



**Experiences with Project-Based Learning in the Foundation
Phase at a South African School: A Descriptive Case Study**

by

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202078809

**Dissertation submitted in fulfilment of the requirements for
the degree**

Master of Education in Early Childhood Education

Supervisor: Dr AS du Plessis

Submission Date: 28 January 2025

Acknowledgements

Writing this section of my dissertation is a very emotional and grateful moment for me. The journey is one of great personal growth, learning, and perseverance, made possible through the support of many individuals.

First, I thank my daughters for their love, patience, and inspiration during long hours of work and study. You are my motivation to strive for excellence.

Mom and Dad, your sacrifices, hard work, and belief in me have been the foundation of my success. Thank you for instilling resilience and determination in me. To my family, your prayers, encouragement, and unconditional love sustained me through tough times.

Dr AS du Plessis, my supervisor, your guidance, wisdom, and trust in my vision have been invaluable. You believed in me even when I doubted myself, and for that, I am deeply grateful.

To the eight incredible teachers who participated in my research, I would like to say thank you so much for giving me the chance to share your experiences and for being dedicated to building young minds. You have made this study possible, and the contributions you made will forever be close to my heart.

I would like to thank my Creator for giving me the strength, courage, and wisdom to embark on this journey. Your presence has been an anchor for me in times of challenges and triumph. This dissertation is lastly dedicated to every teacher and scholar still braving through the maze that education has turned out to be, with hope, determination, and faith in the power of learning to make a difference. This work is for you.

Adelaide Nkosi

Declaration

I, Adelaide Sindiswa Nkosi, declare that:

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List of abbreviations

Abbreviation	Meaning
4Cs	Critical thinking, Collaboration, Communication, and Creativity
4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
ATP	Annual Teaching Plan
CAPS	Curriculum and Assessment Policy Statement
CFIR	Consolidated Framework for Implementation Research
DBE	Department of Basic Education
FP	Foundation Phase
ICT	Information and Communication Technology
IS	Implementation Science
NIRN	National Implementation Research Network
PBL	Project-Based Learning
SA	South Africa

Table of contents

Acknowledgements	iii
Declaration	iv
List of abbreviations	v
List of figures	xii
List of tables	xii
Abstract	xiii
Chapter 1 Introduction and orientation	1
1.1 Introduction	1
1.2 Background	1
1.3 Problem statement	2
1.4 Purpose statement	3
1.4.1 Aim	3
1.4.2 Objectives	3
1.5 Research questions	3
1.5.1 Primary research question	3
1.5.2 Secondary research questions	4
1.6 Rationale of this study	4
1.7 Research assumptions	5
1.8 Definition of key terms	7
1.8.1 Experiences	7
1.8.2 Project-Based Learning	7
1.8.3 Foundation Phase	7
1.8.4 Descriptive case study	7
1.9 Literature review	8
1.10 Theoretical framework	8

1.10.1	Proponent.....	9
1.10.2	Basic tenets.....	9
1.10.3	How Implementation Science strengthens this study	9
1.10.4	Significance to this study	9
1.11	Overview of the research methodology.....	10
1.11.1	Research design	10
1.11.2	Research approach	10
1.11.3	Research paradigm	11
1.11.4	Research methods	11
1.12	Research site	11
1.13	Participants and sampling.....	12
1.14	Layout and focus on the chapters	12
1.15	Summary	13
Chapter 2 Literature review and theoretical framework		14
2.1	Introduction	14
2.2	Conceptualising Project-Based Learning	14
2.3	Factors influencing the implementation of Project-Based Learning.....	16
2.3.1	Organisational culture.....	17
2.3.2	Leadership support.....	17
2.3.3	Resource availability.....	17
2.3.4	Roles of stakeholders	17
2.4	Challenges teachers face when implementing Project-Based Learning.....	18
2.4.1	Developing cooperation skills in learners.....	19
2.4.2	Time constraints	19
2.4.3	Adapting to new roles	20
2.4.4	Redefining assessment	20

2.4.5	Lack of professional development	20
2.4.6	Learner challenges with Project-Based Learning	21
2.5	Constructivism and the role of teachers in Project-Based Learning	22
2.5.1	Constructivism as a complementary pedagogical base	22
2.5.2	Teachers' sense-making of constructivist-driven learning	23
2.6	Foundation Phase teachers' attitudes and perceptions.....	23
2.7	Project-Based Learning in the South African context	25
2.7.1	Curriculum and policy framework	25
2.7.2	Socio-Economic disparities and resource availability	25
2.7.3	Cultural and linguistic diversity	26
2.7.4	Technology integration	26
2.7.5	Professional development and teacher support.....	26
2.7.6	Learner outcomes and Higher Education	26
2.7.7	Benefits of Project-Based Learning in South Africa	27
2.8	Theoretical framework.....	27
2.8.1	Origins and key concepts	27
2.8.2	Relevance to this study.....	28
2.8.3	Complementarity with the constructivist paradigm.....	29
2.9	Summary.....	29
Chapter 3: Research methodology.....		30
3.1	Introduction	30
3.2	Research design	30
3.2.1	Advantages of descriptive case study	31
3.2.2	Limitations of a descriptive case study	31
3.3	Research approach.....	31
3.4	Research paradigm.....	32

3.4.1	Constructivist research paradigm	32
3.4.2	Advantages of the Constructivist Paradigm	33
3.4.3	Rationale for choosing a constructivist paradigm	33
3.5	Methodology.....	34
3.5.1	Site and participants	34
3.5.2	Sampling technique	34
3.5.3	Inclusion criteria.....	35
3.5.4	Data collection methods	35
3.5.5	Data analysis	36
3.6	Trustworthiness.....	38
3.6.1	Credibility.....	38
3.6.2	Triangulation.....	39
3.6.3	Transferability	39
3.6.4	Dependability.....	40
3.6.5	Confirmability.....	40
3.7	Ethics	40
3.7.1	Obtaining permission for the research.....	40
3.7.2	Informed assent (minors) and consent (adults)	41
3.7.3	Anonymity and confidentiality	41
3.7.4	Right to withdraw without penalty	41
3.7.5	Respect and consideration	42
3.7.6	Different roles	42
3.7.7	Social value	42
3.7.8	Methodological limitations.....	42
3.8	Summary.....	43
Chapter 4: Findings and discussions.....		43

4.1	Introduction	43
4.2	Restating the purpose statement	43
4.3	Foundation Phase grades and their project-related sub-projects	46
4.4	Thematic analysis	47
4.5	Themes and sub-themes	48
4.5.1	Knowledge and understanding of Project-Based Learning	49
4.5.2	Implementation of Project-Based Learning	51
4.5.3	Challenges of Project-Based Learning	55
4.5.4	Curriculum integration.....	60
4.5.5	Skills development.....	63
4.5.6	Teacher reflections and growth	67
4.6	Overview of key findings	71
4.6.1	Key patterns and insights	71
4.6.2	Links to the research questions	72
4.7	Summary.....	74
Chapter 5: Conclusion, recommendations, and summary.....		75
5.1	Introduction	75
5.2	Summary of key findings	75
5.2.1	Teachers' attitudes and perceptions towards Project-Based Learning .	76
5.2.2	Systematic challenges enacting Project-Based Learning	76
5.2.3	Evidence of learner growth and engagement	77
5.2.4	Feedback loops and reflective practice.....	77
5.2.5	Collaborative culture and professional learning	78
5.3	Theoretical contributions	78
5.4	Recommendations	80
5.4.1	Teacher professional development on how to implement PBL	80

5.4.2	Collaborative planning frameworks and resource allocation in schools	81
5.4.3	Leadership support essential for an innovative culture	82
5.5	Limitations of this study	83
5.5.1	Researcher bias	83
5.5.2	Other contextual limitations	84
5.5.3	Resource limitations	84
5.6	Future research	84
5.7	Conclusion	85
6	List of references	87
7	Appendices	100
7.1	Appendix A: Ethical clearance letter	100
7.2	Appendix B: Interview questions	101
7.3	Appendix C: Final interviews with teachers	101
7.4	Appendix D: Questionnaires	103
7.5	Appendix E: Observation form	105
7.6	Appendix F: Teachers' consent forms	109
7.7	Appendix G: Learner assent forms	111
7.8	Appendix H: Editor's certificate	112
7.9	Appendix I: Turnitin report	114

List of figures

Figure 1 Key constructs of Implementation Science.	28
Figure 2 Braun and Clarke's 6 steps of data analysis	36

List of tables

Table 1 Research questions, objectives, data sources, and analytical lens	45
Table 2 Teaching experience, PBL familiarity, and project involvement.....	46
Table 3 Themes and subthemes	48

Abstract

This study investigates the implementation of Project-Based Learning (PBL) in Grades 1–3 in the Foundation Phase at a well-resourced private school in the Mpumalanga Province, South Africa. Implementing PBL commenced in 2022 and aimed to enhance learner engagement and develop 21st-century skills. Using a qualitative descriptive case study design, the study explored the lived experiences of eight Foundation Phase teachers. Data were collected using semi-structured interviews, classroom observations, and document analysis during Terms 2–4 in 2024. Findings reveal that teachers' understanding of PBL increased over time. Also, their roles shifted from being content deliverers to facilitators. This transformation positively influenced learner engagement, greater learner autonomy, and 21st-century skills acquisition. However, challenges such as time constraints and limited availability of some task-specific resources emerged. The study highlights the need for ongoing professional development, administrative support, and collaborative planning to sustain PBL. By situating PBL within the South African educational context, the research demonstrates its potential to address curriculum rigidity and enriching learning through real-world, interdisciplinary tasks. Recommendations include structured teacher development, timely planning to ensure task-specific resource availability, and cultivating a collaborative school culture to ensure the sharing of best practices. By providing valuable insights for teachers, school leaders, and policymakers who aim to implement learner-centred pedagogies, this study adds to the expanding body of research on PBL within early childhood education in a South African context.

Keywords

Project-Based Learning, Foundation Phase, learner engagement, teacher roles, curriculum integration, implementation challenges, 21st-century skills.

Chapter 1 Introduction and orientation

1.1 Introduction

Project-Based Learning (PBL) is a dynamic instructional approach that redefines teaching and learning by placing learners at the centre of their educational experience. Unlike traditional teacher-led methods, PBL engages learners in exploring real-world problems and questions, fostering active knowledge construction through inquiry and problem-solving (Kokotsaki, Menzies & Wiggins, 2016). As a learner-centred pedagogy, PBL empowers learners to take ownership of their learning by promoting deeper engagement and understanding (Condliffe, 2017). Central to its design is the cultivation of 21st-century skills—critical thinking, collaboration, communication and creativity—collectively known as the 4Cs. These skills are essential for preparing learners for their personal and professional lives in an increasingly complex, technology-driven world (Kivunja, 2015; Ma & Zhang, 2023).

With a long history in the educational landscape internationally, many schools globally have introduced PBL across different phases, recognising its benefits as a learner-centred pedagogy (Kokotsaki, Menzies & Wiggins, 2016). Given its global adoption and proven benefits, this study investigates one such initiative in South Africa, focusing on how Foundation Phase teachers experienced the implementation of this innovative pedagogy in practice.

1.2 Background

School A, a well-resourced private institution in Mpumalanga, South Africa, started to implement PBL in 2022. The main purpose was to enhance learner engagement and foster 21st-century skills among its Foundation Phase learners (Grades 1–3). This decision was motivated by the need to equip young learners with critical thinking, collaboration, communication, and creativity—skills deemed essential for navigating the demands of the Fourth Industrial Revolution (4IR) (Asman, Barliana & Kumaro, 2022; Kivunja, 2015). Recognising PBL's potential to shift from traditional, teacher-led instruction to a learner-centred approach, School A introduced this pedagogy through a one-day professional development workshop. This was followed by weekly planning and reflective sessions, with the aim of integrating real-world problem-solving into the

curriculum through an overarching project entitled “What’s Worth Fighting For?” Following this approach, Grades 1–3 each developed their own sub-project theme (Condcliffe, 2017).

This effort reflects broader national needs as it unfolded against South Africa’s educational landscape, which is marked by persistent challenges such as low learner performance and high dropout rates, particularly in under-resourced public schools (van der Berg & Wills, 2024). These issues highlight the need for innovative teaching strategies to improve outcomes and prepare learners for a technology-driven future (Dlamini & La Fleur, 2022). At School A, implementing PBL was a response to these national imperatives (Hu & Venketsamy, 2022). This study investigated how Foundation Phase teachers at School A experienced this pedagogical shift, offering insights into PBL’s role in the Foundation Phase within a South African private school context.

1.3 Problem statement

Project-Based Learning (PBL) is increasingly valued as a learner-centred pedagogy that fosters 21st-century skills—critical thinking, collaboration, communication, and problem-solving—yet its application in the Foundation Phase (Grades 1–3) remains underexplored, particularly within the South African context (Dyosini, 2024; Hu & Venketsamy, 2022). While research highlights PBL’s benefits in secondary and tertiary education, a significant gap exists in understanding its implementation at the Foundation Phase level, where foundational skills form the building blocks for lifelong learning (Asman, Barliana & Kumaro, 2022). This lack of insight is particularly pronounced in South Africa, where challenges such as low learner performance and curriculum rigidity justify the need for innovative approaches, yet teachers’ experiences with PBL at this level remain poorly documented (van der Berg & Wills, 2024).

This knowledge gap is evident at School A, where PBL was introduced in 2022 at the Foundation Phase level. Following a single-day professional development workshop, teachers faced challenges transitioning from traditional, teacher-directed methods to facilitative roles, struggling to align PBL with the rigid Annual Teaching Plan (ATP), assess open-ended project-related tasks, and support learner-driven inquiry (Nxasana

et al., 2023). These barriers, compounded by limited ongoing professional support, highlight both practical and systemic challenges to the implementation of PBL. Without addressing these issues, opportunities to foster critical foundational skills may be missed. This study addresses this gap by investigating the lived experiences of Foundation Phase teachers with PBL at School A, aiming to illuminate the factors that shape its adoption and inform strategies for its successful integration in a South African private school setting.

1.4 Purpose statement

This section presents the study's aim, objectives, and research questions, which are formulated to address the identified gap in the problem statement.

1.4.1 Aim

This study aims to investigate the lived experiences of Foundation Phase teachers while implementing PBL in Grades 1–3 at School A.

1.4.2 Objectives

The objectives of this study are listed below.

- 1) Explore how Foundation Phase teachers at School A conceptualise and perceive PBL in their teaching practice.
- 2) Examine how these teachers plan, design, and implement project-related tasks in the classroom.
- 3) Identify the institutional, pedagogical, and contextual factors that influence the implementation of PBL in the Foundation Phase at School A.
- 4) Describe pedagogical shifts among teachers as they facilitate the “What’s Worth Fighting For?” project.

1.5 Research questions

1.5.1 Primary research question

What are the lived experiences of Grades 1–3 Foundation Phase teachers while implementing PBL at School A?

1.5.2 Secondary research questions

- 1) How do Foundation Phase teachers at School A conceptualise, and perceive PBL in their teaching practice?
- 2) How do Foundation Phase teachers at School A plan, design, and implement project-related tasks?
- 3) What institutional, pedagogical, and contextual factors influence the implementation of PBL in the Foundation Phase at School A?
- 4) What pedagogical shifts become evident among teachers at School A as they facilitate the “What’s Worth Fighting For?” project?

1.6 Rationale of this study

This study is driven by the need to understand how Foundation Phase teachers at School A experience the implementation of PBL, a pedagogy recognised for its transformative potential in Foundation Phase education. According to Maree (2020), a rationale should address four guiding questions: What is the problem? Why is it important? How will the study address it? What will it contribute? These questions frame the justification for this research.

The central problem motivating this research is the limited knowledge about PBL’s application in the Foundation Phase within South African schools, despite its established benefits at other levels (Dyosini, 2024). Project-Based Learning fosters learner engagement and enhances critical thinking, collaboration, communication, and creativity (the 4Cs); it also promotes self-directed learning—outcomes required for preparing learners for 21st-century challenges (Condliffe, 2017; Ma & Zhang, 2023). At School A, PBL’s potential is constrained by a rigid national curriculum and the need for teachers to adopt facilitative roles, highlighting a gap in understanding their first-hand experiences (Nxasana et al., 2023).

This study is significant because Foundation Phase education lays the groundwork for lifelong learning. Attempts at addressing South Africa’s educational challenges—low learner performance and high dropout rates—demand an understanding of innovative approaches like PBL (Nxasana et al., 2024; van der Berg & Wills, 2024). If PBL does indeed increase motivation and skills development among young learners, it is essential to understand how to implement it effectively in practice. Investigating

teachers' experiences is especially beneficial for understanding the success factors that would realise PBL's potential benefits (Asman, Barliana & Kumaro, 2022). By focusing on the Foundation Phase, this study addresses a foundational stage where interventions could yield long-term improvements in learners' educational trajectories. The significance also extends to educational reform: insights into PBL at this level could inform strategies to address persistent problems in South African schooling through more engaging, skills-focused pedagogy.

This research adopts a qualitative descriptive case study design and investigates the lived experiences of Foundation Phase teachers at School A who implemented PBL across Grades 1–3. Through methods such as interviews and observations (detailed in Chapter 3), the study examines the practical challenges and successes teachers encountered, with a focus on understanding the *how* and *why* of PBL implementation.

Lastly, the contribution of this research lies in the actionable insights it offers for both theory and practice. Practically, the findings are expected to inform teacher professional development and curriculum design by identifying strategies to enhance PBL's integration in South African Foundation Phase settings. Theoretically, it advances understanding of educational innovation through the lens of Implementation Science, supporting strategies that leverage PBL's strengths to foster meaningful early learning.

1.7 Research assumptions

This study is grounded in a constructivist paradigm, which informs its qualitative case study approach to investigating Foundation Phase teachers' experiences of PBL at School A. Research assumptions reflect the researcher's beliefs about what is knowable and how knowledge is constructed, forming the foundation for the study's methodology (Creswell & Creswell, 2017). The following assumptions, informed by constructivist scholarship, guide this research.

- In line with a constructivist ontology (Creswell & Poth, 2016), reality is socially constructed. Teachers' experiences and perceptions of PBL are shaped by their social, cultural, and institutional contexts at School A, with no single objective

truth. Instead, multiple realities are recognised, emerging from their interactions within the school environment (Merriam & Tisdell, 2015).

- In keeping with qualitative research principles (Denzin & Lincoln, 2018), it is assumed that Foundation Phase teachers at School A share their experiences as truthfully and accurately as possible, within the limits of their subjective contexts.
- Interpretation is subjective, aligned with a constructivist epistemology since data analysis relies on the researcher's interpretation of teachers' accounts, resulting in findings that are specific to the School A context and not necessarily applicable to broader populations (Birks & Mills, 2014). Subjectivity reflects the co-construction of knowledge between the researcher and participants.
- Consistent with qualitative analysis methods (Braun & Clarke, 2021), teachers' experiences can be thematised, enabling the identification of meaningful patterns within the case of PBL implementation at School A. Themes emerge inductively from the data and are specific to this case; they are not intended to reflect generalisable trends.
- In accordance with educational research practices (Cohen, Manion & Morrison, 2018), this study relies on teachers' reflections and self-reported accounts of the implementation of PBL at School A. It acknowledges that these may differ from observed behaviours. Perceptions are valued as valid data, not as exact mirrors of practice.
- Based on implementation research (Fullan, 2015), contextual factors—including school policies, resource availability, and training opportunities—significantly influence the success of PBL implementation in the Foundation Phase. Context shapes the feasibility and outcomes of PBL adoption.
- Drawing on language-in-education studies (Cummins, 2017), this study assumes that language and communication shape pedagogical understanding, especially within South Africa's linguistically diverse context.

These assumptions underpin the study's investigation of teachers' lived experiences, aligning with its constructivist paradigm and a qualitative approach.

1.8 Definition of key terms

This section defines key terms from the study's title. Four terms are clarified by explaining their meaning and relevance to ground the research focus.

1.8.1 Experiences

In qualitative research, experiences refer to individuals' subjective perceptions, emotions, and interactions within a specific context, often explored through their lived realities (Creswell & Poth, 2016; Merriam & Tisdell, 2015). In this study, experiences denote the Foundation Phase teachers' personal accounts of implementing PBL at School A since 2022, capturing their challenges and successes with pedagogical shifts (Nxasana et al., 2023).

