Exploring learners' reading ability in Mathematical Literacy in Eden and Central Karoo district

by

LAROCHELLE MC KIRBY VAN DER WALT
24151750

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SUPERVISOR: Prof. Cedric Bheki Mpungose

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DECLARATION

Name: Larochelle Mc Kirby van der Walt

Student number: 24151750

Degree: Masters of Education

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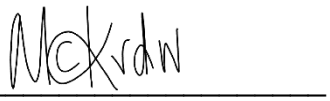

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L. Mc Kirby van der Walt

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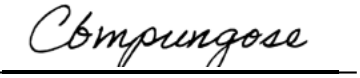

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Exploring learners' reading ability in Mathematical Literacy in Eden and Central Karoo district

KEY TERMS:

Mathematical Literacy, Reading Ability, Comprehension, Word Recognition, Reading Fluency, Decoding, Scarborough's Reading Rope, Further Education and Training, Academic Achievement, Socioeconomic Status, Home Literacy Environment, Real World Context.

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ABSTRACTS

This study explored the impact of learners' reading ability on their performance in Mathematical Literacy (ML) within the Further Education and Training (FET) phase in the Eden and Central Karoo Education Districts of the Western Cape, South Africa. Reading ability, comprising recognition, comprehension, and fluency, is critical for learners' understanding of ML concepts presented. A qualitative research design was employed to gain an in-depth understanding of the phenomenon. Purposeful sampling identified educators with extensive experience and innovative teaching practices in ML. Data were collected through reflective activities and semi-structured interviews, conducted primarily electronically and via telephone due to geographical constraints.

The findings indicate that weak reading comprehension significantly hinders learners' ability to interpret and respond to ML questions, with recognition and fluency further influencing performance, reflecting the literature on reading ability and aligning with Scarborough's Reading Rope, which delineates how decoding and language comprehension interact to shape overall reading proficiency. Educators reported that learners often struggle with multi-step word problems, misinterpret key terms, and overlook punctuation cues, which negatively affects accuracy and efficiency. The study also highlighted the effects of micro- and macro-level factors, as well as limited reading practice outside school. These factors further constrain learners' ability to engage meaningfully with ML tasks.

The results underscore the need for targeted interventions that strengthen reading skills alongside ML instruction. Strategies such as explicit teaching of mathematical vocabulary, guided reading of word problems, and fluency-building exercises were recommended. While the study's scope was limited to a specific district and subject, it provides a context-rich understanding of how reading ability intersects with ML performance. These insights contribute to curriculum planning, teaching practices, and professional development aimed at enhancing learner outcomes in Mathematical Literacy.

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List of Abbreviations

BOT – Back on track

CAPS – Curriculum and Assessment Policy Statement

DBE – Department of Basic Education

ECKED – Eden and Central Karoo Education District

FET – Further Education and Training

HL – Home Language

LOLT – Language of Learning and Teaching

ML – Mathematical Literacy

NSC – National Senior Certificate

PLC – Professional Learning Community

PIRLS – Progress in International Reading Literacy Study

SASE - South African Systemic Evaluation

SBA – School Based Assessment

CHAPTER 1:
INTRODUCTION TO THE STUDY: OVERVIEW, CONTEXT AND OBJECTIVE

1.1 INTRODUCTION

This study aims to determine the effect that reading ability has on learners' achievement in Mathematical Literacy (ML), or whether such an effect exists at all. By exploring this relationship, the study seeks to contribute to the ongoing improvement of teaching and learning strategies, with the goal of enhancing learner outcomes in ML. The ultimate objective is to support both educators and learners in achieving better academic performance through informed intervention and pedagogical practices.

The purpose of this chapter is to introduce the study by presenting the research title and providing the background and context that lay the foundation for the investigation. It then explores the problem statement, research focus, purpose, location, rationale, and significance of the study. The chapter further includes a preliminary literature review and outlines the theoretical framework that underpins the research. Additionally, it discusses the research methodology and design, followed by the data generation methods, the approach to data analysis, ethical considerations, and a brief overview of the structure of the chapters that follow.

1.2 TITLE

Exploring learners' reading ability in Mathematical Literacy in Eden and Central Karoo District.

1.3 BACKGROUND

Both international and local studies consistently show a strong correlation between reading ability and learners' academic performance. Espin and Deno (1993) first established this relationship, and further research by Cromley (2009) among secondary school students in the United States confirmed a significant link between reading comprehension and subject-specific proficiency. More specifically, in the context of this study, reading ability has been shown to influence mathematical performance. In Finland, learners' problem-solving skills were found to be directly

impacted by their comprehension abilities, with stronger reading skills correlating with greater success in solving word-based problems (Cimmiyotti, 2013). These findings are echoed in a range of international and African studies, including those by Vilenius-Tuohimaa et al. (2008), and are particularly relevant to the South African and Western Cape education context.

Several systemic reports have examined literacy levels across Africa. The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) report (2010) documented widespread poor reading proficiency among learners. On a global scale, the Progress in International Reading Literacy Study (PIRLS) benchmarks reading performance across countries. Locally, the South African Systemic Evaluation (SASE) monitors learner achievement in literacy and numeracy across selected grades through nationally administered, sample-based assessments aimed at evaluating the performance of the education system rather than individual learners. The Western Cape Education Department's (WCED) LitNum Strategy further recognises that a lack of literacy skills is a global challenge (DoE, 2006), while emphasising that South Africa remains "amongst the lowest performers" (p. 16). Collectively, these reports and strategies reflect both acknowledgement of the literacy crisis and a commitment, both internationally and provincially, to address its underlying causes.

Reading fluency and comprehension are essential to learner success. Murray (2016) argues that effective word recognition ought to occur both effortlessly and automatically. When excessive cognitive effort is required to decode individual words, less mental capacity remains for comprehension. While word recognition may seem instantaneous, it still requires the brain to process each letter and recognise familiar word shapes. Errors in spelling or structure often interfere with this process by disrupting visual patterns. Beyond decoding, comprehension proves central to reading proficiency, since it enables learners to extract meaning from text, make inferences, and apply information in problem-solving contexts. As Cimmiyotti (2013) and Hall and Barnes (2017) affirm, reading is a learned skill. Learners who lack comprehension cannot independently access information, which hinders academic success. This challenge is particularly visible in Mathematical Literacy (ML), where learners may understand calculation methods, but cannot identify relevant information within word

problems. Iheakanwa et al. (2021) defines reading as involving both decoding and meaning-making processes, simultaneously extracting and constructing meaning from text. This is further supported by Pretorius (2022), who emphasises accessing and interpreting information as the key components of reading. These competencies align with the Department of Basic Education's Curriculum and Assessment Policy (CAPS), which prioritises the skills of deciphering, interpreting, and analysing written information (DBE, 2022).

Reading ability is shaped by several contextual factors, including socio-economic conditions, caregiver literacy levels, and the quality of teaching during early development and current instruction. While examination strategies may help learners temporarily navigate challenges, they cannot fully compensate for underdeveloped comprehension skills. Hall and Barnes (2017) suggest that reading is a talent, a view contested by Lems and Miller (2010), who argue that reading is a teachable skill. With appropriate instruction and consistent practice, reading strategies can be both developed and refined. Despite numerous policies and interventions, many South African learners, particularly those in rural areas, continue to perform poorly in ML. This highlights a critical gap between learners' conceptual knowledge and their ability to access and apply it through reading, interpretation, and problem-solving.

1.4 FOCUS AND PURPOSE OF THE STUDY

The primary focus of this study is to explore the relationship between learners' reading ability and their achievement in ML, with specific attention paid to the challenges faced by learners in understanding word-based mathematical problems. The study aimed to determine whether and how reading comprehension affected learners' ability to interpret, extract, and apply information in ML tasks. In doing so, it sought to contribute to a deeper understanding of the link between language proficiency and mathematical performance. The ultimate purpose of this was to inform the development of effective teaching strategies and intervention programmes that could help bridge the gap between learners' conceptual knowledge and their ability to access and apply this knowledge through reading. By highlighting the role of reading in ML, this study hoped to support both educators and curriculum planners in improving learner outcomes, particularly among learners who struggled with comprehension of questions, annexures of real-life contexts, tabled or graphed information.

1.5 LOCATION

This study was situated in the Western Cape, within the Eden and Central Karoo Education District, which comprised predominantly rural school areas, but also included urban schools. The participating schools represented a range of contexts, from under-resourced to more adequately resourced and functioning institutions. Similarly, the learners came from diverse household and community backgrounds, which varied in terms of socio-economic status and access to academic support. The location was purposefully chosen in order to better understand how contextual factors such as home environments, language use, mixed spoken dialects, and classroom practices influenced learners' ability to comprehend and respond to ML questions. By focusing on this setting, the study aimed to provide insight relevant not only to participating schools, but also to similar educational environments across South Africa.

1.6 RATIONALE

Over the past decade of teaching ML in the Western Cape, particularly within the Eden and Central Karoo Education District, I encountered a recurring challenge among learners, namely: their struggle to comprehend and apply information embedded in contextualised questions. This observation was not unique to my school context, but consistently surfaced in various capacities. I served as a district tutor for the BOT (Back on Track) programme, as a presenter of online intervention classes for both underperforming learners and high achievers, and as a marker of the National Senior Certificate examinations. These experiences led me to observe that many learners' underachievement in ML was not necessarily due to a lack of mathematical ability, but rather, to a deficit in reading comprehension.

ML, by its very nature, demands of learners that they be able to interpret real-life scenarios, extract relevant information, and apply appropriate mathematical procedures to solving these problems. However, when learners misinterpret or overlooked crucial details due to limited reading proficiency, their performance suffers regardless of their ability to perform calculations. This becomes increasingly apparent in exam settings, where learners failed to respond accurately to questions not because they could not do the mathematics, but because they were not able to decode what was being asked of them.

Scholars such as Iheakanwa et al. (2021) argue that poor reading skills were a significant barrier to academic achievement, especially in subjects like ML that required learners to act as “decoders” of information. Similarly, Hall and Barnes (2017) highlighted the integral role of reading in academic success, including higher-order tasks such as studying and analysis. Cimmiyotti (2013) further asserts that reading is foundational to all learning. Thus, it was evident that reading comprehension, rather than fluency or recognition alone, was central to success in ML. My concerns were deepened by socio-economic realities in the district I served, where many learners came from households in which parents had limited formal education, and reading was not a cultural norm. These families often lacked the resources like time, money, or literacy skills to support reading development at home. In many cases, the schools themselves were under-resourced, lacking sufficient textbooks, printed materials, or libraries that promoted independent reading. These contextual factors collectively contributed to the literacy challenges learners faced.

This research was therefore motivated by a desire to validate and explore the correlation between reading ability and learner performance in ML. Investigating the way in which reading challenges manifested in the classroom, and how they impacted learners’ ability to engage with contextualised questions, informs practical pedagogical strategies. Ultimately, this study sought to support both teachers and learners, equipping educators to adapt their instructional methods and assisting learners to overcome reading-related barriers. Such interventions are able to ensure that learners’ results more accurately reflected their mathematical reasoning skills rather than their reading limitations.

1.7 SIGNIFICANCE OF THE STUDY

This study held significance as it aimed to explore the relationship between learners’ reading ability and their performance in ML, as a subject that heavily relies on the interpretation real-life scenarios and extracting relevant information. By identifying whether poor reading comprehension hindered learners’ ability to demonstrate their true mathematical potential, this research sought to inform more effective teaching strategies and intervention programmes. The findings could support educators in adapting their pedagogy to better integrate literacy development within ML instruction, ultimately contributing to improved learner outcomes. Moreover, this study has the

potential to guide policy-makers, curriculum advisors, and educators in addressing literacy challenges that persisted in school contexts similar to that of the Eden and Central Karoo Education District.

1.8 PRELIMINARY LITERATURE REVIEW

Since 2006, learners in the FET phase in South Africa have been able to choose between Mathematics and ML as part of their senior secondary curriculum. The first cohort of Grade 12 learners completed the ML examination in 2008 under the supervision of Umalusi. The introduction of ML was not merely a curriculum diversification, but rather, a targeted intervention aimed at addressing widespread numeracy challenges and underperformance in Mathematics across the country. It was designed to provide learners, particularly those not pursuing mathematically intensive careers, with the skills to engage with numbers and problem-solving in real-life contexts. The subject aimed to cultivate responsible, critically thinking citizens who could apply mathematical reasoning to everyday issues such as finance, measurement, and data interpretation.

Since its implementation, the ML curriculum has undergone several refinements. One of the most significant revisions came in 2020, with the introduction of the Abridged CAPS Section 4. This update reduced the number of School-Based Assessment (SBA) tasks in Grades 10 and 11 and restructured the final examination papers. Previously, learners wrote two papers of varying difficulty. Under the revised model, Paper 1 focused on Finance and Data, while Paper 2 covered Measurement and Maps. These thematic groupings were intended to make assessments more focused and relevant to real-world applications. However, both papers still required learners to read, interpret, and respond to context-rich word problems, which could be especially demanding for those with limited reading proficiency. Despite the non-abstract, context-driven nature of ML, learner performance in the subject often revealed deeper issues related not only to numerical reasoning but also to language processing. Word problems typically required comprehension of complex sentence structures, specific vocabulary, and scenario-based reasoning. As such, learners' ability to read with understanding played a crucial role in their success in ML. Reading ability was not a singular skill, but comprised three interrelated components, namely: word recognition, comprehension, and fluency. Word recognition allowed learners to identify words

quickly and accurately, freeing cognitive resources for deeper understanding. Comprehension involved decoding language and constructing meaning from text, while fluency bridged recognition and comprehension, thereby enabling smooth and efficient processing of information.

Reading researchers such as Perfetti (1985) and Pretorius and Machet (2004) have long argued that difficulties in any of these components could significantly affect learners' academic performance. The well-known Reading Rope model developed by Scarborough (2021) illustrates the way in which various reading subskills work in harmony in order for a learner to read effectively. When one strand proves to be weak, whether vocabulary, syntax, background knowledge, or decoding overall comprehension and problem-solving ability suffered. In the context of ML, this meant that a learner could possess the mathematical ability to perform calculations, but might misinterpret or fail to grasp the question due to reading barriers.

Moreover, these challenges were not uniformly distributed. Learners in rural, under-resourced, and multilingual environments, such as those in the Eden and Central Karoo Education District, often faced added difficulties. Many learners spoke a home language different from the language of learning and teaching (LOLT), which further complicated comprehension. In addition, socio-economic factors such as limited access to reading materials, low parental literacy levels, and inadequate academic support exacerbated poor reading development. These factors contributed to a wider achievement gap and perpetuated inequality in learner outcomes, particularly in subjects like ML, where understanding the context was essential.

Extensive literature supported the argument that reading proficiency underpinned broader academic achievement and was a strong predictor of educational and life success. Studies by Cimmiyotti (2013), Pretorius and Machet (2004) and others highlight the foundational role that reading played in enabling learners to access curriculum content across subjects. When reading difficulties were not addressed early, they could have cumulative effects, particularly in later grades where texts became more complex and examinations demanded deeper understanding and reasoning. Although a substantial body of research understands and examines reading and mathematics as separate domains, and several studies explored the influence of reading comprehension on subjects such as language and science, very

few explicitly investigated the relationship between reading ability and achievement in ML.

A common misconception persists that ML is solely a numeracy-based subject, with insufficient recognition of its strong reliance on language and reading comprehension. As a result, limited attention is given to the extent to which reading ability influenced learner performance in this subject. This indicated a gap in the literature, particularly in relation to how reading difficulties might have affected learners' ability to engage meaningfully with ML tasks, or why such difficulties persisted. This study, therefore, seeks to explore the reading abilities of learners and examine the extent to which these abilities affected their achievement in ML.

1.9 THEORETICAL FRAMEWORK

This study adopted Scarborough's Reading Rope (2021) as its theoretical framework to explore how reading ability influences learners' performance in ML. A theoretical framework offers a structured lens for examining a research problem, connecting the study to established knowledge and guiding analysis and interpretation (Kivunja, 2018). The Reading Rope framework was chosen because it provides a comprehensive model of reading proficiency, demonstrating how multiple interdependent skills combine to support comprehension, an essential foundation for understanding learners' challenges in engaging with ML content.

Scarborough's Reading Rope conceptualises skilled reading as two intertwined strands, viz. language comprehension and word recognition. Language comprehension encompasses background knowledge, vocabulary, language structures, verbal reasoning, and literacy knowledge skills that allow learners to interpret meaning, make inferences, and connect prior knowledge to new information. Word recognition involves phonological awareness, decoding, and sight recognition, which enable learners to read text accurately and fluently. The model highlights that weaknesses in any strand compromise overall reading proficiency, which can directly affect a learner's ability to interpret and solve word-based ML problems. The strength of the Reading Rope lies in its ability to move beyond surface-level fluency to uncover deeper challenges such as limited vocabulary, weak reasoning, or lack of familiarity with text structures (Staake, 2024). This makes it particularly relevant for ML, where

learners often face complex, context-based tasks. In rural and multilingual classrooms, the framework provides a practical and diagnostic tool for identifying barriers to reading that hinder performance. For these reasons, Scarborough's Reading Rope was considered best suited to guide this study, offering a robust and research-based foundation for analysing learner difficulties and informing strategies to strengthen reading support in ML.

1.10 RESEARCH OBJECTIVES

The intended aim of this study was to explore learners' reading ability in ML in the Eden and Central Karoo education District through the following objectives:

- to know ways in which learners' reading ability can affect their achievement in ML;
- to understand the underlying reasons that informs learners' reading ability in ML; and
- to find possible interventions or strategies that can be implemented by the school or teacher to overcome challenges.

1.11 RESEARCH QUESTIONS

In order to guide the study and provide a clear focus for the research, a set of research questions was formulated. These questions are aligned with the central aim of the study, which is to explore how learners' reading ability influences their performance in Mathematical Literacy (ML), within schools in the Eden and Central Education Districts of the Western Cape. The research questions aim to examine the relationship between reading ability and learner achievement in ML, identify factors that influence learners' reading ability, and consider possible strategies that teachers and schools can implement to address these challenges. The main research question and supporting sub-questions are presented below.

1.11.1 Main Question

What are learners' reading ability in ML at Eden and Central Karoo Education District Schools?

1.11.2 Sub-Questions

- How does learners' reading ability effect their achievement in ML?
- What informs or influence learners' reading ability in ML at schools in the Eden and Central Karoo Education District?
- What possible interventions or strategies the school or teacher to overcome challenges can implement?

1.12 METHODOLOGY AND RESEARCH DESIGN

1.12.1 Research Paradigm

This study adopted an interpretive paradigm, which focuses on investigating and understanding the context in which phenomena occur (Gichuru, 2017). Interpretive research is described as a means of exploring the social realities of participants and how they experience their particular contexts or environments, in other words, their realities (Pervin & Mokhtar, 2022). This approach is well-suited for studying human interactions and their surroundings, as it allows researchers to gain insight into participants' lived experiences. In this study, the focus was on ML teachers in schools within the Western Cape, who shared similar realities regarding the impact of learners' reading abilities on their performance in the subject. The interpretive paradigm views each "social world" as unique (Al-Ababneh, 2020, p. 6), emphasising the importance of understanding these worlds, making it an ideal fit for this research. The study aimed to explore whether learners' reading abilities affected their ML achievements by understanding the experiences and interpretations of educators based on their subjective observations. By adopting an interpretive approach, the study created opportunities for teachers to voice their perspectives, share observations, and discuss classroom outcomes, particularly in relation to teaching, assessment, and intervention within the ML curriculum. This enabled the researcher to gain a detailed and in-depth understanding of the realities these teachers faced, how learners' reading abilities influenced their performance, and the strategies and classroom techniques teachers employed to improve learning outcomes.

1.12.2 Research Approach

A research approach outlines the plan or procedure a researcher follows to address a study's objectives, and for this study a qualitative approach was adopted (Creswell, 2007). Qualitative research is distinctively characterised by open-ended questions and data that are not presented in numerical or statistical terms (Wisler, 2010), often focusing on case studies and employing methods tailored to understanding specific contexts. As Bertram and Christiansen (2014) note, qualitative research makes use of verbal, textual, and visual data to construct an understanding of phenomena and participants' social realities. In this study, textual data served as the primary medium through reflective activities, complemented by verbal data from semi-structured interviews that enabled participants to delve deeper into their experiences and perspectives. Because the study examined learners' reading abilities, it was essential to engage with teachers in their natural classroom settings to explore the contexts in which they worked. ML teachers brought both subject knowledge and pedagogical expertise, while also offering valuable perspectives on how they managed the diverse reading abilities of learners and the resulting effects on academic performance. Given the human-centered and perception-based nature of the research, the study sought to gain an in-depth understanding of teachers' lived experiences, exploring why some perceived learners' reading abilities as problematic, how these perceptions influenced their teaching methods and strategies, and what adjustments or interventions were employed. This provided insight into the broader implications of reading ability on teaching practices and, most importantly, on learners' achievement.

1.12.3 Research Design

This study adopted a case study research design, which involves exploring an event or set of related events within a specific context (Creswell, 2007) and is conducted in real-life environments (Yin, 2018). The purpose of examining events within comparable contexts was to gain an in-depth understanding of the underlying phenomena, and, as Yin (2018) has noted, qualitative case studies are particularly useful for addressing "how" questions such as how learners' reading abilities affected their achievement in ML. A descriptive case study approach was employed, focusing on six teachers from three schools in the Eden and Central Karoo Education District. By analysing the experiences of teachers across different educational settings, the

study sought to identify both similarities and differences in how they navigated challenges in their classrooms. Capturing their perspectives and experiences provided a comprehensive understanding of whether and how learners' reading abilities influenced performance in ML.

1.12.4 Sampling

This study employed purposive sampling in combination with a convenience sampling strategy. Purposive sampling is used when the aim is to represent a specific group with knowledge or experience relevant to the research objectives (Creswell, 2014), and in this case, six ML teachers teaching in the FET phase within the Eden and Central Karoo Education District (ECKED) were purposely selected. This method was appropriate, as it ensured that participants could provide rich, relevant data based on their classroom experiences with learners' reading abilities and their influence on ML performance. It also allowed the inclusion of teachers with subject expertise and familiarity with intervention strategies. Convenience sampling was combined with this, as participants were drawn from three accessible secondary schools within the ECKED, offering practical advantages such as saving time, reducing costs, and easing data generation given geographical distances (Marshall & While, 1994). In order to guide the selection, inclusion and exclusion criteria were applied: teachers had to be employed in the district, teach ML in Grades 10–12, and be willing to participate in both the reflective activity and, if selected, a semi-structured interview. Teachers were excluded if they did not teach ML, lacked sufficient experience with learner interventions, or were unwilling to engage in both data generation processes. Applying these criteria ensured that the sample accurately represented the study population and provided meaningful insights into whether and how learners' reading abilities affected performance in ML.

1.13 DATA GENERATION METHODS

Data generation refers to the process through which I gathered credible information to answer the research questions, using strategies appropriate to the qualitative nature of the study (Mukhari, 2016). For this research, questionnaires and semi-structured interviews served as the primary data generation methods. As Johannesson and Perjons (2014) noted, research is most effective when it yields useful, empirical data aligned with the research objectives. The effectiveness of this study's data generation

depended on engaging participants whose perspectives aligned with the study's focus. The two methods used are discussed in the sections that follow.

1.13.1 Reflective Activity

To fulfil the purpose of this study, I first used a reflective activity as a data-generation method. Reflective activity has been widely recognised as a valuable research tool that fosters critical thinking and deeper engagement with one's professional experiences (Jasper, 2005; Goker, 2016; Khoza, 2016). In this study, ML teachers from the Eden and Central Karoo Education District (ECKED), teaching Grades 10 to 12, were invited to complete a digital reflective activity distributed via email and WhatsApp. The open-ended questions encouraged participants to reflect on how learners' reading abilities, performance in ML and intervention strategies implanted by educators. This activity served a dual purpose: it generated rich, context-specific qualitative data and enabled the purposive selection of participants for the second phase of the study, namely semi-structured interviews.

1.13.2 Semi-Structured Interviews

Following the reflective activity, I conducted one-on-one semi-structured interviews with selected participants in order to gain a deeper understanding of their experiences. Interviews are one of the most widely used qualitative data collection methods and allow for conversational, flexible exploration of complex issues (Polkinghorne, 2005; Johannesson & Perjons, 2014). This method enabled participants to share their perspectives freely, while allowing me to probe for clarity and depth (Doody & Noonan, 2013). Six participants from three different schools were selected for interviews based on the insightfulness and relevance of their initial reflections, in particular their views on the impact of learners' reading abilities on ML achievement. The interviews were conducted telephonically to accommodate geographical distances in the ECKED, scheduled at times convenient for the participants. Each session lasted approximately 60 minutes and was recorded to support accurate transcription and analysis.

1.14 DATA ANALYSIS

Data analysis referred to the process of systematically organising, interpreting, and making sense of qualitative information gathered during the study (Creswell, 2012). This study employed a guided analysis strategy, using both inductive and deductive

approaches as outlined by Bertram and Christiansen (2014). Inductive coding was first used to identify emerging themes from the reflective activities and semi-structured interviews, while deductive analysis was then applied to align these themes with the study's theoretical framework, Scarborough's Reading Rope .

Horizontalisation, as described by Creswell (2012), further supported the analysis by highlighting participants' shared experiences. Moreover, educators' perspectives on learners' reading difficulties and how these affect ML performance. The data were categorised into three key themes, namely: the effects of reading ability on ML; the causes of reading challenges; and interventions used or recommended. This process enabled a structured interpretation of the data that helped confirm the study's central argument: that reading ability plays a significant role in learners' success in ML.

1.15 MEASUREMENT FOR TRUSTWORTHINESS

This study aimed to ensure trustworthiness by applying established qualitative research principles, namely credibility, transferability, dependability, and confirmability (Mukhari, 2016). These criteria guided the interpretation and analysis of the data to ensure that the findings were accurate, meaningful, and aligned with the reality experienced by ML educators in the Eden and Central Karoo Education District.

1.15.1 Credibility

Credibility referred to the extent to which the findings accurately reflected participants' lived experiences (Mukhari, 2016). In this study, credibility was enhanced by selecting multiple ML educators as participants and applying triangulation techniques (Stevens, 2020), as recommended by Creswell (2012), to compare and corroborate evidence from different sources. This approach ensured that the data presented a truthful representation of how reading ability affected learners' performance in ML.

1.15.2 Transferability

Transferability was ensured by gathering sufficient, detailed data from a purposively selected group of FET Mathematical Literacy educators across Grades 10 to 12. By involving teachers from various schools in the Western Cape, the study provided insights that could potentially be applied to similar contexts in other regions or educational phases.

1.15.3 Dependability

Dependability was addressed by documenting the research design clearly and allowing for future studies to build upon or adapt the methodology. The study acknowledged that classroom and learner contexts or even the geographical area may change, and thus encouraged further exploration into reading ability in ML beyond the initial study conditions.

1.15.4 Confirmability

Confirmability was maintained by ensuring that the findings were firmly rooted in the participants' own experiences and responses (Stevens, 2020). I as the researcher minimised personal bias and ensured that all conclusions drawn from the data could be traced back to participants' perspectives on how learners' reading abilities influence their ML outcomes.

1.16 ETHICAL CONSIDERATIONS

Ethical conduct in this study was guided by the principles of autonomy, non-maleficence, and beneficence, as described by Bertram and Christiansen (2014) and Blanche et al. (2006). Autonomy was maintained by protecting participants' identities through the use of pseudonyms and ensuring that personal or school-related information remained confidential. Non-maleficence was upheld by minimising risks and preventing harm through ethical handling of data and respectful interactions with participants. Beneficence was ensured by focusing on the potential benefits of the research, particularly in offering insights and recommendations to assist ML educators dealing with learners' reading challenges.

Additionally, ethical clearance was obtained from the University of South Africa (UNISA), and the study was conducted in accordance with institutional and provincial guidelines. These steps ensured that all participants' rights were protected and that the research process remained ethically sound and responsible.

1.17 LIMITATIONS AND DELIMITERS

This study was subject to several limitations that were anticipated at the outset. As a qualitative inquiry, the research was constrained by the time-intensive nature of qualitative data analysis, which necessitated a relatively small, purposively selected

sample. Participants were selected based on their experience in teaching ML and their demonstrated engagement with the subject matter. While this approach was expected to yield rich and meaningful data, it was recognised that it might limit the range of perspectives represented in the study. In addition, the geographical context of the Eden and Central Karoo Education District, characterised by widely dispersed rural schools, posed logistical challenges that influenced data generation methods. To address accessibility and time constraints, reflective activities were administered electronically and semi-structured interviews were conducted telephonically. Although these methods enhanced feasibility, it was acknowledged that they could limit the depth of interaction and rapport typically associated with face-to-face interviews.

