.

Forum meeting 6

During this, meeting, the threats that may hinder successful implementation of a strategy as well as evidence that the strategy worked was discussed. Lastly the team reflected on all the discussions that took place.

The threats that may hinder successful implementation of the strategy

Wandisa: We should understand that as long as we still have teachers who are not qualified in the system, the education of our children is really in trouble. We should also remember that we should have a minimum requirement to teach in Grade R.

Momoza: I agree with you we have to obtain the requirement. This is why in most cases our learners are hitting the rock when coming to mathematics in higher grades.

Tshidi: This is not a threat to our learners only but to our society, we need to be quick to decide what can be done in the meantime.

Siwe: Our fear is that with the limited resources that we have at our disposal, we do not know how we use them economically as we are even not sure whether they will be supplemented by our leaders.

Sbu: I think stories work effectively in teaching mathematical concepts, the challenge is our young children learn better if they see and touch teaching and learning resources. How are they going to be able to do that as they are not enough for the whole class?

Mampe: Really the education department does not have cooperation, they forget that this learner belongs to the society and they need to be properly educated.

Mampe: In most cases teachers are instructing us when they want things to be done at the school, they fail to engage us as. They treat us as if we are not part of them.

Sbu: What is very sad is that the school wants us to assist and be involved in the education of our children but they do not train us as parents. They do not give us

new information on the new trends of curriculum matters, really there is no transparency in the school as such.

Lele: In most cases the school is not communicating with us constantly they want things to be done with immediate effect without being negotiating with us as parent. So how can we support them?

Sbu: This people, they do not involve us when they develop their training schedules and their monitoring sites visits

Siwe: The problem is that they always convene meeting which they do not even pitch up the next thing they will tell us about the other engagement they had to attend to, it makes us to lose interest.

Mampe: Our Subject Advisor is ever cancelling her visit to our school, from there she will take a decade to come and monitor our performance. They really lack interpersonal skills to deal with people.

Thabo: At times I ask myself whether my child will ever be able to express herself in her home language as she mixes different languages when she tries to explain some activities in mathematics.

Dineo: I also fail to understand why the school is using difficult words for us to understand when they write to. This means it is worse when they are teaching our learners in class, they must keep instructions simple.

Lele: Even sometimes when I am attending the meeting I always keep quit because the level of language usage is too high for me to understand and make some contributions.

At the end of this session the co-researchers summarised evidence that the strategy worked and we also reflect on all the discussion that took place, in order to close gaps and leave no one behind.

END AUDIO OF THE FORUM MEETINGS

APPENDIX Q

PHOTOS OF THE PARTICIPATORY ACTION RESEARCH PARTICIPANTS



Forum meeting during participatory action research



Transect movement during participatory action research



Photovoice during participatory action research

APPENDIX R

ATTENDANCE REGISTER

ATTENDANCE REGISTER
MEETING WITH CO-RESEARCHERS

VENUE.....

TIME.....

DATE.....

NAME	PSEUDONYM	CONTACT NUMBER	EMAIL IF AVAILABLE	SIGNATURE
1.				
2.				
3.				
4.				
5.				
6.				
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