1.8.2 Project-Based Learning

Project-Based Learning (PBL) is a learner-centred pedagogy where learners engage in sustained inquiry to address real-world problems, fostering critical thinking, collaboration, communication and creativity (the 4Cs) through clearly defined outcomes (Kokotsaki, Menzies & Wiggins, 2016). In this study, PBL refers to the instructional approach adopted at School A since 2022 to enhance Foundation Phase education, through a teacher-facilitated project "What's Worth Fighting For?" (Asman, Barliana & Kumaro, 2022).

1.8.3 Foundation Phase

In South Africa, the Foundation Phase comprises Grades R–3 (ages 5–9); the focus is on foundational literacy, numeracy, and socio-emotional skills (Department of Basic Education, 2011; Hu & Venketsamy, 2022). In this study, it specifies the educational stage at School A where PBL targets foundational skills development among young learners (van der Berg & Wills, 2024).

1.8.4 Descriptive case study

A descriptive case study is a qualitative research design that provides a detailed, contextualised narrative of a phenomenon within a bounded system, emphasising rich description over broad generalisation (Merriam & Tisdell, 2015; Yin, 2018). This study employs a descriptive case study design to investigate Grade 1–3 teachers'

implementation of PBL at School A. It represents a single case, offering in-depth insights into a South African private school setting.

1.9 Literature review

Chapter 2 provides a comprehensive review; this section briefly frames the investigation of teachers' experiences at School A in terms of the literature.

Project-Based Learning is widely recognised as a learner-centred pedagogy that enhances engagement and fosters critical thinking, collaboration, communication, and creativity (the 4Cs), preparing learners for 21st-century challenges (Condliffe, 2017; Ma & Zhang, 2023). In the Foundation Phase, PBL supports foundational literacy, numeracy, and problem-solving skills, yet implementation faces challenges, including alignment with rigid curricula, limited teacher training, and shifts from teacher-led methods to learner-centred activities (Asman, Barliana & Kumaro, 2022; Ma & Zhang, 2023). South African studies highlight how the Curriculum and Assessment Policy Statement (CAPS) and inadequate professional development hinder PBL's adoption in early grades (Dyosini, 2024; Hu & Venketsamy, 2022).

Despite PBL's well-documented benefits in secondary and tertiary contexts, its application in Foundation Phase settings, particularly in South Africa, remains under-researched (van der Berg & Wills, 2024). This gap is noteworthy given the country's educational challenges. Yet, few studies explore teachers' experiences in this context (Dlamini & La Fleur, 2022; Nxasana et al., 2024). At School A, where PBL was introduced in 2022, literature suggests benefits like enhanced engagement are tempered by barriers such as assessment difficulties and curriculum constraints, thus warranting a focused investigation to inform implementation strategies (Fullan, 2015).

1.10 Theoretical framework

This study is underpinned by Implementation Science (IS), a theoretical framework that serves as a lens to examine the implementation of PBL. Implementation Science is defined as the study of processes, strategies, and contextual factors, making it directly applicable to a study that investigates the implementation of PBL at School A (Nilsen, 2015). Implementation Science is the systematic study of methods and strategies that support the integration of research-based practices and interventions

into real-world settings, such as schools. Instead of focusing on whether an intervention works, Implementation Science explores *how, why, and under what conditions* evidence-based practices can be effectively adopted, sustained, and scaled.

1.10.1 Proponent

The major contributors of this theoretical model are Fixsen, Blase, and Van Dyke (2019), although there no single author could claim ownership of this model. Other major contributors have also added to this model, however Fixsen et al. (2019) formalised its application within an educational context through the National Implementation Research Network (NIRN).

1.10.2 Basic tenets

- Implementation Science focuses on the systematic uptake, fidelity and sustainability of evidence-based practices (Fixsen, Blase & Van Dyke, 2019). Its core tenets include:
- Identifying implementation stages (exploration, installation, initial implementation, full implementation);
- Assessing drivers (e.g., training, organisational support); and
- Evaluating barriers and facilitators (e.g., policy, resources) (Ritchie et al., 2015). In educational settings, IS examines how innovations like PBL are integrated into practice (Bauer & Kirchner, 2020).

1.10.3 How Implementation Science strengthens this study

Implementation Science provides a structured approach to analyse how teachers at School A implement PBL, identifying stages (e.g., implementation post-2022), drivers (e.g., workshop training) and barriers (e.g., curriculum rigidity). It frames data collection and analysis around practical adoption processes, enhancing the study's focus on a real-world application (Durlak, Meyers & Wandersman, 2016).

1.10.4 Significance to this study

Implementation Science is significant because it directs understanding of PBL's implementation in the Foundation Phase, offering insights into why and how teachers

succeed or struggle. By linking teachers' experiences to implementation dynamics, it informs strategies for effective PBL integration at the Foundation Phase (Fullan, 2015).

1.11 Overview of the research methodology

This study employs a qualitative methodology to investigate Foundation Phase teachers' experiences with PBL at School A. Chapter 3 details the methodology; this section summarises key elements.

1.11.1 Research design

Maree (2020) states that a research design is a comprehensive plan that outlines how a researcher will conduct a study, from beginning to end. Although, Bertram and Christiansen affirm this, but differentiate design from style. For this study a descriptive case study design was used to investigate the implementation of PBL within the real-world context at School A, thus enabling an in-depth exploration of teachers' experiences Research approach. This choice enabled a detailed examination of a specific phenomenon within its natural setting, although findings are context-specific and not broadly generalisable (Merriam & Tisdell, 2015).

1.11.2 Research approach

A qualitative approach seeks to explore and interpret the meanings individuals or groups ascribe to social or human problems, focusing on depth, context, and lived experiences (Creswell & Poth, 2016; Merriam & Tisdell, 2015). It allows researchers to capture rich, descriptive data in natural settings and to understand phenomena from participants' perspectives (Braun & Clarke, 2021; Creswell & Creswell, 2017). A qualitative approach captures teachers' subjective, lived experiences, aligning with the study's aim to understand challenges and successes associated with the implementation of PBL—representing a complex phenomenon (Creswell & Poth, 2016). A qualitative approach allows for open-ended data collection (through methods such as interviews, observations, etc.) and iterative analysis, aligning with the exploratory aim of understanding experiences rather than hypothesis testing.

1.11.3 Research paradigm

A research paradigm refers to the overarching worldview or set of beliefs that guide how research is understood, designed, and conducted (Creswell & Poth, 2016; Kivunja, 2015). It reflects assumptions about reality (ontology), how knowledge is constructed (epistemology), and the methods used to investigate phenomena (Creswell & Creswell, 2017). A constructivist paradigm underpins this study, viewing knowledge as co-constructed through teachers' interactions in the contexts of School A (Birks & Mills, 2014). This paradigm requires the use of methods that seek participants' perspectives and acknowledges multiple realities since each teacher may have a different experience of PBL.

1.11.4 Research methods

Research methods are systemic techniques or ways of collecting data when conducting a study (Creswell & Creswell, 2017). These methods include the collection, analysis, and ways of interpreting data to answer the research question. For this study, data collection involves semi-structured interviews, classroom observations, and document analysis. Through thematic analysis, patterns in teachers' experiences are identifiable, such as implementation barriers and pedagogical shifts (Braun & Clarke, 2021). These methods, informed by Implementation Science, ensure triangulation for rigour, guided by Nilsen's (2015) IS framework for studying adoption processes.

This overview establishes the methodological foundation for exploring PBL implementation, grounded in Implementation Science, with further explanations in Chapter 3.

1.12 Research site

This section delineates the boundaries of the study, specifying its focus, context, and participants to clarify the research's parameters. It outlines the scope of investigating Foundation Phase teachers' experiences with PBL at School A, a private institution in Mpumalanga, South Africa, using a descriptive case study design. The study is limited to the Foundation Phase (Grades 1–3), the educational stage at School A where PBL was introduced via the "What's Worth Fighting For?" project in 2022. This focus excludes other phases (e.g., Intermediate or Senior Phases). It reflects South Africa's

emphasis on early learning as a core foundational developmental period (van der Berg & Wills, 2024).

1.13 Participants and sampling

Participants are limited to Grades 1–3 teachers at School A, selected for their direct involvement in the implementation of PBL. The implementation of PBL included eight teachers. Two non-probability techniques were used to sample the participants, namely purposive and convenience sampling to ensure relevance and easy access (Etikan, 2016). Learners are referenced indirectly through teachers' experiences, not as primary participants. Detailed sampling procedures are explained in Chapter 3.

1.14 Layout and focus on the chapters

This section provides a concise overview of the dissertation's structure, outlining each chapter's purpose and focus to guide the reader.

Chapter 1: Introduction and Orientation introduces the study, detailing the background, problem statement, purpose (aim, objectives, research questions), rationale, assumptions, theoretical framework (Implementation Science), methodology overview, brief literature review, key terms, scope, and chapter layout.

Chapter 2: Literature Review examines scholarship on PBL, focusing on its benefits, challenges and implementation in early education, emphasising the South African context. It identifies gaps and contextualises teachers' experiences at School A. Chapter 2 also includes an explanation of the theoretical framing of this study.

Chapter 3: Research Methodology describes the qualitative descriptive case study design, constructivist paradigm, data collection tools (interviews, observations, document analysis) and analysis methods, detailing how teachers' experiences at School A were investigated, adhering to ethical considerations.

Chapter 4: Findings and Discussions presents and interprets findings from School A's Foundation Phase teachers, linking their experiences to Implementation Science and constructivist principles, highlighting PBL's practical and pedagogical impacts.

Chapter 5: Concluding Remarks and Recommendations summarises key findings, offers theoretical contributions to Implementation Science, and provides practical

recommendations for educators and policymakers to enhance PBL in South African Foundation Phase education.

1.15 Summary

This chapter presented the introduction and orientation of the study. It outlined the background of implementing PBL at School A in 2022. The chapter also briefly introduced and clarified various concepts, presented a brief literature review and theoretical framework. The aims of the study was stated. In the next chapter the researcher will present the literature review and theoretical framework.

Chapter 2 Literature review and theoretical framework

2.1 Introduction

In Chapter 1 the researcher presented an introduction and an orientation to the study. The chapter highlighted the background, rationale, research questions, a brief literature, theoretical and methodology section.

This chapter will critically review relevant literature to provide a foundation for this study. The review draws on both South African and international sources to conceptualise PBL, examine its pedagogical roots, explore its application in educational contexts—particularly the Foundation Phase—and highlight the enablers and barriers to its implementation. Particular attention is focused on teachers' perceptions, challenges, and professional development needs, as these are central to the research focus. The chapter also presents the theoretical framework, Implementation Science, which guides the analysis of teacher experiences.

2.2 Conceptualising Project-Based Learning

Project-Based Learning (PBL) is widely recognised as a learner-focused, inquiry-based teaching approach that encourages active learning through the resolution of authentic, real-world problems. It facilitates the development of essential 21st-century skills, including critical thinking, problem-solving, communication and teamwork (Boss, Larmer & Mergendoller, 2017). At its core, PBL shifts the focus from teacher-led instruction to learner autonomy, with learners working on extended projects that culminate in tangible outcomes, such as presentations or products (Condliffe, 2017; Nxasana et al., 2023).

Project-Based Learning encourages deep learning by integrating academic content and real-world contexts. According to Kokotsaki et al. (2016), PBL enhances learner agency, provokes reflective thought and builds motivation by linking learning to associated challenges. Within the South African education system, Van der Merwe, Mokwena, and Ndabezitha (2024) propose that PBL enhances learner-centred education in teaching science by focusing on experiential and inquiry-based learning. Similarly, Mudiono (2024) found that PBL enables deep curriculum integration, cooperation and the development of critical thinking within Intermediate Phase

classrooms. Particularly, Kolmos (2016) argues that PBL has strong foundations in engineering education but that the introduction into school systems—specifically at foundation levels—requires balancing structure and learner autonomy.

The origins of PBL lie in progressive education theory, which gained traction in the early 20th-century through the work of Dewey. Dewey (1938) as cited by Williams (2017), advocated for experiential, hands-on learning where students construct knowledge by actively engaging with their world. Dewey's "learning by doing" ethos still informs today's PBL. For Dewey, education had to reflect real life and promote problem-solving skills, as reflected in the structure of PBL (Boss, Larmer & Mergendoller, 2017).

Another significant contribution made by one of Dewey's learners, Kilpatrick, was the project method. His priority was learner-directed projects based on important tasks requiring learners to take charge of what they were learning (Habók & Nagy, 2016). His legacy can be observed in PBL models today that focus on autonomy and real-world applications.

Project-Based Learning is grounded in constructivist and social constructivist learning theories. Piaget's cognitive development highlights that children construct knowledge through interaction with their environment, aligning with PBL's focus on active discovery (Habók & Nagy, 2016; Kokotsaki, Menzies & Wiggins, 2016). Vygotsky's sociocultural theory complements this with the concept of the Zone of Proximal Development (ZPD) theory. This theory emphasises scaffolding and collaborative learning (Duke et al., 2021). Additionally, Bruner's discovery learning and Papert's constructionism also complement PBL's emphasis on inquiry, learner independence and hands-on problem-solving (Allison, 2018).

Chen, Kolmos and Du (2021) note that while PBL is a transformative pedagogy, putting it into practice, however, can be challenging. These include ensuring that PBL integrates with national curricula, developing appropriate assessments and incorporating it into typical school systems. Du and Han (2016) observed that teachers frequently adjust PBL to fit conventional instructional models, which can diminish its learner-centred nature and hinder the development of autonomy and critical thinking skills. In South Africa, Nxasana (2023), the co-founder of Future Nation Schools,

espouses an education system that embraces PBL to better prepare learners for critical thinking skills, innovations and problem-solving skills for the Fourth Industrial Revolution.

Technological integration has also revolutionised PBL into a more modern practice that allows learners to collaborate virtually, conduct research online and present findings using multimedia, among others. Chen and Yang (2019) argue that blended learning spaces —where digital tools are blended with traditional approaches—open innumerable possibilities for PBL. South African schools that have digital facilities and visionary leadership are embracing these blended approaches (Nxasana et al., 2023).

Despite the numerous advantages of PBL there are multiple challenges. These include increased teacher workload, resource dependency and inconsistencies in the process of implementation (Boss, Larmer & Mergendoller, 2015; Du & Han, 2016). Maintaining the balance between depth and curriculum coverage remains a major problem in South African classrooms (Kotzé & Spaull, 2015). Regardless, the benefits—ranging from increased engagement and academic performance to the development of lifelong learning skills—continue to justify PBL’s relevance (Gabuardi, 2021).

Project-Based Learning has evolved from a progressive education theory into a globally transferable pedagogy that encourages deep learning through inquiry, cooperation and problem-solving in the real world. In South Africa, it offers a promising approach towards bridging the gap between the transmission of conventional content and the development of critical skills, even more so when complemented by strong teacher development and contextualisation.

2.3 Factors influencing the implementation of Project-Based Learning

The successful implementation of PBL in classrooms is influenced by a range of interrelated factors, including organisational culture, leadership support, resource availability and the roles of key stakeholders (Condliffe, 2017). Addressing these elements is critical for creating an enabling environment for PBL to thrive.

2.3.1 Organisational culture

Organisational culture plays a significant role in the adoption and implementation of innovative teaching methodologies like PBL. According to Fullan (2015), schools with a collaborative and open culture are more likely to adopt progressive educational practices. This is supported by Markham, Larmer, and Ravitz (2017), who state that a supportive organisational culture encourages risk-taking and experimentation among teachers, which is essential for PBL. According to Senge et al. (2012), schools that function as learning organisations foster continuous professional development and collective problem-solving, thus creating fertile ground for PBL.

2.3.2 Leadership support

Leadership is a cornerstone of successful PBL implementation. Hargreaves and Fullan (2015) state that effective leadership not only provides a vision for innovation but also ensures that teachers have the support they need to implement PBL effectively. According to Miller and Krajcik (2019), school leaders must allocate time for teacher collaboration, provide access to resources and create professional development opportunities tailored to PBL. Krajcik and Miller (2019) stress that leaders who actively champion PBL can help overcome resistance to change, ensuring its integration into the curriculum.

2.3.3 Resource availability

The availability of resources, both material and human, is a fundamental factor influencing the success of PBL. According to Larmer et al. (2017), teachers often require access to materials, technology and funding to design and facilitate meaningful projects and project-related tasks. However, resource constraints, including large class sizes and insufficient amounts of classroom resources and materials, can hinder the execution of project-related tasks. Haatainen and Aksela (2021), highlight that equitable resource distribution is crucial for ensuring that all learners can fully participate in PBL activities, regardless of their socio-economic background.

2.3.4 Roles of stakeholders

The roles and perspectives of stakeholders including administrators, parents and learners are critical in shaping the success of PBL implementation. School

administrators play a pivotal role by fostering an enabling environment for PBL. According to Fullan (2015), administrators are instrumental in providing the strategic support necessary for innovation, such as scheduling flexibility, resource allocation and teacher mentorship programmes. Their engagement ensures that PBL aligns with the school's broader objectives. Furthermore, parents' attitudes towards PBL significantly influence its implementation. This is confirmed by Epstein (2011), who underscores the importance of involving parents as partners in the educational process. Parental support, through volunteering, resource contributions or simply understanding the benefits of PBL, enhances its acceptance and effectiveness (Condliffe, 2017; Maluleka, 2020). Learners are central to the success of PBL, as the approach requires active engagement and participation. This is confirmed by Kaldi, Filippatou and Govaris (2011), who note that learners' willingness to embrace the autonomy and responsibility inherent in PBL significantly impacts its outcomes. Encouraging learners to take ownership of their projects fosters a deeper connection to the learning process, enhancing both engagement and achievement. (Miller & Krajcik, 2019)

The section concludes by emphasising that for PBL to be implemented successfully, attention must be given to the interplay of organisational culture, leadership support, resource availability, and the roles of administrators, parents, learners, and teachers. A holistic approach, informed by Implementation Science, ensures that all stakeholders contribute meaningfully to the process, ultimately enhancing the effectiveness and sustainability of PBL in educational settings.

2.4 Challenges teachers face when implementing Project-Based Learning

Project-Based Learning presents numerous challenges for teachers and learners at the classroom level, requiring both groups to adapt to new roles, methods and expectations. Addressing these challenges is crucial for the successful implementation of PBL in diverse educational contexts.

2.4.1 Developing cooperation skills in learners

The transition from individual work to collaborative group projects is a significant hurdle for learners. Nguyen-Hoang and Yeung (2016) explored the difficulties teachers faced in fostering cooperation skills among learners who were accustomed to working individually. Learners struggled with adapting to group settings, which required skills like coordinating efforts, sharing responsibilities and effective communication. This challenge was highlighted by Harris (2014), who identified teamwork as a slight yet critical setback in PBL environments.

To address this, teachers must design thoughtful activities that emphasise the collaboration of learners grouped into teams. Cooperative learning techniques, such as group discussions, peer feedback sessions and joint problem-solving exercises, have been shown to improve learners' collaboration skills (Chakyarkandiyil & Prakasha, 2023). Furthermore, providing detailed guidelines and clear expectations for group work fosters a structured environment conducive to effective teamwork. Cultural factors, personal preferences and classroom dynamics also influence the development of cooperation skills, highlighting the need for tailored strategies that account for these variables (Järvelä & Renninger, 2014).

2.4.2 Time constraints

Balancing the demands of PBL with the rigid time constraints of a prescribed curriculum remains a significant challenge for teachers. Harris (2014) noted that time limitations often forced teachers to compromise by shortening PBL projects or reducing learner investigation and reflection opportunities. This challenge is exacerbated by the pressures of standardised testing, inflexible schedules and restricted teaching hours (Ismuwardani, Nuryatin & Doyin, 2019).