The study was also deliberately delimited in scope. It focused exclusively on the subject of ML within the FET phase and examined the perceived impact of learners' reading ability on their performance in this specific subject. Other subjects and phases were intentionally excluded, as they involve different curricular demands and cognitive processes that fell beyond the focus of this research. Furthermore, the study was confined to schools within a single education district, and the findings were therefore not intended to be generalisable to broader contexts. The researcher's professional role as an educator within the same district was acknowledged as a potential limitation; however, this positionality was managed through reflective practice and adherence to ethical research principles. These delimiters were purposefully applied to ensure depth, relevance and contextual clarity within the defined parameters of the study.

1.18 CONCLUSION

This chapter provided an overview, context and objective of the study by first introducing the background, which explored how learners' reading abilities influence their achievement in ML, with specific reference to schools in the Eden and Central Karoo Education District. The chapter outlined the title, research problem, purpose, research questions, objectives, and rationale, while also highlighting the significance of the study. The theoretical framework that guided this study, Scarborough's Reading Rope , was introduced to explain the complex, intertwined components of skilled reading and how these relate to learners' ability to engage with ML tasks. The chapter further described the selected research paradigm, qualitative approach, case study design, sampling strategy and data generation methods, namely, reflective activities

and semi-structured interviews. The approach to data analysis was also presented, followed by an outline of how trustworthiness was ensured through credibility, transferability, dependability, and confirmability. Ethical considerations were addressed, including autonomy, non-maleficence, and beneficence, to protect participants throughout the research process. Lastly, Chapter 1 will now provide the reader with the summary of the chapters found in this study, which are Chapters 1 to 6.

1.19 OVERVIEW ON FOLLOWING CHAPTERS

1.19.1 Chapter 1: Introduction To The Study

This chapter provided an overview of the research proposal, establishing the context and significance of the study. The introduction highlighted the personal connection the researcher had with the phenomenon under investigation, positioning the research within the existing body of literature. It articulated how previous studies intersected with the research question, which focused on ML in the Eden and Central Karoo Education District. Additionally, the chapter outlined the research aims and objectives, presenting the guiding research questions that formed the foundation of the study.

1.19.2 Chapter 2: Literature Review

Chapter 2 considers reading ability through a review of literature from previous studies across different academic specialisations and educational levels, spanning primary to secondary school. The particular focus on the FET phase, encompassing Grades 10 to 12, and emphasised the role of reading ability in the context of ML within the Eden and Central Karoo Education District. Contributions from various scholars in mathematics education and related fields are analysed, shedding light on how reading proficiency impacts learner achievement in this phase.

1.19.3 Chapter 3: Theoretical Framework

This chapter presented the theoretical framework that underpinned the study, namely Scarborough's Reading Rope (2021). This model provided a comprehensive lens through which the relationship between reading ability and learners' performance in ML is explored. The framework integrated various components of reading, enabling an examination of both word recognition and language comprehension in relation to

mathematics understanding. The chapter also argues for the relevance of this framework in guiding the research process and aligning it with the study's aims.

1.19.4 Chapter 4: Data Generation And Methodology

This chapter outlines the research design and methods employed for data generation. It details the qualitative research approach used to explore the research questions, incorporating methods such as reflective activity and semi-structured interviews to gain comprehensive insight. The methodology section also explains how these tools contribute to addressing the sub-research questions, which ultimately support answering the main research question. The chapter provides a rationale for the chosen reflective activities and their alignment with the objectives of the study.

1.19.5 Chapter 5: Data Presentation

Chapter 5 presents the analysis and interpretation of the data collected, using horizontalisation methods to systematically identify patterns and themes. The chapter synthesises participant responses, highlighting areas of consensus and divergence on the influence of reading ability on learner achievement. It demonstrates how these findings align with or challenge the insights from the literature review and addresses the sub-research questions posed.

1.19.6 Chapter 6: Summary, Recommendations And Conclusion

The final chapter concludes the research by summarising key findings and discussing their implications for the field of ML. It provides recommendations for educators and policymakers on strategies to enhance reading ability to support learner achievement. The chapter also outlines potential areas for further research, offering guidance for future studies that aim to extend the understanding of this phenomenon and suggesting practical interventions to improve outcomes for learners facing reading challenges.

CHAPTER 2:
LITERATURE REVIEW: THE IMPACT READING ABILITY HAS ON THE PERMORMANCE IN MATHEMATICAL LITERACY

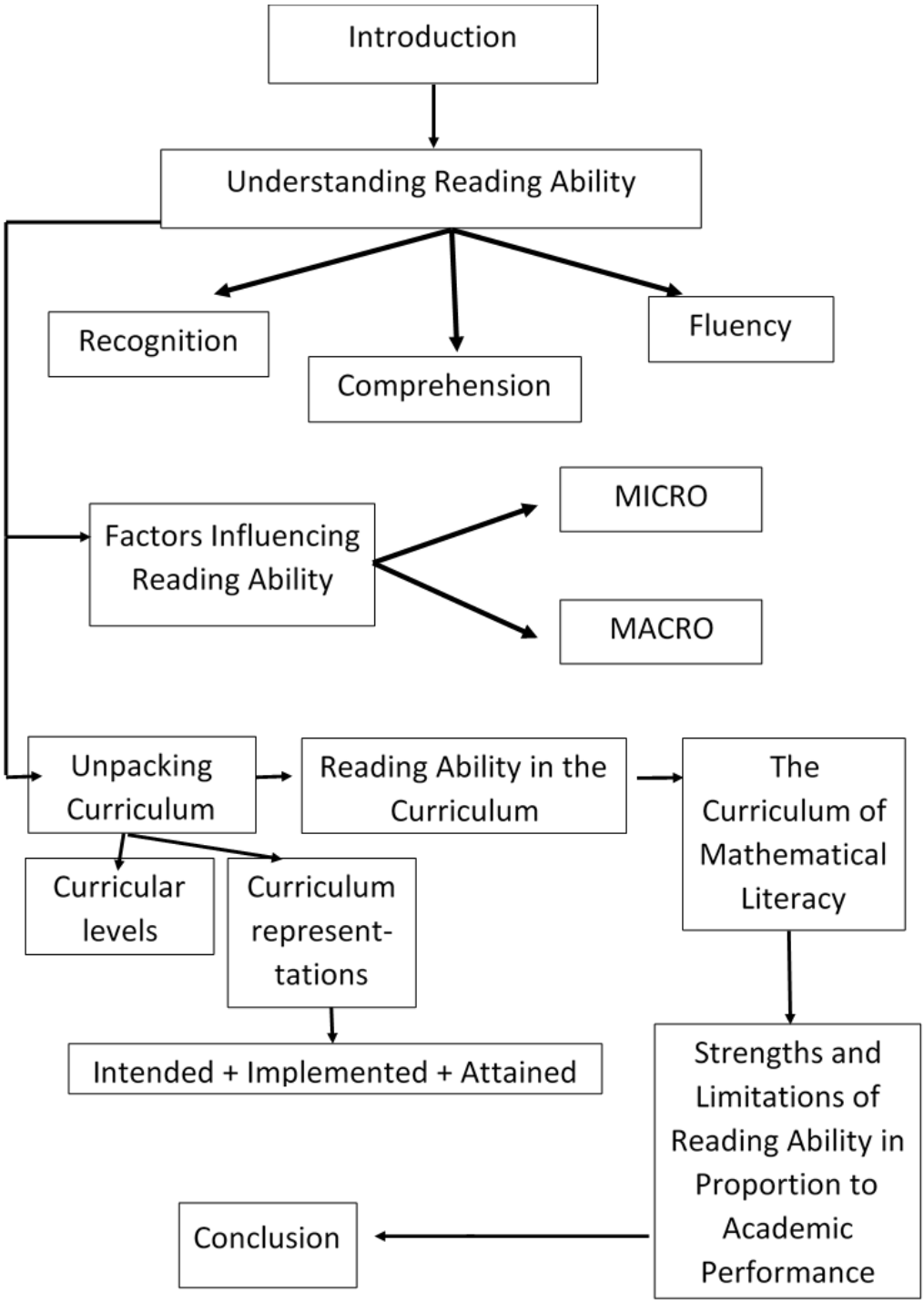

Figure 1: Presents a visual illustration of the structure that is chapter 2

2.1. INTRODUCTION

The foundational understanding of reading ability, as discussed in Chapter One, highlights the interplay between recognition, comprehension, and fluency in developing proficient reading skills. Chapter One presented the background, problem statements, and literature review, establishing a framework for the research approach and data generation methods, while addressing the study's approach to reliability and ethics. This provided a foundational understanding of reading ability, encompassing its three primary components: recognition, comprehension, and fluency. The chapter highlighted that effective reading extends beyond recognition and comprehension, involving constructing meaningful interpretations of text. This understanding was encapsulated in Scarborough's Reading Rope model (2021), illustrating how various reading skills intertwine and scholars confirming the significant influence of reading ability on academic performance and lifelong achievement.

This chapter provides an overview of previous research and knowledge on reading abilities and how it effects a learners academic performance, focusing on ML within the FET phase. The literature review constitutes the core of a dissertation focusing and evaluating what previous scholars have researched and written on the particular topic of reading ability and the issues addressed. The main purpose of this literature review is to organise information established from the scholarly realm from broad topics to narrow and focused literature relating to the phenomena (reading ability) of this study. The phenomenon is presented as reading ability and its three levels, namely recognition, comprehension and fluency, together with the focus of this study namely ML, while at once focusing on curriculum as part of the broader scope.

This chapter provides a thorough systematic literature on the components that makes up the phenomenon of reading ability known as recognition, comprehension and fluency focusing on the curriculum throughout; in particular, the levels in curriculum and more specifically the ML curriculum. Henceforth the factors that influence reading ability are subdivided into micro and macro environments. Finally, the main research question is addressed, namely whether reading ability has an effect on academic performance. This chapter aims to provide a comprehensive outline of all mentioned above in the format of previous literature and with that hoping to contribute to existing

scholars and their literature within the field of curriculum and more specifically that of ML.

2.2. UNDERSTANDING READING ABILITY

Reading is a foundational skill essential for academic success and personal development. According to Patterson (2016) it is the process of constructing meaning from written text, a concept widely explored by researchers and educators. Leipzig (2001) defines reading as making sense of printed material, emphasising that while humans naturally interpret visual and auditory information naturally in their daily lives, where reading itself is a learned skill that requires being instructed or taught. Historically, reading can be traced back to as early as the 1500s, when shifts in society and education contributed to increased literacy. According to Houston (1983), the Renaissance period was characterised by a rapid growth in the number of individuals who were able to read, and the way in which it had an effect on the lives of not only men, but the women and children as well. In other words, if reading at this stage has such a significant impact on people's lives, it explains why many researchers continue to investigate this foundational skill, which remains fundamental to learning and participation in everyday life. This underscores the importance of reading as a skill that shapes individuals and communities, prompting continuous research on effective reading instruction and development. Scholars such as Frankel et al. (2016), Leipzig (2001) and Patterson (2016) generally agree that reading is a cognitive process involving meaning making from text. However, there are variations in how the components of reading are categorised.

Frankel et al. (2016) propose five principles of reading, which are: (1) reading is a constructive process; (2) reading requires fluency; (3) reading requires strategic thinking; (4) reading requires motivation and engagement; and (5) reading is a continuously developing skill**.** Together, these principles highlight that reading is an active and complex process that relies on multiple interconnected elements to develop and sustain proficient readers. Leipzig (2001) identifies three primary components, namely: word recognition, comprehension, and fluency; describing reading as a 'multifaceted process' where word recognition allows learners to decode text, comprehension enables meaning construction, where fluency ensures automatic and

accurate reading. Duke and Cartwright (2021) build on the simple view of reading by Gough and Tunmer (1986), which focuses on two core components, namely: decoding and comprehension. Scarborough (2021) agrees with a two-component framework, but expands it into eight interconnected subskills. Regardless of how many components scholars propose, they all ultimately relate back to the three main components which are recognition, comprehension, and fluency. These principals of reading manifest in various forms, but ultimately come down to the same skill. For instance, Frankel et al. (2016) refer to reading as a constructive process where Leipzig (2001) refers to the exact same skill as comprehension and Duke and Cartwright (2021) refer to it as decoding. This skill no matter the terminological comes down to the reader having the ability to follow a line of information and making meaning of written text. Frankel et al. (2016) note that reading requires motivation, making it part of their core principals.

Building on Patterson's (2016) assertion that reading is a learned skill, Steward (2019) highlights the distinction between speech and reading, noting that, while spoken language is innate, reading is not, where the human brain has evolved to process speech naturally, but written language requires explicit instruction. Steward (2019) further identifies three neurological areas crucial to reading development: the phonological processor (handling spoken language); the orthographic processor (responsible for visual recognition); and the phonological assembly region, which connects the other two to facilitate reading acquisition. This means that, while some children learn to read easily, most require structured instruction, reinforcing the significance of theories such as Scarborough's Reading Rope and the simple view of reading in shaping effective reading pedagogy. To illustrate, learners in certain educational contexts struggle to comprehend written questions independently, as they tend to overlook punctuation marks and sentence structure, which significantly alters their understanding. For example, when these learners listen to the same questions read aloud with appropriate intonation and emphasis, their comprehension noticeably improves. This suggests that their difficulties may not be solely attributable to cognitive limitations, but rather to a lack of reading practice and exposure to structured reading instruction.

In other words, the interplay between home language and spoken communication may further complicate reading comprehension. For instance, in multilingual settings where students frequently switch between languages in informal speech, challenges arise when engaging with subject-specific terminology in formal assessments. Additionally, Aaron and Joshi (2006) agree with Patterson (2016) that, while spoken language varies between school and home environments, it is also important to recognise that written language is not uniform. For example, the formal written language used in a ML classroom differs significantly from the informal language found in text messages and peer-shared notes. This variation in written forms may contribute to students' struggles in decoding and interpreting academic texts, highlighting the need for explicit teaching of different registers of writing. This aligns with theories emphasising the necessity of structured reading instruction to bridge the gap between spoken and written comprehension, ultimately reinforcing the importance of literacy development across subject areas (Aaron & Joshi, 2006; Liu et al., 2022).

Furthermore, understanding that reading ability comprises three main components, namely: recognition, comprehension and fluency rooted in cognitive processes, it is essential to recognise that cognitive factors are not the sole determinants of reading proficiency. External influences, referred to as micro and macro factors, also play significant roles (Liu et al., 2022; L. Pretorius & Klapwijk, 2016). These include the learner's immediate environment, such as the classroom where reading begins; as well as broader factors such as socioeconomic background, family literacy practices, availability of resources, and community attitudes towards reading as a leisure activity. Having established the foundational elements of reading ability, the following section delves into the first-level discussion, exploring how these cognitive and environmental factors interact to influence reading development (Liu et al., 2022; Pretorius & Klapwijk, 2016). This implies that micro factors include immediate learning environments, such as classroom instruction and access to reading materials, while macro factors encompass socioeconomic conditions, family literacy practices, and societal attitudes toward reading.

This chapter establishes that reading is a cognitive process involving three core components, viz.: recognition, comprehension, and fluency. According to the figure 2, there three components forming reading ability phenomena.

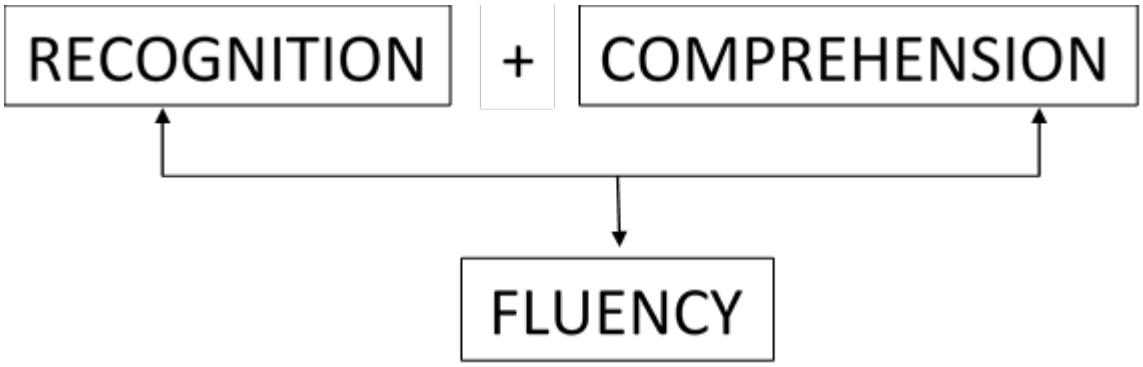

Figure 2: Reading ability components.

2.2.1. Recognition

As early as 1982, Stanovich (1982) found that word recognition serves as a fundamental component of the reading process as a whole. Numerous scholars (Pretorius & Klapwijk, 2016; Shiotsu, 2009) state that reading is a complex cognitive activity occurring in the mind of the reader and involving multiple skills. Recognition, as detailed by Perfetti (1985) and expanded by Smith (2007), refers to the learner's automatic recall of words, akin to accessing a mental bank of vocabulary. Accessing this mental bank forms part of a lower-level process that supports the reader's comprehension ability (Shiotsu, 2009). This highlights the interconnected nature of reading components, as recognition directly influences comprehension.

The Simple View of Reading, presented by Gough and Tunmer (1986), refers to recognition as decoding. According to Farrell et al. (2025), a learner's reading ability can be predicted based on their recognition (decoding) and language skills. This means that a learner's ability to recognise words has a direct impact on their comprehension, ultimately affecting overall reading ability. Arends and Fonseca (2024) agree with Farrell et al. (2025) that that many educators still underestimate the importance of decoding, or word recognition. For instance, weak decoding can occur when a learner guesses an unfamiliar word and attempts to make it fit within the sentence, often leading to misunderstandings of the information or instructions being read. According to the curriculum set by DBE (2022), Grade 10 learners ought to be able to engage with real-life scenarios from their immediate surroundings, such as

situations inside and around the home, while Grade 12 learners ought to be equipped to work with international contexts. This points to the fact that to successfully navigate these contexts, they must be able to decode and apply the information presented to them. While general knowledge can be beneficial, it is not necessarily required to answer the questions everything needed is already provided within the scenario; the key in this regard is to decode and organise the information effectively. Öztürk et al. (2020) state that word recognition positively influences reading ability, forming a crucial role when a learner is working individually. Word recognition, also called decoding, enhances self-efficiency among the learner. Farrell et al. (2025) note that an extreme example of when decoding is the only component lacking is likely to be dyslexia.

Ultimately, reading is the product of three core components, namely: word recognition, language comprehension, and the combined fluency of these two aspects. Without all three, a learner's reading ability suffers (Clements, 2025). While recognition plays a crucial role in decoding words, comprehension is equally essential in making sense of what is read. The following section explores comprehension as the second core component, along with its impact on overall phenomenon of reading ability.

2.2.2. Comprehension

Comprehension consist of two levels; a lower and higher level, where the lower has been identified as recognition and higher level process involves the reader's ability to integrate the recognised text within and across an entire sentence (Shiotsu, 2009).This suggests that it is not enough to be able to recognise the terminology as part of any subject, but rather, poses the skill to comprehend what the terminology means within a real word setting. Clements (2025) and Aaron and Joshi (2006) support this argument by also referring language ability and to comprehend or understand the recognised word in an array of different sentences. The latter studies further outline that lower and higher-level processes play inverse roles, such that the more proficient a reader's word recognition skills, the more cognitive resources are available for higher-level comprehension tasks. Conversely, when word recognition is slow or requires significant effort, lower-level processing consumes greater cognitive capacity, thereby impairing the reader's overall reading performance (Ehri, 2005b; Shiotsu,

2009). This would lead learners to better reading ability, ultimately obtaining results in ML that more closely reflect to their real abilities, without the worry that reading ability effects their ability to demonstrate their core math skills (due to them being unable to grasp the scenario and applying mathematics to solve problems).

Comprehension requires learners to decode and construct meaning from words based on prior knowledge and context (Iheakanwa 2021, and Cimmiyotti, 2013). These scholars further state that good comprehension is of utmost importance if reading is to have the purpose of gaining information, or of understanding the question. This suggests that, within the subject of ML, it is required of a learner to be able to read and comprehend various formats of resources; that is, not only consisting of the expected or traditional paragraph explaining the setting and followed by questions, but rather, comprehending words and terminologies laying out a story in a document such as a statement or an invoice. Clements (2025) explains the process of comprehension by way of analogy, as playing a film in the reader's mind by not only remembering the exact words that are read, but rather, forming mental notes or a story line of what is described.

Kamhi (2007) and Sua (2021) argue that comprehension is not a skill, but rather, a highly complex mental process, whereby a reader not only understands the written text, but rather conforms to a process of reasoning with the text, imagining a story line. Sua (2021) refers to comprehension as a second language, while Clements, (2025) elaborates that it is most important to interpret the information read to the context of the subject at hand. The latter further admits that comprehension is impossible to teach, due to the exact reason that it is content-specific, in other words, related to each subject, such as with ML. In a later study done by Arends and Fonseca (2024), this was noted when suggesting the strategy of "reading across the curriculum" (Arends & Fonseca, 2024, p.13) and also implemented by the Western Cape Education Department (2019) strategy for reading, which entails focusing on reading within the core knowledge based on the curriculum implemented, and due to comprehension being dependant on knowledge. Comprehension proves vital if a reader wants to ultimately engage with or learn from what they are reading. In other words, understanding a text is not solely dependent on comprehension, it is also influenced

by how smoothly and accurately a reader can process the words on the page. The third and final core component of reading ability, fluency, is explained below.

2.2.3. Fluency

Fluency, as noted by Shavazipour et al. (2021), represents the dynamic interaction between recognition and comprehension, shifting in emphasis based on text complexity. Reading fluency is defined as the ability to read with appropriate speed, accuracy, and expressive intonation relative to the reader's age (Felton, 2024). It is widely acknowledged that consistent practice enhances proficiency, and that this principle applies equally to reading fluency. The Department of Higher Education and Training (2021) in their study guide on reading fluency define it as to be able to read aloud in the same manner and speed as you would speak, referring to core components of pace, accuracy and expression, otherwise known as prosody. Focusing on the pace at which a reader reads refers to the number of words read per minute, while accuracy relates to reading at an appropriate pace with minimal errors (Felton, 2024; Reading Rockets, 2025). Reading Rockets (2025) identifies prosody as the core component of fluency, emphasising that a fluent reader naturally applies appropriate tone, stress and pausing. This expressive reading brings the text to life, allowing the reader to engage with the story or characters. When defining fluency, the definition almost always envisages oral reading or reading aloud. Pikulski and Chard (2005) disagree with this, citing various studies like that of Samuels (2002), who they cite as the pioneer of reading fluency research. Strecker et al. (1998) research the complexities of fluency, proposing rather a synthesis of components of fluency as involving expressive oral reading; making it possible for fluency to be understood as relevant when silent reading.

According to Felton (2024), regular reading not only improves fluency among learners, but also benefits individuals in general. Conversely, the process is cyclical, where, to read fluently, one must possess a fundamental understanding of the text (Felton, 2024). This interdependence highlights the critical role of word recognition and comprehension, both of which are integral to fluency development, where the study guide by Department of Higher Education and Training refers to fluency as "the bridge between word recognition and comprehension" (2021, p.7) . In turn, fluency fosters

deeper comprehension of more complex texts, creating a dynamic relationship between these key components. When reading fluency is underdeveloped, it can significantly hinder the improvement of vocabulary and the development of reading comprehension. In other words, fluency serves as a foundational component of overall reading ability, and difficulties in this area often result in learners falling behind their peers.

Early struggles with reading fluency create a cumulative disadvantage, as these individuals tend to engage with less text over time, limiting their exposure to new vocabulary and complex language structures (Felton, 2024; Reading Rockets, 2025). Consequently, this gap not only affects academic performance, but can also extend to broader societal contexts, where reading proficiency is essential for lifelong learning and personal development (Felton, 2024). Pikulski and Chard (2005) further support this by stating that fluency is a critical factor for reading success. They add that fluency can also be influenced by other core components of reading ability. For example, if a reader struggles with comprehension, it becomes more difficult to read fluently, which in turn increases the time needed to read a given text, as per DHET (2021).

2.3. FACTORS INFLUENCING READING ABILITY

Various research studies highlight the significant role that both internal and external factors play in shaping a learner's reading development and, ultimately, their reading ability. Previous literature reviewed in this study has demonstrated that micro-level factors**,** such as parental literacy, home support, and learner motivation, directly influence reading development (Snow, 2002; Pressley, 2006). Similarly, macro-level factors, including socio-economic conditions, home language, school governance, curriculum implementation, and resource allocation, create broader systemic conditions that can either enhance or impede reading development (DoE, 2006; Spaull, 2013). This discussion therefore considers both micro- and macro-level influences to provide a comprehensive understanding of the determinants of learners' reading ability.

2.3.1. Micro Factors

A key factor influencing a learner's reading ability is the family environment, with financial circumstances playing a particularly significant role (Liu et al., 2022). Similar studies have also proved this to be true, where Matvichuk (2015) embarked on a similar study within a first world country such as the US to prove that parental involvement has a positive effect on a child's cognitive and linguistic development, which in turn directly impacts the successes in reading on a school level. These studies can even be traced back to South Africa, where Gumede (2018) states that early parental engagement in age appropriate learning within their own household, creating an environment rich in reading materials, has a positive impact on how children view reading from an early age. Pretorius and Klapwijk (2016) provide a detailed analysis of South Africa's micro-level factors, highlighting that a learner's reading proficiency is strongly affected by the socioeconomic status of their home. This influence extends beyond financial constraints to include parental literacy levels, which can have long-term implications for both the child and the parents. For example, in the district where this study is situated, covered by various rural areas, many parents did not complete their schooling, and still struggle to support their children academically. In some extreme cases, parents are entirely illiterate, which becomes evident during parent meetings when they ask their child to sign attendance registers on their behalf. Low parental literacy not only limits employment opportunities for parents, but also affects their ability to assist with reading development (Pretorius & Machet, 2004).

Cunningham (2010) summarises parental involvement in literacy development into three levels: the limiting literacy home environment, the passive environment, and the active environment. The limiting literacy home environment closely relates to the focus of this study, as it often involves parents from hardworking, lower-income backgrounds with low literacy levels who engage very little, if at all, in reading activities with their children. As a result, research shows that learners from such environments often struggle with reading at school (Cunningham, 2010; Nyama, 2010). The passive literacy environment sees parents reading for their own leisure, but not actively encouraging their children to read. However, if a child is naturally curious or engaged, they may imitate their parents and develop an interest in reading often selecting materials beyond their reading level (Masudi & Silaji, 2024). While this may not provide

structured reading support, it can still help foster a reading habit that benefits the learner at school. Cunningham (2010) concurs with Nyama (2010) that the active literacy home environment is the most beneficial, as parents not only model a reading habit, but also actively involve their children, by providing appropriate reading materials and creating a literacy-rich home environment. In other words, this approach fosters a habit and love for reading, which significantly benefits the learner's academic performance.

Furthermore, certain communities may not perceive reading as a valuable skill, often viewing it as a functional task rather than a leisure activity (Liu et al., 2022). This perception may further hinder the development of reading habits among learners. For instance, unemployment often results in overcrowded living conditions, where multiple families share small homes, leaving learners without a quiet, dedicated space for reading or completing schoolwork. Additionally, household instability caused by alcohol and substance abuse can create noisy and disruptive environments, particularly in the evenings, when homework needs to be done. This suggest that home language and exposure to reading materials in that language also play a crucial role in literacy development. Pretorius and Klapwijk (2016), along with Davids (2023), argue that access to reading materials in one's home language proves essential for fostering reading proficiency. For instance, in this study's district, many learners do not have books in their home language, making it difficult to develop strong literacy skills. Additionally, parents working long hours often leave home before their children go to school and return late, leaving little time for academic support. This lack of guidance may further limits reading development, reinforcing the importance of providing structured literacy support in schools.