According to Dori and Mioduser (2016), a proposed solution includes flexible scheduling, such as block timetabling or dedicated project periods, which allow extended time for in-depth inquiry. Linking PBL projects directly to academic goals and curriculum objectives ensures that PBL becomes an integral part of the learning process rather than an isolated addition (Russo, Teo & Wong, 2013). Moreover, integrating technology and digital tools enables learners to engage in PBL activities beyond the constraints of physical classrooms, facilitating asynchronous collaboration

and self-paced learning (Russo, Teo & Wong, 2013). Moreover, Hoesny et al. (2016) highlight that integrating technology and digital tools enables learners to engage in PBL activities beyond the constraints of physical classrooms, facilitating asynchronous collaboration and self-paced learning.

2.4.3 Adapting to new roles

Project-Based Learning necessitates a shift in the teacher's role from an authoritative instructor to a facilitator, who guides learners through inquiry processes and problem-solving. The challenges teachers face when adopting a hands-off approach, which requires them to create environments where learners take responsibility for their own learning. This transition is particularly difficult for teachers who are accustomed to directive teaching methods, as they may struggle to relinquish control in favour of learner-led inquiry (Ravi et al., 2025).

Professional development is essential to equip teachers with the skills needed for this new role. This is confirmed by Farrow et al. (2022), who emphasise the importance of targeted training to prepare teachers for the nuances of PBL, including how to foster active engagement and critical thinking. Teachers must also adapt their instructional practices to accommodate diverse learning styles, interests and abilities, ensuring that all learners feel supported in their educational journey (Järvelä & Renninger, 2014).

2.4.4 Redefining assessment

Traditional assessment methods are often inadequate for evaluating learning in a PBL environment. In particular, DeBarger et al. (2015) state that PBL demands authentic, learner-centred assessment approaches that capture the depth and breadth of learners' achievements. According to Krajcik and Shin (2019), effective assessment in PBL must align with its learner-driven nature by incorporating interactive and reflective elements such as project portfolios, peer evaluations and presentations. Redefining assessment practices is an integral part of the broader transformation required to implement PBL successfully.

2.4.5 Lack of professional development

The lack of adequate training and support for teachers is a recurring barrier to PBL implementation (Condliffe, 2017). Many teachers are unfamiliar with the strategies

needed to adapt PBL to their specific teaching contexts. In this regard, Farrow, Kavanagh and Samudra (2022) argue that professional preparation plays a crucial role in improving teaching practices, yet many teachers lack access to specialised training on PBL methodologies. This gap often leads to misconceptions about PBL as a standardised system, ignoring the flexibility required to align it with diverse learner profiles and disciplines (Marwan, 2015).

Many teachers therefore, find it difficult to adjust their strategies in accordance with PBL's principles in their specific teaching contexts. Farrow, Kavanagh, and Samudra (2022) state that professional preparation plays a pivotal role in improving teaching practices, yet many teachers lack access to specialised training on PBL methodologies. This gap often leads to misconceptions about PBL as a standardised system, ignoring the flexibility required to align it with diverse learner profiles and disciplines (Condliffe, 2017).

To address this, policymakers and administrators must provide funding for professional development programmes that promote project-based teaching practices. Workshops, seminars and collaborative training sessions can equip teachers with the competencies needed to implement PBL effectively. Additionally, ongoing support and mentorship from experienced practitioners can help teachers navigate the challenges of adopting PBL.

2.4.6 Learner challenges with Project-Based Learning

While the focus has largely been on the challenges faced by teachers, learners also encounter significant difficulties when transitioning to PBL. According to McCarthy et al. (2019) learner challenges include difficulties with self-directed learning, managing group dynamics and adapting to new assessment methods. Learners may struggle with autonomy and responsibility, particularly if they are accustomed to more structured, teacher-led environments. DeBarger et al. (2015) highlight the importance of fostering learner motivation, interest and engagement to mitigate these challenges.

To support learners, teachers must scaffold the PBL process by providing clear instructions, regular feedback and opportunities for reflection. Encouraging learners to

set goals, monitor their progress and evaluate their work promotes self-regulation and accountability (Van Alten et al., 2021).

The successful implementation of PBL requires addressing the multifaceted challenges faced by both teachers and learners. By fostering cooperation skills, managing time constraints, redefining assessment practices and providing professional development, teachers can create an environment conducive to PBL. Additionally, recognising and addressing learner challenges ensures that PBL remains an inclusive and effective pedagogical approach. Policymakers, administrators and other stakeholders must also play an active role in supporting PBL through systemic changes and resource allocation.

2.5 Constructivism and the role of teachers in Project-Based Learning

Project-Based Learning (PBL) is widely recognised as a learner-centred pedagogy that draws deeply on constructivist theories of learning. Constructivism, as a theory of how learners acquire knowledge, is highlighted by Woolfolk Hoy et al. (2013) and Yoshikawa et al. (2013), who posited that individuals actively construct meaning through interaction with their environment, prior knowledge, and social experiences. Within this framework, the teacher's role shifts from being a transmitter of information to a facilitator of learning, guiding learners through inquiry, problem-solving, and reflection.

These principles are operationalised by PBL by engaging learners in extended, real-world projects that demand critical thinking, collaboration, and self-directed learning. Essentially, PBL is a practical instantiation of constructivist principles in classroom practice. It fosters the development of higher-order thinking skills by encouraging learners to engage with authentic problems, set learning goals, make decisions, and reflect on their progress (Kokotsaki, Menzies & Wiggins, 2016; Miller & Krajcik, 2019).

2.5.1 Constructivism as a complementary pedagogical base

The shared emphasis on active learning, collaboration, and learner agency emphasises the synergy between PBL and constructivism. Constructivist learning environments, as embodied by PBL, prioritise exploration, social interaction, and

contextualised meaning-making. Similarly, PBL involves tasks that are inquiry-driven and student-led, supported by teacher-designed scaffolding structures that mirror real-world challenges (Kokotsaki, Menzies & Wiggins, 2016).

When adopting PBL as an approach to teaching and learning, teachers are not passive observers but active co-designers of learners' learning experiences. They are required to plan collaborative problem-solving activities, facilitate ongoing dialogue, provide formative feedback, and ensure that projects remain connected to curricular outcomes. These responsibilities align with the constructivist belief that learning is most effective when it is meaningful, relevant, and socially situated (Bippert & Espinosa, 2019).

2.5.2 Teachers' sense-making of constructivist-driven learning

Helenrose and Gill (2015) and Habók and Nagy (2016) suggest that teachers' beliefs, perceptions, and pedagogical reasoning significantly influence how PBL is implemented in practice. Teachers' own understanding of constructivist principles shapes how they design tasks, manage classroom dynamics, and balance learner autonomy with curriculum demands (Madoyan, 2016; Sahli, 2017).

For example, in the Foundation Phase, where learners are still acquiring basic literacy and numeracy skills; this sense-making process is particularly important. Hoadley (2017) and Spaul (2015) state that teachers must navigate a dual responsibility: facilitating inquiry-based learning while ensuring that core foundational skills, as prescribed by Curriculum and Assessment Policy Statement (CAPS), are not compromised. Their interpretations of PBL and constructivism directly affect their capacity to create environments that support knowledge construction, autonomy, and critical thinking (Harmer & Stokes, 2016; Kokotsaki, Menzies & Wiggins, 2016).

2.6 Foundation Phase teachers' attitudes and perceptions

Insight into teachers' beliefs about PBL is important because, without an understanding of their attitudes and knowledge regarding PBL, this learner-centred teaching method could face difficulties when a shift in pedagogical reasoning and action is required (Condliffe, 2017; Arantes Do Amaral et al., 2023). Teachers' views about PBL are thus influential since their insights, attitudes, and beliefs will influence

how they implement the principles of PBL, navigate classroom dynamics, and whether the benefits of PBL will be realised fully (Bush, 2021).

Along with other researchers, Narayan (2013) noted that teacher attitudes feature prominently when introducing them to new teaching approaches (Sahli, 2017). These attitudes include teachers' openness to embracing PBL and their perceptions of whether PBL can help enhance learning for learners. Examining these attitudes provides valuable insights into potential barriers and enabling conditions that may influence the effective integration of PBL in the Foundation Phase (Madoyan, 2016).

According to Yoshikawa et al. (2013), the practice of teaching is largely influenced by teachers' perceptions of their jobs. Teachers in PBL were facilitators who guided learners through inquiry and problem-solving processes; they did not assume the role of dispensers of knowledge. It was, therefore, necessary to probe the perceptions Foundation Phase teachers held of their roles within the PBL framework as a means of understanding their teaching practices in relation to PBL principles (Kokotsaki, Menzies & Wiggins, 2016).

Teachers' confidence in using a PBL approach contributes a great deal to the overall learning experience of the learners. Teachers' perceptions of the goals of education guide their teaching practices (Arantes Do Amaral et al., 2023). When developing projects and project-related tasks along the principles of PBL it is thus imperative to understand what Foundation Phase teachers believe about the goals of education and how PBL can be positioned alongside their beliefs. Furthermore, ideological beliefs could support or hinder the implementation of PBL into the Foundation Phase curriculum (Nxasana et al., 2023).

The investigation of Foundation Phase teachers' attitudes and perceptions concerning PBL included aspects relating to readiness to adopt PBL, what they said about their roles in this approach, confidence in delivery, opinion on educational purpose, and how that fitted with PBL. Many aspects were put together to fully grasp the issues that affected the successful realisation of PBL in the Foundation Phase, thus laying a firm foundation for effective teaching practice (Madoyan, 2016; Sahli, 2017).

2.7 Project-Based Learning in the South African context

Grounding the discussion of PBL within the South African context adds specificity and relevance to this dissertation. The unique socio-economic, cultural and educational landscape of South Africa presents both challenges and opportunities for implementing PBL effectively. Contributions from local learners and practitioners provide valuable insights into how PBL can address these dynamics while promoting critical thinking, collaboration and practical skills (Engelbrecht, Malan & Ndlovu, 2014).

2.7.1 Curriculum and policy framework

The South African education system, guided by CAPS, emphasises outcomes-based education and learner-centred approaches (DBE, 2015). In principle, CAPS aligns with the values of PBL. However, CAPS' rigid curriculum structure and extensive content requirements often leave little room for the depth of inquiry and flexibility that PBL demands (Hoadley, 2017; Spaull, 2013). However, by aligning PBL projects with curriculum objectives, teachers can enhance learner engagement while still meeting academic goals (Engelbrecht, Malan & Ndlovu, 2014).

2.7.2 Socio-Economic disparities and resource availability

South Africa's socio-economic inequalities significantly impact the implementation of PBL. Schools in under-resourced areas face challenges such as inadequate infrastructure, limited access to materials and unequal technological resources (Spaull, 2013). Despite these constraints, Maphalala and Mpofu (2018) demonstrated that teachers can leverage locally available materials, community-based projects and indigenous knowledge systems to make PBL both relevant and accessible in disadvantaged settings.

Nxasana's Future Nation Schools (2023) provides a compelling example of addressing educational disparities. By integrating project-based learning (PBL) into its curriculum, FNS equips learners with critical thinking and problem-solving skills through collaborative, real-world projects. Nxasana's initiatives include tailored teacher training and technology integration to address resource limitations, demonstrating PBL's adaptability to systemic challenges (Nxasana et al., 2023).

2.7.3 Cultural and linguistic diversity

South Africa's cultural and linguistic diversity offers a unique opportunity for PBL to promote inclusivity and cultural understanding. For example, Du Plessis and Webb (2012) emphasised that PBL projects designed to explore local histories, traditions and social issues can make learning more relevant and engaging. Similarly, Vandeyar and Mohale (2022) explored how the African philosophy of *Ubuntu*, which values community and interdependence, aligns with the collaborative nature of PBL. Their study illustrates how *Ubuntu* principles can enhance group dynamics and teamwork in project-based activities.

2.7.4 Technology integration

Technology integration is another key factor influencing PBL in South Africa. Initiatives such as the Information and Communication Technologies for Rural Education Development (ICT4RED) Programme and Future Nation Schools' digital tools highlight how technology can support collaborative, inquiry-based learning even in resource-constrained settings (Botha, 2016; Nxasana et al., 2024). By incorporating online platforms, multimedia resources and mobile devices, learners can engage in PBL activities that transcend the limitations of traditional classrooms. However, ensuring equitable access to technology remains a critical challenge in large parts of South Africa due to the persistent digital divide (Duma et al., 2021).

2.7.5 Professional development and teacher support

The successful implementation of PBL relies heavily on teacher preparation and ongoing support. According to Havenga (2016), professional development programmes are important since they equip teachers with the necessary skills to facilitate PBL effectively. Nxasana's Sifiso Learning Group and other initiatives provide frameworks for empowering teachers to adopt innovative methodologies. These programmes address the gap in teacher training, enabling teachers to transition from traditional instruction to learner-centred facilitation (Nxasana et al., 2023).

2.7.6 Learner outcomes and Higher Education

Project-Based Learning's impact on learner outcomes is also evident in higher education contexts, where it has shown to enhance self-directed learning, problem-

solving abilities and academic performance (Zhao, Zhao & Li, 2023). Havenga (2016) explained the effectiveness of PBL in developing autonomy and critical thinking among programming learners. Similarly, Choshi (2023) found that integrating PBL with mobile technology improved English writing skills among first-year university students, highlighting its adaptability across disciplines and educational levels.

2.7.7 Benefits of Project-Based Learning in South Africa

Project-Based Learning holds considerable promise to transform South African education by fostering active participation, critical inquiry and collaborative problem-solving (Lazic, Knežević & Maričić, 2021). By addressing socio-economic disparities, embracing cultural diversity and leveraging technology, PBL can prepare learners for the demands of the 21st century (Engelbrecht, Malan & Ndlovu, 2014). However, systemic changes are required to support its widespread adoption. These include flexible curriculum frameworks, equitable resource allocation and robust professional development programmes.

Grounded in South Africa's unique context, PBL offers a pathway to create inclusive, learner-centred educational environments that promote lifelong learning and social cohesion. Scholars such as Nxasana (2023), Vandeyar and Mohale (2022), as well as Havenga (2016), have demonstrated the potential of PBL to bridge educational gaps and equip learners with essential skills for a rapidly changing world.

2.8 Theoretical framework

This study employs Implementation Science (IS) as its theoretical framework (Nilsen, 2015), since it offers a structured lens to examine how learner-centred approaches to teaching and learning like PBL are adopted, operationalised, and sustained within real-world educational settings (Fixsen, Blase & Van Dyke, 2019). It focuses on the processes that influence successful implementation, such as contextual enablers, barriers, support systems, and stages of change.

2.8.1 Origins and key concepts

Implementation Science emerged from the health and social sciences to play the role of bridging evidence-based innovation and its practical application. Implementation Science has been used in education to learn why successful interventions either work

or fail to be incorporated into teaching in classrooms (Bauer & Kirchner, 2020). Key contributors include Fixsen et al. (2019), who introduced the National Implementation Research Network (NIRN) framework, and (Damschroder et al., 2022), whose Consolidated Framework for Implementation Research (CFIR) has been applied in schooling contexts.

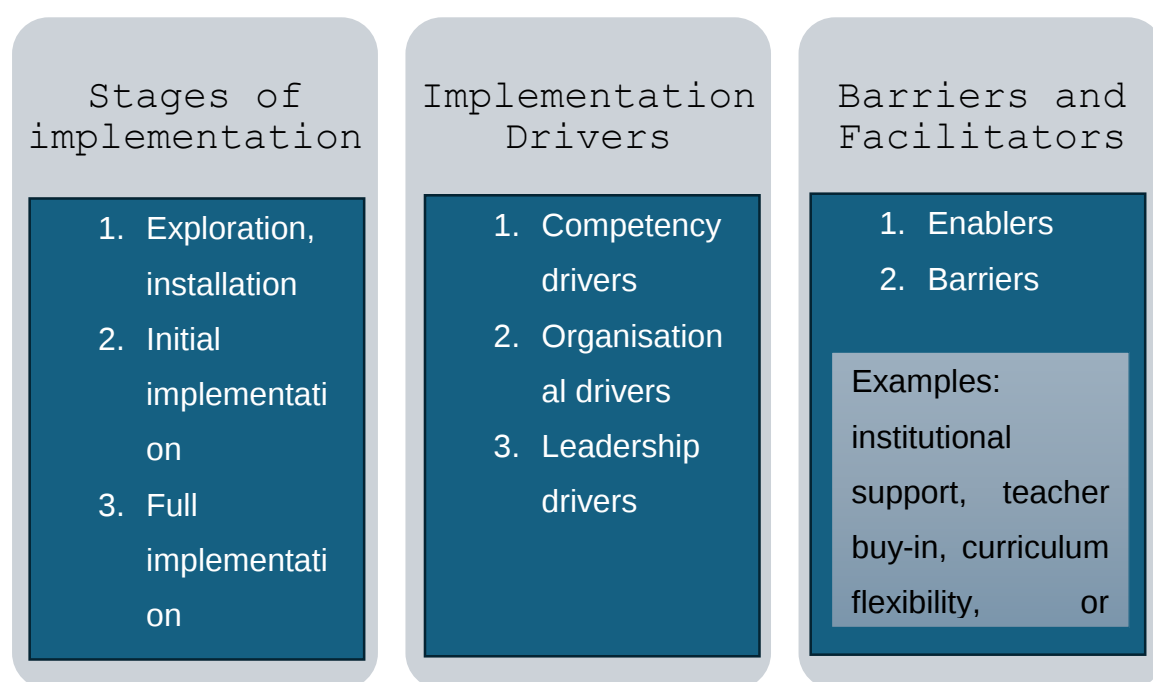


Figure 1 Key constructs of Implementation Science. (Source: Adapted from Fixsen et al., 2019))

2.8.2 Relevance to this study

Implementation Science provides a highly suitable analytical framework for this study, which investigates Foundation Phase teachers' experiences of adopting PBL at School A. Rather than merely ascertaining if PBL works, IS allows the study to explore how and why PBL is implemented in particular ways within a real school context.

In this case, School A initiated PBL through a one-day training workshop, followed by numerous collaborative planning and reflective sessions. Using IS, the study could therefore explore the following:

- 1) What stage of implementation is the school in (likely early implementation)?
- 2) What drivers were present or lacking (e.g., training depth, resource provision, leadership backing)?
- 3) What barriers and facilitators shaped teachers' uptake and adaptation of PBL principles?

This framework is particularly useful for identifying practical constraints and enablers within a bounded case such as this case study. It helps explain variation in teacher responses and the unevenness of implementation fidelity, while also yielding practical insights for improving PBL adoption in similar contexts.

2.8.3 Complementarity with the constructivist paradigm

It is important to distinguish between the constructivist paradigm, which underpins this study's epistemological stance, and Implementation Science, which serves as its theoretical framework. The constructivist paradigm informs how knowledge is understood—as socially constructed, situated, and co-created between researcher and participant (Birks & Mills, 2014). In contrast, Implementation Science offers a set of conceptual tools to examine how an educational innovation such as PBL is put into practice at a school.

Together, the paradigm and theoretical lens offer a comprehensive framework: the constructivist paradigm supports the interpretive, qualitative methodology, while Implementation Science structures the analysis of implementation dynamics and systemic influences.

2.9 Summary

This chapter reviewed the literature on Project-based learning (PBL), outlining its pedagogical foundations, benefits, challenges, and relevance in the South African context. It supported the study's focus on teachers' experiences at School A and informed the methodology in Chapter 3 through Implementation Science and constructivist theory. The chapter also defined research questions and subtopics to guide the investigation of PBL in the Foundation Phase.

Chapter 3: Research methodology

3.1 Introduction

This chapter outlines the methodology employed to investigate Foundation Phase teachers' lived experiences with implementing PBL at School A in Mpumalanga, South Africa. A systematic and credible inquiry was designed to ensure alignment with the study's aim and objectives. As introduced in Chapter 1, this descriptive case study is situated within a constructivist paradigm and uses Implementation Science (IS) as its theoretical framework.

After ethical clearance was obtained, data were collected during Terms 2–4 through semi-structured interviews, classroom observations, and document analysis. Thematic analysis addressed the primary research question: "What are teachers' experiences with PBL implementation in the Foundation Phase?" Ethical rigour, triangulation, and principles of trustworthiness underpin the qualitative approach adopted in this study, the details of which are described below.