2.3.2. Macro Factors

The impact of financial status on reading ability is not limited to the district or province examined in this study but is a global phenomenon. In China, Han (2017) found that family income significantly influences a learner's educational attainment, ultimately determining the quality of the institution they attend. Similarly, in South Africa, Davids (2023) argues that every learner has the right to a rich learning experience and that a school's financial status ought not dictate the level of reading education a learner receives. However, beyond financial constraints, Davids (2023) suggests that literacy education ought to incorporate elements of the learner's community and culture,

thereby expanding access to diverse reading resources. Contrary to this perspective, Gumede (2018) conducted a mixed-methods study in Zimbabwe to investigate factors influencing learners' reading ability in English. The study involved two single-sex schools, viz. one government school and one private school. The sample included 48 learners and 12 teachers from the government school and 22 learners and nine teachers from the private school. Both schools were examined for similar factors affecting reading ability. The findings revealed that a school's macro-environment, shaped by community and socio-economic circumstances, significantly impacts reading proficiency. Learners' reading and comprehension levels were below their expected developmental stage, which led to motivational issues. Private school educators largely acknowledged this impact, whereas government school teachers disagreed on the extent to which financial constraints affected teaching and learning. Nevertheless, the study concluded that socio-economic conditions play a crucial role in academic performance, as seen in the disparities in reading outcomes between schools within the same country.

While financial limitations undoubtedly affect access to educational materials, various initiatives have emerged to bridge this gap, particularly in ML. In the Western Cape, for instance, subject advisors have developed free resources that are accessible to all schools, regardless of their financial standing. These materials play a crucial role in addressing challenges such as the lack of textbooks and supporting educators, regardless of their qualifications, in improving their subject knowledge. Additionally, the Western Cape Department of Education offers a range of free professional development courses tailored for ML teachers, particularly those in rural or underperforming schools. By monitoring participation in these training sessions, districts can ensure that educators enhance both their content knowledge and teaching methodologies, ultimately improving learner outcomes. Moreover, to further mitigate the impact of financial disparities, many schools in the Western Cape provide zero-rated online platforms where both teachers and learners are able to access digital learning resources at little to no cost. In addition, the district supplies essential classroom tools, such as scientific calculators and rulers, to schools in economically disadvantaged areas, ensuring that learners are not hindered by a lack of basic mathematical instruments. These interventions highlight the importance of strategic resource allocation in ensuring equitable access to quality ML education.

Beyond financial constraints, structural challenges within the education system further contribute to disparities in reading proficiency. Pretorius and Klapwijk (2016) identify macro-level factors such as the lack of well-resourced schools, where many institutions fail to provide a diverse range of reading materials. Davids (2023) reinforces this concern, arguing that learners should be exposed to both fiction and non-fiction texts from an early age. However, a significant challenge remains, since reading materials are often unavailable in a learner's home language, as they are predominantly published in mainstream languages. In addition, Gumede (2018) suggested several improvements to help schools that are lagging behind, including reviving public libraries to enhance learners' immediate environment, implementing specialised reading sessions and interventions in schools, and, most importantly, fostering collaboration with other communities by organising exchange and networking programmes.

Additionally, a critical factor influencing reading ability is the availability of well-qualified teachers in the early phases of education. While many educators recognise the importance of reading, Pretorius and Klapwijk (2016) note that some do not actively engage in reading for their own professional development. Liu et al. (2022) further emphasise that teachers play a vital role in shaping learners' reading abilities, with their motivation and encouragement significantly impacting students' interest and engagement in reading. When learners perceive strong support from their teachers, their reading abilities are more likely to develop positively. This support is underscored in the five principals of reading, whereby one principal speaks to reading requiring motivation. According to this principal, a positive attitude towards reading will develop an interest and build on a learners reading ability.

While financial status remains a significant determinant of educational access and quality, targeted interventions such as free resources, teacher development programs, and digital access initiatives can help level the playing field. Addressing both financial and structural barriers is essential to ensuring that all learners, regardless of their socio-economic background, have the opportunity to develop strong reading skills and succeed in ML education.

2.4. UNPACKING CURRICULUM

Mulenga (2018) and Van den Akker et al. (2010) emphasise the challenge of offering a comprehensive or holistic definition of the term "curriculum." However, Mulenga (1993) stresses the importance of clearly defining the term as formal education continues to expand globally. Various definitions of curriculum can be found in the literature. For instance, Isham (1982), citing Hilda Taba, describes it as a guide or program outlining specific aims and objectives intended to organise the patterns of learning and teaching. In contrast, Dewey (1938) defines the curriculum as a learning experiment, viewing it as a dynamic entity that evolves continuously based on learners' experiences and reflections. This definition presents the curriculum as more fluid compared to Taba's structured and defined approach. In contemporary terms, the State of Rhode Island (2023) in the US defines the curriculum as a structured and systematic sequence of subjects or specialised fields designed to equip learners with specific skills. These skills are then assessed through evaluations measuring abilities such as reading, with the results reflecting the learners' level of competency in the subject.

Van den Akker et al. (2010) define curriculum from the Latin currere, meaning "to run the course" (2010, p.10). Historically, the term was used in Greek civilisation to refer to the subjects being taught. Initially associated with the idea of a "course," which originally signified a "racecourse," its meaning evolved over time to denote a "plan" a definition that remains relevant in modern educational contexts. Given the focus of this study on the Western Cape, it is important to consider the term ‘leerplan’, derived from Dutch, which is commonly used in Afrikaans and reflects the region's historical linguistic influences. The term curriculum will be regarded as a structured and standardised framework for learning that is both comprehensive and accessible, for the purposes of this study.

2.4.1. Curricular Levels

The curriculum is not a one-dimensional document but rather a multi-layered roadmap that guides various stakeholders, such as learners, educators, and policymakers, toward a shared intended goal. This claim aligns with Alvunger et al. (2021), who describe the curriculum as a nonlinear framework encompassing multiple levels

SUPRA, MACRO, MESO, MICRO, and NANO, each of which influences and shapes the others. The curriculum operates at multiple levels, each shaping and influencing the others in a complex, interconnected system.

Hoadley and Jansen (2013) agrees with Van den Akker et al. (2010) that at the highest level, the SUPRA division addresses reading ability at an international context, which encompasses global comparisons of curricula and assessments, such as South Africa's performance in PIRLS (Progress in International Reading Literacy Study). According to the latter authors, this level sets the broadest context for educational standards and provides a framework for evaluating the curriculum in relation to global trends. The PIRLS 2021 assessed South African learners' reading ability and found that 81% of Grade Four learners or children within the 10 year old age group struggled to read with comprehension (Davids, 2023; Mahlokwane, 2023). Alarmingly, the similar studies highlights a decline in performance since the previous study in 2016, with South Africa now ranked the lowest among 57 participating countries (Mullis & Martin, 2019). Despite these findings, most research and resources focus on early primary school learners (Grades 4 and 6), leaving a notable gap in studies on learners in the FET phase (Davids, 2023).

Moving to the MACRO level, the focus shifts to the national context, where policies for example, the CAPS curriculum are developed. The national level also includes significant revisions, such as the Section 4 amendments (DBE, 2020b), which aim to improve educational outcomes across the country. Moreover, policies such as the National Reading Strategy focuses on reading ability in the lowest level of recognition and their aim is that all learners should be able to read basic texts at the end of grade three level (Botha et al., 2008). The authors go on to state that comprehension and reading for meaning should continuously develop throughout the curriculum as the learner progresses through grades. This strategy supports statements made within the CAPS document towards the focus of this study ML that learners should develop their reading ability through language across the curriculum (DBE, 2020b, 2022a), meaning that one language must be drawn throughout all subjects within the curriculum.

At the MESO level, the curriculum is implemented within schools or institutions, where provincial or regional strategies come into play. For example, the Western Cape's LitNum strategy targets literacy and numeracy improvements, focusing on specific

regional needs and challenges (DoE, 2006). This strategy follows a whole language approach, emphasising comprehension, where learners should be able to make meaning of what they read (DoE, 2006, p. 3). The policy further highlights three critical aspects influencing a learner's reading ability, namely: the educator, language in education, and the whole school and community. This is achieved by actively supporting and teaching learners in classrooms where their mother tongue is the primary language of learning and teaching, at least until Grade Six. The debate on how best to teach reading largely falls into two categories: phonics based instruction, which emphasises teaching children the sounds of letters and words (Castles et al., 2018), and the whole language approach, which focuses on meaning-making and is supported by policies like the LitNum strategy (Barends and Reddy, 2024; DoE, 2006). However, Gear (2021) moves beyond this debate, arguing that the focus should not be on which method is superior, but rather, on adopting an approach that caters to a child's individual needs and learning style, rather than enforcing a one-size-fits-all model.

At the micro level, the focus narrows further to classroom-specific curriculum elements, such as lesson plans, teaching modules, and course content (Van den Akker et al. 2010). This level is where school-based interventions, like implementing a dedicated reading period, are designed to enhance literacy outcomes in a localised context a strategy supported by both Davids (2023) and Gumede (2018) to improve reading proficiency at the school level. Professional Learning Communities (PLCs) play a crucial role in this process by developing targeted strategies to enhance student performance. One such strategy involves drawing from MESO-level initiatives, such as the "language across the curriculum" approach, and refining them at the micro level (Barends and Reddy, 2024). For example, educators identify key action words and create instructional posters to support learning. These tools help teachers at the NANO level within their own classrooms reinforce the use of standardised terminology aligned with the National Senior Certificate requirements (Department of Basic Education, 2021). By incorporating these terms into school-based assessments (SBAs), learners gradually recognise and apply them across the ML curriculum, strengthening their subject-specific language proficiency.

Finally, at the nano level, the curriculum focuses on the individual learner (Van den Akker et al. 2010). This level emphasises personalised learning plans tailored to each student's unique needs, ensuring that teaching methods adapt to their abilities and challenges (Van den Akker, 2006). However, Prestley (2021) cautions against viewing curriculum structures as rigid levels, particularly the nano level, where learners are placed at the final stage in a 'hierarchical linear' format. This raises the question: Are learners only involved in curriculum development within the classroom? Instead of a fixed hierarchy, curriculum levels are better represented as a set of interlocking wheels, allowing role players to move fluidly between different sites and fulfill various curriculum-making functions. This approach fosters a more dynamic and meaningful curriculum development process (Alvunger et al., 2021; Prestley, 2021). These interlocking parts of curriculum interact dynamically, with higher levels such as the supra and macro levels being more structured and set in policy, while lower levels such as micro and nano levels tend to be more flexible, allowing for adaptation to the specific needs of students and educators (Van den Akker et al., 2010). This interaction underscores the complexity of curriculum design and implementation, where each level has a significant impact on the others, influencing educational outcomes at the classroom and individual learner levels.

Further enriching this understanding, Stokhof et al. (2018) and Alsubaie (2015) expand on Van den Akker's framework by introducing the concept of the hidden curriculum. Figure 3 depicts the hidden curriculum, showcasing all the different stakeholders discussed below.

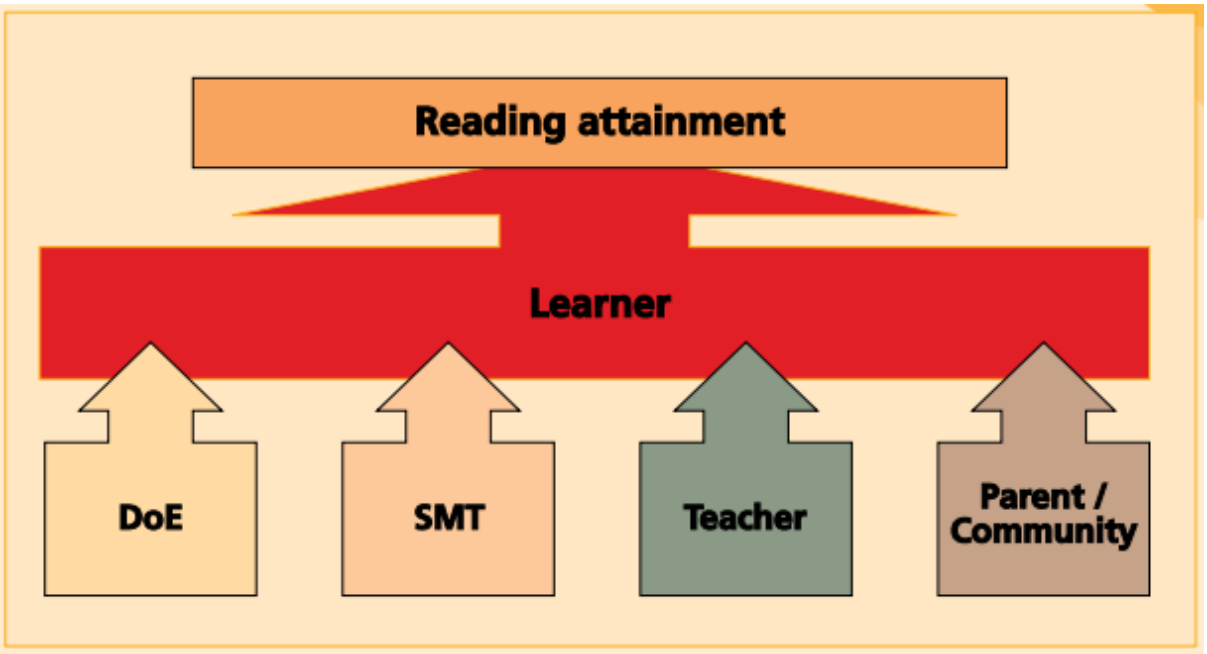

Figure 3: Stakeholders within the hidden curriculum (Botha et al., 2008, p.13)

In other words, socio-cultural norms and values embedded within the school community play a significant role in shaping educational practices, often in implicit ways (Botha et al., 2008, p. 13). The perceived curriculum reflects how educators interpret and plan the curriculum, the operational curriculum refers to its practical implementation, and the realised curriculum captures the outcomes of teachers' adaptations to meet learners' needs (Stokhof et al., 2018; Ornstein & Hunkins, 2017). As illustrated in Figure 3, a learner's reading attainment is influenced not only by the teacher but also by multiple stakeholders, including the Department of Education (DoE), the School Management Team (SMT), parents, and the wider community. While teachers play a central role in teaching reading, Botha et al. (2008, p. 13) emphasise that learning is mediated through the hidden curriculum, where socio-cultural expectations and contributions from various stakeholders collectively shape learners' development. This highlights that reading attainment is a whole-school and whole-community responsibility, demonstrating the interplay of micro- and macro-level factors in supporting literacy.

2.4.2. Curriculum Representations

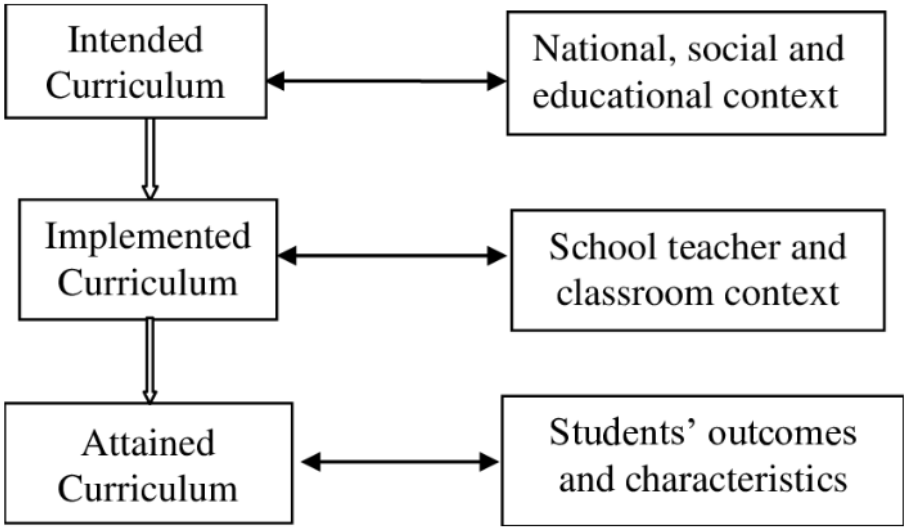

Figure 4: TIMSS framework of intended implemented and attained curriculum (Hossain, 2019).

Curriculum representations provide a framework for understanding how teaching and learning are structured, enacted, and evaluated within educational contexts. Drawing on the TIMSS framework (Hossain, 2019), curriculum can be viewed through three interrelated perspectives: the intended curriculum, which articulates formal educational goals and objectives; the implemented curriculum, which reflects how teachers translate these objectives into classroom practice; and the assessed curriculum, which captures learners' attainment and achievement of the planned outcomes. Examining curriculum through these representations highlights the complex interplay between policy, teacher agency, learner engagement, and assessment, as well as the influence of contextual factors on curriculum delivery and learner outcomes. This approach emphasises that curriculum is not merely a static document but a dynamic process shaped by multiple stakeholders, learners' experiences, and the socio-cultural context in which education occurs.

2.4.2.1. Intended Curriculum

Van den Akker (2006) defines the intended curriculum as the ideal version of a curriculum, formally documented to serve as a guiding vision for educators. It represents the foundational philosophy that informs teaching practices. Similarly, Borji and Farsani (2023) describe the intended curriculum as a structured, written sequence outlining learning objectives, comparable to a blueprint that specifies educational

goals, subject content, and the skills students should acquire at each grade level. Makumane and Khoza (2020) expand on this perspective, asserting that a curriculum serves as a comprehensive plan for teaching. They highlight Van den Akker (2006) notion of the curriculum as a guiding vision and emphasise that teachers ought to act as the drivers of the curriculum, applying their subject-specific expertise to implement it effectively (Makumane & Khoza, 2020; Williams, 2017). Prominent educational theorists, such as John Dewey, have underscored the necessity of clearly defining educational goals and ensuring their alignment with instructional practices (Williams, 2017). This structured approach has led to the development of curriculum frameworks, standards, and guidelines that offer educators a systematic plan for instruction and assessment.

In the South African context, the intended curriculum is encapsulated in the Curriculum and Assessment Policy Statement (CAPS) (Basic Education, 2020), which provides a structured framework for teaching and learning. Additionally, assessment policies such as the National Policy Pertaining to the Progression and Promotion Requirements (NPPR) (South African Department of Basic Education, 2013) establish criteria for student advancement. Subject-specific examination guidelines (South African Department of Basic Education, 2021) further detail essential aspects such as the required number of assessments, time allocations for subjects, and the topics covered each term, ensuring consistency in curriculum implementation. Although, these policies and documents guide teachers on what to teach and when to teach it, they do not fully address the diverse reading abilities of learners (Williams, 2017). Various macro- and micro-level factors influence students' reading skills, yet these factors are often overlooked in curriculum implementation (Bertram et al., 2021).

Williams (2017) & Gutek (2014) highlight the need to align teaching practices with students’ varying abilities, including their reading proficiency and socio-economic backgrounds. For example, schools geographically located in rural areas or far away from major cities, learners may encounter concepts like "tariff parking" only in textbooks, as many come from rural areas, where such scenarios are not part of their lived experiences. As such, this lack of exposure limits their ability to recognise and comprehend real world applications of curriculum content (DBE, 2020a; Frith, 2009).

In other words, in many cases, learners rely on educators who are well-travelled and knowledgeable about the curriculum's real-world references to bridge this gap.

To address this challenge, Bertram et al. (2021) propose that educators implement the intended curriculum in a way that draws on learners' experiences and gradually builds their understanding to meet the expectations of the National Senior Certificate examination (DBE, 2021). Barends and Reddy (2024) elaborate on interventions and strategies developed and implemented by the Department of Basic Education (DBE, 2020, 2021, 2022) to integrate reading strategies within the curriculum. These strategies aim not only to deliver content, but also to enhance learners' reading ability to access content by improving their fluency, comprehension, and decoding skills. A lack of reading ability significantly hinders a learner's academic success not only in language subjects but also in content subjects such as ML, reinforcing the importance of 'language across the curriculum' as emphasised in various curriculum implementation policies (Botha et al., 2008; DoE, 2006; Western Cape Education Department, 2019). Imam (2016) highlights that learners with stronger reading skills perform at a much higher level due to their enhanced comprehension abilities. This is particularly evident in subjects like mathematics, where problem solving requires the ability to analyse and interpret information through scenarios, tables or graphs effectively. By contextualising learning and making it more relatable, educators can help students bridge the gap between theoretical content and real-world applications. This approach ultimately improves their reading ability through comprehension, leading to greater academic success.

2.4.2.2. Implemented Curriculum

The implemented curriculum is often referred to as the "curriculum in action" (van den Akker, 2006). This concept, also supported by Maxwell and Roofe (2020), describes the process by which educators interpret curriculum documents to create lesson plans that facilitate teaching and learning in the classroom. Furthermore, Chaudhary (2015), along with Fomunyam and Khoza (2020), expand on this definition by emphasising that the implemented curriculum is what teachers put into practice by delivering content knowledge and skills as intended by the curriculum, in this case, the CAPS. Teachers play a crucial role in this process, using their professional experience to interpret the curriculum and structure lessons accordingly. For example, by integrating

the CAPS with the Annual Teaching Plan (ATP), teachers equip learners with the necessary skills to meet the goals set out by subject-specific policies. Myatt (2025) refers to curriculum implementation as the ‘nuts and bolts’ of curriculum quality, highlighting its significance. According to Myatt, the implementation phase is the most critical, as it directly impacts the learners' engagement with the curriculum and determines the overall quality of their learning experience. A key challenge affecting curriculum implementation arises when teachers are required to teach subjects they did not specialise in during their studies. Even when they have studied the subject methodology, continuous professional development proves essential to ensuring effective teaching and high-quality curriculum delivery. This underscores the importance of a well-implemented curriculum and its impact on learners (Myatt, 2025).

Although the intended curriculum provides a framework for implementation, scholars such as Hoadley and Jansen (2013), Maxwell and Roofe (2020), and Myatt (2025) emphasise that the true focus ought to be on what happens in the classroom, that is, the dynamic interaction between teacher and learner. Maxwell and Roofe (2020) even describe the implemented curriculum as the curriculum that is "lived out" by the educator. Williams (2017) further suggests that teachers ought to incorporate learners' lived experiences into the classroom, making learning more relevant and engaging. For this process to be effective, learners must be able to extract meaning from written text. Leipzig (2001) asserts that learners need the ability to decode and comprehend text to fully engage with the curriculum. Frankel et al. (2016) add that, beyond word recognition, learners must also be motivated to construct meaning from text. This reinforces Myatt’s (2025) argument that teachers with a strong foundation in subject methodology are better equipped to present lessons in a way that fosters deeper understanding. Frankel et al. (2016) further suggest that when teachers possess both content knowledge and the ability to inspire interest, learners are more likely to develop motivation and enthusiasm for the subject.

In summary, the implemented curriculum is more than just the delivery of content; it is an interactive process shaped by teachers’ expertise, learners' experiences, and the ability to make learning accessible and engaging. The success of curriculum implementation depends not only on structured policies but also on the continuous

professional development of teachers and their ability to foster meaningful learning experiences.

2.4.2.3. Attained Curriculum

Van den Akker et al. (2009) define the attained curriculum as the assessed curriculum, emphasising the experiential aspect where learners construct knowledge based on their perceived experiences and their achievement of learning outcomes. Notably, this perspective shifts the focus primarily onto the learner, with minimal reference to the teacher's role. Moreover, Mbhele et al. (2024) refer to the assessed curriculum as the achieved curriculum, affirming that its primary goal is to evaluate, through assessment, whether learners have acquired, understood, and internalised what was planned and taught. They further support Van den Akker et al.'s (2009) assertion that the focus is now on the learner, as assessment serves to determine whether the intended learning objectives have been met. However, Mbhele et al. (2024) also highlight that assessment is not only about measuring achievement, but also about identifying areas where learners may need additional support. This allows teachers to reassess and reteach concepts where necessary, ensuring that gaps in understanding are addressed.

In this way, the assessed curriculum provides teachers with an opportunity for reflection and refinement, enabling them to revisit and adjust their implemented curriculum. This process operates in a continuous cycle moving back and forth until learners reach their full potential.

2.5. READING ABILITY IN CURRICULUM

In South Africa, and particularly within the Western Cape, there are several notable programmes and campaigns aimed at addressing the well-documented and persistent challenge of learners' declining reading abilities such as the LitNum strategy (DoE, 2006), the National Reading Strategy (Botha et al., 2008), and even in the CAPS policy document (DBE, 2020a, 2022a). This issue has been widely acknowledged as one of the key factors negatively impacting curriculum coverage (Botha et al., 2008; Department of Education, 2006; Western Cape Education Department, 2019). In order for learners to successfully engage with and master the school curriculum, it is essential that they first develop strong reading skills. Reading ability is a foundational

skill that enables learners to access, interpret, and internalise the content delivered across all subjects (Iheakanwa, Obro & Akpochafo, 2021).

Bharuthram (2012) emphasises that reading ability extends beyond basic word recognition or decoding. While the ability to interpret a large volume of written material is necessary, it is the deeper level of comprehension that truly empowers learners. Comprehension enables them to analyse, evaluate, and synthesise information from various sources, which is essential for constructing subject-specific knowledge. For instance, Ojose (2011) illustrates this by referring to ML, where students are required not only to understand mathematical concepts, but also to apply them in real-life contexts. This demonstrates that reading ability is not an isolated skill, but a critical tool that supports cognitive engagement, critical thinking, and problem-solving within the curriculum.

2.6. THE CURRICULUM OF MATHEMATICAL LITERACY

MLis commonly referred to by learners in the FET band as *Math Lit* (Graven et al., 2011); however, it exists as a South African curriculum subject.The name internationally or alternatively loosely translates to a subject characterised from the word literacy to minimum skill or knowledge a learner needs to be considered literate in the field of mathematics. Ojose (2011) defines the word literacy as “knowledge that is needed” (Ojose, 2011. p. 2). This South African subject field is closely related to quantitative literacy in the US and as numeracy in other countries such as England and Australia (Frith, 2023) but all these terms refer to mathematical calculations within a real word context.

The subject ML was first introduced in South African schools as an official subject in 2006 (Graven et al., 2011) as intervention to learners poor Mathematical marks, commonly now referred to as “pure maths”. The aim of this subject is to offer learners “metamorphosis” (Graven et al., 2011. p.491) in the format of mathematics so that every learner has a form of a mathematical background. Thus, according to the DBE (2022a) helping every learner analyse every day scenarios and being to solve problems. In the words of the DoE (2008), addressing the issues of quality in relation to enabling a learner to become “a self-managing person, a contributing worker and a participating citizen in a developing democracy” (p.10). Scholars such as Frith (2009)

and Steen (2004) refer to this phenomena as still being able to do mathematical operations, but only in a real scenario reminiscent of daily life. For example, a 2.7% salary increase may appear beneficial; however, when compared with a 5% cost-of-living adjustment (COLA), the increase may negatively affect an individual's purchasing power, leaving them financially worse off.

The ML curriculum consist of a learner doing nine School-based assessments (SBA) in grades 10 and 11; and eight SBA's in Grade 12, excluding the final National Senior Certificate, consisting of two papers. These SBA's consist of a standardised cognitive layout, which entails 30% of the question paper involving basic knowledge and reading from various information such as diagrammes, tables, and financial documents. Another 30% of the SBA is set on basic calculations and applying routine procedures. Moreover, difficult calculations involving multistep procedures cover 20% of the SBA and the remaining 20% consists of reasoning and reflecting on calculations in a real word scenario. The cognitive layout is applied in all SBAs, which is used as an umbrella term for investigations, controlled tests, and both paper 1 and 2. The papers are also split up according to the five main topics of ML, which are 60% Finance, 35% Data Handling and 5% Probability covered by Paper 1. Paper 2 consist of 40% Maps, Plans and other representations of the physical word, followed by 55% Measurement and lastly repeated probability of 5% as seen in Paper 1 (DBE, 2021, 2022a).

2.7. STRENGTHS AND LIMITATIONS OF READING ABILITY IN PROPORTION TO ACADEMIC PERFORMANCE

From an international perspective, Öztürk et al. (2020) conducted a study in Turkey, finding a significant relationship between students' mathematical performance and their reading and comprehension skills. The study further elaborates that strong reading skills positively influence students' ability to solve mathematical problems, which, in turn, enhances their self-efficacy in tackling problems that are more complex in the future. Additional international research highlights the critical role of literacy in broader academic and professional success. The Program for International Student Assessment (PISA 2018) emphasises the importance of foundational literacy for full participation in a functional society, asserting that literacy is not merely a skill developed in early childhood, but one that evolves throughout an individual's lifetime (Liu et al., 2022). Similarly, findings from the OECD Adult Skills Survey underscore the

significance of literacy and numeracy in problem-solving, highlighting their role in fostering employability in the 21st century. Higher literacy and numeracy skills are associated with increased earnings, lower unemployment risk, and overall improved job performance (Liu et al., 2022; OECD, 2019).

Furthermore, multiple country-specific studies have found that learners with high levels of reading proficiency are more adept at employing effective learning strategies, which, in turn, enhance their academic performance (Areepattamannil, and Caleon, 2013; Lee & Shute, 2010; Liu et al., 2022). Conversely, research also suggests a bidirectional relationship between intelligence and reading ability. Deary et al. (2007) argue that a learner's cognitive ability and academic aptitude can influence their reading proficiency, particularly in later stages of development.

2.8. CONCLUSION

The literature presented in this chapter provides a comprehensive understanding of reading ability by focusing on the three key levels: recognition, comprehension, and fluency. These components are essential in understanding how learners process and apply information in an academic context, particularly within the framework of Mathematical Literacy. The discussion highlighted the direct impact of reading ability on learners' capacity to analyse problems and draw meaningful conclusions, as comprehension of written texts is a crucial factor in successfully interpreting mathematical questions. Furthermore, the role of language use and reading practice in developing these skills was emphasised, along with the challenges posed by mixed-language usage in learners' daily communication. The curriculum was examined in relation to its levels and representations, with a specific focus on the ML curriculum and the impact of reading ability on its implementation and execution. Building on this foundation, the next chapter focuses on the research methodology, outlining the design and approach used to generate data for this study.

CHAPTER 3:
THEORETICAL FRAMEWORK

3.1. INTRODUCTION

This chapter outlines the theoretical framework underpinning this study: Scarborough's Reading Rope . It begins by providing a description of the framework, followed by an explanation of how it was applied within the context of this research. The chapter also includes a rationale for selecting this particular framework. Furthermore, it explores the Reading Rope as a metaphor that illustrates the interwoven strands of word recognition and language comprehension, each comprising multiple sub-skills. These intricately woven strands contribute to the development of a skilled reader. The discussion highlights how proficient reading is essential for learners to perform optimally in Mathematical Literacy, as difficulties in reading can negatively impact their academic achievement in the subject.

3.2. THEORETICAL FRAMEWORK: THE READING ROPE

Scarborough (2001) developed the *Reading Rope* framework (refer to figure 5 below) to illustrate the complexity of learning to read.

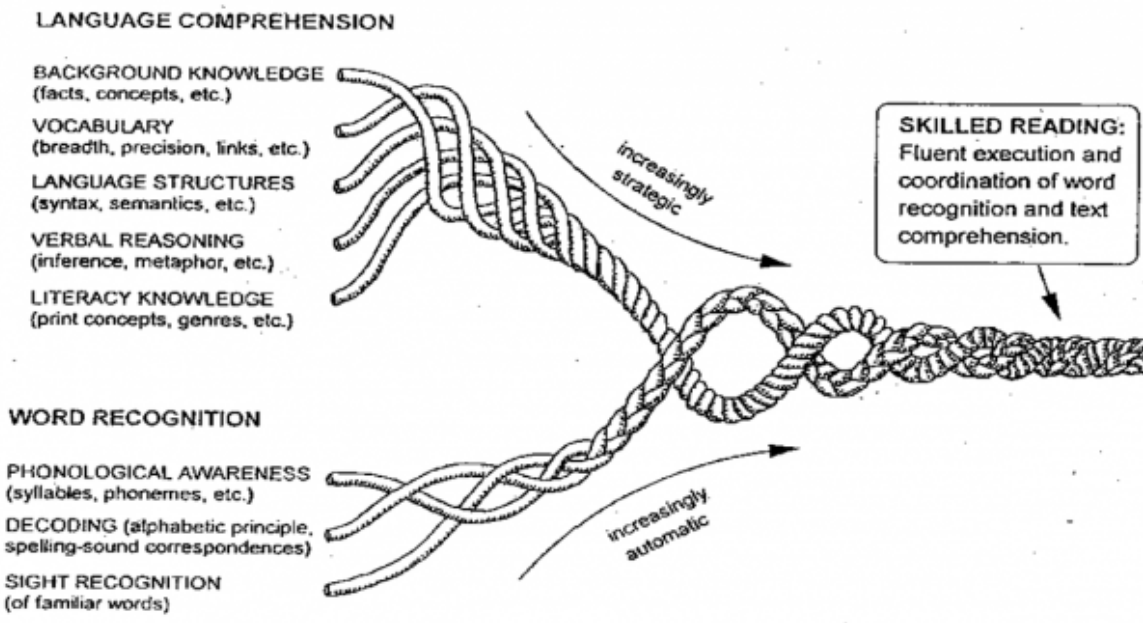

Figure 5: The many strands interwoven to make up a skilled reader. (Source: Scarborough, 2001)

The International Dyslexia Association (IDA, 2018) describes this model as a "groundbreaking infographic" that captures the multifaceted nature of reading. The Reading Rope consists of eight distinct skills, namely, under language comprehension, there are background knowledge, vocabulary, language structures, verbal reading and literacy knowledge, and then under Word recognition, there are phonological awareness, decoding, and sight recognition that must be woven together for a learner to become a fluent and skilled reader. The framework further suggests that if one or more of these strands are weak, the reader is likely to experience difficulty in some aspect of reading.

The *Reading Rope* framework is divided into two main components: word recognition and language comprehension, woven tightly and later with all necessary individual skills developed, enabling a skilled reader. Each of these is made up of smaller strands, much like the individual fibers that form a strong rope. Imagine examining a rope. What will make one rope stronger than another? A stronger rope is made of many smaller threads tightly intertwined, and in the same way, the Reading Rope emphasizes how various reading skills must be integrated to form strong reading proficiency. The bottom part of the rope represents the word recognition strand includes phonological awareness, decoding, and sight recognition (Cambium Learning Group, 2024). The language comprehension strand can be seen in the figure as the top part, equally vital, which consists of background knowledge, vocabulary, language structures, verbal reasoning, and literacy knowledge. Kambach and Mesmer (2024) emphasize that both components are essential and interdependent, with each playing a crucial role in developing a skilled reader. Scarborough's Reading Rope provides a comprehensive, multidimensional model of reading that reflects the complex, interactive processes involved in being a skilled reader. Unlike models that isolate phonics or comprehension as singular factors, the Rope captures the intricate interweaving of word recognition and language comprehension skills. Given the focus of this study on how reading ability impacts ML performance, particularly in learners struggling with text, graphs, and other 'real world' extracts interpretation, Scarborough's model offers a robust theoretical foundation for identifying and analyzing the various linguistic, cognitive, and decoding factors that contribute to understanding mathematical questions.

3.2.1. Word Recognition

Word recognition, often referred to as the lower strand of Scarborough's Reading Rope , forms the foundational base for fluent reading. It refers to the ability to read words quickly and accurately, making the reading process seem almost automatic and without effort (Cambium Learning Group, 2024). According to Scarborough (2001), this automaticity is crucial as it frees cognitive resources for understanding rather than using them to recognise individual words. The lower strand is strengthened when three interdependent components, phonological awareness, decoding, and sight recognition, are individually well developed and woven together, making up the lower strand of a skilled reader's metaphorical rope. As these skills are mastered, they are carried out with increasing automaticity, allowing skilled readers to recognize words rapidly, accurately, and with minimal conscious effort (Scarborough, 2001).

Phonological awareness is the ability to recognise and manipulate the sounds of spoken language. This serves as the foundation of reading (Kilpatrick, 2016). Petscher et al. (2020) emphasize that phonological awareness, alongside alphabet knowledge, is a major component in developing future decoding skills. Lyon (2022) further elaborates that initiating strong phonological instruction early significantly improves a student's later reading success. In the context of Mathematical Literacy, strong phonological awareness supports learners in decoding unfamiliar terms embedded in real-world scenarios. According to the MLCAPS document (DBE, 2020a) and Examination Guidelines (DBE, 2021), learners encounter scenarios that expand from local household contexts in Grade 10 to national and international contexts by Grade 12. This progression introduces increasingly complex vocabulary, such as currency exchange, inflation rate, or international landmarks with metric or imperial units. Learners must decode these unfamiliar terms to extract the relevant information needed for calculations. Although spelling errors are not penalized in MLassessments, clear written explanations are expected, making phonological encoding equally important for effective communication (Cambium Learning Group, 2024).

Decoding is the process of translating written text into spoken language using phonics and other word recognition strategies (Scarborough, 2001). It is a critical skill for learners, particularly for accurately reading mathematical terminology. For example, a learner who can decode terms such as *cm³* into *cubic centimeters* understands that the measurement refers to a shape measured in centimeters, with the ³ indicating a

cubic unit, meaning that the volume was calculated. Such decoding skills equip learners to interpret problem statements correctly and efficiently. As Braintrust Tutors (n.d.) explain, "decoding is at the heart of reading." While decoding is not the only skill necessary for successful reading, it is foundational; without decoding, other reading skills become "essentially useless." In essence, decoding refers to the ability to determine how to pronounce a word accurately. In Mathematical Literacy, where a correct understanding of the wording directly impacts a learner's ability to solve problems, difficulties in decoding technical terms can lead to misinterpretations and mistakes unrelated to the learner's actual mathematical ability.

Sight recognition involves the instant identification of familiar words without consciously decoding each word (Ehri, 2005). Through repeated exposure, critical mathematical terms such as interest rate, budget deficit, and cm^3 become part of learners' sight vocabulary via orthographic mapping (Cambium Learning Group, 2024). Sight recognition not only enhances word identification but also plays a vital role in reading fluency, enabling readers to read text smoothly, quickly, and accurately (Digital Promise, 2024). Fluent reading ensures that learners' cognitive resources are reserved for understanding the text rather than expended on word decoding. In Mathematical Literacy, learners who instantly recognise key subject-specific terms can focus their mental effort on analysing the scenario and completing the necessary calculations, ultimately improving their mathematical reasoning and overall performance.

Thus, phonological awareness, decoding, and sight recognition constitute the three essential strands of word recognition, which collectively build the automaticity required for skilled reading. These strands form the foundation for learners' ability to access and engage effectively with the language demands of ML tasks.

3.2.2. Language Comprehension

The strands of Language Comprehension within Scarborough's Reading Rope become increasingly strategic, focusing on purposeful, intentional, and schema-building strategies (Scarborough, 2021). In this strand, readers actively engage with texts by asking questions, making predictions, monitoring their understanding, and making connections between ideas. Strategic readers employ comprehension

strategies such as summarizing, visualizing, and self-questioning to deepen their understanding of the material (Amplify, 2023).

a) Background Knowledge, the first individual strand as illustrated by Figure 5 is essential for understanding text because it allows readers to connect new information to what they already know (Cambium Learning Group, 2024). Background knowledge is dynamic and develops over time as learners are exposed to new experiences and information. Teachers play a key role in nurturing this growth by linking new concepts to familiar experiences and broadening students' exposure to a wide range of topics. For example, in Mathematical Literacy, background knowledge is particularly important. Students bring diverse prior knowledge to the classroom, influenced by their cultural and educational experiences. However, it is important to recognize that prior knowledge may sometimes be incomplete or based on what their realities are (Great Minds, 2022). For instance, learners from rural communities may have limited familiarity with certain real-world concepts, such as the topic in finance: tariffs, more directly, parking fees, which are common for airport and mall parking in bigger cities, which are common contexts used in MLassessments. Teachers must, therefore, intentionally build and bridge background knowledge to support learners in successfully interpreting these real-world scenarios and solving the related problems.

b) The next strand is Vocabulary. Within the Reading Rope , vocabulary refers to the words one understands and uses, both orally and in writing. A strong vocabulary supports comprehension and the ability to communicate effectively (Amplify, 2023). In Mathematical Literacy, vocabulary extends beyond general language knowledge to include subject-specific terminology, such as inflation rate, surface area, or unit cost, which learners must understand to accurately interpret and solve problems.

c) Language Structures are equally vital. This refers to the grammatical rules and relationships between words, phrases, and sentences. It includes both syntax (word order) and semantics (word meaning) (Amplify, 2023). In Mathematical Literacy, learners must comprehend the structure of questions, which are often long and complex. Many students find it easier to understand questions when they are read aloud by a teacher, who naturally emphasizes punctuation, pauses, and intonation. This highlights the role of language structures in breaking down and understanding a

problem step-by-step, an essential skill for successfully extracting information in examinations.

d) Verbal Reasoning forms another crucial part of Language Comprehension. It involves making inferences, connecting ideas within and across texts, and reasoning using language (Great Minds, 2022). Although ML is often considered a calculation subject rather than a language-based subject, even though MLrequires significant verbal reasoning, particularly at higher cognitive levels. For example, Level 4 questions (DBE, 2020a, 2021) often demand that learners not only perform calculations but also reason through multiple possibilities to select the most appropriate solution. Effective verbal reasoning enables learners to justify their decisions and articulate their answers clearly in written form, as required by examination standards (Cambium Learning Group, 2024).

e) Finally, Literacy Knowledge supports the understanding of print conventions, text structures, and the purposes of different written genres (Reading Universe, n.d.). In Mathematical Literacy, there are no different genres but rather students are expected to navigate ‘real-world’ documents such as municipal statements, bank slips, graphs, and tables. These everyday texts require learners to apply their literacy skills in interpreting data, identifying relevant information, and responding appropriately to practical problems.

3.3. CONNECTING READING ABILITY AND SCAROBOUGH’S READING ROPE

Scarborough’s Reading Rope (2001) visually and conceptually illustrates that skilled reading is not a single ability, but rather the integration of multiple interwoven skills that make up a skilled reader. Throughout this research, the phenomenon of reading is discussed across three key levels: recognition, comprehension, and fluency. Recognition refers to the ability to accurately identify words, while comprehension, closely linked with decoding, involves understanding the meaning of the text. Fluency, the third component, entails reading smoothly, accurately, and efficiently. These three elements of reading ability are not isolated, but rather deeply connected, as reflected in the structure of the Reading Rope . Scarborough (2001) expands on each level by detailing the various skills, illustrating that reading is a complex, braided process where each individual strand must be strong to support a fluent, skilled reader.

Within this study, the focus falls on the FET subject ML and investigates how learners' reading abilities influence their performance. Weaknesses in one or more of the strands elaborated by Scarborough (2001) can lead to difficulties not in computational ability, but in interpreting and understanding the diverse genres of text presented in ML assessments. By adopting Scarborough's Reading Rope as the theoretical framework, this study highlights that challenges in ML are often rooted in fundamental reading processes rather than purely mathematical or computational shortcomings.

3.4. GAP AND LIMITATIONS IN THE FRAMEWORK OF THE READING ROPE

While Scarborough's Reading Rope (2001) provides a detailed and valuable visual framework for understanding the development of skilled reading, it is not without its limitations. One significant critique is that, although the Rope incorporates a broader range of skills than earlier models like the Five Pillars of Reading (National Reading Panel, 2000) or the Simple View of Reading (Gough & Tunmer, 1986), it does not always translate into practice during educational interventions. Research by Cervetti et al. (2020), Kambach and Mesmer (2024), and Dewitz (2021) highlights that although structured literacy approaches recognize the complexity of reading development, conversations around implementation often oversimplify these components, leaving out important elements of language comprehension or higher-order thinking skills.

Another limitation lies in the model's limited engagement with socio-economic and contextual factors that heavily influence reading development. Scarborough's Reading Rope primarily frames reading as a cognitive and linguistic process without fully addressing how external variables such as poverty, parental literacy, access to resources, and school quality affect a learner's ability to develop the strands outlined. Research consistently shows that reading ability and, consequently, academic performance are deeply intertwined with socio-economic status (Cimmiyotti, 2013; Iheakanwa, Obro & Akpochafo, 2021; Perfetti, 1985; Pretorius & Machet, 2004). Pretorius and Klapwijk (2016) emphasize that both micro-level factors (e.g., home language, parental support, exposure to reading) and macro-level factors (e.g., school funding, resource allocation, teacher quality) significantly shape learners' reading experiences. Moreover, parental literacy and involvement play crucial roles. Cunningham (2010) identifies three levels of home literacy environments: limiting, passive, and active. Particularly relevant to this study is the limiting literacy home

environment, common in lower socio-economic contexts, where parents' limited literacy skills result in minimal engagement with their children's reading development (Cunningham, 2010; Nyama, 2010). These conditions, as Pretorius and Machet (2004) argue, further widen the literacy gap. David's (2023) proposal is that literacy education should integrate learners' cultural and community contexts, suggesting that reading instruction must move beyond a purely cognitive-linguistic model to fully support diverse learner backgrounds.

Thus, while Scarborough's Reading Rope offers an intricate metaphorical illustration of the skills necessary for reading proficiency, its framework does not explicitly account for the socio-economic and cultural diversity that shapes learners' literacy journeys. For a study focusing on ML within the Eden and Central Karoo Education District FET phase, where varied social contexts, especially within this area, heavily influence reading ability, it is essential to acknowledge and address these additional dimensions.

3.5. CONCLUSION

This chapter has outlined Scarborough's Reading Rope (2001) as the theoretical framework underpinning this study, illustrating the interconnected components represented metaphorically by a woven rope necessary for skilled reading. While the model provides a valuable structure for understanding reading ability through the integration of recognition, comprehension, and fluency, it also presents certain limitations. In particular, the model does not fully account for socio-economic and contextual factors that influence literacy development, especially within diverse educational settings such as those encountered in the Western Cape, Eden, and Central Karoo Education District FET phase. This framework, together with the limitations presented, is critical for understanding how reading ability impacts learners' performance in the subject of Mathematical Literacy. The next chapter will describe the research methodology and data generation strategies employed to explore these relationships in greater depth.

CHAPTER 4:
DATA GENERATION, RESEARCH DESIGN AND METHODOLOGY

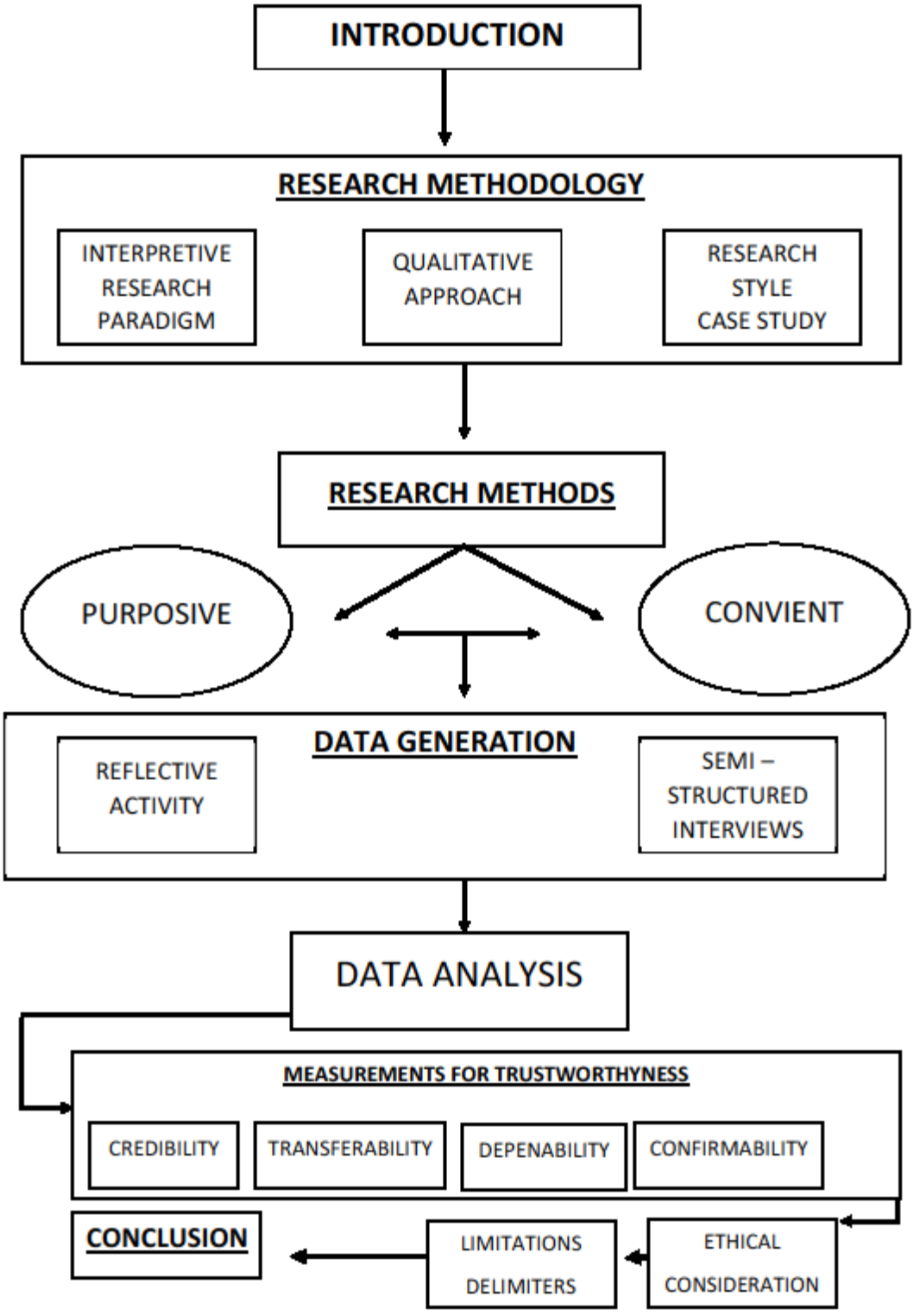

Figure 6: Visual flow and outline of Chapter 4

4.1. INTRODUCTION

Building on the insights gained from the literature review in Chapter Two, which explored the relationship between reading ability and learners' performance in ML, this chapter presents the research methodology adopted to investigate this connection in the context of selected schools in the Eden and Central Karoo Education District.

The primary aim of this study was to explore how learners' reading ability influences their achievement in ML. To guide this investigation, the following objectives were set:

1. To explore the ways in which learners' reading ability can affect their achievement in ML.
2. To understand the underlying factors that influence learners' reading ability in the context of ML at schools in the Eden and Central Karoo Education District.
3. To identify possible interventions or strategies that teachers and schools can implement to overcome challenges related to reading ability in ML.

In alignment with these objectives, the main research question guiding this study is:

What are learners' reading abilities in ML at schools in the Eden and Central Karoo Education District?

This question is further supported by the following sub-questions:

1. How does learners' reading ability affect their achievement in ML?
2. What factors inform or influence learners' reading ability in ML in Western Cape schools?
3. What possible interventions or strategies can be implemented by teachers or schools to address challenges related to reading ability?

This chapter outlines the research design and methods employed for data generation and analysis. It details the qualitative approach used, incorporating tools such as reflective activities and semi-structured interviews to gather rich and meaningful data. The chapter also provides a rationale for the selected methodology, including the research paradigm, sampling techniques, population, and data analysis strategies. Furthermore, it addresses ethical considerations, limitations of the study, and the measures taken to ensure trustworthiness and credibility.

A flow diagramme (Figure 6) is included to visually present the step-by-step research process followed in this study, illustrating how each component of the methodology contributes to achieving the overall aims.

4.2. RESEARCH METHODOLOGY

Selecting an appropriate research paradigm is a critical first step in any study, as it frames the entire research process. According to Pervin and Mokhtar (2022) different paradigms are suited to different research purposes, and understanding the chosen paradigm is essential for interpreting the findings within the correct philosophical context. Furthermore, Lather (1986) argues that a paradigm is more than a methodological choice; it reflects the researcher's worldview and how they interpret the environment in which they live or work. This view is supported by Ryan (2018), who asserts that knowledge is subjective and constructed through individuals' lived experiences. These ideas are particularly relevant in the context of this study, which is situated within the interpretive paradigm. The aim is to explore ML teachers' perceptions regarding the possible impacts of learners' reading ability on their performance in ML assessments. This perception is shaped by the realities teachers face in rural areas of the Western Cape, where socio-economic challenges are widespread. Many learners come from homes where literacy is not prioritised, often because parents or caregivers themselves are illiterate, resulting in limited exposure to reading both at home and in the broader community.

4.2.1. Interpretive Research Paradigm

In interpretive research, contextual and subjective experiences were viewed as central to understanding behaviour and meaning. The interpretive paradigm emphasised the importance of understanding human experience within its specific social and cultural context (Al-Ababneh, 2020). Gichuru (2017) noted that this paradigm is concerned with understanding and interpreting the environments in which phenomena occurred. In the context of this study, the phenomenon under investigation was how learners' reading abilities influence their academic performance in ML. Pervin and Mokhtar (2022) expanded on this by stating that interpretive research aimed to uncover the social realities of participants, recognising that individuals acted and responded based on how they experienced and made sense of their environments.

Berryman (2019) emphasised that social constructs were vital to answering the "how" and "why" questions in qualitative research, as these enabled the researcher to explore how people made sense of their world. This perspective aligned with the work of Pervin and Mokhtar (2022). According to their explanation, the interpretive paradigm is based on the assumption that individuals' actions and understandings are shaped by their environments. In this study, ML teachers' perceptions of learners' academic struggles were therefore not interpreted as isolated opinions, but rather as reflections of a broader socio-economic and educational ecosystem. Moreover, the teachers observed several challenges related to learners' reading ability. These included difficulties in understanding assessment questions and correctly interpreting or extracting relevant information from scenarios, which they linked to the absence of a reading culture embedded within broader familial and socio-economic contexts. Teachers' beliefs about the relationship between reading ability and ML achievement thus emerged from their interpretation of these interconnected systems, confirming the interpretive paradigm's emphasis on meaning-making through contextually situated experiences.

Pervin and Mokhtar (2022) further argue that an interpretive approach was particularly suited to studies involving human interactions within complex environments, as it allowed researchers to access the lived experiences of participants and the meanings they attached to those experiences. In this study, teachers' perspectives were shaped by the challenges they encountered on a daily basis with learners who struggled with reading comprehension, homes where literacy was not prioritised, and communities where reading was often not viewed as a core value due to deep-rooted socio-economic conditions. These factors were not viewed in isolation but rather as interwoven influences that affected both learner performance and teacher perceptions. This approach proved valuable in investigating how teachers made sense of the academic struggles learners faced. These struggles did not necessarily stem from an inability to perform mathematical calculations, but possibly from poor reading comprehension that may have hindered their understanding of what was required in assessment tasks. The research was conducted in rural areas of the Western Cape, where these challenges were often amplified by limited resources and educational support structures. A qualitative research approach was therefore deemed most

appropriate for this study, as it allowed for a deep exploration of teachers' experiences and reflections regarding learners' reading abilities within the ML classroom.

Nonetheless, Hammersley (2012) offered a notable critique of the interpretive paradigm by pointing out its tendency to focus on small, context-specific groups. This limitation applied to the present study as well, since it was confined to ML teachers within the Eden and Central Karoo education districts. Although this narrow scope allowed for an in-depth exploration of context-specific experiences, it also limited the generalisability of the findings to other districts in the Western Cape or across South Africa. However, in line with the interpretive paradigm, the strength of this study lay in its depth of understanding rather than its breadth. The value of this research resided in the nuanced insights it provided into the lived experiences of teachers embedded in rural, socio-economically challenged environments. The interpretive paradigm thus proved to be well suited to this study, as it supported the exploration of how reading difficulties were perceived to affect learner performance and how those perceptions were shaped by broader community dynamics. Despite the study's limited scope, the contextual depth achieved aligned with the strengths of interpretive research and offered meaningful contributions to the discourse on academic achievement and literacy in the ML classroom.

4.2.2. Research Approach: Qualitative

Qualitative research is rooted in the aim of gaining rich, detailed insights into human behaviour, experiences, and motivations. Vaughan (2021) states that the goal of qualitative research is to understand the underlying motivations and perspectives that drive human actions. This approach is particularly useful when the objective is to explore learners' reading ability and to what extent it affects their ML performance. In this study, a qualitative approach was adopted through the use of a descriptive case study design. Creswell (2007) described a case study as an exploration of an event or series of events within a bounded system or specific context. Yin (2018) further explains that case studies were typically situated in real-life environments, aiming to examine how and why certain phenomena occurred. In this research, the phenomenon under investigation was how learners' reading abilities influenced their achievement in Mathematical Literacy, which necessitated a deep understanding of teachers' experiences within rural school contexts.

A qualitative approach was selected for this study because it aligned with the research aim of gaining multiple perspectives on learners' reading abilities across different school environments. Given that these experiences were subjective and shaped by each teacher's context, a qualitative method was the most suitable way to uncover the meaning behind teachers' perceptions. Teachers' interpretations of learner performance, particularly in relation to reading comprehension, were complex and context-dependent. The flexibility of the qualitative approach enabled the researcher to explore how socio-economic conditions, school settings, and classroom dynamics influenced these perceptions. By engaging with teachers from three schools in the Western Cape, the study aimed to highlight both common themes and unique experiences across diverse educational contexts.