3.2 Research design

The framework of a research design structures the investigation and serves as the plan for the study (Yin, 2018). The plan for this study is shaped by using a descriptive case study design that can be defined as an in-depth exploration of a phenomenon within its real-life context; case studies focus on *how* and *why* questions, with the aim to describe "what is it like?" (Bertram & Christiansen, 2020:48). For this study, the phenomenon is the implementation of PBL at School A within a bounded system (one school, the Foundation Phase, Grades 1–3). Unlike experimental designs, a case study prioritises rich, contextual descriptions over causality, capturing participants' subjective experiences. This aligns with the ontological belief that views reality as context dependent and subjective.

As explained in Chapter 2, Implementation Science serves as the theoretical framework, providing a systematic lens to examine PBL adoption (Nilsen, 2015). This framework facilitates analysis of key elements such as implementation stages (e.g., initial implementation following teacher workshops), enabling drivers (e.g., collaborative planning), and potential barriers (e.g., curriculum constraints) (Fixsen et

al., 2019). In doing so, it anchors the study within a structured model of educational innovation and change.

3.2.1 Advantages of descriptive case study

One advantage is depth since a descriptive case study offers detailed insights into participants' experiences; in the case of this study, it focuses on teachers' experiences with implementing PBL. With its singular focus, a case study reveals nuances (e.g., pedagogical shifts) that would be unattainable through broader designs (Yin, 2018).

A second advantage of a descriptive case study design is contextual relevance. It captures School A's unique setting (e.g., well-resourced, private school), enhancing the study's relevance for similar schools while remaining mindful of the limitations of case studies (Merriam & Tisdell, 2015).

3.2.2 Limitations of a descriptive case study

A limitation is an inability to generalise the findings, which is a common feature of qualitative research (Smith & McGannon, 2018). In this study, findings are specific to School A, thus restricting applicability to other diverse South African school contexts (e.g., under-resourced public schools) (Davis, 2021). A second limitation is the risk of subjectivity (Creswell & Creswell, 2017). Researcher bias could influence interpretation, given the researcher's role as a teacher in the Intermediate Phase at School A. However, having kept a reflective journal during the research process meant constant awareness and reflection, which mitigated bias (Nieuwenhuis, 2020a).

3.3 Research approach

Researchers have a choice of three broad approaches, namely quantitative, qualitative, or a combination of both (Maree, 2020); the latter is referred to as a mixed methods approach. Qualitative research is concerned with understanding human experiences and social phenomena in depth, emphasising meaning, interpretation, and context rather than measurement or numerical data (Creswell & Poth, 2016; Merriam & Tisdell, 2015). It seeks to capture participants' voices and perspectives, making it suitable for studies where the richness of lived experiences is central to answering the research questions. In this study, a qualitative research approach was selected because it aligns with the constructivist paradigm, which views reality as

socially constructed (ontology) and knowledge as best understood through the subjective experiences of participants (epistemology) (Creswell & Creswell, 2017; Kivunja, 2015)

The qualitative approach was particularly appropriate given the focus on exploring Foundation Phase teachers' experiences of Project-Based Learning (PBL) implementation, as it enables the researcher to examine the nuances of teachers' beliefs, practices, and contextual challenges. Advantages of adopting a qualitative approach include the ability to generate rich, descriptive data; uncover insights that might not emerge through standardised measures; and develop a contextualised understanding of how PBL is interpreted and enacted in a South African school setting (Braun & Clarke, 2021; Moir, 2018).

3.4 Research paradigm

A research paradigm can be described as an overarching framework of thought that guides how research is conceptualised and conducted (Maree, 2020). It provides the philosophical foundation for both ontological (the nature of reality) and epistemological (the nature of knowledge and how it is acquired) assumptions (Creswell & Poth, 2016). In essence, it frames the way researchers view the world, the types of questions they ask, and the methods they use to seek answers.

3.4.1 Constructivist research paradigm

The constructivist research paradigm asserts that knowledge is co-constructed through interaction, dialogue, and reflection rather than discovered as an objective truth (Birks & Mills, 2014). It emphasises that reality is subjective and shaped by individuals' experiences and social contexts (Merriam & Tisdell, 2015). In this paradigm, participants play an active role in creating meaning, and research becomes a collaborative process where the voices and perspectives of individuals are valued (Merriam & Tisdell, 2015).

Unlike interpretivism, which often involves researchers interpreting meanings from an external standpoint (Willig & Rogers, 2017), constructivism highlights the insider's role in making sense of lived experiences. This makes it particularly suitable in educational contexts where shared reflection and sense-making are central (Birks & Mills, 2014).

3.4.2 Advantages of the Constructivist Paradigm

- Acknowledges multiple realities: It recognises that individuals construct their own subjective truths, allowing diverse perspectives to be heard (Denzin & Lincoln, 2018).
- Supports collaboration: It values co-construction of meaning through social interaction, making it well-suited for group-based or team-based settings such as teacher planning sessions (Birks & Mills, 2014).
- Encourages reflection: It provides a framework for participants to critically reflect on their experiences, enabling deeper understanding of challenges and successes (Merriam & Tisdell, 2015).
- Context-sensitive: Findings are grounded in the specific environment, ensuring that the voices of participants and the uniqueness of their setting are authentically represented (Creswell & Poth, 2016).

3.4.3 Rationale for choosing a constructivist paradigm

This study is underpinned by the constructivist paradigm because it focuses on how teachers at School A collaboratively made sense of Project-Based Learning (PBL) within their unique context. Knowledge was co-created through weekly planning sessions, where teachers reflected on both challenges such as time constraints and successes such as increased learner engagement (Merriam & Tisdell, 2015). These shared reflections shaped their subjective realities and understandings of PBL implementation.

The paradigm aligns with the study's ontological stance that reality is multiple and socially constructed, and with its epistemological view that knowledge emerges through interaction and collaboration (Birks & Mills, 2014; Denzin & Lincoln, 2018). As highlighted in Chapter One, this study is concerned with teachers' active roles in meaning-making rather than the pursuit of a singular truth. Current scholarship further supports this choice: Birks and Mills (2014) emphasise the suitability of constructivism for reflective and collaborative environments, while Denzin and Lincoln (2018) affirm its rejection of absolute truths in favour of co-constructed realities. Thus, the constructivist paradigm provides the most appropriate lens for understanding the lived

experiences, sense-making, and co-construction of meaning among teachers in this study.

3.5 Methodology

3.5.1 Site and participants

School A, a well-resourced private institution in Mpumalanga, introduced PBL in 2022 to enhance Foundation Phase education (Grades 1–3). Eight full-time teachers participated; each engaged in the “What’s Worth Fighting For?” project that was divided into different sub-themes for each grade. Their teaching experiences (1–15 years) provided diverse perspectives about the implementation of PBL, given their different levels of experience with PBL and years serving as teachers. See Table 2.

3.5.2 Sampling technique

Sampling refers to the process of selecting a subset of individuals, groups, or settings from a larger population to participate in a study. It enables the researcher to gather relevant data without having to study the entire population, while still producing insights that are meaningful to the research questions (Creswell & Poth, 2016). The two main types of sampling are probability and non-probability sampling.

In this study, two non-probability sampling techniques were employed: (1) purposive sampling and (2) convenience sampling. Purposive sampling, also known as judgmental or selective sampling, involves the intentional selection of participants who possess specific characteristics or experiences relevant to the research objectives (Etikan, 2016). This technique was used to identify teachers actively engaged in the implementation of Project-Based Learning (PBL), ensuring that they were directly relevant to the research questions and capable of providing meaningful data.

In addition, convenience sampling was applied to complement purposive sampling, as it relies on the availability and willingness of participants to take part in the study (Etikan, 2016). This approach made participation feasible within the practical constraints of time, access, and the school context. While learners and administrators were not primary participants, they were occasionally mentioned or inferred indirectly in teachers’ accounts, offering supplementary perspectives on PBL implementation. The use of purposive and convenience sampling together ensured both the relevance

and practicality of data collection, thereby strengthening the study's ability to generate contextually grounded insights into PBL implementation.

3.5.3 Inclusion criteria

Participants had to be Foundation Phase teachers at School A during the research period. They should also have been actively involved with the implementation of PBL. They should also have participated in the one-day workshop, which was conducted early in January 2022. Another criterion was that participants had to participate in weekly planning sessions, as well as reflection sessions (Terms 2–4). These criteria helped ensure that participants could provide first hand experiences using data collection tools associated with a qualitative approach (Creswell & Poth, 2016).

3.5.4 Data collection methods

Data collection tools involved three qualitative methods (Nieuwenhuis, 2020b). First, a series of semi-structured interviews were selected for their interactive nature, enabling the researcher to probe deeper into participants' responses. This choice aligns with the study's ontological and epistemological positions. During eight interviews, the researcher explored participants' perceptions, planning approaches and challenges related to PBL implementation while also clarifying ambiguities. This interactive engagement further illustrates alignment with the epistemological stance of the study. Open-ended questions (Appendix B)—for example, “How do you introduce PBL?”—provided flexibility and encouraged reflective responses. Each interview session (lasting 45–60 minutes) was conducted in a private office, recorded with consent, transcribed verbatim and annotated with observational notes for future reference (Adams, 2015).

Secondly, the researcher undertook classroom observations. Ten weekly observations lasted 1 hour each. Keeping notes was aided with a checklist and detailed observation notes that documented teacher facilitation styles and the dynamics of PBL across Grades R–3. Protocols (Appendix E) and field notes captured strategies (e.g., scaffolding) and interactions (e.g., group work) during scheduled lessons (Spradley, 2016).

Thirdly, the researcher resorted to document analysis. Approximately 25 documents were collected. These included lesson plans, project outlines like Grade 3 mock elections, and teachers' written reflections. These documents provided evidence of planning and implementation and were reviewed during reflective sessions as a way to ensure continuous alignment (Khaliq, Alam & Mushtaq, 2015).

3.5.5 Data analysis

Thematic analysis was conducted inductively given the qualitative nature of the data (Creswell & Poth, 2016). This enabled themes to emerge directly from the data without a pre-existing coding frame, which is appropriate for investigating and analysing teachers' lived experiences. The analysis of the data followed Braun and Clarke's (2021) six-stage process. Each data set was initially analysed independently before being integrated to generate overarching themes across methods. The steps below outline how each data source was handled.

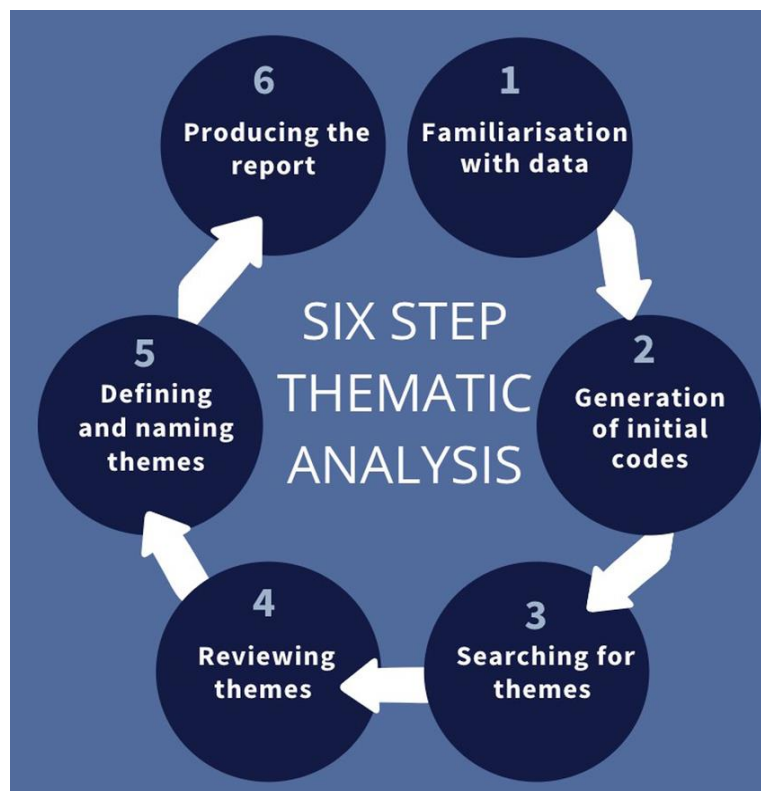


Figure 2 Braun and Clarke's 6 steps of data analysis (Source: (Braun & Clarke, 2021))

The researcher adhered to the following steps during the data analysis process, as described by Braun and Clarke (2021)

- 1) Familiarisation: Immersion occurred via transcribing interviews, re-reading notes and annotating documents (e.g., noting “time challenges”).
- 2) All the codes were created by hand from close reading of the data and the identification of repeated words, ideas, and concepts. Codes such as “shift to facilitator”, “scaffolding”, “collaboration” and “curriculum tension” served to categorise the data into something useful for analysis.
- 3) Searching for themes: Codes were categorised (e.g., “Pedagogical Shifts” under IS’s initial implementation), grouping “scaffolding” and “guidance”.
- 4) Reviewing themes: Themes were refined, merging overlaps (e.g., “resource scarcity” into “Implementation Barriers”).
- 5) Defining and naming themes: Themes (e.g., “Pedagogical Shifts: From Instructor to Facilitator”) were defined, with excerpts included in Chapter 4 (e.g., “I guide, not lecture” – Teacher 4).
- 6) Producing the report: Chapter 4 weaves themes into a narrative, linking through the IS theoretical lens using a constructivist paradigm.

3.5.5.1 Structured interviews

Interviews were transcribed verbatim. Familiarisation involved repeated reading and annotation of transcript sets. Manual coding captured repeated words, feelings and observations (e.g., shift to facilitator, curriculum tension, scaffolding), which were categorised based on patterns between and across participants. It guaranteed that what emerged were themes that represented the lived experiences of individual teachers while enabling comparison between Grades 1–3.

3.5.5.2 Observations

Notes and checklists were examined soon after visiting. Codes were attributed to teaching behaviours, styles of facilitation and learner interactions observed in the moment (e.g., group co-operation, learner-directed activity, teacher control). Trends that were developing were cross-checked across classrooms and matched to interview content. Observation provided contextual richness to what had been described by participants, revealing tacit behaviour or contradiction.

3.5.5.3 Document analysis

Lesson plans, project templates, learner artefacts and teachers' notes of reflection were examined to validate or disconfirm developing ideas. Codes were assigned to overt instances of PBL approaches, planning templates or assessment activities (e.g., integration, learner voice, time management). These documents were used to validate claims during interviews and observations and to improve credibility and triangulation. Cross-data theme development occurred after the initial coding of all sets of data, and codes were combined and categorised into broader categories.

3.6 Trustworthiness

Trustworthiness ensures the rigour of qualitative findings, adopting Lincoln and Denzin's four principles (Denzin & Lincoln, 2018). Trustworthiness ensures the rigour and quality of qualitative research by demonstrating that the findings are credible, consistent, and grounded in the data. This study adopts the four criteria of trustworthiness, namely credibility, transferability, dependability, and confirmability, as originally conceptualised by Yvonna Lincoln and Norman Denzin and further supported by contemporary qualitative research scholars (Nowell et al., 2017; Stahl & King, 2020). These principles guided the research design, data collection, and analysis processes.

3.6.1 Credibility

Credibility refers to the confidence in the truth and accuracy of the findings (Stahl & King, 2020). In this study, credibility was established through prolonged engagement, triangulation, member checking, and persistent observation. Prolonged engagement occurred over a six-month period of formal data collection (May to November 2024), supported by the researcher's role as an Intermediate Phase teacher at School A since the implementation of Project-Based Learning (PBL) in 2022. This sustained involvement enabled in-depth familiarity with the research context, including classroom practices, collaborative planning sessions, and teacher reflections, thereby enhancing contextual understanding and data richness (Creswell & Poth, 2016; Nowell et al., 2017).

3.6.2 Triangulation

Triangulation further strengthened credibility by cross-verifying interviews, observations and documents (e.g., “learner engagement” claims matched observation notes made during group discussions) (Carter, 2014). Member checking involved sharing preliminary theme summaries with three teachers (e.g., Teacher 2 validated “collaboration” as a driver) and refining interpretations through dialogue. Persistent observation, enabled by the researcher’s ongoing presence, captured recurring patterns (e.g., time constraints), bolstering trust in the findings (Merriam & Tisdell, 2015).

First, transferability involved that rich, detailed descriptions of School A’s context (e.g., private school setting, PBL rollout) enable readers to assess applicability to similar environments, despite the study’s specificity (Merriam & Tisdell, 2015). Secondly, dependability involved consistent data collection methods (e.g., standard interview questions and observation protocols in Appendix E) and an audit trail (e.g., dated field notes) ensured reliability over time (Yin, 2018).

Lastly, confirmability required reflexivity, which was maintained through the researchers’ continuous journaling that documented assumptions (e.g., familiarity with School A’s culture from the researchers’ role in the Intermediate Phase), separating personal biases from data-driven conclusions (Birks & Mills, 2014). For instance, initial expectations of seamless PBL adoption were challenged by data revealing curriculum tensions, recorded and adjusted accordingly.

3.6.3 Transferability

Transferability refers to the extent to which the findings can be applied to other contexts or settings (Cypress, 2017). In this study, transferability was addressed through the provision of rich, thick descriptions of the research context. Detailed descriptions of School A, including its status as a well-resourced private school, the structure of the Foundation Phase, and the implementation of PBL since 2022, were provided to enable readers to determine the applicability of the findings to similar educational contexts. This allows for analytical generalisation rather than statistical generalisation (Merriam & Tisdell, 2015; Stahl & King, 2020: 20).

3.6.4 Dependability

Dependability refers to the consistency and stability of the research process over time (Nowell et al., 2017). In this study, dependability was ensured through consistent data collection procedures and detailed documentation of the research process. Standardised interview protocols and observation instruments (see Appendix E) were used to maintain consistency across data collection. In addition, an audit trail was maintained, including dated field notes, interview transcripts, and coding processes. This provides transparency and allows the research process to be traced and evaluated (Cyprress, 2017; Stahl & King, 2020). This systematic approach ensures that the study could be replicated under similar conditions, thereby enhancing its methodological integrity.

3.6.5 Confirmability

Confirmability refers to the extent to which the findings are shaped by the participants and the data rather than researcher bias (Nowell et al., 2017). In this study, confirmability was ensured through reflexivity and the maintenance of a reflective journal. The researcher engaged in continuous journaling to document personal assumptions, positionality, and potential biases, particularly given their dual role within the research context. This process ensured that interpretations remained grounded in the data rather than personal perspectives (Cyprress, 2017). For example, initial expectations of seamless PBL implementation were challenged by findings that revealed curriculum-related tensions. These reflections were documented and incorporated into the analysis, ensuring that conclusions were data-driven and not assumption-based.

3.7 Ethics

Ethical integrity safeguarded participants and upheld the study's credibility, following Maree's (2020) comprehensive guidelines.

3.7.1 Obtaining permission for the research

Permission was secured at multiple levels before data could be collected. The University of Mpumalanga's Faculty of Education Postgraduate Research Committee and Ethics Committee approved the study in May 2024 (Appendix A), following a

proposal submission in July 2023. School A's administration granted consent in May 2023, after a meeting with the principal, where a letter outlined the study's purpose and ensured minimal disruption, ensuring institutional support (Olivier, 2020).

3.7.2 Informed assent (minors) and consent (adults)

Informed consent and assent ensured voluntary participation. Eight Foundation Phase teachers received consent forms (Appendix F), detailing the study's aim (exploring PBL experiences), methods (interviews, observations, document analysis) and their rights. Verbal explanations in English clarified terms during a pre-Term 2 briefing, with forms signed and returned before interviews were conducted (Creswell & Poth, 2016).

Informed assent and consent were obtained using a Google Form, with both adult and minor participants giving their consent voluntarily. For minors, their rights and the research aim were explained verbally via their parents/guardians before the latter completed the Google Form to verify their children's understanding and willingness to participate (Olivier, 2020). Once data were obtained, the online form was taken offline; the cloud-based data were removed from the researcher's Google Drive and securely stored offline in a password-protected file and folder.

3.7.3 Anonymity and confidentiality

Care was taken to ensure that participants' identities and data remain protected. Teachers names were coded (e.g., Teacher 1–8) in all records, to avoid revealing their identities. Data—digital transcripts, notes and documents are stored in encrypted, password-protected files, accessible only to the researcher. Similarly, hard copy formats are stored in a locked cabinet to which only the researcher has access (Willis, Slade & Prinsloo, 2016). This aligns with the emphasis on private, secure and anonymised data handling (Olivier, 2020).