The research employed a descriptive case study design to capture and analyse the lived experiences of ML teachers. Yin (2018) notes that descriptive case studies sought to present a comprehensive and contextual account of real-life experiences. Teachers served as the primary participants, and their schools represented the real-life environments in which they observed and interpreted learners' academic challenges. Through interviews and narrative responses, the study collected rich qualitative data that shed light on how teachers understood the role of reading ability in ML performance. These narratives enabled the researcher to describe how reading difficulties were perceived not only as barriers to understanding assessment questions but also as reflections of broader systemic issues, such as poor reading culture, and lack of parental support. The qualitative nature of the research also allowed for deep engagement with the data, fostering an interpretive analysis of each participant's perspective within their specific context.

Despite the strengths of the qualitative approach, several limitations were acknowledged. One primary challenge involved managing the subjectivity and potential biases that could arise from the researcher's own beliefs and assumptions. Hecker and Kalpokas (n.d.) stressed that reflexivity, ongoing self-awareness, and critical reflection were essential to mitigate these risks. In this study, reflexivity was maintained through journalling, listing potential biases, and constantly reminding myself of consciously adopting an open and non-judgmental stance. Another limitation was the difficulty in collecting high-quality data (Hecker & Kalpokas, n.d.; Vaughan, 2021), especially given the sensitive nature of the topic. Teachers might have been

hesitant to disclose personal views on learners' reading struggles, fearing judgment or professional scrutiny. Furthermore, the workload and availability of participants posed a challenge, where many educators taught ML to meet staffing requirements (DBE, 2022b) rather than out of subject expertise, potentially impacting the depth and relevance of their contributions. Due to the previously mentioned shortcomings, ethical considerations were also central to this research. Establishing trust, ensuring confidentiality, and respecting participants' time and autonomy were crucial in maintaining integrity throughout the data generation process. These limitations underscore the importance of thoughtful and respectful engagement when conducting qualitative research in educational settings.

4.2.3. Research Style: Case Study

This study adopted a qualitative descriptive case study approach to explore how learners' reading abilities influence their performance in ML. A case study, as defined by Creswell (2007), involves an in-depth exploration of a bounded system such as an event, activity, or process within its real-life context. Yin (2018) complements this by explaining that case studies allow researchers to investigate contemporary phenomena in real-life environments, especially when the boundaries between the phenomenon and context are not clearly evident. These definitions justify the use of a case study in this research, which seeks to understand how reading challenges manifest in learners' ML classrooms, in the Western Cape's Eden and Central Karoo Education District.

The study is designed as a descriptive case study, with the aim of producing a rich, detailed narrative of ML educators' lived experiences and perceptions. According to Yin (2014), descriptive case studies are well-suited for answering "how" and "why" questions and are typically used when the researcher does not control the events, but rather interprets them through the eyes of participants. In this case, the key research question considered how learners' reading abilities affect their achievement in ML necessitates the kind of deep, contextually grounded exploration that a case study affords.

This research involved six participants from three schools in the Eden and Central Karoo Education district, providing a multi-site perspective to explore both

commonalities and contrasts across teaching environments. By engaging with ML teachers through reflective activities with the use of Google Forms and follow-up semi-structured interviews conducted telephonically, the study gained insight into how reading ability influences learning in diverse but contextually linked settings.

As Zainal (2007) and Lambert and Lambert (2012) suggest, the strength of qualitative descriptive studies lies in their capacity to describe real-life phenomena in naturalistic settings. In this study, the participants' classrooms represent such real-life settings where their professional experiences, beliefs, and strategies are directly shaped by the reading abilities of their learners. By capturing the nuanced ways in which educators navigate this challenge, the case study approach helps to surface the often-overlooked literacy component embedded within ML pedagogy.

The case study method is particularly powerful when dealing with complex phenomena, such as the relationship between reading ability and performance in ML. As Annamalah (2024) notes, case studies offer methodological flexibility and depth, making them ideal for exploring multifaceted educational challenges. Hamilton and Corbett-Whittier (2013) add that this approach enables the researcher to construct detailed, context-rich analyses of real-world processes, something that is critical in educational settings where numerous contextual factors social, linguistic, institutional intersect. Moreover, case studies are increasingly favored in education research because they allow for a holistic understanding of human behaviour and the dynamics within learning environments (Hecker & Kalpokas, 2025). They enable researchers to focus on specific educational contexts, making the findings more relevant and actionable for similar environments.

Despite its strengths, the case study method is not without its limitations. As Sirisilla (2023) points out, researcher bias is a critical concern; a researcher's own assumptions and interpretations can skew the data analysis process. To address this, data will be collected through participant written responses and voice-recorded interviews**,** ensuring that the participants' own words form the basis of analysis. Furthermore, member checking will be employed to validate interpretations, ensuring that participants have the opportunity to clarify or confirm their intended meaning.

Another common critique is the limited generalisability of case study findings. As this research focuses exclusively on the Eden and Central Karoo Education District, its findings cannot be assumed to reflect the experiences of teachers in other regions. However, this limitation is both acknowledged and appropriate, where the study does not aim for universal conclusions, but rather for an in-depth understanding of a specific educational context, as reflected in the study's title and objectives (Satter, n.d.).

Garcia et al. (2024) further caution against making broad claims based on descriptive research. To mitigate this, the study incorporates multiple case sites, employs diverse data generation methods, and maintains rigorous documentation of the research process. These practices strengthen the credibility and trustworthiness of the findings. Lastly, case study research can be time-consuming and logistically demanding, especially when it involves geographically dispersed participants. To manage this, the study uses technology-enabled tools such as Google Forms for reflective journaling and telephonic interviews to facilitate participation and overcome the challenges of distance.

In sum, the qualitative descriptive case study design offers a robust framework for exploring the nuanced relationship between reading ability and achievement in ML. While it presents some methodological challenges, these are addressed through thoughtful design, triangulation, and ethical research practices. The case study approach is thus well-aligned with the aims of a case study to foreground the lived experiences of educators in real-world classrooms and to understand the literacy challenges that shape learners' ML outcomes.

4.3. SAMPLING: PURPOSIVE AND CONVENIENCE

A sample refers to a specific group that a researcher focuses on to investigate and draw conclusions about a broader population (Mukhari, 2016). In this study, both purposive and convenience sampling were used to identify participants most aligned with the research objectives. Purposive sampling enabled the selection of ML teachers based on criteria directly relevant to the study's focus, namely their experience with how learners' reading abilities might impact their ML performance. Convenience sampling complemented this approach by selecting participants from the Eden and Central Karoo Education District (ECKED), where the researcher had established

accessibility and professional networks. The sample consisted of six teachers, two from each of the three selected schools, who were directly involved in implementing interventions to support struggling learners and had practical experience addressing barriers in the ML classroom.

Purposive sampling proved effective for this qualitative study, as it prioritised participants with deep contextual knowledge and direct experience (Wisler, 2010). Although this method is often criticised for limited generalisability, this was not a concern for the present research, which focused on the rural educational context of Eden and Central Karoo Education District. By targeting teachers who met the pre-established criteria, including teaching ML in the FET phase, with relevant experience and qualification in the subject area, and willingness to participate in the study. I gained access to rich, detailed data. These educators also demonstrated willingness to engage in both reflective activity and follow-up telephonic interviews, further enhancing the depth of insight. The purposive strategy, therefore, led to data that was both relevant and grounded in the realities of rural schooling, aligning closely with the study's aim of understanding if and how reading impacts learners' academic performance in ML.

Despite its strengths, the use of convenience sampling introduced potential limitations, particularly the risk of selection bias. Participants were chosen based on proximity and accessibility, which may have skewed the sample toward teachers who were more cooperative or aligned with the researcher's networks. This could affect the broader applicability of the findings. However, this limitation was addressed by clearly defining the population of interest and ensuring that all participants met the same strict selection criteria. As suggested by Steward (n.d.) and SAGO (2025), maintaining alignment between sampling decisions and research objectives helps mitigate such bias. Furthermore, the combination of purposive and convenience sampling allowed for practical data generation within a geographically constrained district, without compromising the relevance or richness of the data.

In this study, six teachers from three different schools were purposively and conveniently selected according to the designed criteria.

Table 1: Participants Profiles

Participant	School	Grade(s) Taught	Years of experience	Language of Instruction
P1	School A	Gr.11 and 12	<6 Years	Afr/Eng Mix
P2	School A	Gr.10,11 and 12	<6 Years	Afr
P3	School B	Gr.12	<6 Years	Afr/Eng Mix
P4	School B	Gr.11 and 12	<6 Years	Afr
P5	School C	Gr.11 and 12	<6 Years	Afr/Eng Mix
P6	School C	Gr. 10, 11 and 12	<6 Years	Afr/Eng Mix

4.4. DATA GENERATION

4.4.1. Reflective Activity

Reflective activity was used as the initial qualitative data generation method in this study. Jasper (2005) described reflective activity as a widely used tool in education that allows individuals to think critically about their actions and experiences. Goker (2016) referred to this process as “conscious writing,” while Khoza (2016) highlighted its role in enabling educators to deeply engage with their professional realities. In the context of this study, the reflective activity provided participants with an opportunity to consider their experiences regarding learners’ reading abilities, ML performance, and any perceived connections between the two. Creswell (2007) described reflective activity as a process used to explore particular scenarios, problems, or contexts, and to act on that reflection. Creswell (2013) further added that it requires participants to respond to prompts that are directly related to the phenomenon being researched. In this study, educators from Grades 10 to 12 in the Eden and Central Karoo Education District were invited to complete a series of open-ended, electronically distributed questions. The profiles of the participating educators, including their schools, years of teaching experience, and language of instruction, are presented in Table 1. These prompts encouraged them to reflect on how reading ability influences ML performance, the nature and causes of learners’ reading challenges, and the instructional strategies they employed to support learners with limited reading proficiency.

The reflective activity focused on three key components of reading ability: recognition, decoding, and comprehension. These elements were aligned with the theoretical framework of this study, the Reading Rope (Scarborough, 2021). Recognition referred to the ability to identify subject-specific terms, mathematical units, and frequently used formulas. Decoding included interpreting tables, graphs, and unfamiliar real-life scenarios, especially those rooted in unfamiliar international contexts (DBE, 2020). Comprehension focused on the ability to understand the given context, interpret the question, and connect the scenario to the required mathematical procedure. The reflective responses were instrumental in establishing whether participants recognised a relationship between reading ability and learner performance in ML.

This method offered several strengths. Firstly, reflective activity allowed participants to engage deeply with the research topic in their own time and space without the researcher's presence, thus reducing potential bias or pressure. McAllister and McCaughtry (2009), supported by O'Dea and Murphy (2013), highlighted the richness and authenticity that emerge when individuals are given time to reflect and articulate their thoughts freely. The electronic format further enhanced flexibility, allowing participants to complete the activity using a device of their choice, whether a phone or laptop. As noted by Regmi et al. (2016), digital self-administered tools promote convenience and efficiency, particularly across geographically dispersed populations. In this study, this was essential, given the wide spread of schools across the Eden and Central Karoo district. Moreover, the reflective activity served a dual purpose: not only did it provide rich, qualitative data on the research phenomenon, but it also enabled the purposive selection of participants for the next phase of data generation namely semi-structured interviews. Participants who demonstrated in-depth engagement and insight through their reflective responses were selected for follow-up interviews to enrich the dataset.

However, there were also limitations. Kapoulas (2018) noted that not all participants may possess the skills or self-awareness required to engage meaningfully in reflective practice, which could affect the depth or accuracy of their responses. Similarly, Kircher and Zipp (2022) caution that self-administered written responses such as those used in open-ended questionnaires may vary in length and detail. This concern applied equally to the reflective activity, as some participants wrote extensively while others offered only brief responses. Another limitation was the absence of the researcher

during the activity, which meant that misunderstandings of the prompts could not be clarified in real time. To mitigate this, the prompts were clearly worded and contextually relevant, and participants, all of whom were qualified educators and were familiar with reflective writing and digital tools. Access issues were minimised by distributing the reflective activity electronically via familiar platforms like email and WhatsApp.

In conclusion, the reflective activity was a valuable starting point in the data generation process. It aligned well with the qualitative design of the study and its theoretical framework, offering participants an opportunity to express their realities and pedagogical experiences related to reading and ML. While it was not without challenges, its strengths in generating rich, individualised data and facilitating participant selection for interviews made it an essential component of this research.

4.4.2. Semi-Structured Interviews

Interviews are widely recognised as one of the most effective qualitative data generation methods (Polkinghorne, 2005). In this study, semi-structured interviews were employed as a means of gathering in-depth data from ML educators. As described by Johannesson and Perjons (2014), this method involved controlled, researcher-led conversations where participants responded to open ended questions designed to explore their lived experiences. The semi-structured format allowed for a conversational flow, enabling participants to express their views, insights, and strategies regarding the influence of learners' reading abilities on their ML performance. Six participants were purposively selected for interviews based on the richness of their responses to the initial reflective activity and their professional experience in addressing literacy-related barriers in ML. The interview schedule was developed in advance and remained flexible, allowing for natural exploration of sub-themes related to the main research questions. Due to the geographic spread of schools in ECKED, all interviews were conducted telephonically, at times convenient to the participants. Each interview lasted approximately 60 minutes and was recorded using the Voice Recorder app in interview mode. The app’s speech-to-text function further facilitated transcription and data analysis.

Semi-structured interviews were chosen for their ability to generate multi-layered insights into complex issues. Kakilla (2021) emphasised that such interviews are vital in critical qualitative research because they allow for knowledge production through

conversation and interaction with individuals from diverse experiences. This approach enabled the researcher to probe initial responses and uncover deeper meanings through follow-up questions. As supported by Ritchie and Lewis (2003), both verbal and non-verbal cues including laughter, hesitation, or silence were noted and interpreted to extract hidden layers of meaning. The flexibility of this method allowed the researcher to synthesise multiple themes organically and engage in meaningful dialogue across several interconnected topics. In this study, such depth was crucial in understanding the nuanced ways in which reading ability interacts with ML teaching and learning in rural educational contexts.

Despite its strengths, the semi-structured interview method posed certain limitations. One potential weakness, identified by Marshall and While (1994) and supported by Kakilla (2021), was the risk of limited probing when language barriers were present. However, in this study, this risk was minimised due to the shared linguistic background of the participants and the researcher. Afrikaans and English are the most commonly spoken languages in the Eden and Central Karoo Education District, and they are also the official languages of instruction in schools (DBE, 2020), which will strengthen the mitigating factors posed. Interviews were conducted in the participants' language of preference, ensuring ease of communication and clarity of meaning. Furthermore, Small (2008) cautioned that weak or limited responses could affect data quality, especially if the interviewer misinterpreted or failed to pursue key themes. This risk was mitigated by the purposive selection of teachers, who specialised in ML and had demonstrated the ability to articulate the challenges they faced regarding learners' reading abilities. Additionally, a semi-structured guide was used to help maintain focus and consistency, while still allowing flexibility to explore emerging themes in depth.

4.5. DATA ANALYSIS

Data analysis within this qualitative case study involved synthesising multiple data sources to develop a detailed understanding of the research phenomenon. Creswell (2012) explains that analysing data in case study research requires the researcher to examine participants' storied experiences in depth, using a variety of data to build a cohesive case. In this study, data analysis involved processing responses from electronically submitted reflective activities and transcribed semi-structured interviews. This process began with systematically organising the data, transcribing

interview recordings, and categorising the information. According to Mukhari (2016), thorough analysis is essential to draw credible conclusions that directly respond to the research questions. Stevens (2020) further emphasises the importance of researchers being intimately familiar with transcribed data in order to ensure trustworthy interpretations.

Thematic analysis, as proposed by Braun and Clarke (2006), was used as the primary method of analysis. This method involves identifying and analysing themes within qualitative data, thereby allowing the researcher to draw meaning from patterns and shared experiences. In this study, the data from both the reflective activity and interviews was categorised and reduced from raw data into meaningful themes. The process included identifying repeating patterns, understanding the data in its broader context, summarising key ideas, and using these insights to address the central research problem. Thematic analysis was chosen to gain deeper insight into participants' experiences and the instructional strategies they apply in response to learners' reading challenges and the effects on the performance in the subject ML. To guide this thematic process, both inductive and deductive approaches were employed. As explained by Bertram and Christiansen (2014), guided analysis allows researchers to apply both methods flexibly. Deductively, themes were established beforehand based on the research sub-questions, such as how learners' reading abilities affect ML, the reasons for these reading challenges, and potential or existing interventions. Inductively, additional themes were identified from the participants' narratives through careful analysis, allowing unexpected but valuable insights to be incorporated. This dual approach was particularly important given the semi-structured nature of the interviews, which often revealed perspectives not anticipated in the initial framework.

Braun and Clarke (2006) note that a major strength of thematic analysis lies in its flexibility and wide applicability to various forms of qualitative data. This was supported by Hecker and Kalpokas (n.d.), who stated that thematic analysis can be effectively applied to interviews, written reflections, and focus group data. Dawadi (2020) further explain that this method supports both inductive and deductive strategies, making it a practical choice for research involving rich, narrative data.

However, thematic analysis also has limitations. As Braun and Clarke (2006) acknowledged, the method relies heavily on the researcher's interpretation, which may

introduce bias. Different researchers analysing the same data may identify different themes, potentially overlooking important insights. Nowell et al. (2017) reinforced this concern, warning that subjectivity in thematic interpretation may compromise the trustworthiness of findings. To mitigate these limitations, this study incorporated several strategies. Firstly, a deductive structure was developed in advance to provide consistency in theme identification. Throughout the process, I engaged in continuous self-reflection and maintained awareness of potential personal biases. Regular review of emerging themes ensured that the analysis remained grounded in the data and not driven solely by researcher expectations. The use of pseudonyms and anonymised transcripts further helped ensure neutrality and focus on the meaning of the data itself.

4.6. MEASUREMENT FOR TRUSTWORTHINESS

To ensure the rigor and quality of this qualitative study, various strategies were employed to measure trustworthiness, including credibility, transferability, dependability, and confirmability, which collectively enhance the validity and reliability of the findings.

4.6.1. Credibility

Credibility refers to the extent to which the findings of a study are congruent with reality and truth as perceived by the participants (Mukhari, 2016). In this study, credibility was ensured by using multiple data gathering techniques, namely reflective activities and semi-structured interviews which allowed participants to authentically express their lived realities. The semi-structured interviews, in particular, invited participants to share their experiences in the form of storytelling. These interviews were recorded and transcribed using digital applications, which supported accurate representation of participants' voices and experiences. This approach allowed for deeper insight into both the research problem and the context in which participants operated.

Triangulation was another strategy used to enhance credibility. According to John W. Creswell (2012), triangulation involves corroborating evidence from different sources. In this study, triangulation was achieved by gathering data from six educators across three different schools in the Eden and Central Karoo Education District. Although all participants were teachers, their experiences reflected different school contexts, which provided multiple perspectives on the phenomenon under investigation. In addition,

data collected through the reflective activity and the semi-structured interviews were compared to identify consistent themes. Stevens (2020) argues that such triangulation strengthens the credibility of qualitative findings by confirming patterns across independent sources of data.

The strength of this approach lay in capturing rich, contextualised experiences from diverse perspectives. However, a limitation was the potential for researcher bias during interpretation, especially in selecting which participant quotes to highlight. This was mitigated through consistent reflection and transparency during the analysis process.

4.6.2. Transferability

Transferability refers to the degree to which the findings of a study can be applied or transferred to other settings or contexts (Mukhari, 2016). This study supported transferability by providing a detailed description of the research setting, the data generation methods, the sample (spanning grades 10 to 12), and the process of data analysis. In particular, contextual details related to the rural nature of the Eden and Central Karoo Education District were shared to assist readers in determining the applicability of the findings to similar environments. Hadi and Closs (2016) emphasise that thorough documentation of the research process such as accurate transcription of recorded interviews further enhances transferability. While this study was not designed to be generalised to all South African contexts, the findings may be applicable in settings that share similar socio-economic or geographical features.

The strength of this criterion lies in its ability to offer relevance to comparable contexts. However, a limitation is that the findings remain highly context-specific, and their application outside similar rural educational settings should be approached with caution.

4.6.3. Dependability

Dependability concerns the stability and consistency of the research findings over time and across similar conditions (Mukhari, 2016). In this study, dependability was strengthened through the consistent application of data generation procedures and by including direct quotations from participants' reflective activities and interviews. This

offered a transparent chain of evidence that supported the interpretations made by the researcher.

The use of both inductive and deductive thematic analysis applied consistently across all data which also supported methodological consistency. The possibility of evolving contexts in the education sector, particularly related to literacy challenges, was acknowledged by suggesting directions for future research.

The main strength of this approach was its ability to provide a clear audit trail of decisions and interpretations. However, limitations include the difficulty in fully replicating qualitative studies due to their context dependent nature and the role of the researcher in shaping the analysis.

4.6.4. Confirmability

Confirmability refers to the degree to which the findings can be corroborated by others and are shaped by the participants' experiences rather than researcher bias (Stevens, 2020; Mukhari, 2016). In this study, confirmability was enhanced through reflexive practices, including the researcher’s regular self-reflection on their role, potential biases, and interpretations. Awareness of personal involvement in the research setting as a colleague not by school but by district of several participants was acknowledged, and measures were taken to prevent undue influence during data generation. Data were collected from various participants, across schools, finally selecting six participant teachers from three schools to further home in on valuable data. Using more than one technique, which provided diverse perspectives and helped reduce single-source bias. During interviews, efforts were made to reflect participants’ views accurately by paraphrasing, confirming, and clarifying statements in real time.

A major strength of confirmability lies in its emphasis on neutrality and transparency. Nevertheless, a limitation remains the interpretive role of the researcher in thematic analysis, where subjective judgment is inevitable. To mitigate this, themes were revisited regularly, and analysis decisions were documented thoroughly to ensure transparency.

Keeping the measurements of trustworthiness in this study in mind, moving to the next section ethical considerations are laid out.

4.7. ETHICAL CONSIDERATIONS

Bertram and Christiansen (2014) define ethics as behaviour that distinguishes right from wrong within the context of a study. According to Mukhari (2016), ethics also encompasses a code of conduct and belief system that guides appropriate and responsible research practices.

Three key ethical principles were central to this study: autonomy, non-maleficence, and beneficence, as identified by Bertram and Christiansen (2014) and Blanche et al. (2006). Autonomy refers to respecting the dignity and independence of all participants (Blanche et al., 2006). In this study, participants' anonymity was strictly upheld through the use of pseudonyms. Personal information that included the names of participants, their schools, and any identifiable traits was kept confidential. For instance, teachers were referred to as "Teacher 1" to "Teacher 6," coding T1 to T6 and schools as "School A" to "School C." Non-maleficence captures the principle of doing no harm (Bertram & Christiansen, 2014). By ensuring confidentiality and de-identification of all data, the study aimed to protect participants from potential emotional or reputational harm that could arise from their responses in interviews or reflective activities. Beneficence involves contributing positively to society. This research aimed to benefit the broader educational community by offering insights into how learners' reading ability affects performance in Mathematical Literacy. It also sought to inform teaching strategies and potential interventions for educators working under similar conditions.

In addition to adhering to these principles, the study complied with institutional and provincial ethical requirements. Ethical clearance was first obtained from the University of South Africa (UNISA), which guided and authorised the research to be conducted ethically and responsibly. Subsequently, permission was granted by the Eden and Central Karoo Education District and the principals of the three participating schools. Each participant and institution received detailed permission letters along with informed consent forms outlining their rights, the purpose of the research, and assurances regarding their voluntary participation and anonymity.

All data collected were securely stored on the OneDrive digital cloud platform provided by UNISA, under the researcher's personal and regularly updated credentials. The safekeeping of this data was treated with the utmost seriousness, given that it represented the thoughts, experiences, and reflections of real human participants

within an educational setting. At every stage of the research process, participants were reminded that their involvement was voluntary and that their identities would be protected. Pseudonyms were used consistently, and participants were assured that their responses would remain anonymous and confidential throughout and beyond the research process.

4.8. POSSIBLE LIMITATIONS AND DELIMITERS

As with many qualitative research studies, this study faced several limitations. According to Simon (2011), research limitations are potential weaknesses in a study that are typically outside the researcher's control. In this study, one such limitation was the time-consuming nature of qualitative data analysis. To manage this challenge, only educators selected for interviews were those who demonstrated both a keen interest in the topic and a strong knowledge base, often coupled with innovative teaching approaches. While this purposeful selection supported rich data generation, it may have limited the diversity of perspectives. Geographical and logistical challenges also posed limitations. The study was conducted within the Eden and Central Karoo Education District of the Western Cape, where schools are often dispersed across vast rural areas. To increase accessibility and participation, reflective activities were administered electronically. Semi-structured interviews were primarily conducted via telephone to reduce the impact of distance and travel constraints. While these approaches enhanced efficiency, they may have limited the depth of rapport typically established during face-to-face interviews. Moreover, another limitation was the narrow focus of the study. It explored the impact of reading ability on performance in only one subject that is Mathematical Literacy. While insightful for this specific learning area, the findings may not necessarily apply to other subjects, where different cognitive demands may interact with reading proficiency in distinct ways.

The study also faced limitations related to generalisability. As a qualitative inquiry situated within a specific district and involving a small, purposively selected sample, the findings are not intended to be generalised to broader populations. Rather, they offer a deep, context-rich understanding of a particular educational phenomenon. As Marshall and Rossman (2016) note, qualitative studies prioritise depth over breadth, often at the expense of generalisability.

Lastly, the dual role of the researcher as both an educator within the district and a colleague of some participants presented a potential source of bias. While every effort was made to remain objective, and participants were encouraged to speak freely without influence, complete detachment was inherently challenging. I remained mindful of this throughout the data generation and analysis process, striving to uphold the integrity and trustworthiness of the study.

4.9. CONCLUSION

This chapter presented the research design, data generation methods, and methodological approach used in this study. It outlined the qualitative research paradigm, case study approach, sampling strategies, and the data generation tools employed namely, the reflective activity and semi-structured interviews. The processes of data analysis were discussed, including the use of thematic analysis through both inductive and deductive approaches. Ethical considerations were addressed in detail, along with the strategies implemented to ensure the trustworthiness of the study through credibility, transferability, dependability, and confirmability. Both the strengths and limitations of each method were acknowledged, and steps taken to mitigate the identified limitations were described.

The following chapter will present and discuss the findings generated from the reflective activity and semi-structured interviews, highlighting key themes and patterns that emerged in relation to the research questions.

CHAPTER 5:
DATA REPRESENTATION AND DISCUSSION

5.1. INTRODUCTION

This chapter presents the data generated from the reflective activity and semi-structured interviews, followed by an analysis and discussion of the emerging themes. The data is interpreted through both deductive and inductive approaches. The deductive themes were guided by Scarborough's Reading Rope framework and aligned with the study's aims and objectives. In addition, inductive themes emerged from participants' responses that highlighted issues not fully accounted for by the Reading Rope , but which proved significant due to their frequent mention and relevance to the research problem.

The discussion in this chapter seeks to provide answers to the study's research questions, namely:

Main research question:

1. What is the level of learners' reading ability in ML at at Eden and Central Education District Schools?

Sub research questions:

2. How does learners' reading ability affect their achievement in ML?
3. What informs or influences learners' reading ability in ML at Eden and Central Karoo Education District schools?
4. What possible interventions or strategies can schools or teachers implement to overcome these challenges?

The analysis produced six overarching themes, which were organised through a combination of deductive and inductive reasoning. Within the deductive reasoning framework, four key themes emerged, namely: the effects of poor reading ability; the reasons for poor reading ability; possible interventions proposed and already implemented by teachers; and the integration of the strands of word recognition and language comprehension. Beyond this framework, two additional themes were

identified through inductive reasoning, namely learner background and reading culture, as well as learner motivation and discipline. The chapter is structured as follows: it begins by discussing the deductive themes through the lens of the Reading Rope framework, illustrating how word recognition and language comprehension influence ML performance. This is followed by the inductive themes, which provide deeper insights into learners' backgrounds, motivation, and behavioural aspects. The chapter concludes with a synthesis of the findings, highlighting the implications for both teaching practice and future interventions.

5.2. DEDUCTIVE REASONING

The first part of the analysis follows a deductive approach, guided by Scarborough's Reading Rope framework. This framework emphasises the interwoven nature of word recognition and language comprehension in shaping reading proficiency. By applying this lens, the analysis explores how learners' difficulties with reading directly influence their ability to engage with ML tasks. The deductive reasoning process therefore foregrounds three core areas aligned with the study's objectives: the effects of poor reading ability, the reasons contributing to poor reading, and possible interventions. In addition, attention is given to how the two strands of the Reading Rope , word recognition and language comprehension interact within the context of ML.

5.2.1. Theme 1: Effects Of Poor Reading Ability

5.2.1.1. Verbatim Extracts From Reflective Activity And Semi Structured Interviews

All participants agreed that reading ability has a significant influence on learners' achievement in ML. This was evident in both the reflective activity and the semi-structured interviews. The responses consistently emphasised that poor reading comprehension prevents learners from engaging meaningfully with questions and ultimately affects their performance. This can firstly be supported by the pie chart presenting the question in the reflective activity shown below.

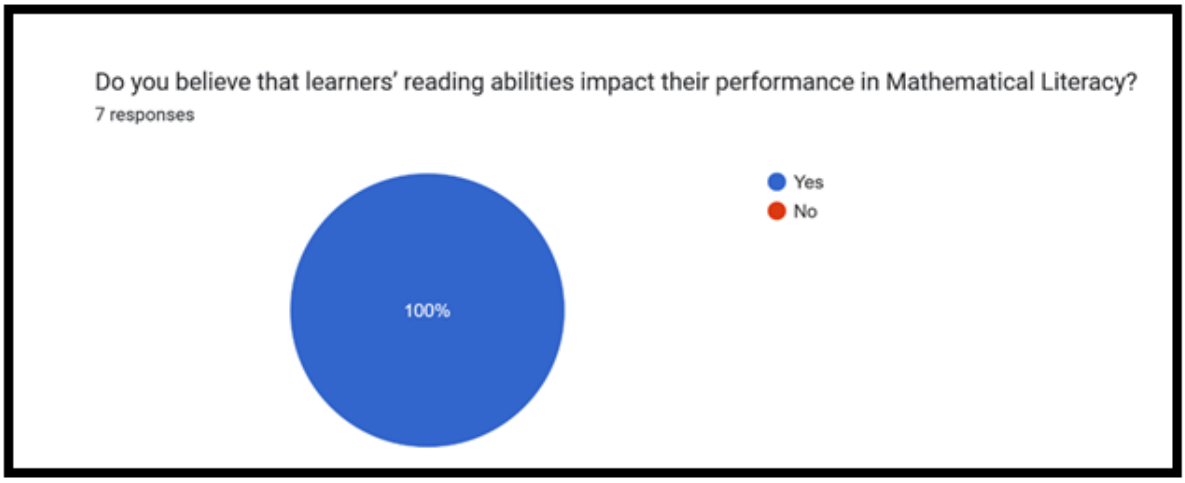

Figure 7: Pie chart presenting the question in the reflective activity.

Participant 1: In the reflective activity it was noted that "Learners do not read with comprehension". During the semi-structured interview, the participant elaborated: "Questions are word-based, learners sometimes misunderstand what is being asked, even if they can do the calculations […] Real-life application, learners sometimes fail to see the connection between the subject and real-world situations, so they don't engage fully… Poor reading skills have a very strong impact on learners' ability to succeed in Mathematical Literacy, because the subject is language-intensive. Here are some specific ways: Learners often struggle to extract the mathematical task from long written contexts, so they don't know what is actually being asked. If they can't read clearly, they may misunderstand words like calculate, estimate, justify, explain, compare, which changes how they attempt the question. Missing key details – important numbers, conditions, or units in the text might be overlooked, leading to incorrect calculations […] Long questions that require breaking down information into smaller steps become overwhelming, so learners give up or answer only partially."

Participant 2: In the reflective activity remarked that "Learners can't read the question with understanding". This was reinforced in the interview where the participant explained: "Learners do not read with insight […] They start by reading the questions before getting the picture of what is expected and then give up quite easily because they don't understand […] Some of the bigger words are not part of their vocabulary, so they are not sure where to fit the concepts. If they understand what they read and can get started, they can complete the process, but the getting started is sometimes a challenge."

Participant 3: In the interview highlighted: “There is a big lack of reading because when I read a question and I ask the learners to say what the question asks or what they have read, then you can see their blank faces. Their ability to understand what is read or even certain words they don’t understand […] It has an impact on the subject of ML because in the subject you need to understand the scenario to be able to understand the question and interpret the question in your answer.”

Participant 4: In the reflective study stated: “Math Lit has everything to do with reading. To comprehend it helps to understand what the question wants from you.” This was further developed during the interview: “Most of the learners lack the basic skills like reading, writing, and counting […] The overall reading ability in our school is a challenge because most of the learners can’t read. They can read, but they can’t interpret certain things.”

Participant 5: In the interview explained: “I believe that learners don’t understand what they are reading and thus can’t answer the questions correctly. But if it was said to them in normal non-academic language, then they will be able to do the sum.”

Participant 6: In the reflective study commented: “They do not understand what to do at questions.” This was expanded in the interview: “Many learners cannot work on their own, but if the teacher works with them and reads the questions aloud, they are able to complete the calculations. This indicates that the problem lies more with reading and comprehension skills than with arithmetic skills themselves […] Learners can read, but not with insight. They are able to read sentences aloud, but they do not understand the content or intention of what is being read. This lack of reading comprehension directly leads to poor performance in problem-solving.”

5.2.1.2. Discussion

The participants’ reflections and interview responses consistently highlight that poor reading ability has a direct and significant impact on learners’ achievement in Mathematical Literacy. Learners often misinterpret or overlook key terms in questions, fail to grasp what is being asked, and struggle to extract the mathematical task from long written contexts. Several participants (P2, P3, and P5) pointed out that while learners may be able to perform calculations when guided by the teacher, they

frequently fail, particularly the weaker learners when working independently because they cannot comprehend the language of the question.

This point to a fundamental challenge at the comprehension level, where learners are unable to construct meaning from the text in order to engage with the mathematical demands. Others observed that vocabulary gaps, difficulty understanding “bigger words,” and the inability to interpret real-world scenarios embedded in tasks reflect weaknesses in both decoding and fluency**.** Learners often pause, lose momentum, or abandon questions altogether, indicating that they cannot decode words accurately or read with sufficient fluency to maintain understanding throughout the problem.

Collectively, these findings underscore that the challenge is not primarily mathematical ability, but rather the learners’ difficulty in reading with comprehension, fluency, and barriers in decoding that significantly limit their capacity to access and respond to ML tasks effectively. These findings are strongly supported by extant research. Patterson (2016) defines reading ability as the process of constructing meaning from written text, a view echoed by Shiotsu (2009), who stresses that successful reading requires more than decoding, it requires active comprehension. This distinction is critical in ML, where it is insufficient for learners to merely recognise mathematical terminology. They must also comprehend its meaning in real-world contexts. Bharuthram (2012) similarly emphasises that reading extends beyond basic word recognition, arguing that deep comprehension enables learners to engage meaningfully with large volumes of written material, which is prevalent in Grade 12 ML question papers in particular. In the same vein, Ojose (2011) illustrates that learners are required not only to understand mathematical concepts but also to apply them within everyday scenarios.

Collectively, these perspectives reinforce the phenomenon under investigation, namely that comprehension, fluency, and decoding operate together as essential building blocks of reading ability and, by extension, as gateways to successful problem-solving skills for success in ML.

This understanding is further encapsulated in Scarborough’s Reading Rope model (2021), which illustrates how various reading skills intertwine to strengthen comprehension. Scholars have repeatedly confirmed the significant influence of reading ability on academic performance and lifelong achievement, highlighting its

foundational role across learning contexts. Steward (2019) makes an important distinction between speech and reading, noting that while spoken language is innate, reading is not. The human brain has evolved to process speech naturally, but written language requires explicit instruction. Steward (2019) further identifies three neurological areas crucial to reading development: the phonological processor (handling spoken language), the orthographic processor (responsible for visual recognition), and the phonological assembly region, which connects the other two to facilitate reading acquisition. This neurological perspective aligns with theories emphasising the necessity of structured reading instruction to bridge the gap between spoken and written comprehension, thereby reinforcing the importance of literacy development across subject areas (Aaron & Joshi, 2006; Liu et al., 2022) such as ML, and not only in languages. Recent research strengthens this claim, where Farrell et al. (2025) argue that a learner's reading ability can be predicted based on their word recognition (decoding) and language comprehension skills, demonstrating that difficulties in decoding directly hinder comprehension. Arends and Fonseca (2024) concur, noting that many educators still underestimate the importance of decoding or word recognition. For example, weak decoding often occurs when learners guess unfamiliar words and attempt to make them fit within a sentence, a practice that leads to misinterpretations of information or instructions. Such breakdowns in decoding disrupt fluency and comprehension simultaneously, illustrating that reading difficulties are layered and cumulative. Within the context of ML, this interplay between decoding, fluency, and comprehension explains why learners may possess sufficient mathematical ability but remain unable to access or respond effectively to tasks. Thus, the literature not only validates the study's findings but also situates them within a broader theoretical and empirical framework, underscoring that poor reading ability manifesting across decoding, fluency, and comprehension significantly constrains learners' academic performance.

When these findings are compared with existing policy frameworks, it becomes clear that while there is policy recognition of the importance of reading, the depth of learners' difficulties in decoding, fluency, and comprehension is not fully addressed. According to the DBE (2022), Grade 10 learners are expected to engage with real-life contexts from their immediate surroundings, and by Grade 12, to navigate international contexts. However, as this study shows, learners' poor reading ability prevents them

from accessing even localised tasks effectively, suggesting a gap between curriculum expectations and classroom realities. The Western Cape Education Department's (2019) Reading Strategy acknowledges that comprehension is dependent on background knowledge, and the DHET (2021) highlights fluency as the bridge between word recognition and comprehension. These align closely with the study's findings, which emphasise that decoding, fluency, and comprehension are interdependent and central to ML success. At the national level, the Section 4 amendments (DBE, 2020b) and earlier initiatives such as the National Reading Strategy (Botha et al., 2008) stress the need for learners to read with meaning across the curriculum, starting with foundational reading in Grade Three.

While these policies establish the importance of reading broadly, they remain largely silent on how reading ability continues to affect subject specific performance at FET level, particularly in ML. In practice, this silence leaves teachers without clear guidance on how to support learners who have passed through the foundational grades but still struggle with decoding, fluency, and comprehension. As a result, policy often sets aspirational goals but provides few mechanisms for sustained intervention beyond the early grades, creating a misalignment between curriculum expectations and learner capabilities. The findings of this study therefore not only concur with the emphasis on comprehension and fluency and decoding but most importantly, the urgent need for explicit, ongoing strategies that address subject-specific reading demands in the FET phase, particularly in ML.

5.2.2. Theme 2: Reasons For Poor Reading Ability

5.2.2.1. Verbatim Extracts From Reflective Activity And Semi Structured Interviews

Participant 1: "They try to get to the answer as soon as possible without going through the process, so they are not sure where to start — as the information is too much to process as a whole. Don't understand what they read — as it might not be words they are familiar with." This participant elaborated further: "Confusion with context – ML often uses real-life scenarios (budgets, graphs, maps, timetables). Learners with weak reading skills may not grasp the context, so they can't apply the maths correctly […]

Learners sometimes fail to see the connection between the subject and real-world situations, so they don't engage fully."

Participant 2: "Learners do not read with understanding – and want to get to the answer as fast as possible without embracing the process. They want to get things done without doing it properly. They read to complete rather than to understand. They read to get a gist rather than to grasp it all. They start by reading the questions before getting the picture of what is expected and then give up quite easily because they don't understand. Learners don't start in the 'block' they start with the questions, looking for the answers in the block and then they get lost and feel frustrated. Some of the words are not part of their everyday language, so they try to connect 'words-to-words' without knowing what they connect to. Questions connected to unknown content are always a challenge (and a good one indeed)."

Participant 3: "Lazy, learners choose what they want to read. They don't work through all the information." This participant added: "Learners struggle to put their thoughts into their own words."

Participant 4: "Language barriers English Home Language learners are actually isiXhosa Home Language speakers, and Afrikaans learners face high-level Afrikaans vocabulary that is unfamiliar to them. "They suggested: "Reading out loud helps them to pronounce and understand certain words."

Participant 5: "It is very subpar learners read at way below their age level. We had a psychologist at school testing the learners for concessions, and they discovered that learners in Grade 12 read at a primary school level. Learners do not recognise simple terminology if it is engulfed in a sea of information. Learners also don't have a wide range of general knowledge that hinders their understanding and following of a story. There is no reading culture at school, or most importantly, at home. Many parents are barely literate, and this plays a big role."

Participant 6: "There is a decline in reading habits. Learners no longer read regularly on their own. This is made worse by the fact that the Language Department no longer focuses on general reading skills. Even parents at home don't help the learner to read more."

5.2.2.2. Discussion

The data highlights that poor reading ability is rooted in a range of factors, both internal and external. Learners often adopt surface-level strategies, attempting to “get to the answer quickly” (Participants 1 and 2) rather than engaging with the full process. This reflects a lack of deep comprehension strategies, leaving learners frustrated and unable to navigate texts that require them to construct meaning. Motivation and effort also play a role, as noted by Participant 3, who observed that learners tend to skip through information selectively, while Participant 5 described a lack of general knowledge and cultural exposure as further obstacles.

Language emerged as a recurring theme, with Participants 4 and 6 pointing out that many learners face barriers when reading in a language other than their home language. This not only makes comprehension more difficult but also discourages learners from developing independent reading habits. Furthermore, both participants 5 and 6 linked these struggles to home environments where parental literacy is low, and where little emphasis is placed on building a reading culture.

These findings resonate strongly with the literature. Various studies highlight that both micro-level factors (home background, socioeconomic conditions, and parental literacy) and macro-level factors (teacher support, school resources and language of instruction) significantly influence reading development. For instance, Liu et al. (2022) and Gumede (2018) stress the importance of early parental engagement and the presence of reading materials in the home, noting that such environments shape learners’ positive attitudes toward reading from an early age. Similarly, Pretorius and Klapwijk (2016) argue that parental literacy and socioeconomic status strongly affect a learner’s reading proficiency, with long-term consequences that extend beyond school (Cunningham, 2010; Nyama, 2010). On the macro side, Liu et al. (2022) emphasise that teacher encouragement is critical in motivating learners to read, while Pretorius and Klapwijk (2016) and Davids (2023) point to the absence of sufficient and diverse reading materials, particularly in learners’ home languages, as a structural barrier. These insights align with the experiences shared by Participants 4, 5, and 6, who identified both language barriers and the lack of a reading culture as major challenges.

While these findings point to significant challenges, the curriculum and provincial interventions provide possible pathways forward. In the Western Cape, subject advisors have developed free resources for ML, ensuring equitable access regardless of school funding. Professional development courses are offered to strengthen teachers' subject knowledge, particularly in rural or underperforming schools, and digital zero-rated platforms extend access to learning materials. Furthermore, the provision of basic mathematical tools like calculators and rulers helps to ensure that learners are not disadvantaged by resource gaps. Together, these initiatives reflect an intentional attempt to mitigate the negative impact of both micro- and macro-level factors on learners' reading development and academic success.

5.2.3. Theme 3: Possible Interventions Proposed And Already Implemented By Teachers

5.2.3.1. Verbatim Extracts From Reflective Activity And Semi Structured Interviews

Participant 1: "Explicit teaching of problem-solving steps: Teaching a structured approach such as Read, Identify key information, Decide on operation, Calculate, Check […] Keyword and command word focus: Training learners to underline words like difference, total, justify, estimate, compare, and linking them to the mathematical process required […] Scaffolding and chunking questions: Breaking down long word problems into smaller, guided steps. Asking simpler sub-questions first, then building up to the full multi-step problem."

Participant 2: "Start from the beginning. Read the story, get the picture. Helping them then to connect the word in the question with the word in the picture […] Highlight [...] Ask yourself first, 'what do I have,' and only then ask, 'what do I need.' The answer is always somewhere: if you do not get it at first you might be looking at the wrong place. Start with the first two questions of each section to get the easier marks then tackle the harder ones […] Start with the content you can do and then try the ones you are not too confident with […] There will always be something somewhere that they can do [...] Start there. Accomplish something small, then move on to the next completion […] I try to let learners read out loud during lessons. It is not perfect, but it helps them

to at least practice pronunciation and build confidence. Sometimes I stop them and explain what the words mean, so that the whole class benefits."

Participant 3: "We give the terminology and explain the terminology. I ask learners to write in their own words of what the term means within context, and also to copy into their books what they understand."

Participant 4: "I always start simple, with examples they already know, then move to the more difficult text or question. If you just give the exam paper as it is, they won't manage […] Group reading and allowing my stronger learners to read out loud to help them pronounce and understand certain words […] The problem is bigger than just my class. We need proper libraries, even community libraries, and structured time in the school day where learners only focus on reading."

Participant 5: "When I use examples from their daily lives, like shopping, taxis, or cell phone data, they become more interested in the problem. It makes the reading less intimidating because they already understand the context […] I have implemented action words […] the words linked to the subject and to the cognitive levels. Each word will tell the learners what they are supposed to do all they need to know is that they should identify the word in the instruction. I often tell them, especially in Paper 2, that they should draw a picture of what they read."

Participant 6: " …I use strategies such as highlighting action words and other important information in questions together with the learners. This method especially helps learners with lower cognitive skills (code 1 and 2) to better identify the core of the question [...] Some of us never got training in how to teach reading strategies. We were trained in our subjects, but now we are expected to also build reading skills. That's why ongoing workshops are important."

5.2.3.2. Discussion

The reflective activity and interviews revealed that teachers are not only aware of learners' challenges with reading but also actively attempting to implement interventions, while suggesting further measures that could support learners' development. Participants emphasised practical strategies such as creating opportunities for learners to read aloud in class, breaking down complex texts, and

encouraging discussions around scenarios. These classroom-based practices reflect educators' efforts to address barriers with the resources available to them. For instance, Participant 2 explained: "I try to let learners read out loud during lessons. It is not perfect, but it helps them to at least practice pronunciation and build confidence. Sometimes I stop them and explain what the words mean, so that the whole class benefits." Similarly, Participant 5 highlighted the importance of linking texts to learners' real-world contexts: "When I use examples from their daily lives, like shopping, taxis, or cell phone data, they become more interested in the problem. It makes the reading less intimidating because they already understand the context." Participant 5 and 6 furthermore uses the same strategy of action words only on various levels, as they aim to provide learners with a starting point, which actually encompasses participants 1, 2, 3 and 4's methods, just in various intervention names, in essence resulting in the exact same intervention.

These interventions, though modest, align with the five principles of reading which emphasise motivation and contextual relevance as key to developing reading ability. Liu et al. (2022) argue that teacher encouragement significantly influences learners' willingness to engage with texts, a point clearly supported by the classroom practices shared by participants. Teachers also acknowledged systemic barriers and suggested broader interventions. Participant 4 remarked: "The problem is bigger than just my class. We need proper libraries, even community libraries, and structured time in the school day where learners only focus on reading." This suggestion echoes Gumede (2018), who called for reviving public libraries and implementing dedicated reading sessions in schools to enhance learners' environments. Similarly, Davids (2023) emphasised that access to both fiction and non-fiction texts, especially in learners' home languages, is critical for nurturing reading skills from an early age.

Participants also stressed the importance of teacher capacity. Participant 6 noted: "Some of us never got training in how to teach reading strategies. We were trained in our subjects, but now we are expected to also build reading skills. That's why ongoing workshops are important." This sentiment resonates with Myatt's (2025) assertion that curriculum implementation is the "nuts and bolts" of educational quality, requiring continuous professional development to ensure teachers are equipped to deliver effectively. Bertram et al. (2021) further highlight that the intended curriculum must be

implemented in ways that scaffold learners from their own experiences towards higher-level expectations, a point underscored by Participant 4's comment: "I always start simple, with examples they already know, then move to the more difficult text or question. If you just give the exam paper as it is, they won't manage."

At a policy level, Barends and Reddy (2024) outline DBE strategies that integrate reading development into curriculum delivery, aiming to strengthen fluency, comprehension, and decoding skills across subjects. These align closely with the interventions already observed in practice, where teachers break down complex content and contextualise learning for accessibility. Collectively, the findings suggest that while teachers are implementing small-scale interventions in their classrooms, broader systemic and curricular supports are necessary to make a sustainable impact. From encouraging learners to read aloud, to advocating for libraries, to calling for continuous professional development, teachers' voices highlight that improving reading ability requires both grassroots efforts and top-down support.

5.2.4. Theme 4: Integration Of The Strands (Word Recognition And Language Comprehension)

5.2.4.1. Verbatim Extracts From Reflective Activity And Semi Structured Interviews

Participant 1: Reflective activity: "Guide them on how to read, and how to proceed when they see big words, as well as guide how to navigate through a question to break it up in workable pieces." Interview: "A learner confuses area with perimeter because they only recognise one word but not its meaning. They then apply the wrong formula, even though they know the maths […] Misreading numbers such as 1 000 and 100 leads to huge calculation errors […] When a question says: Estimate the total cost by rounding to the nearest R10, some learners ignore estimate and perform exact calculations, losing marks […] In timetable or map questions, they may not understand words like departure, arrival, scale, or interval, so they cannot apply the maths correctly."

Participant 2: Reflective activity: "Let the learners read the question and highlight what is important for them." Interview: "Some of the words are not part of their 'day-to-day'

language so they need to connect ‘words-to-words’ without knowing what they connect to.”

Participant 3: Reflective activity: “Group reading.” Interview: “… I try to first read the question to them so that they can hear how the question should be read – not in a monotonous voice. I try to say the key words in a different tone so they can see which words stand out.”

Participant 4: Reflective activity: “I break the question in smaller pieces, and I do unpack the question so that the learners have some sort of idea of how to answer different types of questions.” Interview: “Reading the questions or scenarios to them. Breaking up the sentences. Explaining key words. Asking learners to read and then explain what they read, so that they can learn how to think and interpret the questions.”

Participant 5: Reflective activity: “Learners do not recognise simple terminology if it is engulfed in a sea of information […] Some of the lower-level learners don’t even recognise it in a level 1 or 2.” Interview: “Learners read the questions and they don’t know what to do because they do not know the subject terminology […] They also read a question and do way too much, or way too little, of what the question requires this is once again because they do not understand, and can’t decipher what the question requires of them.”

Participant 6: Reflective activity: “Many learners do not recognise action words (such as calculate, compare, explain) in questions. As a result, they often only do part of the sum or answer the question incorrectly.” Interview: “The learners who perform the weakest in ML are usually those with the weakest reading ability. If their reading skills were stronger, they would be able to interpret the questions better and consequently achieve higher marks.”

5.2.4.2. Discussion

Teachers’ observations revealed that learners’ struggles in ML are often rooted in weaknesses in both word recognition and language comprehension. Participant 1 noted: “A learner confuses area with perimeter because they only recognise one word but not its meaning. They then apply the wrong formula, even though they know the maths […] Misreading numbers such as 1 000 and 100 leads to huge calculation errors

[…] When a question says: Estimate the total cost by rounding to the nearest R10, some learners ignore estimate and perform exact calculations, losing marks […]" These examples highlight how fragile decoding skills and poor phonological awareness compromise performance. Learners who cannot distinguish between terms like area and perimeter or who misread numbers are not necessarily struggling with mathematics itself but with recognising and accurately processing the words and symbols. According to Scarborough (2001), weak word recognition consumes cognitive resources that should be available for comprehension, leaving less capacity for problem solving in mathematical tasks. Similarly, Lyon (2022) argues that deficits in phonological processing and decoding form the foundation of broader reading challenges, which directly limits learners' ability to engage with content subjects.

Participant 5 further described that "learners do not recognise simple terminology if it is engulfed in a sea of information… Some of the lower-level learners don't even recognise it in a level 1 or 2." This reinforces the idea that learners lack automatic sight recognition of subject-specific words. Without a strong bank of instantly recognisable vocabulary, every phrase requires decoding, slowing learners down and making it difficult to extract meaning. Ehri (2005) explains in this regard that sight word recognition constitutes a key step in freeing working memory for comprehension. In line with this, Kilpatrick (2016) emphasises the importance of orthographic mapping for building fluent readers. In ML, this means that learners must first recognise terms like interest rate or perimeter quickly and automatically before, they can meaningfully apply the related concepts.

Beyond word recognition, teachers also identified gaps in language comprehension. Participant 6 observed: "They struggle when the question is long, and they must break it down. They miss important information." Similarly, Participant 4 explained: "Learners can do calculations if I explain it to them, but they cannot do it when it is in a context." These comments show that weaknesses in vocabulary, background knowledge, and the ability to navigate sentence structures limit learners' capacity to interpret contextualised problems. This reflects Davids' (2023) assertion that learners should be exposed to both mathematical language and broader literacy practices to build comprehension. The findings also echo Perfetti's (2007) lexical quality hypothesis, which stresses that shallow or incomplete knowledge of words undermines

comprehension. In ML, where problems are embedded in real-life scenarios, insufficient vocabulary and weak knowledge of text structures make it difficult for learners to transfer their calculation skills into context. The teachers' reflections therefore demonstrate that the challenges learners face are not simply mathematical but fundamentally linguistic. Misreading numbers, confusing terms, and failing to grasp contextual meaning illustrate breakdowns across both strands of Scarborough's Reading Rope . Weaknesses in word recognition prevent automatic decoding, while gaps in language comprehension hinder learners' ability to interpret and reason with information. Together these deficits constrain performance in ML, despite learners often having the necessary calculation skills.

5.2.5. Conclusion

In conclusion, the discussion confirms that learners' difficulties in ML stem largely from the reading processes described by Scarborough (2001). When word recognition is slow and comprehension strands are underdeveloped, learners cannot fully access the demands of contextualised problem solving. This aligns with Davids (2023), who highlights the importance of embedding literacy within subject teaching, and with Kilpatrick (2016) and Lyon (2022), who emphasise the foundational role of decoding and phonological awareness in supporting higher order comprehension. Importantly, these findings resonate with the expectations of the DBE's Curriculum and Assessment Policy Statement (CAPS), which emphasises reading and interpretation skills as fundamental to ML. CAPS explicitly requires learners to engage with real-life scenarios, interpret instructions, and apply knowledge in context, but the teachers' accounts suggest that weak reading ability prevents learners from meeting these policy goals. In this sense, the findings confirm that while policy recognises the centrality of literacy to ML, there remains a gap between policy intention and classroom reality. Addressing this gap requires that literacy instruction be intentionally reinforced within ML teaching, ensuring that DBE's vision of preparing learners for functional numeracy and critical citizenship is realised.

While CAPS and the DBE Examination Guidelines clearly emphasise that ML requires learners to interpret contextual scenarios and communicate their reasoning (DBE, 2020; DBE, 2021), the policy documents remain largely silent on how literacy skills should be systematically developed within the subject. The curriculum assumes that

learners arrive in the FET phase with adequate reading proficiency, yet the teachers' reflections in this study show that many learners lack even the most basic word recognition and comprehension skills. This silence creates a disjuncture between policy expectations and classroom realities: teachers are expected to develop learners' problem-solving skills through language-rich tasks, but they receive little guidance on integrating explicit literacy instruction into ML teaching. The findings therefore suggest a need for supplementary support that bridges this gap, ensuring that the literacy demands outlined in CAPS are achievable for all learners, especially those from disadvantaged language backgrounds.

5.3. INDUCTIVE REASONING

The second part of the analysis adopts an inductive approach, allowing additional patterns, insights, and themes to be identified directly from participants' narratives. This approach complements the deductive framework by capturing unexpected or nuanced experiences related to learners' reading abilities, the challenges they face in ML, and strategies that may support their learning. Inductive reasoning thus provides a more comprehensive understanding of the phenomenon by foregrounding the perspectives and lived experiences of participants, ensuring that the analysis remains grounded in the context of the study.

5.3.1. Theme 5: Learner Background And Reading Culture.

5.3.1.1. Verbatim Extracts From Reflective Activity And Semi Structured Interviews

Participant 1: "Learners with weak reading skills may not grasp the context, so they can't apply the maths correctly… Many questions require written explanations or justifications. Poor readers often give one-word answers or avoid explanation, losing marks… Weak reading fluency… Learners take so long to read through a long word problem that they lose focus, skip steps, or misinterpret the main question… they may only answer the first part because reading fatigue prevents them from completing the rest."