3.7.4 Right to withdraw without penalty

Participants could exit freely without consequence. Consent forms and verbal briefings explicitly stated this right, reiterated during initial interactions. For example, one teacher declined a follow-up interview, and this was respected without any consequences, thus upholding voluntariness (Olivier, 2020).

3.7.5 Respect and consideration

Respect for participants' dignity and well-being was paramount. Data collection posed no physical, psychological or emotional risks, focusing on professional experiences (e.g., "How do you facilitate PBL?"). Observations during regular lessons minimised disruption and document analysis used existing materials. Informal post-interview check-ins confirmed no distress, ensuring participant comfort (Creswell & Poth, 2016).

3.7.6 Different roles

The researcher's role in the Intermediate Phase versus participants' Foundation Phase context was actively managed to avoid any potential influence. As a School A teacher since 2022, the researcher observed the implementation of PBL across all phases. However, the researcher was not directly involved with the Foundation Phase, thereby reducing power dynamics. Reflexivity—via journaling (e.g., noting assumptions about PBL, teacher-specific actions such as planning, and task facilitation)—and supervisor oversight ensured the necessary distance, aligning with dual-role ethics (Olivier, 2020).

3.7.7 Social value

By advancing an understanding of Foundation Phase teachers' experiences with the implementation of PBL this study promoted the common good. Benefits included shaping School A's practices (e.g., teacher training) and contributing to South African education via an MEd dissertation that is publicly accessible school reports and presentations about the overarching project "What is worth fighting for?" Participants gained insights into their experiences and shared age-appropriately (e.g., learner feedback reported by teachers) and enhanced learner-centred pedagogical practices (Olivier, 2020: 78).

3.7.8 Methodological limitations

This study, conducted at School A using a case study design, limits generalisability, though transferability is supported (Yin, 2018). Triangulation was used to mitigate interview bias by cross-checking findings from interviews with observations and analyses of documents. This helped build credibility by cross-verifying findings from

diverse sources and limiting the impact of any one method or participant (Carter, 2014).

3.8 Summary

This chapter outlined a research methodology adopted for this study. The most appropriate methodology was qualitative research approach because the researcher aimed to explore the phenomena from a constructive paradigm. The data collection and analysis methods were presented. Ethics and ethical principles were discussed to ensure trustworthiness and participants voluntary participation in this study. In the next chapter the researcher presented the findings and discussion.

Chapter 4: Findings and discussions

4.1 Introduction

This chapter presents the findings of the qualitative inquiry into Foundation Phase teachers' experiences with implementing PBL at School A. The analysis is framed by the principles of Implementation Science, which enable a systematic interpretation of how educational innovations are adopted, enacted, and sustained in real-world school contexts (Fixsen, Blase & Van Dyke, 2019). Drawing from the constructivist paradigm and descriptive case study design (Yin, 2018; Maree, 2020), the findings are interpreted through an inductive thematic analysis approach (Braun & Clarke, 2021). This method is deemed suitable for identifying patterns across the rich, qualitative datasets used in this study and generating theory-informed insights into the participants' experiences with implementing PBL. This approach aligns with both the ontological and epistemological positions of this study.

4.2 Restating the purpose statement

According to Maree (2020), a clear re-articulation of the research purpose and questions at the outset of the findings chapter aids in maintaining coherence between the conceptual framing, research design, and data presentation. Similarly, Cohen, Manion and Morrison (2018) argue that qualitative research demands transparent alignment between research questions, data sources, and the theoretical framework

that is used for the analysis. This approach enables a structured analysis of how Foundation Phase teachers experienced the implementation of PBL.

The aim of this study was to investigate how Foundation Phase teachers experienced the implementation of PBL at School A. The study investigated how teachers interpreted and enacted PBL in their classrooms, what enablers and barriers they encountered, and how contextual factors shaped their implementation practices. Drawing on Implementation Science (Fixsen, Blase & Van Dyke, 2019) and the constructivist paradigm, the study aimed to provide rich, contextually grounded insights that could inform wider adoption of a learner-centred pedagogy such as PBL.

The alignment in Table 1 reflects best practice in qualitative educational research, where data generation is explicitly linked to analytic purpose and theoretical framing (Creswell & Creswell, 2017; Cohen, Manion & Morrison, 2018; Braun & Clarke, 2021)

In the sections that follow, the findings are presented thematically in direct relation to the primary and secondary questions, while drawing on the Implementation Science framework to interpret the patterns that emerge from Foundation Phase teachers' narratives, among other data sources.

Table 1 Research questions, objectives, data sources, and analytical lens

Research Questions	Research Objective	Primary Data Sources	Analytical Lens
<i>Primary Research Question</i>			
What are the lived experiences of Foundation Phase teachers in implementing PBL at School A?	To explore teachers' overall experiences with PBL implementation in an authentic school setting.	Interviews, reflective journals, observations	Implementation Science: stages of implementation; teacher sense-making
<i>Secondary Research Questions</i>			
1. How do teachers conceptualise and perceive PBL?	To examine teachers' understanding and framing of PBL as a pedagogical approach.	Interviews, reflective journals	Constructivist paradigm; IS – teacher readiness
2. How do teachers plan, design and implement PBL tasks?	To investigate classroom-level planning, delivery and facilitation of PBL.	Lesson plans, observations, teacher interviews	IS – implementation drivers; pedagogical design
3. What factors influence implementation?	To identify contextual, systemic and personal barriers or enablers.	Interviews, journals, planning meeting minutes	IS – barriers and facilitators
4. What pedagogical shifts occur?	To describe shifts in teachers' instructional roles and learning facilitation strategies.	Interviews, observation field notes	IS – practice adaptation; change processes

4.3 Foundation Phase grades and their project-related sub-projects

While the overall theme for the Foundation Phase remained the same, namely “What’s Worth Fighting For?”, every grade addressed this theme via a specific sub-project. This approach was followed to align with each learner’s development levels and curriculum objectives. These sub-themes gave contextual depth that influenced the nature of the learning experiences and how teachers approached and interacted with PBL in conjunction with CAPS. Observing the grade-specific sub-projects made it possible to investigate both the commonalities and differences in how Foundation Phase teachers interpreted and enacted PBL in their classrooms. Table 2 shows each grade’s sub-theme, together with the teacher’s years of experience, and experience with PBL.

Table 2 Teaching experience, PBL familiarity, and project involvement

Grade	Teacher	Years of teaching experience	Familiarity with PBL	Project sub-theme
One	1	5+ years	Familiar	Hydroponics
One	2	10+ years	Implemented PBL last year	Hydroponics
Two	3	1 year	Pretty familiar	Worm Farms
Two	4	20+ years	Very familiar	Worm Farms
Three	5	10+ years	Becoming more familiar	Recycling plastics
Three	6	10+ years	Very familiar	Protecting birds
One – Three (Art)	7	5+ years	Knowledgeable	Collaborative art related to sub-projects (e.g., posters, models)
One – Three (Digital Lit)	8	1 year	Knowledgeable	Creating digital content related to environmental awareness

From an Implementation Science viewpoint, variations in the sub-projects at grade level affected the overall project's implementation, especially at initial and full implementation phases (Moir, 2018). These phases are determined by the extent to which novel practices are grounded in prevailing systems, like how teachers approached PBL in response to their project-related sub-themes.

Teachers' sense-making is another concept that describes how teachers interpreted and reacted to PBL demands, guided by their experience with PBL, beliefs, professional practice and anticipated learners' needs (Bauer & Kirchner, 2020; Sisk et al., 2020). These understandings guided decisions about scaffolding, group work, and resource integration, such as digital tools. Such variations depended on the grade, which indicates the value of contextual sensitivity and professional agency in effecting enduring and meaningful educational reform.

4.4 Thematic analysis

As outlined in Chapter 3, data were collected during Terms 2–4. In alignment with the research approach, data collection methods included classroom observations (class visits), semi-structured interviews, and document analysis. The documents reviewed comprised teachers' lesson plans, the Curriculum and Assessment Policy Statement (CAPS), Annual Teaching Plans (ATPs), and examples of learners' artefacts. The researcher also attended grade-specific planning sessions, during which teachers collaboratively brainstormed and unpacked their project-related sub-themes. These observations offered valuable insights into Foundation Phase teachers' thinking, expectations, and perceived challenges.

Furthermore, the researcher noted how learners engaged with various tasks, how teachers facilitated learning, and how classroom spaces either enabled or constrained PBL implementation. In some instances, learners were observed sharing their final products with peers and teachers—these moments were particularly valuable for generating authentic insights into the enactment of project-based learning.

The researcher utilised manual coding that included handwritten notes and colour-coded transcripts to note significant patterns. The researcher used Braun and Clarke's (2021) six-stage thematic analysis. The researcher repeatedly revisited the data to

sharpen categories or merge codes that addressed underlying meanings. Triangulating across observation notes, documents and interviews allowed the researcher to validate key themes, as well as get a better picture of how PBL had been implemented across grades.

4.5 Themes and sub-themes

In qualitative research, themes represent patterns of meaning across data sets that are important to the research question, while subthemes offer more specific insights that sit within broader thematic categories. Braun and Clarke (2021) assert that themes are not just summaries of findings but are built through an in-depth interaction with and interpretation of findings.

According to Merriam and Tisdell (2015), themes describe patterns that appear repeatedly among different participants and contexts, as well as commonalities and tensions across different participants and contexts. Themes occur as data are structured in such a manner as to reveal connections as well as relationships between concepts. The themes and sub-themes are summarised in Table 3.

Table 3 Themes and subthemes

Theme	Sub-themes
1. Knowledge and Understanding of PBL	Planning and design Teacher familiarity and growth
2. Implementation of PBL	Scaffolding and facilitation Learner engagement Collaboration
3. Challenges in Implementing PBL	Time constraints Resource limitations Managing group dynamics
4. Curriculum Integration	Alignment with ATP Interdisciplinary connections
5. Skills Development through PBL	Literacy and numeracy Critical thinking Leadership and communication

6. Teacher Reflection and Growth	Role transformation Collaboration and professional learning
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4.5.1 Knowledge and understanding of Project-Based Learning

This theme discusses teachers' interpretation and conceptualisation of PBL over time. The findings show a clear progression in understanding from task-orientated perceptions towards a more conceptual understanding of PBL as inquiry-based and learner-centred. Two subthemes were apparent: Planning and Design, as well as Teacher Familiarity and Development.

4.5.1.1 Planning and design

Teachers initially associated PBL with the creation of projects that were aligned with classroom tasks. Over time, planning became more intentional and learner-led. Once the teachers became more confident, they began integrating curriculum goals with learner interests and real-world applications. Teacher 1 stated that:

We created our mini-greenhouse in Term 2 primarily to fit the CAPS topics, but in Term 3, we use the same time frame to enable learners to choose what they wanted to plant.

Teacher 2 emphasised a stages approach, by stating:

We plan in stages all the time. Mondays are our planning afternoons and we had everything laid out in line by Term 4.

Importantly, Teacher 4 noted the initial difficulties during the planning phase, stating that:

The initial planning used to be difficult, but now I implement PBL planning for topics such as Language, Life Skills and even some Mathematics.

According to Kokotsaki et al. (2016), collaborative planning underlies the success of PBL. It allows teachers to anticipate learner needs, coordinate goals and co-design interdisciplinary projects that foster critical thinking. This view is seconded by Markula and Aksela (2022), who discovered that planning by the teacher makes the integration

of PBL into formal curricula easier, especially where projects are grounded in particular inquiry questions and practical application.

According to Son and Penny (2022), sound project design includes scaffolding, constant reflection by the teachers, and learner engagement. Without planning, the teachers might end up with superficial implementation that lacks depth and connections to the outcomes. These studies confirm the shift evident in the data—from scheduling project tasks to intentional, reflective design based on integration of the curriculum and learner choice.

The data indicated that the teachers transitioned from compliance-based planning to learner-responsive and collaborative design processes. Initially, planning was viewed as the coverage of curriculum material. The process, however, evolved to incorporate learner agency and interdisciplinary practices. This transition conforms to the principles of Implementation Science, which demands systematic integration of innovation into the real world.

4.5.1.2 Teacher familiarity and growth

Teachers' perceptions of PBL varied quite significantly in the beginning. Newer teachers used “something fun” or “activity-based” to characterise the process. More experienced teachers perceived it as a deeper process that promoted inquiry and learner agency. Teacher 3, for example, remarked:

Project-Based Learning makes the learners perform activities that interest them and keep them occupied.

Teacher 4 posits that self-discovery, rather than the outcome of the task, was important by remarking:

It isn't about creating a poster; it is about the learners discovering for themselves.

It is, however, Teacher 5 whose insight provides evidence of the significance of PBL upon stating:

I did not believe that I would enjoy it, but the more I tried it, the more I saw the learners thinking otherwise.

This sequence mirrors an increasing pedagogical transformation, namely from teaching content to supporting learning. This is affirmed by Kokotsaki et al. (2016) who believe that the understanding of PBL becomes deeper with time as teachers engage in experimentation in the classroom and with fellow teachers. Furthermore, Markula and Aksela (2022) found that teachers get accustomed to PBL through reflective practice and collaborative learning, which facilitates the growth of their roles from content deliverers to facilitators. After researching teachers' perceptions, Boyers (2018) found that getting used to PBL occurs gradually and greatly relies on leadership and peer support.

This explains why Ma (2022) stresses the importance of community, collaboration and design thinking in shaping teachers' evolving roles in PBL classrooms. The reflections of the teachers and the change in terminology showed that the teachers were not merely presenting a new method but were themselves changing professionally. The increased familiarity with PBL brought with it a mind-set shift from being instructors to serving as facilitators. This process also illustrates core features of IS, including practitioner engagement and ownership in the maintenance of change over the long term (Curran, 2020).

4.5.2 Implementation of Project-Based Learning

This theme describes how teachers used PBL in the classroom, showing a clear pedagogical change from traditional, didactic, teacher-centred teaching to more facilitative, learner-centred approaches. The findings show that teachers began to move back to allow learners greater voice, agency, and ownership of learning—a practice recommended by Curran (2020), who emphasises that successful integration requires teachers to change their role to facilitate ongoing engagement and ownership.

Kokotsaki et al. (2016) also note that successful PBL requires a shift in teaching practice, where inquiry, collaboration, and learner autonomy are prioritised. This theme is developed through three subthemes, namely Scaffolding and Facilitation, Learner Engagement, and Collaboration. These findings reflect core principles of Implementation Science, particularly the importance of iterative change, practitioner-led adaptation and sustained commitment to innovation in real-world educational settings (Moir, 2018).

4.5.2.1 Scaffolding and facilitation

Scaffolding in an educational setting is defined as the intentional support provided by teachers to help learners perform tasks they may not yet be able to accomplish independently, gradually reducing that support as learners gain competence (Van de Pol et al., 2015). Teachers described how they increasingly moved away from direct instruction to a more facilitative role. They discussed letting go of control of the learning process and providing learners with more autonomy to explore, make decisions, and struggle through activities independently.

A process of guiding learners through questioning, prompting, and only intervening when required was followed. Several teachers noted that they found it difficult to let go at first, but became more confident over time. This allowed learners to take ownership of parts of the learning process. These narratives were supported by classroom observations. Teachers were seen to be circulating through the room, offering individualised instruction rather than whole-class teaching. This subtheme describes a central aspect of PBL implementation, in which scaffolding is used to balance learner autonomy with structured support. These practices align with what Implementation Science refers to as practitioner-led adaptation within new instructional models (Moir, 2018; Curran, 2020). Teacher 5, for example remarked:

We used to give them step-by-step instructions, but now I pose them a question and allow them to find things out for themselves. If they get stuck, I step in—just enough.

As the year progressed, the progress learners showed to work independently was echoed by Teacher 6, who remarked:

By Term 3, the composting group didn't even require me to be in the room – they allocated tasks and presented confidently at assembly.

During Term 2, Teacher 3 stood before the groups, offering cautious directions for creating posters. In Term 3, Teacher 3 walked around among the groups, offering gentle prompts like “*What would you do next?*” and “*What does your group think?*” (Observation notes, 24 July 2024)

The researcher observed that Teacher 5 interrupted the learners to a limited extent while guiding them through the recycling bin project. She gave them the autonomy to make their own decisions, intervening only to ask difficult questions. This was a shift from her former way of working (Journal entry, 8 August 2024).

Scaffolding, according to Kokotsaki et al. (2016), enables learner autonomy while providing structure. Likewise, Markula and Aksela (2022) describe the requirement for teachers to shift from content providers to facilitators of critical thinking and inquiry. However, Ma (2022) argues that this is not a linear process, but one that evolves with growing confidence as teachers respond to learners' needs. The triangulation of data revealed a pedagogical change to more adaptive, facilitative roles on the part of the teachers; the learners were empowered to manage their own learning. This reflects key IS tenets, which promote adaptive and long-term implementation of new practices.

4.5.2.2 Learner engagement

Learner engagement explains learners' active participation in learning activities, often demonstrated through attention, participation, curiosity and persistence (Bond & Bedenlier, 2019). Project-Based Learning supports engagement when learning activities are relevant and meaningful, providing opportunities for collaboration and learner agency (Choi, Lee & Kim, 2019). During this study, teachers explained the noticeable gains made with learner engagement—something that became apparent since projects were linked to the real world, shared, and connected to learners' contexts. Classroom observations confirmed that learners often took initiative, stayed on task without regular reminders, and constructively engaged peers. Teachers also demonstrated heightened enthusiasm and greater professional engagement during these classes, particularly when learners controlled aspects of the project. This subtheme captures essential IS principles, including the importance of contextual alignment, responsiveness to participant feedback, and practitioner-led adaptation (Curran, 2020; Sisk et al., 2020). Teacher 5's remark substantiates this:

It was their initiative for the recycling campaign. They brought everything, even from home, and we were proud of educating people about it.

The level of learners' enthusiasm was echoed by Teacher 4, who stated:

Our learners came alive with the addition of worm farming. They were excited to witness the worms grow and show them to their parents.

In Grade 3 classes, the researcher observed that some learners were staying behind after break to work on their campaign posters for a mock election. They were discussing slogans, colours and speech openers with no guidance from the teachers (Observation notes, 15 August 2024).

Learner engagement flourishes where there is autonomy, relevance and collaboration (Kokotsaki, Menzies & Wiggins, 2016). This is confirmed by Boyers (2018) who found that learner-driven, purposeful projects result in enduring motivation. This is confirmed by Markula and Aksela (2022), who state that project ownership facilitates engagement, especially where learners see the tangible impact of their work. The researcher's journal entries concurred with the researcher's observations that all point towards the idea that PBL can change passive learner engagement into active ownership. When learners have genuine control over their work, the likelihood of them persevering, working in groups and reflecting increases. Implementation Science confirms that learner engagement is one of the most important indicators of adoption success.

4.5.2.3 Collaboration

Collaboration, one of the 4Cs, is defined as learners deliberately working together to achieve shared goals, such as planning, problem-solving, negotiating, and supporting each other (Markula & Aksela, 2022). Collaboration in PBL is not just a skill that learners acquire but a fundamental approach that facilitates learning (Choi, Lee & Kim, 2019). Learners, while not primary participants in this research project, consistently exhibited collaborative behaviour by habitually working in teams, allocating roles, negotiating challenges, and supporting each other with minimal intervention from the teacher.

Teachers explained that learners took responsibility for allocating tasks, providing feedback to each other, and resolving minor disputes independently. Reflective journal entries and interview transcripts supported these explanations, revealing that peer-led teamwork permeated all grade levels. Teachers explained collaboration as both an

outcome of PBL and a requirement for its successful execution. This subtheme illustrates principles of Implementation Science, where practitioner- and learner-led ownership of process and decision-making are paramount to embedding change (Curran, 2020; Sisk et al., 2020). Teacher 1 observed that learners

...formed their own groups and told each other who does what. I just assisted them when there were arguments.

In Grade 2, the researcher noticed one group redrawing their worm bin after one of the learners raised concerns about ventilation. They talked, drew and built the redesigned one without involving the teacher (Observation notes, 17 June 2024). The researcher made the following journal entry in Term 2:

What I observed today was that learners were not looking to the teacher but to one another for support instead. Their conversations—‘You’re better at drawing, you take that’ or ‘Let’s do it this way’—indicated genuine ownership of working together.