Participant 2: "Learners want to get to the answer as fast as possible without embracing the process. They want to get things done without doing it properly… They

give up and don’t want to try. They don’t always want to sit with a problem to get to the answer – if the ‘path’ to the answer is not wide and crystal clear it is hard, and then they leave it. Maybe it is the effect of spoon feeding them answers without challenging the thinking process. Most social media content that they relate to is a ‘completed picture’ without challenging the learner to form their own picture as they would have in reading books. If they are bored with one story, they move on to another – and then another – so they don’t learn to complete one process before moving on to another. Even the writing texts are based on predicted text, so they are not challenged to complete a typed word and validate if the spelling is correct. Their social media environment does not challenge them to ‘practice understanding’ – it challenges them to move through a rabbit hole without connecting truly, so why would they want to read if they can just see the solution?... Why stick if they can scroll by?... If you read with understanding you are present, and your focus will be connected, but if you are everywhere but present, your thoughts are disconnected as well as your understanding. At least – that is what my observation is.”

Participant 3: “The learners do not come with a willingness to learn, so they are not very enthusiastic about school itself, which leads to a lack of interest; they do not do homework, and I do not get feedback in class, and it rarely happens… learners don’t understand what it means. I can especially see it during revision. They cannot explain what they understand about the question. Learners struggle to put their thoughts into their own words.”

Participant 4: “Most of the learners lack the basic skills like reading, writing, and counting. The overall reading ability in our school is a challenge because most of the learners can’t read. They can read, but they can’t interpret certain things… I think the role of the district starts at the primary school where the learners need to learn the most basic skills in reading and writing so that when they come to high school they can read fluently and read with comprehension. The focus must be on the primary school teachers to help the learners there with the basic reading and writing skills.”

Participant 5: “I believe that learners don’t understand what they are reading and thus can’t answer the questions correctly, but if it was said to them in normal, non-academic language, then they would be able to do the sum. We had a psychologist at school

testing the learners for concessions, and they discovered that learners in Grade 12 read at a primary school level."

Participant 6: "Focus must again be placed on the development of reading skills in schools. There is a decline in reading habits. Learners no longer read regularly on their own.")

5.3.1.2. Discussion

The participants' reflections highlight how weak reading skills can significantly hinder learners' engagement with ML and other subjects. Participant 1 observed that "Learners with weak reading skills may not grasp the context, so they can't apply the maths correctly… Many questions require written explanations or justifications. Poor readers often give one-word answers or avoid explanation, losing marks… Weak reading fluency… Learners take so long to read through a long word problem that they lose focus, skip steps, or misinterpret the main question… they may only answer the first part because reading fatigue prevents them from completing the rest." These challenges illustrate the cumulative disadvantage identified by Felton (2024) and Reading Rockets (2025), where early struggles with fluency reduce learners' exposure to text over time, limiting vocabulary growth and comprehension. Pikulski and Chard (2005) similarly emphasise that fluency is a critical determinant of reading success, and when readers struggle with comprehension, the additional cognitive load increases reading time and fatigue, further compounding academic difficulties.

Participant 2 provided insight into the influence of modern literacy environments, noting that learners "want to get to the answer as fast as possible without embracing the 'process'… Most social media content that they relate to is a 'completed picture' without challenging the learner to 'form their own picture'… their 'social media environment' does not challenge them to 'practice understanding' – it challenges them to move through a rabbit hole without connecting truly, so why would they want to 'read' if they can just 'see' the solution?" This observation aligns with Cunningham's (2010) conceptualisation of limiting literacy home environments, where learners are not exposed to meaningful reading practices. In rural contexts, as in the district of this study, many parents have low literacy levels or are entirely illiterate, limiting the support learners receive at home (Pretorius & Machet, 2004). Consequently, learners

enter school with insufficient exposure to rich language environments, a situation exacerbated by limited reading materials in their home language (Pretorius & Klapwijk, 2016; Davids, 2023) and socio-economic challenges, including overcrowding and household instability (Liu et al., 2022).

Participants 3, 4, and 5 further illustrated the impact of low reading culture and limited support at home. For instance, Participant 3 stated: “Learners don’t understand what it means… they can’t tell me what they understand about the question. They struggle to put their thoughts into their own words.” Participant 4 added: “Most of the learners lack the basic skills like reading, writing, and counting […] The focus must be on the primary school teachers to help the learners there with the basic reading and writing skills.” Participant 5 reported that learners read at a primary school level even in Grade 12. These reflections highlight the need for structured reading support in schools to compensate for gaps in home literacy environments, as supported by Cunningham (2010), Nyama (2010), and Masudi and Silaji (2024), who argue that both passive and active literacy engagement at home can significantly shape learners’ reading habits and academic performance. Without this support, learners’ reading difficulties persist, affecting comprehension and performance across all subjects.

The findings also reflect the role of the school as a mediator in literacy development, aligning with the literature on curriculum implementation. Participants emphasised that learners’ weak reading ability constrains the operationalisation of the curriculum, making it difficult to achieve the goals outlined in CAPS and the DBE Examination Guidelines (DBE, 2020a, 2022). Scholars such as Stokhof et al. (2018), Maxwell and Roofe (2020), and Myatt (2025) argue that the implemented curriculum, or the ‘curriculum in action,’ is shaped by teachers’ professional knowledge and their ability to interpret and adapt policies to the learners’ context. In this district, teachers must not only deliver content but also scaffold reading and comprehension skills to ensure learners can engage meaningfully with the curriculum. Programs such as LitNum and the National Reading Strategy (DoE, 2006; Botha et al., 2008) demonstrate policy recognition of this challenge, but effective classroom implementation remains essential to bridge the gap between policy and practice.

In conclusion, the study highlights that learners’ reading backgrounds and culture profoundly impact their academic performance. Weak reading fluency, limited

exposure to text, and low parental literacy create cumulative disadvantages, reducing learners' ability to extract meaning and engage fully with the curriculum (Felton, 2024; Pikulski & Chard, 2005; Pretorius & Machet, 2004). These findings underscore the necessity of structured literacy support within schools, particularly in contexts where home environments are less supportive. Integrating reading development into curriculum delivery, as emphasised by Myatt (2025), Cunningham (2010), and the DBE's strategies, is critical to fostering comprehension, engagement, and ultimately, learners' academic success. Reading ability is therefore not an isolated skill but a foundational prerequisite for the development of a learners reading culture and literacy background.

5.3.2. Theme 6: Learner Motivation And Discipline

5.3.2.1. Verbatim Extracts From Reflective Activity And Semi Structured Interviews

Participant 1: "I try to keep lessons interactive and make sure learners feel confident applying what they learn outside the class… Negative attitude towards the subject… Many learners believe ML is 'easy' or 'less important' than Mathematics, so they don't take it seriously."

Participant 2: "The Mathematical type of learner has a different focus than the ML learner. The content is much more fun and relevant to teach as pure maths although appreciating the complexity in the numbers also has a magic to it. We should rename the subject 'World Mathematics' as the aspects covered in this subject are more relevant to non-abstract mathematics… Learners and parents still think it is 'slow mathematics' and this subject 'closes all doors' to an academic career path. They 'assume' that the subject is easy and then apply their efforts accordingly downward. The subject still does not get the 'light' it deserves, and people still 'look down at it,' including those who teach it. Some learners truly find the connection to numbers challenging and no matter what the effort, the connection stays a disconnected grey. You might sit with a learner who should take Mathematics, but chooses not to, and a learner that doesn't connect any form of logic in the same class so teaching in such a manner that the 'fast' learner is still interested and the 'slow' learner doesn't fall

behind is sometimes quite challenging. Some of the content might only make sense a bit later in life; the ‘getting started’ is sometimes a challenge.”

Participant 3: “The learners do not come with a willingness to learn, so they are not very enthusiastic about school itself, which leads to a lack of interest; they do not do homework, and I do not get feedback in class, and it rarely happens.”

Participant 4: “The last few years have become more challenging, but I still love my job. It is because of discipline measures and the new BELA Act influence.”

Participant 5: “The learners lack willingness to be better and master the subject through hard work. I do not know how the district will get this right, but it is important to make the learners more accountable for their work. Help them be proud and willing to learn. I think it has a lot to do with the culture of a school.”

Participant 6: “Dependence on support. Many learners cannot work independently, but they can when the teacher works alongside them.”

5.3.2.2. Discussion

The participants’ reflections reveal that learner discipline and motivation are crucial factors affecting engagement and achievement in ML. Participant 1 observed, “I try to keep lessons interactive and make sure learners feel confident applying what they learn outside the class… Negative attitude towards the subject… Many learners believe ML is ‘easy’ or ‘less important’ than Mathematics, so they don’t take it seriously.” This aligns with research indicating that learner motivation is closely linked to perceptions of subject relevance and difficulty. When students perceive a subject as less challenging or less important, their intrinsic motivation diminishes, negatively impacting their engagement and willingness to persist in problem solving tasks (OECD, 2019; PISA, 2018). Participant 2 further emphasised this, noting that learners and parents often view ML as ‘slow mathematics’ or a subject that ‘closes all doors’ to academic pathways, leading to low effort and disengagement. Such attitudes illustrate the broader societal and cultural perceptions that shape learners’ motivation, highlighting the influence of macro-level factors on classroom behaviour (Liu et al., 2022).

Micro-level factors also play a significant role in shaping learners' discipline and motivation. Participants 3 and 5 highlighted the lack of willingness among learners to engage with tasks, do homework, or take responsibility for their learning. For example, Participant 3 stated, "The learners do not come with a willingness to learn… they do not do homework, and I do not get feedback in class, and it rarely happens." Similarly, Participant 5 noted, "The learners lack willingness to be better and master the subject through hard work… Help them be proud and willing to learn." These reflections correspond with the literature on self-determination and motivation, which emphasises that learners' engagement and effort are strongly influenced by both their perceived competence and the classroom environment created by teachers (Ryan & Deci, 2017). Teachers' ability to scaffold learning, maintain discipline, and provide opportunities for success is therefore vital in fostering intrinsic motivation and self-efficacy among learners.

Participants also highlighted the importance of structured support in promoting discipline and engagement. Participant 6 observed, "Dependence on support. Many learners cannot work independently, but they can when the teacher works alongside them."). This underscores the dual role of teachers in providing both academic guidance and behavioural scaffolding. Micro-level interventions, such as interactive lessons, collaborative problem-solving, and immediate feedback, can counteract learners' disengagement and build resilience, particularly in contexts where home support and literacy culture are limited (Cunningham, 2010; Nyama, 2010). At the macro level, broader socio-economic factors such as parental literacy, household instability, and community perceptions of education interact with classroom-level interventions to either support or hinder learners' motivation and discipline (Felton, 2024; Liu et al., 2022).

The influence of policy and curriculum frameworks cannot be overlooked. Participants 4 and 2 reflected on how institutional structures, including discipline measures and broader legislative influences like the BELA Act, support classroom management and learner accountability. The literature reinforces that well-implemented policies, aligned with CAPS and DBE expectations, can provide a structured environment that promotes both learner engagement and academic achievement (DBE, 2020; Myatt,

2025). In addition, foundational literacy and numeracy, as highlighted by PISA (2018) and the OECD Adult Skills Survey (2019), are critical not only for academic success but also for employability and social participation. In this sense, learners' motivation and discipline are intrinsically linked to their ability to fully access and benefit from the curriculum, illustrating the intersection of micro-level classroom strategies and macro-level socio-economic and policy factors.

To sum up the discussion for this theme, learner discipline and motivation are shaped by an intricate interplay of personal attitudes, classroom practices, socio-cultural expectations, and policy frameworks. Learners' disengagement, negative perceptions of ML, and dependence on support reflect both micro-level challenges, such as classroom management and teacher scaffolding, and macro-level influences, including parental literacy, societal perceptions, and policy environments. By addressing these factors, educators can enhance both learners' academic performance and their long-term development as self-directed, motivated participants in society (Liu et al., 2022; OECD, 2019; Ryan, 2018).

5.4 CONCLUSION

This chapter presented and discussed the findings generated through reflective activities and interviews with six educators from three different schools. The data were analysed using thematic analysis, guided by the theoretical framework of Scarborough's Reading Rope (2021), and facilitated the identification of inductive themes emerging from the educators' responses. Six overarching themes were identified, which effectively addressed the main and sub-research questions outlined in the aims and objectives of this study. This chapter thus provided a comprehensive synthesis of the data, linking empirical insights from participants with established theoretical perspectives on reading and literacy development.

CHAPTER 6:
SUMMARY, RECOMMENDATIONS AND CONCLUSION

6.1 INTRODUCTION

The previous chapter presented the analysis and discussion of the data collected through reflective activities and semi-structured interviews. The findings were organised into six thematic categories, which were interpreted using both deductive and inductive reasoning, guided by Scarborough's Reading Rope theoretical framework. The inductive reasoning themes that emerged were linked to learners' backgrounds, including aspects such as reading culture, discipline, and motivation, providing insight into the factors influencing their performance in ML.

The purpose of this study was to explore how learners' reading ability affects their achievement in ML within the context of the Western Cape. ML, offered as an FET subject to learners in Grades 10 to 12, aims to develop learners' capacity to interpret and respond to real-life contexts through mathematical reasoning. According to the Curriculum and Assessment Policy Statement (CAPS) (DBE, 2022), learners are expected to analyse and interpret authentic, real-world problems through mathematical understanding. However, despite the subject's emphasis on contextual application, learners often experience difficulties that stem from challenges in reading comprehension rather than mathematical skill. The study therefore sought to understand how reading ability specifically decoding, fluency, and comprehension affects learners' capacity to access, interpret, and respond to ML tasks.

In line with this purpose, the study was guided by the following objectives:

1. To explore the ways in which learners' reading ability affects their achievement in ML.
2. To understand the underlying factors that influence learners' reading ability in ML at Eden and Central Karoo Education District schools.
3. To identify possible interventions or strategies that can be implemented by schools or teachers to overcome these challenges.

The research questions were developed to address these objectives and include both the main and sub-research questions:

Main Research Question:

1. What are learners' reading ability in ML at Eden and Central Karoo Education District Schools?

Sub-Research Questions:

1. How does learners' reading ability affect their achievement in ML?
2. What informs or influences learners' reading ability in ML at Eden and Central Karoo Education District schools?
3. What possible interventions or strategies can schools or teachers implement to overcome these challenges?

Furthermore, this chapter provides a comprehensive summary of all six chapters of the study, highlights the key findings, and offers recommendations aimed at addressing the challenges and limitations identified. The chapter concludes by reflecting on the educational implications of the study and suggesting directions for future research.

6.2 SUMMARY OF CHAPTERS

6.2.1 Chapter 1

Chapter 1 laid the foundation for this study by establishing the context and significance of exploring ML in the Eden and Central Karoo Education District. The chapter highlighted the personal connection of the researcher to the phenomenon under investigation and situated the study within the broader body of extant literature, demonstrating how previous research intersected with the focus of this study. Furthermore, Chapter 1 clearly outlined the research aims and objectives, presenting the guiding research questions that framed the investigation and provided a structured foundation for the study. These elements collectively set the stage for the methodology and subsequent chapters, ensuring a coherent progression from the research problem to the study's design and execution.

6.2.2 Chapter 2

Chapter 2 presented a review of literature on reading ability from previous studies across different academic specialisations and educational levels, spanning primary to secondary school. The particular focus on the FET phase, encompassing Grades 10 to 12, and emphasised the role of reading ability in the context of ML within the Eden and Central Karoo Education District. Contributions from various scholars in mathematics education and related fields are analysed, shedding light on how reading proficiency impacts learner achievement in this phase.

6.2.3 Chapter 3

Chapter 3 presented the theoretical framework that guided this study, Scarborough's Reading Rope (2021). This framework provided a comprehensive lens for examining the relationship between reading ability and learners' performance in ML. By integrating components of reading, including word recognition and language comprehension, the framework enabled a detailed understanding of how reading proficiency interacts with mathematical understanding. The chapter also justified the selection of this framework, demonstrating its relevance in guiding the research process and ensuring alignment with the study's aims and objectives.

6.2.4 Chapter 4

Chapter 4 outlined the research design and methods employed in this study. It detailed the qualitative research approach used to explore the research questions, incorporating data-generation methods such as reflective activities and semi-structured interviews to gain in-depth insights. The chapter explained how these methods were aligned with the sub-research questions, ultimately supporting the investigation of the main research question. Additionally, the rationale for selecting reflective activities was provided, highlighting their relevance in achieving the study's objectives and ensuring that the methodology effectively addressed the focus of the research.

6.2.5 Chapter 5

Chapter 5 presented the analysis and interpretation of the data collected, systematically identifying patterns and themes through horizontalisation methods. The

chapter synthesised participants' responses, highlighting areas of agreement and divergence regarding the influence of reading ability on learner achievement in ML. It also demonstrated how these findings related to, supported, or challenged insights from the literature review and addressed the sub-research questions, providing a comprehensive understanding of the research problem.

6.3 RECOMMENDATIONS

The purpose of this study was guided by the main research question, which sought to explore how learners' reading ability influences their achievement in ML. This central focus shaped the overall direction of the study and provided the foundation for investigating the relationship between reading ability and academic performance in the subject. In alignment with the main research question, the study was further guided by three objectives derived from the sub-research questions. The first objective was to examine the ways in which learners' reading ability affects their achievement in ML. The second objective aimed to understand the underlying factors that influence learners' reading ability within the context of Western Cape schools. The third objective sought to identify potential interventions or strategies that schools and teachers can implement to address the challenges associated with learners' reading difficulties. These objectives were addressed through both the main and sub-research questions and analysed by identifying key themes that emerged from the data. The insights gained from these themes informed the recommendations presented in this chapter, which aim to address the central phenomenon of this study learners' reading ability and its impact on their performance in ML.

6.3.1 Effects Of Poor Reading Ability

The findings of this study reveal that poor reading ability has a profound and direct impact on learners' achievement in ML. Participants consistently reported that learners often misinterpret or overlook key terms, struggle to identify what a question requires, and are unable to extract mathematical meaning from lengthy, text-rich problems. While learners may perform calculations correctly when guided by teachers, they frequently fail to do so independently due to difficulties in comprehension. These difficulties manifest primarily at the decoding and fluency levels, where learners are unable to read with sufficient accuracy, pace, or understanding to sustain meaning throughout a task. Furthermore, the findings confirm that the primary barrier in ML is

learners' limited ability to read with comprehension and to process mathematical language effectively. This aligns with existing literature, which recognises reading ability as a multi-layered process that integrates decoding, fluency, and comprehension (Scarborough, 2021; Patterson, 2016; Shiotsu, 2009). When these elements are weak, learners are unable to access the mathematical reasoning required in problem-solving. Policy expectations, such as those outlined in DBE (2022), assume that learners can engage meaningfully with real-world contexts by the FET phase. However, this study reveals a significant disconnect between these expectations and learners' actual reading competence.

This theme responds to the main research question, which sought to determine the level of learners' reading ability in ML. The findings indicate that learners display significant weaknesses across all three levels of reading ability (recognition, decoding, and fluency) which collectively hinder their performance in the subject. At the recognition level, learners struggle to identify and recall basic difference between mathematical terminology such as radius and diameter or circumference and area. This lack of word recognition results in confusion about what is required in a question and often leads to incorrect calculations or complete task avoidance. At the decoding level, learners experience difficulty interpreting unfamiliar or complex scenarios, particularly those presented in Grade 12 examination contexts that move beyond local, everyday examples to national or international settings. Learners are unable to decode and extract relevant information from written passages, tables, and graphs, making it difficult to understand the problem before attempting to solve it. At the fluency level, learners read slowly and hesitantly, frequently losing their place or meaning mid-sentence, which interrupts comprehension and problem-solving processes.

Collectively, these findings show that learners' overall reading ability is inadequate for the demands of ML and that difficulties at the recognition, decoding, and fluency levels interact to constrain their achievement. This directly addresses the purpose of the study, which was to explore how learners' reading ability influences their achievement, and the first objective, namely to identify the ways in which reading difficulties affect performance. The evidence confirms that limited reading ability undermines learners' capacity to access, interpret, and respond to ML tasks effectively. In light of these findings and drawing on Scarborough's Reading Rope framework (2001), this study

recommends that the teaching of language across the curriculum be reinforced from the earliest grades and sustained throughout learners' schooling years. The framework emphasises that proficient reading develops from the integration of word recognition (decoding, fluency) and language comprehension (vocabulary, syntax, background knowledge). Therefore, reading and comprehension skills should not be confined to language subjects alone but intentionally embedded across all learning areas, including ML. Collaboration between ML and language teachers is essential to ensure that learners develop the vocabulary, sentence structure awareness, and comprehension strategies needed to interpret mathematical problems effectively. Schools and districts should place stronger emphasis on subject-specific literacy development, ensuring that learners are explicitly taught how to interpret and use key mathematical terms within context. This reiterates the importance of aligning the language of instruction with the language of assessment, as mismatches often exacerbate comprehension difficulties in multilingual classrooms.

Furthermore, intervention strategies should be reconceptualised to include reading support as a fundamental component of learning recovery rather than focusing solely on content remediation. At district and provincial levels, subject advisors and officials should promote reading focused interventions within ML support programmes. This includes designing workshops and classroom based strategies that strengthen decoding, fluency, and comprehension, the very strands that the Reading Rope identifies as essential for skilled reading. Teachers should therefore receive professional development not only in content pedagogy but also in addressing reading barriers that hinder learners' conceptual understanding and academic success.

6.3.2 Reasons For Poor Reading Ability

The findings indicate that learners' poor reading ability stems from a combination of internal and external factors that collectively hinder the development of essential reading skills. Participants noted that learners often adopt surface-level strategies, attempting to reach answers quickly without engaging in the deeper comprehension processes required to make meaning of text. Motivation and effort further emerged as influential factors, with participants observing that many learners skim or skip through information and demonstrate limited perseverance when confronted with unfamiliar or complex texts. Participant reflections also highlighted a lack of general knowledge and

limited real-world exposure, which restrict learners' ability to connect new information to prior knowledge a critical component of comprehension, according to Kambach and Mesmer (2024).

Language barriers were another prominent concern. Participants emphasised that many learners are taught and assessed in a language that differs from their home language, resulting in significant comprehension difficulties and reduced confidence. This mismatch between the language of learning and teaching (LoLT) and the language of assessment discourages independent reading and reduces learners' willingness to engage with text-heavy ML questions. Furthermore, limited exposure to reading, or an environment that does not promote reading as a leisure activity often due to parental work demands or low literacy levels further diminishes enthusiasm for both reading and academic engagement.

In terms of the phenomenon explored in this study, if any one of the three key components of reading; decoding, comprehension, or fluency is weak, it can result in poor reading ability. According to the National Reading Panel (2000) and Pikulski and Chard (2005), these three processes function interdependently: decoding enables word recognition, fluency ensures efficient reading with appropriate pace and expression, and comprehension allows for the construction of meaning. When one element is underdeveloped, the entire reading process becomes disrupted, resulting in cognitive overload and reduced understanding.

The data revealed that learners often adopt surface-level strategies, attempting to "get to the answer quickly" (Participants 1 and 2) rather than engaging deeply with the text. This reflects a lack of comprehension, leaving learners frustrated and unable to navigate texts that require meaning-making. Participant 3 observed that learners tend to skip through information selectively, further hindering their comprehension, while Participant 5 described limited general knowledge and cultural exposure as additional obstacles to understanding text. All of these findings point to comprehension as the most critical factor in reading success. When learners fail to comprehend, they struggle to understand what questions are asking or to interpret the information presented. This aligns with Scarborough's (2001) Reading Rope , which illustrates that reading ability is only as strong as each individual strand, with multiple subskills woven together to form a cohesive whole. As further investigation into the reasons for poor

reading ability continued, it became clear that these challenges could not be explained only through the phenomenon or framework of this study, but must also consider external influences.

Early struggles with reading fluency create a cumulative disadvantage, as these learners tend to engage with less text over time, limiting their exposure to new vocabulary and complex language structures (Felton, 2024; Reading Rockets, 2025). Consequently, this gap not only affects academic performance but also extends to broader societal contexts, where reading proficiency is essential for lifelong learning and personal development (Felton, 2024). Pikulski and Chard (2005) further support this by asserting that fluency is a critical factor for reading success, and that it is influenced by other core components of reading ability. For instance, if a reader struggles with comprehension, it becomes more difficult to read fluently, which in turn increases the time needed to process text. This aligns with DHET stipulations (2021), which emphasise that reading fluency and comprehension must be developed concurrently to ensure academic success.

These findings are supported by the literature, which demonstrates that both micro-level factors (such as home background, socioeconomic conditions, and parental literacy) and macro-level factors (such as teacher support, resource availability, and language policy) shape reading development. Liu et al. (2022) and Gumede (2018) emphasise the role of early parental engagement and the presence of reading materials in fostering positive reading attitudes. Pretorius and Klapwijk (2016) further argue that socioeconomic disadvantage and low parental literacy have long-term effects on reading proficiency, while Cunningham (2010) and Nyama (2010) note that limited home reading experiences hinder vocabulary growth and comprehension development. On the macro level, Pretorius and Klapwijk (2016) and Davids (2023) point to inadequate access to diverse reading materials especially in learners' home languages as a structural barrier, while Liu et al. (2022) highlight that teacher support and encouragement are vital to sustaining reading motivation in the classroom.

The framework for this study, as illustrated by Scarborough (2001), shows that reading comprehension depends on the intertwining of word recognition (decoding and fluency) and language comprehension (vocabulary, background knowledge, and verbal reasoning). If one strand is weak, the integrity of the entire rope is compromised.

While the framework primarily focuses on cognitive and linguistic components, this study highlights that contextual influences, both micro and macro, directly affect the strength of these strands.

To address these challenges, this study recommends stronger collaboration between parents, teachers, and schools to build and reinforce reading skills through shared accountability. Parents should be empowered to provide literacy support at home, while teachers across subjects should integrate reading and vocabulary-building strategies into their lessons. Collaboration between language and ML educators can help identify and strengthen weak strands within the “Reading Rope ” by aligning vocabulary instruction, contextual understanding, and comprehension strategies. At a broader level, district and provincial authorities should ensure that schools have access to age-appropriate, multilingual reading resources and sustained literacy programmes that target both home and school environments.

These findings ultimately underscore that improving learners’ reading ability requires a holistic, system-wide approach that nurtures every strand of the Reading Rope . When support structures at home, in school, and at the system level work in harmony, learners’ recognition, decoding, and comprehension skills can develop more robustly enhancing their ability to engage meaningfully with ML tasks.

6.3.3 Possible Interventions Posed And Already Implemented By Teachers

The findings reveal that ML teachers are not only aware of learners’ reading challenges but are actively attempting to implement interventions within their classrooms. Many teachers described strategies that encourage learner participation in reading and promote comprehension. Participants highlighted classroom-based interventions such as reading aloud, breaking down complex sentences, explaining terminology, and linking mathematical problems to familiar, everyday contexts. These approaches align with Liu et al. (2022), who argue that motivation and contextual relevance are key factors in sustaining reading engagement. For example, Participant 2 emphasised that allowing learners to read aloud builds confidence while other learner can silently follow along helping them to hear the pronunciation and listen at the question, while Participant 5 noted that using real-life examples helps the learner

feel that the work is achievable by connecting content to learners' prior knowledge. These teacher-initiated interventions align closely with several strands of the Reading Rope model, particularly the strands of vocabulary, background knowledge, and language structures, which collectively strengthen comprehension. By focusing on familiar contexts and explicit word meanings, teachers are helping learners compensate for weaknesses in word recognition and language comprehension. However, as the Reading Rope suggests, the strength of reading ability depends on the interconnection of all strands. When one is weak, overall reading proficiency suffers. Therefore, while classroom-based strategies are valuable, their isolated implementation cannot fully address the depth of the problem.

Participants also highlighted the need for systemic and collaborative interventions. Participant 4 stressed the lack of library access and dedicated reading time, echoing Gumede's (2018) call for community and school-based reading environments. Moreover, teachers recognised the importance of ongoing professional development to equip educators with the skills to teach reading strategies, not just content. Participant 6 stated that "teachers were trained in content, not in how to teach reading," reflecting a broader systemic issue. Myatt (2025) and Bertram et al. (2021) support this, noting that curriculum implementation and teacher training are essential for developing learners' higher order skills.