According to Ma (2022), collaboration facilitates both academic and social-emotional learning when following a PBL approach. Also, Kokotsaki et al. (2016) mention that collaboration fosters leadership, empathy and collective responsibility. Among the Foundation Phase learners at School A, collaboration was not only noticeable; it was in fact thriving. Learners were developing conflict resolution skills, taking on responsibilities and contributing in valuable ways to group products. This shift in the stance of a teacher—from group manager to group supporter—is proof of the transformative potential of PBL. Implementation Science considers collaboration as a requisite at both the learner and practitioner levels (Bauer & Kirchner, 2020).

4.5.3 Challenges of Project-Based Learning

Although the implementation of PBL at School A revealed significant pedagogical growth and learner engagement, teachers also encountered several challenges. These did not reflect resistance or reticence but were structural and contextual constraints affecting the consistency and intensity with which PBL could be implemented.

According to Markula and Aksela (2022), while PBL fosters authentic learning, it also places demands on teachers' time, resources and organisational capabilities. To sustain PBL, Boyers (2018) notes that enabling conditions such as sufficient time, access to resources and teacher support systems are necessary. Without these, teachers resort to more traditional methods. From an Implementation Science point of view, such challenges are typical of the "initial implementation" phase, where innovation is initiated but not yet consolidated (Fixsen, Blase & Van Dyke, 2019).

The findings in this study resonate with three broad categories of difficulty: time constraints, limited resources and teamwork.

4.5.3.1 Time constraints

Teachers at every stage consistently cited a lack of time as one of the greatest obstacles to utilising PBL. The demands of completing the Annual Teaching Plan (ATP), preparing for assessments, preparing for meetings and attending to extracurricular responsibilities often interfered with the open-endedness of project-based learning. Teacher 6 noted that:

We had to halt the project to accommodate the common tests. It was frustrating since the learners were so engaged.

Teacher 2 capsulated the sense of a lack of time by stating:

I like the idea of PBL, but there's never enough time to do it properly. Between planning, marking and meetings, I'm always in a rush.

In Term 3, PBL tasks were consistently delayed due to preparation for tests. In Grade 1, the researcher observed that teachers skipped over the hands-on component of a recycling project due to timetable pressure (Observation notes, 6 September 2024). A journal entry made during Term 3 reads:

Even the most passionate teachers are torn between deadlines and innovation. It's hard to give learners enough time to explore when the curriculum clock keeps ticking.

Some teachers also mentioned that even though planning for PBL was conducted in groups, time to meet term deadlines made them omit or cut down elements of the project.

Such a reality is confirmed by Boyers (2018), who confirms that time pressure is a common challenge to PBL sustainability, especially in systems that value assessment readiness. Notably, Son and Penry (2022) found that time constraints lead teachers to prioritise “coverage over depth”, especially if innovation support is not built into the school calendar. To this Markula and Aksela (2022) added the need for school-level structural changes to allow flexible scheduling and longer planning cycles for successful PBL integration.

Time limitations were not just a logistical challenge but a systemic obstacle to innovation. Teachers were eager to dive deeper, to learn more authentically, yet incessant pressures to “keep moving” interfered with that potential. Implementation Science acknowledges these tensions as being among the realities of the real world that will need to be addressed if innovation is to be sustained (Moir, 2018).

4.5.3.2 Resource constraints

Resource availability in education is the continual supply of materials, infrastructure, and equipment to support teaching and learning activities efficiently (Ma, 2022). While School A is generally well-resourced, teachers commented that specific project demands—digital technologies, consumable materials, or flexible learning spaces, for example—were not always available at the moment they were needed. The inconsistency of this provision limited the quality and scope of some projects, with teachers having to scale back or adjust their original plans. Teacher 8 remarked that:

The learners needed to share tablets in the research stage of the project and sometimes would need to wait, as another class had booked the lab out.

Teacher 1 reflected upon resource use by stating:

For our hydroponics activity, we had to use recycled bottles, as we did not have the appropriate containers or funds for kits.

For the Grade 3 recycling project, the researcher noticed that some groups were not able to start working immediately due to a shortage of scissors and cardboard. Teachers attempted to circulate materials among groups, but this slowed down the lesson's flow. (Observation notes, 12 September 2024)

During Term 3 the researcher made the following journal entry:

Despite the creativity flowing from the learners, it is clear that limited access to fundamental materials affects the quality and pace of the projects.

Access to purpose-built and flexible resources is emphasised by Ma (2022), who states that effective PBL requires a myriad of resources when learners are required to create, build or conduct digital research. Notably, Son and Penry (2022) warn that logistical and material constraints can create delays, reduce motivation and limit the quality of learning activities. Rightfully, Boyers (2018) also adds that a lack of equitable access, especially for hands-on or inquiry-based activities, can be frustrating for both teachers and learners.

The results are a form of resource tension, where innovation is demanded but not necessarily resourced in practice. Teachers usually improvised and attempted creative solutions, but these workarounds usually meant a compromise on outcomes or limited learner choice. Implementation Science affirms that to sustain change, infrastructure must be congruent with instructional change (Sisk et al., 2020).

4.5.3.3 Group dynamics

Most classrooms successfully used collaborative learning, but some teachers said it was difficult to get learners to work well together, especially when they were put in groups with learners of different abilities or groups that were randomly grouped. Under these circumstances, collaboration did not automatically lead to equal participation. Teachers indicated that conflict, disengagement and role confusion were common. Some learners dominated tasks, while others were unsure how to contribute or disengaged. Because of this, teachers had to step in to settle disagreements, change the meaning of tasks, or change the roles of people in groups in order to get the project moving again.

These kinds of interventions show how important it is to keep leading and helping during group activities, especially for younger learners in the Foundation Phase who are still learning how to get along with others and work together. This observation fits with Moir's (2018) claim that it is important for PBL group work to have clear structure and support, especially for learners who are still learning how to control themselves. Bauer (2020) similarly cautions that unstructured group work will exacerbate already present inequalities, with more capable learners taking control and others falling behind.

Points emphasised by Curran (2020) include the importance of explicitly modelling norms of collaboration, including the negotiation of roles, the sharing of responsibility, and solving problems together as a group. These results back up what the teachers in this study said: they said that learners worked together effectively only when there was structure, trust, and support. Therefore, while collaboration is a fertile aspect of PBL, its success is reliant on considerable teacher-led modelling, conflict management and relationship building along the way. Teacher 3 remarked:

Sometimes one child does all the work and the others just wait and copy. It's difficult to get them all to do their part.

Teacher 1 reflected upon leadership position and remarked:

They fight over who's the boss or who must do the presenting. If I don't watch them closely, it breaks down into anarchy.

Teacher 2 pondered about the effects of learner discussions and arguments about roles:

I find that group work takes longer because of the talking and the arguments, especially with the younger pupils.

In Grade 1, the researcher observed a group arguing over which one of them would get to hold the poster when presenting. They had to be settled down by the teacher before they could continue. (Observation notes, 30 August 2024)

The researcher's journal entry made during term 3 states:

*Collaboration is beautiful when it works, but I've seen how fragile it can be.
Without clear roles, the strongest personalities take over and others switch off.*

Despite these problems, some teachers reported improvement over time, especially when learners were taught communication and shared responsibility.

While PBL collaboration develops useful social and learning capacities, Kokotsaki et al. (2016) acknowledge it requires overt instruction in group processes, especially for younger learners. If not resolved, Son and Penry (2022) stress that tensions in groups can derail project momentum and negatively affect learner confidence. Ma (2022) also argues that overt role allocation, peer accountability and reflection are necessary for successful group work. These sources confirm that group dynamics are not a by-product but a part of PBL that needs to be consciously structured and facilitated.

Group work during PBL was fertile ground for collaboration but also exposed deeper classroom problems. Effective collaboration was not inevitable—it had to be modelled, facilitated and managed (Kokotsaki, Menzies & Wiggins, 2016; Condliffe, 2017). While tension is a normal part of learning, unresolved group conflicts stifled progress and inclusion. Implementation Science reminds us that the uptake of a new practice, like PBL, requires not only teacher commitment but also learner readiness and maintenance support (Moir, 2018; Curran, 2020). From a Social Constructivist stance, the social aspect of learning is important, but it requires scaffolding to flourish. Group dynamics, when well-managed, can deepen understanding. However, when unmanaged, groups can become dysfunctional, resulting in inequality and disengagement (Merriam & Tisdell, 2015).

4.5.4 Curriculum integration

One of the successful outcomes observed in this research was the intentional integration of PBL within the formal curriculum, rather than offering it as an extracurricular or add-on experience. Teachers were very dedicated to connecting project themes to the needs of the curriculum, specifically the ATP, so that learners could keep learning with a purpose and an eye on the end result. This was best reflected in their ability to design interdisciplinary learning experiences, where learning areas such as Natural Sciences, Social Sciences, and Language were integrated

cohesively into a single project theme. Such integration supports what Curran (2020) describes as a shift from traditional compartmentalised teaching to more holistic, connected teaching, where learners see the relevance of their work across subjects.

Also, Sisk et al. (2020) found that when PBL is part of the curriculum, it not only gets learners more involved but also helps them understand things better because they have to use what they've learnt in real life. The evidence of this research suggests that the effective integration of PBL enriched the learning experience and enabled teachers to work towards formal curriculum demands while maintaining learner agency and creativity at the centre of instruction. Curriculum integration has been widely touted as a PBL strength, if properly executed. Project-Based Learning, Kokotsaki et al. (2016) argue, lends itself naturally to teaching a range of skills and subjects through one underlying theme. This is confirmed by Markula and Aksela (2022) who claim that teachers who plan with integration in mind are more likely to sustain PBL practices within curriculum frameworks. In the South African context, this alignment is especially crucial, considering the prescriptive nature of the ATP and the emphasis on academic coverage.

Two subthemes emerged, namely Alignment with the ATP, and Interdisciplinary connections. These are discussed below.

4.5.4.1 Alignment with the Annual Teaching Plans

Teachers expressed that they were able to align project themes to content required by the Annual Teaching Plan. Whereas some had initially viewed PBL as an add-on to their practice, they later began creating projects that addressed curriculum outcomes in subjects such as Natural Sciences, English, Life Skills and even Mathematics. As Teacher 2 reflected:

At first I thought we had to do this on top of everything, but then we realised we can use the projects to cover CAPS content—just in a different way.

Similarly, Teacher 5 remarked that:

We made sure that every theme of the term linked to what we had to teach. So, when we did the worm farms in Term 2, it was teaching life cycles and soils from NS.

Teacher 6 noted that "We had to adjust the ATP a bit, but nothing was left out. We just did it differently."

In a Grade 2 environmental class, the teacher drew direct connections between the learners' recycling drive and ATP Life Skills themes of "Caring for the Earth" and "Our responsibility at home and school" (Observation notes, 13 June 2024). The researcher's journal entry in Term 2 is noteworthy:

The beauty of what I'm seeing is how the project work is being incorporated with curriculum goals. Teachers aren't doing 'more'—they're doing differently.

Boyers (2018) found that teachers who see strong alignments between PBL and curriculum standards are more likely to sustain its adoption in the long term. Markula and Aksela (2022) claim that aligning PBL with national curriculum standards reduces teacher stress and makes the approach more manageable. Likewise, Son and Penry (2022) stated that curriculum alignment gives PBL credibility and generates school administration buy-in.

This shift from considering PBL as an add-on to a vehicle for meeting curriculum objectives is a foundational achievement in this study. Teachers were not simply teaching content but were doing so in ways that were engaging learner interest and ownership. This kind of embedded use is strongly argued for in Implementation Science, which fosters the necessity of alignment between innovation and institutional norms.

4.5.4.2 Interdisciplinary connections

Teachers described how PBL allowed them to incorporate learning across learning areas and, in some instances, utilise a single project to address outcomes in Language, Life Skills, Natural Sciences and even Mathematics. This cross-curricular learning increased learning and made lessons feel more integrated and relevant to learners.

While they were doing the worm farm, they were doing instructions in English, measuring soil in Maths and learning about living things in NS. (Teacher 4)

The Olympics project allowed us to bring in History, Geography and even Art. It all connected. (Teacher 6)

Instead of having things taught separately as subjects, we took one project and linked all of them up. It was a time saver and made more sense to the kids. (Teacher 5)

In Grade 3, learners presented bird protection posters that combined life science content, persuasive writing and visual arts—all within a single PBL theme. (Observation notes, 13 June 2024)

The richness of interdisciplinary learning is evident in the manner in which learners talk about their work. They make connections naturally without needing to be told, ‘This is Language’ or ‘This is Science.’ (Journal, Term 2)

Kokotsaki et al. (2016) note that interdisciplinary learning in PBL facilitates deeper comprehension, critical thinking and the transfer of knowledge across contexts. Ma (2022) also adds that integrated projects maintain real-world learning, where learners apply knowledge in multifaceted ways. Notably, Markula and Aksela (2022) found that interdisciplinary planning functions particularly well in early education, where subject boundaries are already more fluid.

Interdisciplinary learning gave teachers flexibility and learners coherence. Instead of switching between disjointed subjects, both teachers and learners experienced learning as a coherent piece of a bigger, meaningful journey. This illustrates a great level of maturity in PBL, both in pedagogical depth and strategic implementation. From an Implementation Science perspective, this level of integration increases the possibility of long-term sustainability.

4.5.5 Skills development

One of the most powerful benefits observed during the implementation of PBL was the development of basic learner competencies that extended beyond subject content. Teachers all reported that PBL enhanced learners’ academic, intellectual and social competencies in a powerful and lasting way. These included basic literacies (reading, writing and numeracy), higher-order thinking skills and interpersonal skills, such as communication and leadership.

Environments in which PBL is implemented allow learners to develop skills in real-life situations, including collaboration, problem-solving and integration of knowledge from across disciplines. PBL environments also allow for learner voice and autonomy (Kokotsaki, Menzies & Wiggins, 2016). This is corroborated by Ma (2022), who state that project work improves problem-solving and independent learning and enhances communication, reflection and teamwork capacity when learners undergo long-term, cross-disciplinary tasks.

Three skill-related subthemes crystallised from the data, namely literacy and numeracy, Critical Thinking, as well as leadership and communication.

4.5.5.1 Literacy and numeracy

Learners demonstrated intentional use of literacy and numeracy skills in project settings. These skills were not taught in isolation to the learners but were applied in real-life contexts. Teachers indicated that learners were reading and writing with greater confidence, asking how to spell words, writing speeches, creating posters and writing letters within their projects. Numeracy was seen in functional contexts—through measuring, estimating, budgeting and reporting information.

They were writing every day—notes, instructions, posters. It wasn't worksheets—it was purposeful. (Teacher 3)

We used the worm farm activity to teach measurement — they had to measure soil and count how many worms they found. (Teacher 5)

For the hydroponics project, learners gathered data on the growth of plants for two weeks and reported their results to classmates through the use of simple bar graphs. (Observation notes, 19 June 2024)

The learners wrote confidently because the writing had a purpose. I noticed that they read and wrote more than usual, and they enjoyed it more too. (Journal, Term 2)

Project-Based Learning assists in the development of literacy and numeracy when placed within meaningful and context-rich activities (Son & Penry, 2022). According to Kokotsaki et al. (2016), when literacy and numeracy skills are applied to practical

problems, learners are more likely to recall things and stay motivated. Similarly, Ma (2022) corroborates that applied numeracy and literacy activities promote understanding and support the cognitive development of young learners.

The data shows that learners were more inclined to read, write and perform math when the context was relevant and engaging. PBL transformed these skills from abstract classroom drills into valuable tools. This aligns with Implementation Science, whereby adaptable practices that encourage tangible outcomes are highly valued.

4.5.5.2 Critical thinking

Teachers noted significant growth in learners' critical thinking skills. Learners engaged in questioning, comparing ideas, explaining choices and revising plans, based on feedback and discoveries. Instead of waiting for answers, they demonstrated initiative and curiosity. Teacher 2 noted the level of independence one group of learners exhibited by remarking:

One group entirely changed their worm box after they had noticed the worms weren't moving. They attempted several things and justified their reasons.

Teacher 4 made the following important observation:

They started questioning things—like why we're using plastic or why worms are beneficial to the soil. It wasn't me telling them; it was them learning.

During the Grade 3 bird conservation project, the learners debated and argued with each other about what bird species they would put on their poster. They considered research information and class discussion before reaching a decision (Observation notes, 13 June 2024).

I could see them thinking—actual thinking. It wasn't about right answers but reasoning, defending ideas and redoing plans. (Journal, Term 3)

Critical thinking is also a natural outcome of PBL if the learners are encouraged to find solutions independently and in groups (Ma, 2022). According to Kokotsaki et al., (2016) learners who work on long-term, inquiry-based assignments develop deeper reasoning skills and become reflective thinkers. Likewise, Moir (2018) explains that in

preschool and early childhood education, project-based learning activities promote decision-making, experimentation and logical thinking.

The ability of the learners to question, adapt and problem-solve reflects a strong development of critical thinking. Project-Based Learning afforded the conditions for intellectual autonomy and analytical reasoning. This confirms the principles of Implementation Science that espouse learning through doing and reflecting.

4.5.5.3 Leadership and communication

This study found that the PBL method helped Foundation Phase learners improve their communication and leadership skills. Teachers were amazed and impressed by how learners naturally took the initiative to lead, guided aspects of their group work, and encouraged their peers to stay active and involved. Even normally shy and reserved learners became more audible, cooperative and assertive, particularly when the classroom setting was supportive and challenging. This result is in line with Sisk's argument that PBL builds critical 21st-century skills, such as collaboration, communication, and self-leadership, by placing learners in real-world situations where they must take initiative and share their ideas in meaningful contexts (Sisk et al., 2020).

Similarly, (Bauer & Kirchner, 2020) highlights the fact that when learners are given ownership and voice within organised project contexts, they are capable of building not only confidence but also a sense of ownership towards their team's achievement. In this study, these changes were seen in how learners shared their ideas with confidence in class discussions, helped each other, and behaved more maturely in groups. These findings are in line with the argument that PBL offers real opportunities for learners to practise real-world skills, even at an early stage, when learning is context-specific, purpose-orientated, and trusting.

Some of the introverts ended up being our strongest presenters. I was surprised at how they presented their project. (Teacher 6)

Teacher 5 remarked:

One learner who usually doesn't say much dominated the whole conversation about what to do to safeguard birds in the school vicinity.

In Grade 2, children presented their project on the class worm farm in groups. They coordinated speaking turns, took turns telling facts and supported each other in staying on track. (Observation notes, 27 August 2024). The researcher made the following journal entry in Term 3:

Leadership is being shown in small but powerful ways. Learners are stepping forward, encouraging others to help and standing up straight when presenting.

Leadership and communication, according to Ma (2022), are core life skills acquired when engaged in authentic, group-based projects. This is confirmed by Son and Penry (2022) who noted that learners who learn in groups learn to negotiate, clarify thoughts and maintain group goals. Neither leadership nor communication was taught as an isolated skill—it was acquired through real responsibility. The learners were not passive recipients but active participants, negotiating meaning and leading one another—a dynamic that, as (Dobson & Dobson, 2021) explain, reflects the power of PBL to promote learner agency, voice and confidence through meaningful social interaction.

4.5.6 Teacher reflections and growth

As teachers implemented PBL, their professional practice became an inherent focus of the process. The research indicated that PBL was not only transformative for learners but also for teachers, who described deep changes in how they planned, taught, collaborated and viewed their professional roles. Reflection was both an organic by-product of the process and a catalyst for deeper professional learning. This gets confirmed by Nxasana et al. (2024).

Regarding the matter of teacher reflection, Kokotsaki et al. (2016) state that it is a core component to ensure successful PBL implementation. It fosters adaptation, refinement and deeper pedagogical insight. Ma (2022) attests that reflection supports professional growth and is readily provoked through collaborative planning and responsive pedagogy. Implementation Science emphasises the role of practitioner learning and feedback in scaling and sustaining educational change (Fixsen, Blase & Van Dyke, 2019).

Three subthemes were identified under this theme, namely professional collaboration, changes in roles, and mindset shift.