At the policy level, Barends and Reddy (2024) emphasise that national strategies such as the DBE reading interventions and curriculum integration frameworks aim to build fluency, decoding, and comprehension across subjects. These align with the suggestions made by participants, where all strategies are unfortunately only implemented at a primary schooling level, which are the downside of this as the study focuses on FET learners. The framework further adds reading development must be the responsibility of all educators, not just language specialists, adding and supporting the plea by the participant. Teachers in the FET phase often assume that reading instruction belongs in the Foundation Phase; however, findings from this study confirm that reading remains a developmental skill that requires reinforcement throughout schooling.

Therefore, interventions ought to move beyond isolated classroom practices and towards a coherent, multi-level approach. Collaboration between language and

content teachers, early identification of reading difficulties, and ongoing district-level support can strengthen each strand of the Reading Rope . In this way, interventions become both preventive and developmental, ensuring that reading ability is a foundational skill and continues to be nurtured throughout learners' academic journey.

6.3.4 Integrations Of Word Recognition And Language Comprehension Strands

The findings of the study revealed that learners' difficulties in ML stem from weaknesses across both strands of the Reading Rope , that is, word recognition and language comprehension (Scarborough, 2001). Teachers' reflections demonstrated that learners often misinterpret questions not because they lack mathematical knowledge, but because they struggle to decode and comprehend the language of the task. Participant 1 observed that learners "confuse area with perimeter because they only recognise one word but not its meaning," and that "misreading numbers such as 1 000 and 100 leads to huge calculation errors." Such examples illustrate how fragile decoding and weak phonological awareness interfere with problem-solving. As Scarborough (2001) notes, when word recognition is not automatic, cognitive energy that should be available for comprehension is instead consumed by basic decoding, leaving learners unable to engage meaningfully with the problem.

These findings resonate with Lyon (2022) and Kilpatrick (2016), who emphasise that phonological processing and orthographic mapping form the foundation for fluent reading. Without these automatic processes, learners must decode every word individually, slowing down comprehension and increasing cognitive load. In ML, this is evident when learners cannot instantly recognise key terms such as radius, circumference, or when interest or interest rate is required. As Participant 5 noted, "learners do not recognise simple terminology if it is engulfed in a sea of information." This lack of sight recognition indicates underdeveloped vocabulary and limited exposure to subject specific terminology. Ehri (2005) highlights that fluent readers rely on stored sight words to free up working memory for higher-order comprehension, a capacity that many learners in this study appear to lack according to the participants which are their educators. In addition to decoding challenges, the data also showed that language comprehension weaknesses limited vocabulary, poor background knowledge, and difficulties understanding sentence structures further hinder learners'

ability to interpret contextualised problems. Participant 6 remarked, “They struggle when the question is long, and they must break it down,” while Participant 4 explained that learners “can do the calculations if I explain it, but they cannot do it when it is in a context.” These statements confirm Davids’ (2023) argument that comprehension requires exposure to both mathematical language and general literacy practices. Perfetti’s (2007) lexical quality hypothesis similarly suggests that shallow or incomplete knowledge of words results in weak comprehension, particularly in subjects like ML, where the interpretation of real-world scenarios is central.

Together, these findings demonstrate how deficits in both strands of the Reading Rope reinforce one another. When learners cannot automatically recognise mathematical terminology (word recognition), and simultaneously struggle to make sense of longer, context-based questions (language comprehension), their ML performance suffers. This interdependence confirms Scarborough’s principle that the rope’s strands must operate in harmony. At the curricular level, these findings expose a significant gap between policy intent and classroom reality. Although the DBE’s Curriculum and Assessment Policy Statement (CAPS) and Examination Guidelines (DBE, 2020; 2021) emphasise interpretation and communication as core components of ML, they provide little guidance on how literacy skills should be explicitly taught within the subject. The curriculum assumes that learners entering the FET phase already possess sufficient reading fluency and comprehension, an assumption not supported by the evidence presented here. Teachers in this study noted that they were trained primarily in content delivery, not in developing learners’ reading strategies. As a result, learners’ reading difficulties are often overlooked or misinterpreted as mathematical weaknesses.

This disconnect underscores the need for targeted intervention and teacher training. Teachers should be equipped not only to teach ML content but also to identify and address reading barriers that prevent learners from engaging with that content, it’s in the name after all ML with the focus on the literacy. Interventions, especially for struggling learners, ought to shift focus from calculation procedures alone to activities that strengthen understanding of scenarios, recognition of key terms, and comprehension of instructions and data. Strengthening both strands of the Reading Rope within ML, instruction can bridge the gap between curriculum expectations and

learner readiness, ensuring that the subject fulfils its goal of developing functional, literate citizens.

6.3.5 Learner Background And Reading Culture

The findings reveal that learners' reading backgrounds and home literacy environments exert a profound influence on their engagement and how they view ML. Participant 1 observed that "learners with weak reading skills may not grasp the context, so they can't apply the maths correctly… Many questions require written explanations or justifications. Poor readers often give one-word answers or avoid explanation, losing marks… They take so long to read through a long word problem that they lose focus, skip steps, or misinterpret the main question." These difficulties reflect the cumulative disadvantage described by Felton (2024) and Reading Rockets (2025), where early struggles with fluency reduce learners' exposure to text over time, limiting vocabulary growth and comprehension. As Pikulski and Chard (2005) explain, weak fluency increases cognitive load and reading fatigue, creating a cycle that further hinders comprehension and achievement. Participant 2 expanded on the impact of the modern literacy environment, noting that learners "want to get to the answer as fast as possible without embracing the process […] Their social media environment doesn't challenge them to form their own understanding; it encourages instant solutions." This insight aligns with Cunningham's (2010) notion of limiting literacy environments, where learners are not exposed to sustained or meaningful reading experiences. In many cases, rural learners such as those in the district of this study enter school with limited exposure to books or print in their home language due to low parental literacy and scarce reading resources (Pretorius & Machet, 2004; Pretorius & Klapwijk, 2016; Davids, 2023). Liu et al. (2022) add that such socio-economic and linguistic barriers compound over time, reducing motivation to read and deepening the literacy gap between learners from resource-rich and resource-poor backgrounds. Participants 3, 4, and 5 echoed these challenges, pointing to the lack of a sustained reading culture both at home and in school. Participant 3 explained, "Learners can't tell me what they understand about the question. They struggle to put their thoughts into their own words," while Participant 4 stated that "the focus must be on the primary school teachers to help learners there with the basic reading and writing skills." Participant 5 reported that many Grade 12 learners still read at a primary school level. These reflections confirm findings by Cunningham (2010), Nyama (2010), and Masudi and

Silaji (2024), who show that limited parental involvement and the absence of active or passive literacy engagement at home have lasting consequences for learners' reading development and academic confidence.

The study also highlights the role of schools as critical mediators in fostering literacy, particularly where home environments are unsupportive. Teachers in this study noted that weak reading ability constrains curriculum delivery, limiting learners' ability to meet the expectations outlined in CAPS and the DBE Examination Guidelines (DBE, 2020a, 2022). Scholars such as that of Stokhof et al. (2018), Maxwell and Roofe (2020), and Myatt (2025) emphasise that curriculum implementation is inseparable from teacher capacity, where teachers must not only deliver content but also scaffold reading comprehension to ensure equitable learning. While initiatives such as LitNum and the National Reading Strategy (DoE, 2006; Botha et al., 2008) acknowledge the need for literacy development, effective classroom-level implementation remains inconsistent.

In conclusion, the data illustrate that a learner's reading ability is not an isolated skill but a composite of multiple interdependent factors. Just as the framework for this study conceptualises reading ability as comprising language comprehension and word recognition, an additional strand representing home background, school environment, exposure to print, teacher support, and personal motivation should be woven into the Reading Rope to strengthen it further. As the Reading Rope suggests, each strand contributes to the overall strength of reading proficiency; when one strand is weak or missing, the entire structure becomes fragile. Weak reading fluency, low parental literacy, and minimal engagement with text combine to hinder comprehension and academic growth (Felton, 2024; Pretorius & Machet, 2004). These findings reinforce the earlier themes, highlighting that both micro and macro level factors shape reading ability (Themes 1 and 2), that teacher interventions are crucial (Theme 3), and that word recognition and comprehension must be jointly strengthened (Theme 4). Ultimately, fostering a robust reading culture requires a unified effort across home, school, and systemic levels to ensure that learners develop the literacy foundations essential for success in ML and lifelong learning.

6.3.6 Learner Motivation And Discipline

The participants' reflections reveal that learner discipline and motivation are crucial factors affecting engagement and achievement in ML. Participant 1 observed, "I try to keep lessons interactive and make sure learners feel confident applying what they learn outside the class… Negative attitude towards the subject… Many learners believe ML is 'easy' or 'less important' than Mathematics, so they don't take it seriously." This observation aligns with research indicating that learner motivation is closely linked to perceptions of subject relevance and difficulty. When learners perceive a subject as less challenging or less valuable, their intrinsic motivation diminishes, negatively influencing their engagement and persistence in problem-solving tasks (OECD, 2019; PISA, 2018). Participant 2 further emphasised this point, noting that both learners and parents often view ML as "slow mathematics" or a subject that "closes doors" to tertiary pathways, resulting in reduced effort and commitment. These attitudes reflect the broader societal and cultural perceptions that shape learners' motivation, underscoring the influence of macro-level factors on classroom engagement (Liu et al., 2022).

Micro-level factors also play a significant role in shaping learners' discipline and motivation. Participants highlighted a general lack of willingness among learners to engage actively with tasks, complete homework, or take responsibility for their own learning. Participant 5 emphasised the importance of building learner confidence gradually through small, structured assessments such as short class tests at the end of each topic to help learners prepare for high-stakes examinations of three hours and 150 marks per paper. This progressive approach promotes self-efficacy, helping learners experience success incrementally and develop resilience. These reflections correspond with the literature on self-determination theory, which posits that motivation is enhanced when learners experience competence, autonomy, and relatedness within a supportive classroom environment (Ryan & Deci, 2017). Teachers' ability to scaffold learning, maintain structure, and provide opportunities for mastery is therefore vital in fostering both motivation and discipline.

Participants also emphasised the necessity of structured support systems within schools to promote discipline and accountability. Learners require clear behavioural expectations and consistent routines to function effectively, while educators need

institutional structures that support teaching and learning. A well-managed classroom and school environment ensures that all learners can operate within the same learning space without disruption. The school system, therefore, must play an active role in supporting both teachers and learners through effective discipline policies, guidance programmes, and consistent behavioural standards. Furthermore, parental influence and collaboration emerged as essential external factors. When parents hold learners accountable and actively support school expectations, learners develop a sense of responsibility not only towards their education but also towards themselves. Despite being in the FET phase, learners remain minors under the law, requiring guidance, structure, and consistent reinforcement from both the school and home environment.

At the macro level, broader socio-economic factors and policy frameworks also influence learner discipline and motivation. Participants reflected on the role of institutional and legislative measures, such as those supported by the BELA Act and DBE policies, in establishing accountability and promoting learner engagement. Well-implemented policies that align with CAPS and the DBE's expectations provide an enabling environment for both learners and teachers, reinforcing discipline and motivation as key components of academic achievement (DBE, 2020; Myatt, 2025). Furthermore, foundational literacy and numeracy, as highlighted by PISA (2018) and the OECD Adult Skills Survey (2019), are not only essential for academic success, but also for employability, and broader societal participation.

In conclusion, learner motivation and discipline underpin every aspect of learning. They are shaped by an intricate interplay of individual attitudes, classroom practices, socio-cultural expectations, and policy environments. Without structure, accountability, and a shared partnership between parents and schools, learners struggle to remain engaged and purposeful. Motivation and discipline therefore form the foundation on which all other educational processes are built. By strengthening these aspects through consistent school practices, supportive home environments, and effective policy implementation, educators can foster resilient, self-directed learners who engage meaningfully with ML and beyond (Ryan & Deci, 2017; Liu et al., 2022; OECD, 2019).

6.4 RESEARCH QUESTIONS

6.4.1 Main Research Question: What Is The Level Of Learners' Reading Ability In MI At Eden And Central Education Schools?

The findings revealed that learners' reading ability in ML is generally below the expected level of functional comprehension. Across participants' reflections, learners demonstrated weaknesses in all three core components of reading namely, decoding, fluency, and comprehension. Many learners struggled to recognise familiar terms such as radius, diameter, and circumference, indicating limited decoding and vocabulary knowledge. Reading tasks that required interpretation of contextual information, graphs, and tables proved particularly challenging, suggesting poor comprehension. Fluency, although present in basic reading tasks, often lacked the comprehension techniques for meaning making. Overall, the data indicate that learners operate at a low to moderate level of reading ability, which impedes their capacity to interpret and solve ML problems accurately.

6.4.2. Research Question 1: How Does Learners' Reading Ability Affect Their Performance In ML?

The findings clearly demonstrated a direct relationship between learners' reading ability and their achievement in ML. Learners who struggled with decoding and comprehension were unable to interpret question requirements or identify key information from texts, resulting in incorrect calculations and incomplete responses. Participants observed that learners often used surface-level strategies to "get to the answer quickly" rather than engaging in meaningful interpretation (Participants 1 and 2). This behaviour reflects poor comprehension processes and aligns with Scarborough's (2001) Reading Rope , which illustrates that reading proficiency depends on the strength of each intertwined strand. When decoding, fluency, or comprehension is weak, the learner's overall ability to process mathematical language deteriorates, leading to poor academic performance.

6.4.3. Research Question 2: What Internal And External Factors Influence Learners' Reading Ability In Mathematical Literacy?

The study found that learners' reading development is shaped by both micro (internal) and macro (external) factors. Micro factors include motivation, concentration, and prior

exposure to reading, while macro factors encompass home literacy environments, school resources, and teaching quality. Participants noted that limited parental literacy and minimal access to reading materials contribute to poor reading fluency and comprehension. This supports Pretorius and Klapwijk's (2016) argument that both internal and external contexts shape literacy outcomes. Thus, a learner's reading level cannot be explained by cognitive skills alone, but rather by a complex interaction of personal, home, and school environments.

6.4.4. Research Question 3: What Role Can Teachers Play In Supporting Reading Development In ML Classrooms?

Teacher reflections indicated that effective mediation can strengthen reading ability in content subjects. Strategies such as reading aloud, unpacking terminology, and scaffolding vocabulary such as implementing action words were found to enhance learners' comprehension of mathematical contexts. However, participants expressed that they often lack formal training in integrating reading instruction into their ML lessons. This highlights the need for continuous professional development that equips teachers to embed reading strategies within classroom instruction; not only at the primary level, but across all grades in the FET Phase.

6.5 CONCLUSION

In conclusion, this study has demonstrated that reading ability is a fundamental component of achievement in ML, alongside learner discipline and motivation. Together, these factors highlight the interconnected nature of learning as illustrated by Scarborough's Reading Rope , the theoretical framework that guided this study. The research successfully addressed both the main and subsidiary questions, revealing that learners' reading ability in ML is generally weak. This weakness is influenced by a combination of cognitive factors such as decoding, fluency, and comprehension and contextual factors operating at both micro and macro levels.

Teachers play a critical role in addressing these challenges through the deliberate integration of reading support within ML instruction. The findings reaffirm that when one strand of the Reading Rope whether word recognition, language comprehension, or learner motivation is weak, the entire structure of learning is compromised. The reflections shared by participating teachers vividly illustrated this interdependence.

However, the Reading Rope does not explicitly encompass the broader contextual dimensions that shape learning, including home background, school environment, socio-economic conditions, and teacher preparedness. These aspects emerged as significant influences on learners' reading and learning experiences in this study.

Future research should therefore consider developing or adapting theoretical frameworks that integrate these contextual elements alongside cognitive processes to provide a more holistic understanding of literacy within content-based subjects such as ML. Further investigation is also needed into the professional development of educators specifically how teachers across subjects and grade levels can be better supported to embed reading strategies within their everyday teaching. This includes exploring effective models of continuous professional learning that enhance teachers' confidence and competence in teaching reading as part of every subject, across all phases of schooling.

Ultimately, this study underscores that a learner's development is shaped by multiple, interrelated factors that extend beyond the classroom. The key challenge and opportunity for future research lie in understanding how these factors can be aligned to promote literacy, meaningful learning, and lifelong growth for both teachers and learners.

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ANNEXURES

Annexure A: Consent Letter

REQUEST FOR PARTICIPATION IN A RESEARCH STUDY

PARTICIPANT INFORMATION SHEET

Date: January 2025

Title: EXPLORING LEARNERS' READING ABILITY IN MATHEMATICAL LITERACY IN EDEN AND CENTRAL KAROO DISTRICT

DEAR PROSPECTIVE PARTICIPANT

I, Larochelle Mc Kirby van der Walt, am conducting research under the supervision of Prof. Cedrick Bheki

Mpungose, a professor in the Department of Curriculum and Instructional Studies, towards a MEd at the University of South Africa. The study, titled "Exploring Learners' Reading Ability in Mathematical Literacy in the Eden and Central Karoo District," aims to determine whether learners' reading abilities impact their performance in Mathematical Literacy.

WHAT IS THE PURPOSE OF THE STUDY?

This study seeks to provide insight into the challenges faced by educators teaching Mathematical Literacy, particularly concerning learners' reading abilities. The findings may help inform interventions and new teaching techniques that could improve learner outcomes and expand study opportunities for learners with Mathematical Literacy as subject.

WHY AM I BEING INVITED TO PARTICIPATE?

You are being invited to participate because they are a Mathematical Literacy teacher within the Eden and Central Karoo Education District, where the study is being conducted. Your insights and experiences are valuable in exploring the impact of learners' reading abilities on their Mathematical Literacy performance. Additionally,

your interest in the research topic and involvement in intervention strategies make their perspective particularly relevant to the study.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study involves a questionnaire and semi-structured interviews. The questions will be based on your daily experience within the classroom teaching Mathematical Literacy. The research study will be conducted over a period of one month, but I will need only fifteen minutes of your time to electronically complete the questionnaire questions. Furthermore there might be one follow-up interview which shall not exceed one hour.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent.

You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

This study aims to provide valuable insights into how learners' reading abilities impact their performance in Mathematical Literacy. By identifying key challenges, the research may contribute to the development of improved teaching strategies, intervention programs, and curriculum refinements that better support both educators and learners. The findings could enhance learner comprehension, leading to improved academic outcomes, while also informing education stakeholders on effective policies. Additionally, the study may pave the way for further research on the relationship between literacy skills and mathematical understanding.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

There are no potential risks that are involved in participating in this study.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

You have the right to ensure that neither your name nor your school's name is recorded or disclosed in any part of this research. Only the researcher and the supervisor will be aware of your participation. Your name will not appear in any records, and your responses will remain anonymous, ensuring that no one can link them back to you. To protect confidentiality, your answers will be assigned a code number or pseudonym, which will be used in all data records, publications, and research reports, including conference proceedings. While a report of the study may be published, individual participants will not be identifiable.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

The researcher will ensure the security and confidentiality of the collected data by implementing multiple protective measures. Electronic data will be stored on a password-protected computer using the OneDrive cloud storage provided by UNISA, which is linked to a secure university email account as an additional layer of protection. Physical documents will be kept in a locked cupboard at the researcher’s home office. Furthermore, any quotes used in the mini-dissertation will be anonymized to protect participants' identities and maintain their privacy.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

There will be no reimbursement or any incentives for participation in the research.

HAS THE STUDY RECEIVED ETHICS APPROVAL

This study has received written approval from the Research Ethics Review Committee of the CEDU, Unisa.

A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact

Larochelle Mc Kirby van der Walt at 079 503 1294 or 24151750@mylife.unisa.ac.za

The findings are accessible for a month before an article is submitted for publication.

Should you have concerns about the way in which the research has been conducted, you may contact

Prof. Cedrick Bheki Mpungose at 0124293111 or mpungcb@unisa.ac.za

Thank you for taking time to read this information sheet and for participating in this study.

CONSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the questionnaire and semi structured interview

I have received a signed copy of the informed consent agreement.

_____ (Participant Name & Surname)

_____

_____

Participant Signature Date

(Researcher)

_____ _____

Researcher's signature Date

Annexure B: Reflective Activity

QUESTIONS FOR REFLECTIVESTUDY

Title: EXPLORING LEARNERS' READING ABILITY IN MATHEMATICAL LITERACY IN EDEN AND CENTRAL KAROO DISTRICT

PARTICIPANT CONCENT

- Have you read (or been explained) the letter of consent for this study?
- Do you give consent?

QUESTIONS TO PARTICIPANT (for selection of participants)

1. What is your name and surname? (responses will be anonymized) 2. What school are you currently teaching at? (responses will be anonymized)
3. Is you school located in the Eden and Central Karoo Education District?
4. How many years have you been teaching Mathematical Literacy?
5. What grade(s) do you currently teach?

QUESTIONNAIRE: QUESTIONS TO CONSENTED PARTICIPANTS

6. Do you believe that learners' reading abilities impact their performance in Mathematical Literacy?
   (Yes/No)
7. Please explain your answer to the above question.
8. What are the most common reading challenges you observe among learners in Mathematical Literacy?
9. In your experience, how do these reading challenges affect learners' ability to solve mathematical problems?
10. Have you implemented any intervention strategies to help learners with reading difficulties in Mathematical Literacy? (Yes/No)
11. If yes, please describe some of the strategies you have used and their effectiveness.
12. Would you be willing to participate in a follow-up interview to discuss your experiences in more detail? (Yes/No)

Please find link to google form: https://forms.gle/hhATPHnaGZsNXKhZ6

Annexure C: Semi Structured Interviews

QUESTIONS FOR SEMI STRUCTURED INTERVIEWS

Title: EXPLORING LEARNERS' READING ABILITY IN MATHEMATICAL LITERACY IN EDEN AND CENTRAL KAROO DISTRICT

INTERVIEW QUESTIONS (FOR SELECTED PARTICIPANTS):

TEACHING EXPERIENCE AND CONTEXT

1. Can you briefly describe your experience teaching Mathematical Literacy?
2. What are some of the biggest challenges you face in teaching this subject?

READING ABILITY AND ITS IMPACT ON MATHEMATICAL LITERACY

3. How would you describe the overall reading ability of the learners in your school?
4. In what ways have you noticed that poor reading skills affect learners' ability to understand and answer Mathematical Literacy questions?
5. Can you provide specific examples where reading difficulties impacted learners' performance in Mathematical Literacy assessments?

STRATEGIES AND INTERVENTIONS

6. What strategies have you implemented to support learners with weak reading skills in Mathematical Literacy?
7. Have you found any particular teaching methods or interventions effective in helping learners improve their comprehension of word problems?
8. What role do you think the school or education district can play in supporting teachers and learners facing reading challenges in Mathematical Literacy?

BROADER IMPLICATIONS AND FUTURE RECOMMENDATIONS

9. Based on your experience, what recommendations would you make to improve learners' reading abilities in Mathematical Literacy (intervention wise)?

10. Is there any additional insight you would like to share about how reading ability influences success in Mathematical Literacy?

Annexure D: Ethical Clearance

College of Education _ERC

NHREC Registration # : (if applicable)

Ref #: 7574

Name: Ms Larochelle Mc Kirby van der Walt

Student #: 24151750

Staff #:

Date: 27/08/2025

Dear: Ms Larochelle Mc Kirby van der Walt

Decision: Ethics Approval from 26/08/2025 to 25/08/2028

Researcher: Ms Larochelle Mc Kirby van der Walt
11 Die Eike, 40 York Street
George
larochellemk@gmail.com 0795031294

Supervisor: Prof Cedric Bheki Mpungose mpungcb@unisa.ac.za

Co-Supervisor:

Co-Researcher(s):

Email address:

EXPLORING LEARNERS' READING ABILITY IN MATHEMATICAL LITERACY IN EDEN AND CENTRAL KAROO DISTRICT

Qualification: MED (CURRICULUM STUDIES)

Thank you for the application for research ethics approval by the College of Education _ERC for the above-mentioned research study. Ethics approval is granted for three years .

The **low risk application** was **reviewed** by the College of Education _ERC in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

2. Any adverse circumstance arising during the undertaking of the research study that may affect the ethical integrity of the study, including those involving research participants, third parties, or juristic persons, must be reported in writing to the College of Education _ERC without delay.

3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

4. Any changes that may affect study-related risks to research participants, juristic or third persons, must be reported in writing to the College of Education _ERC, accompanied by a progress report.

5.	The researcher will ensure that the research study complies with all applicable national legislation, professional codes of conduct, institutional guidelines, and scientific standards relevant to the specific field of study. Where applicable, adherence to the following South African legislation is essential: the Protection of Personal Information Act (No. 4 of 2013), the Children's Act (No. 38 of 2005), and the National Health Act (No. 61 of 2003)

6.	Future use of this research data is permitted only in de-identified form and only for secondary research with objectives similar to those of the original study. Any secondary use involving identifiable human data will require additional ethics clearance.

7.	No fieldwork activities may continue beyond the stated expiry date (25/08/2028) . A completed Research Ethics Progress Report must be submitted as an application for renewal and is subject to approval by the Research Ethics Committee. A Close-Out Report must be submitted upon completion of the research study.

8.	The with Section 7.2 of the Unisa Policy on Research Ethics (2024).College of Education _ERC may require the submission of regular progress reports on an annual basis, in alignment

Additional Conditions

1.	Disclosure of data to third parties is prohibited without explicit consent from the research participants and Unisa.
2.	Research data must be stored in compliance with the university's research data management policy for a period of up to 15 years.
3.	When publishing the results, the researcher must take appropriate precautions to safeguard the confidentiality and privacy of the research participants, juristic persons, third parties, and the university, in accordance with institutional policies and ethical standards.
4.	Adherence to the National Statement on Ethical Research and Publication Practices, specifically Principle 7 on Social Awareness, must be ensured. This principle states: 'Researchers and institutions must be sensitive to the potential impact of their research on society, marginal groups, or individuals, and must consider these when weighing the benefits of the research against any harmful effects, with a view to minimising or avoiding the latter where possible.' The University of South

Africa (Unisa) accepts no liability for any failure to comply with this principle.

Note

The reference number 7574 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,

Prof Justin Oswin August
Chair of College of Education _ERC
E-mail: augusjo@unisa.ac.za

Prof M Makoe
Executive Dean / By delegation from the Executive Dean of College of Education _ERC
E-mail: qakisme@unisa.ac.za, magolmc@unisa.ac.za

Annexure E: Gatekeepers Letter

Western Cape Government

Western Cape Education Department
Gerhard Ackerman
Eden Central Karoo Educational District
Gerhard.Ackerman@westerncape.gov.za | 044 803 8300

Enquiries: G C Ackerman
Reference: Permission to conduct research in schools in Circuit 8 in Eden Central Karoo Educational District.

To Whom It May Concern

Dear principal and educator

(Via email: larochellemk@gmail.com)

PERMISSION TO CONDUCT RESEARCH AT SCHOOLS IN CIRCUIT 8 IN EDEN CENTRAL KAROO EDUCATIONAL DISTRICT:

I fully support and hereby give permission to Mrs. Larochelle Mc Kirby van der Walt, to conduct research regarding learners' reading ability in Mathematical Literacy in Circuit 8 schools in Eden Central Karoo Educational District.

Herewith I acknowledge that the research will be conducted under the supervision of Prof. Cedrick Bheki Mpungose from the Department of Curriculum and Instructional Studies at UNISA.

All schools that offer Mathematical Literacy are hereby requested to kindly support and assist Ms. Mc Kirby van der Walt with her research.

Thank you for your time and attention and your cooperation in this regard.

Kind regards

GC Ackerman
Circuit Manager: Circuit 8
Date: 28 July 2025

Annexure F: Turnitin (Similarity) Report

Similarity Report

PAPER NAME
L.McKirbyvdWalt_Masters - TurnItIn.docx

AUTHOR
LAROCHELLE MC KIRBY VAN DER WALT

WORD COUNT
37728 Words

CHARACTER COUNT
227051 Characters

PAGE COUNT
118 Pages

FILE SIZE
1.2MB

SUBMISSION DATE
Dec 17, 2025 2:15 PM GMT+2

REPORT DATE
Dec 17, 2025 2:18 PM GMT+2

7% Overall Similarity

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- Crossref Posted Content database
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Excluded from Similarity Report

- Manually excluded sources

Summary

Annexure G: Letter of Edit

PRO EDIT PTY LTD
PO BOX 23081, CLAREMONT CAPE TOWN 7735

EDITING CERTIFICATE

Date: 2025/12/18

This serves to confirm that the document entitled:

Exploring learners' reading ability in Mathematical Literacy in Eden and Central Karoo district

by

LAROCHELLE MC KIRBY VAN DER WALT

24151750

has been language edited on behalf of its author.

Genevieve Wood
Pro Edit Pty Ltd