4.5.6.1 Professional collaboration

Teachers valued the possibility to reflect and plan together. They shared materials, bounced ideas off one another and assisted each other in modifying PBL activities for their classrooms. Many reported that collaboration became more frequent, meaningful and centred on learner needs.

We plan together every Monday. That helps a lot. I don't think I could do PBL alone. (Teacher 2)

Teacher 4 remarked:

As a stage, we bounce ideas off each other. I've learnt so much from my colleagues this year.

Observation notes confirmed teachers' remarks:

After school, teachers met in the staffroom to discuss timelines for the environment project and collaborate on developing presentation rubrics. (Observation notes, 15 August 2024)

A journal entry in made by the researcher in Term 3 is particularly telling of the progress made in terms of professional development:

The professional dialogue around PBL has matured. It's no longer one advocate anymore — it's the entire stage thinking sideways and helping each other."
(Journal, Term 3)

Collaborative planning builds teacher confidence and consistency in PBL implementation. Voet and De Wever (2017) contend that when teachers share lesson design and reflective discussion, they are more likely to instruct learner-centred approaches such as PBL with fidelity and confidence. Ketelhut et al. (2020) also observe that teachers who receive ongoing peer support and collaborate on problem-solving are more capable of adjusting instructional strategies and sustaining innovation in the classroom. Notably, DeLuca et al. (2019) observe that teacher

collaboration improves instructional decision-making and the ability to design authentic, integrated learning experiences for diverse learners.

Collaboration was also central to both the success and the sustainability of PBL at the research site. Teachers thrived when they knew they were part of a community of professional peers. Implementation Science affirms the need for peer support and collective ownership in achieving sustainable change (Moir, 2018; Curran, 2020). Social Constructivist theory also recognises that teacher learning is built through talk, shared experience and reflection (Sisk et al., 2020).

4.5.6.2 *Changes in role*

Some teachers remarked on how their role in the classroom had shifted. Rather than deliverers of content, they described themselves as facilitators, coaches and learning partners. This shift was challenging at first but as time went on, it became more and more natural as confidence grew. The following extracts support this claim.

I used to control every part of the lesson. Now I sit back and watch them lead—and it works. (Teacher 3)

I still teach, but differently. I listen more, I guide, I ask questions. (Teacher 6)

Teachers quietly sat at the back and took notes while there were Grade 3 project presentations. They commented and asked questions after learners had presented. (Observation notes, 13 June 2024)

What's powerful is how teachers are letting go — allowing learners to struggle productively and take ownership of it. It's a different kind of teaching, but it's paying off. (Journal, Term 2)

The shifting role of the teacher is widely recognised as an essential characteristic of successful PBL implementation. Rather than being traditional instructors, teachers in PBL classrooms take on the role of facilitators, co-learners, and guides, helping learners to navigate difficult tasks, group dynamics, and independent learning habits. Miller and Krajcik (2019) argue that successful PBL teachers create space for learners to take initiative and ownership while, simultaneously, scaffolding their inquiry and thinking. Similarly, Brush and Saye (2017) argue that teachers in PBL classrooms

must balance learner autonomy with strategic guidance, deftly moving between supporting, prompting and observing as learners construct knowledge.

This changed role for teachers was observed during this study; teachers became responsive facilitators, helping learners to reflect, problem-solve and collaborate authentically across disciplines. Teachers demonstrated a clear shift from being the “sage on the stage” to the “guide on the side”. This is a sign of professional identity development and is consonant with the principles of Implementation Science, which view practitioner autonomy as central to lasting change. It is also consonant with Social Constructivist conceptions of learning as a partnership between learner and teacher.

4.5.6.3 Mindset shift

A theme across teacher reflections was a profound shift in mindset—not only in pedagogy but in their understanding of learners and learning. Several teachers said they were hesitant to start using PBL at first, sometimes because they didn't know how to handle open-ended tasks or give up control of the classroom. However, as they became more acquainted with PBL, they began to align with its learner-centred, inquiry-based philosophy.

This fits with findings by Dobson and Dobson (2021) about the way in which teachers are compelled to change their roles. They are not limited to delivering information, but also need to encourage learners to ask questions and develop cognitively through independent actions. Importantly, Moir (2018) notes that teachers start to trust children's abilities to lead their learning in meaningful ways when they start to believe in their agency. According to this study, teachers who were concerned about learner management or inefficiency at the outset of the project's implementation said they felt free and committed again when they noted their learners' increased interest, greater independence, and certainty about guiding their own learning.

“I didn't think the learners could handle so much responsibility, but they surprised me. Now I have more confidence in them.” (Teacher 5)

“I thought projects were just fun extras, but now I see how deep the learning goes.” (Teacher 1)

Teachers who were initially hesitant to engage with PBL were later seen celebrating learner-initiated results and sharing project achievements with peers. (Observation notes, Term 3)

"The transformation I'm witnessing isn't just in the learners — it's in the teachers. Their belief in what learners can do has changed. They're shifting from fear to curiosity." (Journal, Term 3)

A shift in attitude is a common result of prolonged exposure to PBL, as explained by Kokotsaki et al. (2016) when they state that teachers learn to think differently about teaching and learning when exposed to learner-centred approaches. Confirmed by Boyers (2018), teachers who were initially resistant to PBL later found it to be professionally revitalising and transforming. This shift is also supported by IS, which encourages reflective cycles and ongoing learning by those adopting new practices.

Teacher mindset shifts were powerful predictors of professional growth. As confidence increased, so did their willingness to experiment, reflect and release control. This aligns perfectly with IS, where a growth mindset and reflective practice are key to sustainability.

4.6 Overview of key findings

In this chapter, an in-depth qualitative analysis of data, collected through classroom observations, interviews, document analysis, and reflective journaling, was provided. The findings were organised into six broad themes, each of which represented a significant aspect of teachers' experiences of PBL in the Foundation Phase. Collectively, these findings illustrate the complexities, successes and transformative potential of PBL implementation in a South African schooling context.

4.6.1 Key patterns and insights

The initial key observation was that teachers' knowledge and understanding of PBL evolved over the period. Initially, PBL was considered an activity-based methodology, but with practice and reflection, the teachers began to create more intentional, learner-centred projects. This finding aligns with those of Kokotsaki et al., (2016) who emphasised that teacher understanding is developed through continuous practice and collaboration.

The second theme illustrated how PBL practice changed teaching from instruction to facilitation. Teachers explained how they moved incrementally toward scaffolding learner autonomy, building collaboration, and facilitating inquiry, echoing Ma's (2022) argument that facilitative teaching empowers independent learning and adaptability. Observations illustrated learners responding to these shifts through increased engagement and independent initiative.

Despite progress, implementation issues were prominent. Teachers cited time demands, resource limitations and group dynamics as ongoing concerns. These concerns echo the caution in Boyers (2018) and Son and Penry (2022), who observe that without structural support, PBL might be perceived as time-demanding or difficult to sustain. This affirms Implementation Science's argument that innovation must be sustained at system and operational levels (Fixsen, Blase & Van Dyke, 2019).

One of the principal outcomes was the success of curriculum integration. Teachers were able to align projects with the Annual Teaching Plan (ATP) and to facilitate interdisciplinary learning, validating the view that PBL is not only aligned with curriculum expectations but can enhance cross-subject understanding (Markula & Aksela, 2022).

A fifth insight was in skills development. Learners demonstrated measurable growth in literacy, numeracy, critical thinking and collaborative communication. Teachers noted that this development was more authentic and long-term than in traditional approaches. Research from Kokotsaki et al., (2016) and Ma (2022) supports the view that PBL enhances deeper skills development through engagement in meaningful, real-world tasks.

Finally, PBL stimulated teacher reflection and professional growth. Teachers experienced a change in philosophy, became more confident as facilitators, and engaged in collaborative planning that improved both practice and professional affiliation.

4.6.2 Links to the research questions

At the outset of this chapter, the research questions were restated in Table 1.

The findings are aligned to the primary research question:

What are the lived experiences of Foundation Phase teachers implementing PBL at School A?

Each of the themes represented an element related to teachers' experiences. These include:

- 1) Learning gets adjusted when their roles evolve into becoming facilitators.
- 2) Guide learners and transition classrooms to facilitate collaboration.
- 3) Reframe content and assessment to align with the grade's sub-project under the overarching project "What's worth fighting for?"
- 4) Deal with challenges such as time constraints and specific resource shortages.

The secondary research questions yielded rich insights into teacher experience with PBL at School A. In answering the first question, "How do teachers conceptualise and perceive PBL?", it became apparent that teachers conceptualised PBL as an inquiry-driven, learner-focused method that facilitates critical inquiry, collaboration and application to real-life scenarios. The teachers' perceptions tended to be favourable but varied according to levels of teaching experience, confidence levels, and contextual requirements of each grade level.

When addressing the second question, "How do Foundation Phase teachers plan and implement PBL?", teachers exhibited development in planning collaboratively, aligning with the curriculum and an emerging shift from direct instruction to facilitation. The implementation process necessitated purposeful structuring, frequent team meetings, and an openness to students taking charge of aspects of learning themselves.

To the third question, "What challenges do teachers have with PBL?", several challenges were mentioned. These were time constraints, limited access to resources for hands-on activities, and group dynamics management. Despite these challenges, the teachers manifested resilience and resourcefulness by changing tactics. To conclude, answering the last question, "What pedagogical shifts become apparent among teachers at School A as they teach the 'What is Worth Fighting For?' project?", major changes became obvious. The teachers became more flexible, reflective, and learner responsive. Teachers enhanced cross-curriculum integration and entrusted students with more freedom, acting more as facilitators than content providers. All

these changes came as a result of constant collaboration, reflective practice, and shared commitment to significant learning. There was a clear mindset shift that was observed, with greater reflection, role change and cooperative culture.

4.7 Summary

Chapter 4 provided an analysis of the lived experiences of teachers with PBL in a Foundation Phase classroom. From multiple qualitative data sources, six themes were identified: knowledge of PBL, implementation, challenges, integration with the curriculum, development of skills and teacher development. These findings, as seen through a constructivist paradigm and Implementation Science theoretical framework illustrate that, while PBL results in real challenges, it also promises the potential for both improved learner engagement and teacher transformation.

The chapter concluded that through the aid of collaboration, planning and reflection, PBL is a viable and sustainable pedagogical method in South African primary school classrooms. The next chapter will offer a synthesis of these findings with the broader literature, as well as make recommendations for future research and practice.

Chapter 5: Conclusion, recommendations, and summary

5.1 Introduction

This concluding chapter synthesises the key findings of the study, demonstrating how they address the primary and secondary research questions. The research investigated the experiences of Foundation Phase teachers in implementing PBL at School A, a well-resourced private school in Mpumalanga Province, South Africa. The study was underpinned by Implementation Science (IS), which provided a theoretical lens through which to explore teachers' engagement with PBL as a pedagogical innovation—particularly their collaborative practices, processes of sense-making, and orientation toward learner-centred teaching.

The chapter begins by summarising the main findings in relation to the research aims. It then interprets the significance of these findings within the broader educational context. Thereafter, the chapter discusses the study's limitations and concludes with a critical reflection on the research process, offering insights into the researcher's learning and the potential implications for future practice and research.

5.2 Summary of key findings

Project-Based Learning (PBL) is a learner-centred instructional method in which learners undertake prolonged, authentic tasks that incorporate inquiry, collaboration and real-world problem-solving (Condliffe, 2017). Project-Based Learning (PBL) places the learner as an actor and the teacher as a facilitator, promoting deeper learning through contextual relevance (Govaris & Kaldi, 2012). As a pedagogical approach, PBL disrupts customary practice and necessitates that teachers embrace novel strategies, classroom roles and planning mechanisms.

Situated within the context of IS, PBL can be viewed as an innovative practice that relies on competency drivers, data systems and organisational support to achieve successful and sustainable implementation (Bauer & Kirchner, 2020; Curran, 2020; Sisk et al., 2020). The following major findings arose from the data and are presented according to themes developed in Chapter 4.

5.2.1 Teachers' attitudes and perceptions towards Project-Based Learning

Teachers have varying levels of confidence and willingness to accept PBL. More experienced teachers are more flexible, embracing their new roles as facilitators. For instance, a study by Markula and Aksela (2022) established that teachers with more classroom experience were more capable of utilising PBL and effectively juggling curriculum expectations with learner-led inquiry. Less-experienced teachers, however, may be overwhelmed by PBL expectations. A study by Guo et al., (2020) using a mixed methods approach showed that new teachers have trouble planning for and implementing PBL because they do not have enough time or mentorship to do so. This reiterates the need for extensive professional development. These results confirm that teachers need ongoing training and support to acquire the required skills to use PBL effectively. As Markula and Aksela (2022) suggest, teachers can better handle PBL challenges with the help of systematic collaboration and professional development.

5.2.2 Systematic challenges enacting Project-Based Learning

Teachers reported systemic obstacles such as time constraints, inflexible scheduling and requirements for more resources. The process of mapping project tasks, interleaving across disciplines onto the Curriculum and Assessment Policy (CAPS) outcomes, was especially challenging. These challenges are reflected in research by Guo et al., (2020), who found that the time-intensive nature of PBL, along with curriculum alignment and administrative expectations, significantly constrained implementation across educational contexts. Similarly, Zhou et al., (2012) reported that even in a well-resourced environment, traditional scheduling structure, teacher workload and insufficient planning time pose ongoing challenges to PBL adoption.

Nonetheless, teachers in the current study were reactive. Regular weekly planning meetings became the arena for co-developing project tasks, re-tuning objectives and exchanging classroom experiences. In doing so, this practice embodies the organisational drivers of IS, where scaffolding structures accelerate implementation through feedback and alignment (Bauer & Kirchner, 2020). The culture of collaboration enabled the teachers to blunt some of these systemic obstacles, confirming Sick's

(2020) reflection that shared leadership and distributed planning substantially enhance schools' implementation reliability.

5.2.3 Evidence of learner growth and engagement

Learners involved in PBL exhibited greater agency, creativity and collaboration. One such exemplary instance was Grade 3 mock elections project, where the learners took it upon themselves to design campaign material, author persuasive speeches and create electronic presentations. "I saw the learners taking pride in their work, which to me was so exciting and pleasing," remarked Teacher 6.

These observations resonate with research findings from recent literature. According to Condliffe (2017), Project-Based Learning enhances learner engagement by situating learning in authentic, real-world contexts that are meaningful to learners. Also, Krajcik and Miller (2019) posit that PBL deepens engagement and incubates essential 21st-century skills. Moreover, Wurdinger and Qureshi (2015) found that when learners are given ownership of their learning through extended projects, they exhibit increased motivation, deeper cognitive involvement, and emotional investment in the learning process. From an IS perspective, this is an essential but indirect implementation outcome, reflecting the beneficial effect of high-fidelity delivery on learner performance and well-being (Fixsen, Blase & Van Dyke, 2019).

5.2.4 Feedback loops and reflective practice

One of the most effective enablers in this study was the deliberate use of feedback loops. Teachers met weekly to reflect on prior project phases and make adaptations in real-time. As Teacher 2 explained, "*We met every Monday to reflect on the tasks of last week and adjust the next phase accordingly.*" These practices reflect the Plan-Do-Study-Act (PDSA) cycles at the heart of IS (Bauer & Kirchner, 2020; Damschroder et al., 2022).

The ability to gather implementation data and react to it in real time enabled teachers to tune their methods and improve learning outcomes. Teachers also used reflection journals and peer discussion, fostering professional self-awareness and growth. These mechanisms are vital to long-term innovation sustainability (Sisk et al., 2020)

and reflect Wenger's (2014) concept of communities of practice, whereby collective reflection gives rise to practice change.

5.2.5 Collaborative culture and professional learning

A salient theme emerged across all stages: the development of a collaborative professional culture. Teachers engaged in co-planning, co-teaching and peer preview practices that enriched individual and collective knowledge of PBL. These communities of practice were not only support groups but also rich sources of innovation and co-creation. This aligns with the implementation team concept suggested by Fixsen et al., (2019) and echoed in more contemporary literature (Curran, 2020; Sisk et al., 2020), which suggests collaborative structures as a cornerstone of sustainable practice change. The evidence affirms that implementation is not a task of individual capacity but of collective system strength and purpose.

5.3 Theoretical contributions

The research contributes to the growing body of literature on the implementation of innovative pedagogies by drawing on IS as a theoretical framework in a Foundation Phase context. The research's analytic foundations and primary findings were forged through the application of IS, which provided a pragmatic and system-focused lens to examine how PBL was implemented in a real-world school environment (Bauer & Kirchner, 2020; Curran, 2020; Sisk et al., 2020).

Building on this foundation, constructivist learning theory was used to frame PBL as an inquiry-based, learner-centred pedagogy. Real-world related projects—such as the Grade 1 hydroponics, and Grade 2 composting ones—served as examples that fostered collaboration, critical thinking, and knowledge construction. These outcomes resonate with Dewey's foundational views on experiential learning, and are reinforced by contemporary studies highlighting PBL's role in deepening learner engagement and skill development (Condliffe, 2017; Nxasana et al., 2024).

Beyond supporting existing theoretical perspectives, the research offers new insight into how constructivist ideas can be actualised within modern classrooms when supported by systemic planning and resource alignment. The integration of CAPS-

aligned learning outcomes with open-ended tasks illustrates that curriculum compliance and learner-centred pedagogy can co-exist—a view supported by Markula and Aksela (2022) and Ramnarain (2018) who argue for more flexible, inquiry-driven curriculum integration.

In addition to reinforcing constructivist-informed practice, the investigation makes a meaningful contribution to the field of Implementation Science, particularly its relevance to early childhood and pedagogical innovation. Implementation Science provides the conceptual levers needed to understand the systemic conditions required for high-quality PBL implementation—especially the interaction between competency drivers (e.g., teacher development), organisational supports (e.g., collaborative planning), and feedback mechanisms (e.g., reflective meetings and structured review sessions) (Nilsen, 2015).

Findings show that long-lasting changes in education depend on both new ways of teaching and strong systems for putting those changes into action that can support long-term consistency and flexibility (Bauer & Kirchner, 2020; Sisk et al., 2020). The Plan-Do-Study-Act (PDSA) cycles of IS are shown in action by teachers' use of weekly planning meetings, reflective discussion, and adaptive task cycles (Nilsen, 2015). These made it possible to respond quickly to learners' needs and better match up with what was expected in the curriculum, which are two important parts of high-fidelity implementation (Fixsen, Blase & Van Dyke, 2019).

Moreover, the findings illustrate IS's potential to bridge the longstanding theory-practice gap in schools. Innovative practices like PBL are able to thrive when leadership, team-based support, and data-informed reflection work together. This supports recent work by Moir (2018) and Bauer et al. (2020), who call for implementation approaches that are tailored to complex school settings.

The theoretical contribution also extends to how pedagogical and systemic theories can be synthesised. While constructivist concepts offer a compelling rationale for PBL's learner-centred design, IS provides the structural blueprint for embedding and scaling these practices across diverse educational contexts (Bauer & Kirchner, 2020; Markula & Aksela, 2022). Instead of seeing theory and practice as two separate areas,

this research backs up calls for frameworks that bring them together in a way that is both philosophically sound and useful in real life (Fullan, 2015).

The study adds to the body of research that connects theoretical frameworks with real-world applications by showing how IS principles helped with collaborative planning, adapting lessons, and building teachers' skills during the implementation of PBL. This has important implications for teachers, school leaders, and policymakers who want to make innovations that will last in early childhood education.

5.4 Recommendations

5.4.1 Teacher professional development on how to implement PBL

Teachers play a central role in the effective implementation of project-based learning (PBL); their professional support or resistance significantly influences the success of pedagogical change. PBL requires a methodological shift in which learners no longer passively receive knowledge but actively construct meaning through engagement, inquiry, and reflection.

Teacher training and ongoing scaffolding should prioritise equipping teachers with strategies to shift both their pedagogical thinking and classroom practices. For PBL to be successful, teachers must adopt the role of facilitators, enabling learners to take greater ownership of their learning. This pedagogical shift can—and should—be integrated into subject-specific training. For instance, during a recent Grade 3 mock electoral event, teachers emphasised the importance of clear, direct initial instruction followed by gradually reduced support.

Moreover, teachers require guidance on how to foster critical thinking and problem-solving across interdisciplinary projects, ensuring that learners engage with relevant, meaningful tasks. Such professional development must be practical, context-sensitive, and sustained over time if PBL is to take root in South African classrooms.

Interdisciplinary integration is another important area for in-service professional training. Teachers need to be prepared in the design and implementation of projects emanating from various disciplines, such as the Grade 1 hydroponic and Grade 2 composting projects. These projects connect science, mathematics, and language

skills and show how real-life tasks have been executed to drive learning outcomes and develop collaboration and creativity. Training sessions must have hands-on opportunities for teachers to design and test interdisciplinary projects in line with curriculum goals.

Reflective practice remains key to a culture of lifelong learning and continuous professional development. Professional Learning Communities (PLC) can be created to facilitate co-created solutions to problems by sharing experiences. Professional Learning Communities facilitate collaborative learning by providing spaces where stakeholders, specifically teachers, continuously improve their strategies. Given that teachers have to make pedagogical shifts; PLCs also offer opportunities to provide support to those teachers who are inexperienced or hesitant to change. The use of the model introduced within this presentation for weekly planning shows exactly how a reflective practice within the teacher could unpack that complicated nature of PBL practice for learning improvements.

5.4.2 Collaborative planning frameworks and resource allocation in schools

Schools play a critical role in sustaining the practice and long-term implementation of PBL. This includes creating an environment that enables collaboration, fosters supportive professional relationships, and ensures access to the necessary resources. Structured collaboration—particularly in the form of collective planning—emerged as a key mechanism for developing project plans. Teachers were able to align these projects with curriculum objectives through shared decisions on resources and instructional strategies.

Regular meetings, often held weekly during the course of this study, served as reflective spaces in which teachers engaged in collegial dialogue about their experiences with PBL. These sessions enabled educators to adapt their instructional practices, address emerging challenges and refine their approach within a collaborative professional setting. Such sustained collaboration fosters a culture of shared responsibility, which is vital for the success of interdisciplinary and learner-centred teaching practices.

Another critical factor in sustaining PBL relates to resource allocation. Many PBL activities require equipment and materials that may be beyond the reach of the average public school. For instance, a project combining hydroponics and a mock election would require both scientific apparatus and digital tools to support authentic, real-world learning. It is therefore essential that schools invest in the resources necessary to implement PBL equitably, rather than placing the burden on individual teachers to procure materials. Adequate and equitable resourcing is a foundational requirement for ensuring that PBL can be implemented effectively and sustained over time.

5.4.3 Leadership support essential for an innovative culture

Innovation in schools requires school leaders to incentivise teachers by considering PBL as a learner-centred approach. This is facilitated by allowing time and flexibility for designing and implementing projects. Leadership support can also extend to organising professional development opportunities, recognising teachers' efforts in adopting innovative practices, and solving the systemic challenges of rigid schedules or resource constraints. In so doing, schools create a protective environment that will allow teachers and learners to invest fully in PBL.

Policymakers surely do play a leading role in determining the structural possibilities of PBL. For example, flexibility in curriculum guidelines needs to be allowed so that interdisciplinary and project-based approaches can be possible. Current curricula too often stick to rigid, subject-specific attainment targets that allow little scope for large-scale, real-world projects relevant to learners. Policymakers should revise these to accommodate the adoption of inquiry-driven, practical activities in line with attaining academic targets while developing essential 21st-century skills.

Interdisciplinary approaches, for example, composting and hydroponics projects developed in this research, demonstrate ways in which this might be possible. The second recommendation involves supporting innovative policy frameworks for encouraging innovation. Policymakers should invest in funding teacher training programmes, professional development, and resources for schools that are already practising PBL. This ensures that teachers have the necessary tools, knowledge, and support to actualise these learner-centred approaches.

Additionally, policies should foster enabling environments for schools to establish planning frameworks – such as the weekly sessions that this study profiled – whereby teachers are allowed to design and iterate on projects collaboratively. The realignment of assessment techniques in concert with PBL principles will now be paramount for assessment reform. Traditional assessment fails to capture fully the richness of learning gained through such projects.

Authentic performance-based evaluation methods, such as the use of artefacts, presentations, and reflective portfolios, are encouraged by policy to showcase learner creations. Such techniques have proven better indicators of learners thinking more critically, solving problems, and applying their knowledge in a relevant context. Policymakers can revise assessment frameworks to better support wider adoption of PBL and to accurately measure and recognise its benefits.

5.5 Limitations of this study

This study extracted invaluable insights about the implementation of PBL. However, given its specific focus and being a case study, the limitations must be acknowledged.

The longitudinal nature of the data enriched the findings by giving an in-depth insight into how the process of PBL implementation evolved over time (Terms 2–4). The qualitative case study approach allowed for detailed and rich data to be collected but had limitations in terms of generalisability. For instance, the small sample size from just one well-resourced private school limits the generalisation to any other school contexts, especially under-resourced schools within South Africa.

Furthermore, relying on self-reported data from interviews and open-ended questionnaires may create the potential problem of response bias, with the participants describing experiences that are portrayed to be more positive than they have been in practice. This, however, is limited, with the use of observations as complementary data to observations that allow the research process to be performed on a fairer level about an understanding of how PBL has been used.

5.5.1 Researcher bias

Another possible limitation is researcher bias, as the researcher was also an implementer of PBL at the research site, but notably not in the foundation phase. A

dual role played by the same person may lead to biases during the interpretation of data, as the closeness of the researcher to the context may result in subjective analysis. This was minimised through data triangulation, whereby data was sourced from multiple sources, including classroom observations, interviews, and a review of the artefacts produced by the learners. However, the possibility of any omissions of this nature cannot be totally ruled out.

5.5.2 Other contextual limitations

The study's data collection was limited due to the time required to obtain ethical clearance, which reduced the opportunity to fully account for the longitudinal effects of PBL on teachers and learners. Additionally, the structured school timetable constrained the number of extended interdisciplinary projects, highlighting the need for more flexible scheduling to accommodate the full potential of PBL.

5.5.3 Resource limitations

While the school in this study was well-resourced, the resourcing of specific project-related tasks, such as the science kits required for hydroponics or the necessary digital tools to support student campaign presentations, was at times insufficient. In some cases, this meant teachers had to think on their feet and make adaptations to plans; this underlines the consistent provision of resources as crucial to guaranteeing equitable participation and the sustainability of PBL practices.

5.6 Future research

The potential of PBL to transform educational practices in the Foundation Phase has been identified in this study, but further research is needed regarding its broader application and longer-term impact. Among the issues that future research might explore is the scalability of PBL in under-resourced schools. It is also envisioned that research will explore how PBL can be adapted to contexts with limited access to materials, technology, and professional development by identifying strategies needed to overcome systemic challenges like time constraints and curriculum rigidity.

Equally worthy of future research is the integration of digital tools within PBL. In a world where digital literacy has joined the ranks of other 21st-century skills, studies could focus on how technology enhances PBL experiences, especially for remote or blended

learning environments. For example, how are digital platforms used to support collaborative planning, virtual project presentations, and engagement among learners? Such studies would be instrumental in informing developments in the modernisation of PBL methodologies.

Longitudinal studies will also be very useful in exploring the long-term effect of PBL on learners' critical thinking and socio-emotional skills. That would have gone a long way in showing just how PBL affects the preparedness of the learner for later educational and vocational challenges. Comparison studies across diversified private and public schools may illuminate contextual factors influencing the effectiveness and scalability of PBL.

5.7 Conclusion

This study emphasises the significant potential of Project-Based Learning (PBL) to transform learner-centred education by fostering meaningful engagement and equipping learners with skills relevant to the demands of the 21st century. Core competencies such as critical thinking, collaboration, creativity, and communication are highlighted as essential for preparing learners to function effectively in an increasingly complex and rapidly changing world, where they must solve real-world problems.

The findings position PBL as a powerful pedagogical approach for addressing persistent inequalities in the South African education system. By promoting active participation and contextualised learning, PBL holds promise as a motivating and inclusive strategy for advancing equal learning opportunities and contributing to broader societal progress

This study adds to the growing body of evidence that presents PBL on a global level as an approach rather than a mere pedagogical method; it is the pathway to innovation in education. It confirms the value of PBL in improving learner outcomes, as well as some concrete strategies for tackling the challenges of PBL. It is through promoting reflective practice, nurturing collaboration, and ensuring systemic support that teachers and policymakers can draw upon the full potential of PBL in service of improved educational quality in South Africa and beyond. It thus places a responsibility

on this study to call for a collective commitment to the reimagining of education: one in which learners would actively own their learning, since teachers would be empowered to serve as facilitators. Moreover, schools would become dynamic spaces for curiosity, inquiry, creativity, and growth, thereby preparing learners for the 21st-century.

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7 Appendices

7.1 Appendix A: Ethical clearance letter



Prof HF Israel
Dean: Faculty of Education
Siyabuswa Campus

27 May 2024

Dear Ms AS Nkosi,

Protocol Reference Number: UMP/NKOSI202078809/SECE/ MED/2023

**Project Title: EXPERIENCES WITH PROJECT-BASED LEARNING IN THE FOUNDATION PHASE
AT A SOUTH AFRICAN SCHOOL: A DESCRIPTIVE CASE STUDY**

Approval Notification: In response to your application received in 2023, The Faculty of Education Research Ethics Committee has considered the above-mentioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interviews Schedule, Informed Consent form, Title of the project, Location of the study, Research Approach and methods must be reviewed and approved through the amendment/ modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be stored securely in the School/division for a period of 5 years.

The Ethical Clearance certificate is only valid for a period of 3 years from date of issue. Thereafter, Recertification must be applied for on an annual basis.

Wishing you the best with your study.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'H Israel', written over a horizontal line.

Prof H Israel: Dean on behalf of SEC (Chair)

Cc: Research Office Administrator:

Cc: Faculty Research Committee Chair: Prof HF Israel

DECLARATION OF INVESTGATOR (S)

I/We fully understand the conditions under which I am/we are authorised to carry out the abovementioned research and guarantee to ensure compliance with these conditions. I agree to completion of a yearly progress report.

A handwritten signature in black ink, appearing to read 'AS Nkosi', written over a horizontal line.

Signature

30 May 2024

Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

7.2 Appendix B: Interview questions

Grade Teachers:

- 1) How do you introduce PBL to young learners?
- 2) What strategies do you use to keep Grade 1 learners engaged in PBL?
- 3) How do you support learners who struggle with PBL activities?
- 4) How do you integrate play-based learning with PBL?
- 5) How do you assess early literacy and numeracy skills within PBL projects?
- 6) Can you share an example of a successful PBL activity for Grade 1?
- 7) How do you communicate the PBL process and outcomes to parents?
- 8) What resources are most helpful for implementing PBL in Grade 1?
- 9) How do you manage classroom behaviour during PBL activities?
- 10) What professional development in PBL has been the most beneficial for you?

7.3 Appendix C: Final interviews with teachers

Purpose: To gather final reflections on the PBL experience, understand the overall impact on teaching and learning, and identify lessons learned.

- 1) Reflecting on your overall experience, how effective do you think PBL has achieved its intended outcomes?
Follow-up: Can you provide specific examples of successes?
- 2) What were the biggest challenges you faced throughout the PBL implementation?
Follow-up: How did you address these challenges, and were those strategies effective?
- 3) How do you feel about your professional growth due to implementing PBL?
Follow-up: Have you noticed any changes in your teaching philosophy or methods?
- 4) What feedback have you received from learners about PBL?
Follow-up: How has this feedback influenced your approach?
- 5) What recommendations would you make to other teachers considering implementing PBL?

Follow-up: What are the key lessons or takeaways you would share?

6) How do you see the future of PBL in your classroom or school?

Follow-up: Are there specific changes you would like to make in how PBL is conducted?

Interviewer: _____

Interviewee: _____

Venue: _____

Time: _____

7.4 Appendix D: Questionnaires

Questionnaire Form

Instructions

Please rate the following statements based on your level of agreement using the scale below. Write your response in the space provided after each question.

- 1) Strongly Agree (5): You completely agree with the statement.
- 2) Agree (4): You mostly agree with the statement.
- 3) Neutral (3): You neither agree nor disagree with the statement.
- 4) Disagree (2): You mostly disagree with the statement.
- 5) Strongly Disagree (1): You completely disagree with the statement.

Questionnaire

1. How would you rate the improvement in learners' engagement?

Answer: _____

2. To what extent does PBL foster critical thinking among learners?

Answer: _____

3. How sufficient were the resources available for implementing PBL?

Answer: _____

4. How would you describe the level of planning support you received from colleagues?

Answer: _____

5. How supportive was the administration in facilitating PBL implementation?

Answer: _____

6. How well did learners demonstrate teamwork skills during PBL activities?

Answer: _____

7. How adequate was the training provided to support PBL implementation?

Answer: _____

7.5 Appendix E: Observation form

PBL Classroom Observation Form

Observer's Name: _____

Date of Observation: _____

Time of Observation: _____

Class/Group: _____

Number of Learners: _____

Teacher's Name: _____

1. Learner Engagement and Participation

1) Level of Engagement:

- a. High: learners are actively participating, asking questions, and showing enthusiasm.
- b. Moderate: Some learners are engaged, while others are passive or distracted.
- c. Low: Most learners appear disengaged, bored, or off-task.

2) Specific Behaviours Observed:

- a. learners asking questions.
- b. learners volunteering answers or ideas.
- c. learners discussing with peers.
- d. learners using materials or resources effectively.

3) Comments/Examples

Example: Learner A frequently raised hand to ask questions about the project's next steps.

2. Teacher Facilitation and Instructional Strategies

1) Instructional Techniques Used:

- a. Open-ended questioning.
- b. Providing feedback and guidance.
- c. Encouraging learner autonomy.
- d. Managing group dynamics.

2) Teacher's Interaction with learners:

- a. One-on-one guidance.
- b. Small group facilitation.
- c. Whole class instruction.
- d. Minimal intervention, allowing learner independence.

3) Comments/Examples:

The teacher guided Group 2 through a conflict by asking them to each share their point of view.”)

3. Collaboration and Teamwork Among Learners

1) Group Dynamics Observed:

- a. Equal participation among group members.
- b. One or more learners dominating the group.
- c. Clear communication and sharing of ideas.
- d. Evidence of conflict and resolution.

2) Collaboration Strategies Used:

- a. Role assignment within groups.
- b. Peer feedback and support.
- c. Group decision-making processes.
- d. Lack of cooperation or involvement.

3) Comments/Examples:

Group 3 assigned specific roles, which improved efficiency and reduced confusion.

4. Problem-Solving and Critical Thinking

1) Evidence of Problem-Solving:

- a. Learners generating multiple solutions.
- b. Learners experimenting with different approaches.
- c. Reflecting on mistakes and adjusting strategies.
- d. Seeking feedback to improve work.

2) Critical Thinking Behaviours

- a. Questioning assumptions.
- b. Making connections between ideas.
- c. Evaluating the validity of information.

- d. Applying knowledge in new contexts.

3) Comments/Examples

Learners in Group 1 brainstormed three different methods to test their hypothesis before selecting one.”

5. Creativity and Innovation

1) Creative Approaches Observed

- a. Use of unique or original ideas.
- b. Application of creativity in project design or presentation.
- c. Integration of multiple perspectives or discipline.
- d. Limited or no evidence of creative thinking.

2) Innovative Problem-Solving

- a. learners developing new tools or methods.
- b. Combining existing ideas in novel ways.
- c. Overcoming challenges creatively.
- d. Relying on conventional methods.

3) Comments/Examples

Group 2 used digital animation to present their findings, which engaged their peers effectively.

6. learner Autonomy and Independence

1) Level of learner Autonomy

- a. High: learners make independent decisions and manage their own tasks.
- b. Moderate: learners require some guidance but show initiative.
- c. Low: learners rely heavily on teacher direction.

2) Examples of Independence

- a. learners leading their own group discussions.
- b. Self-directed research and information gathering.
- c. Time management and task allocation within groups.
- d. Hesitancy or dependence on the teacher for direction.

3) Comments/Examples

Learners in Group 4 set their own goals and deadlines for the week’s tasks.

7. General Observations and Reflections

1) Overall Impressions of the Session

- a. Positive: High levels of engagement and collaboration observed.
- b. Mixed: Some areas of strength, but notable challenges.
- c. Negative: Significant issues with engagement or behaviour.

2) Reflections on PBL Effectiveness

- a. Example: "The session demonstrated how PBL can enhance critical thinking, but there is a need for more structured guidance on teamwork skills."

3) Suggestions for Improvement

- a. Example: "Providing clear guidelines for conflict resolution might help groups handle disputes more effectively."

Observer's Signature: _____

Date: _____

7.6 Appendix F: Teachers' consent forms

Consent - Ethical Clearance for Teachers

Dear [Prospective Participant – personalised name],

You are invited to participate in an exploratory case study investigating the implementation of project-based learning (PBL) in the foundation phase of School A in the Mpumalanga province of South Africa. This research aims to explore the attitudes and perceptions of foundation phase teachers towards the PBL strategy, their planning and designing of PBL projects, the factors that influence PBL implementation, and the experiences of both teachers and learners in PBL projects.

Your participation in this study is voluntary and not coerced, and you have the right to withdraw from the study at any stage without penalty or interference. Furthermore, you have the right to refuse to answer any questions you deem overly invasive or that you do not feel comfortable answering. Your responses to the research will remain anonymous and confidential and stored securely. Confidentiality will be ensured by storing the research results in password-protected folders for the duration of the analysis period and access only to the research team. The school's name will not be mentioned in reports or publications resulting from this study.

While no direct benefits can accrue from participating in this study, your input and feedback could improve PBL teaching methodologies and eventually inform future policy-making. The study's expected outcomes will contribute empirical knowledge on the PBL implementation in South African schools, offering pathways and lessons learned, mainly influencing relevant education systems and stakeholders. However, there are no foreseeable known or hidden risks or harms in participating in this study, and any potential risk will be minimised using ethical research guidelines. Please note, there is no penalty for not participating in this study.

By participating in the study, you acknowledge that you have understood the research intent, the process, no risk assessment, and ethical clearance of your participation in this study. The Principal Investigator or the research team members will answer any

questions you might have relating to the research study. We appreciate your time and effort in helping us carry out this important study, and we assure you of the confidentiality of all the data gathered from this study.

Please sign this letter to indicate your consent for participation and return it to the research assistant before the study begins.

Signed: _____

Date: _____

7.7 Appendix G: Learner assent forms

Form for Learners

Header: Research Permission Form for Learners

Dear learner and Parent/Guardian,

We are conducting a research project on project-based learning (PBL) in the foundation phase and invite your participation. Please read and discuss the following information before deciding whether to take part. Remember, your participation is completely voluntary.

Please colour this emoticon green



if you agree this emoticon red



if you don't agree.

Participation:

I, [Learner's Name], can choose whether or not to take part in this research project. It is up to me, and I won't be forced to participate.

No Harm:

Taking part in this research project will not hurt or harm me. The activities involved will be safe and enjoyable.

Right to Withdraw:

I can change my mind and stop participating in the research project at any time. Even if I already agreed, I can still say "no" later without any negative consequences.

Confidentiality:

The information I provide will be kept private and confidential. My name and personal details will remain secret. The research data will only be used for the study and reported anonymously.

Involvement Details:

My involvement will include:

Being observed during the PBL project.

Researchers looking at documents related to the project, like my work or presentations.

Overall findings are being shared without mentioning me specifically.

By signing this permission form, I confirm that I have understood the information provided above. I agree to participate in the research project voluntarily.

Do you agree to take part in this research?



yes

or



no

Parent's signature: _____

7.8 Appendix H: Editor's certificate

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28 January 2025

To whom it may concern

This letter serves to confirm that the following text was edited:

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PHASE AT A SOUTH AFRICAN SCHOOL: A DESCRIPTIVE CASE STUDY**

The onus rests on the client(s) to work through the proposed track changes, and to accept or reject proposed changes. Clients may still decide to make changes to the content after the editing process. Clients must also make certain that all sources/references have been cited.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Kellie Steinke', with a horizontal line underneath.

Dr Kellie Steinke

7.9 Appendix I: Turnitin report

Nkosi A

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