The impact of guided inquiry-based learning in enhancing problem-solving skills among Grade 11 Development Studies learners: Insights from one high school in Maseru district

THE NATIONAL UNIVERSITY OF LESOTHO

A thesis submitted in fulfilment of the requirement for the award of degree of Master of Arts in Education (MA.Ed) in the Faculty of Education, Department of Language and Social Education (LASED)

By

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Declaration statement

I Puseletso Mathaha (201701827) hereby announce that this dissertation entitled "*The impact of guided inquiry-based learning in enhancing problem-solving skills among grade 11 Development Studies learners: Insights from one high school in Maseru district*" is my original work and has not been published or submitted previously for any personal or academic purpose. I declare that the materials and sources used in this study have been duly acknowledged in-text accompanied by a compiled list of references.

Signature: 

Ethics statement

I declare that in conducting this study, I observed all necessary ethics indicated by The National University of Lesotho. The human participants were involved in the current investigation. Therefore, ethical considerations including informed consent and confidentiality were adhered to.

Certification

Having met all the necessary requirements of the university, this certifies that this thesis deserves an award of the Master of Arts in Education under the Faculty of Education.

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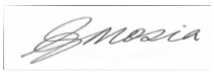
Dean Faculty of Education: PROF MOSIA P. A. 

Supervisors' statement

I **Mohaeka Raselimo** affirm that I have approved the submission of this thesis which was under my supervision.

Signature_  _____

Dedication

I dedicate this thesis to my beloved daughter, Kananelo Alice. Dear daughter, you have been my greatest source of inspiration and strength through every uncertainty and challenge we faced together. This is not just an academic achievement, as it may appear, but a testament to our journey together—a journey marked by love, perseverance, and unwavering support. To myself, this work represents not only my academic endeavours but also my commitment to self-improvement and resilience.

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Abstract

Teaching and learning in the 21st century necessitate a paradigm shift in the educational system, with a stronger emphasis on learner-centered methods. Constructivist theorists posit that learner-centered approaches can foster the development of skills valuable in both academic and personal contexts. This study aimed to investigate the efficacy of guided inquiry-based learning (IBL) in enhancing problem-solving abilities among Grade 11 Development Studies learners at a high school in Maseru. The theoretical framework for this study was grounded in the IDEAL model of problem-solving, developed by Bransford and Stein (1984). A two-group pre-test and post-test quasi-experimental design was employed to collect quantitative data on the effectiveness of guided IBL compared to traditional teaching and learning methods, within a positivist paradigm. The findings indicate that guided IBL is more effective in improving problem-solving skills among Development Studies learners than traditional learning methods. Specifically, the study revealed that at the pre-test level, both the control and experimental groups were statistically equivalent, with a recorded p-value of 0.702 (>0.05), indicating no significant differences in the learners' initial problem-solving abilities. After the intervention, the experimental group significantly outperformed the control group ($p = 0.000 < 0.05$). Furthermore, observations showed that learners found it easier to solve problems when actively engaged in the learning process through inquiry. The Likert scale responses also indicated that learners were satisfied with the use of guided IBL in their classroom. While the study suggests that learners are better equipped to solve problems when actively engaged in the classroom, it also emphasises that teachers should facilitate this process by allowing students to ask questions and providing ongoing support throughout the learning process. Additionally, the study recommends that teachers be encouraged to adopt learner-centered approaches, such as guided IBL, to help learners acquire critical skills. Assessment and monitoring mechanisms should also be implemented to ensure the effective adoption of these teaching and learning strategies.

Keywords: Problem-solving, Education for Self-reliance, Guided IBL and 21st-century skills

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CHAPTER 1

1.0 Introduction

This chapter provides the background to the study, with a primary focus on Development Studies as a subject and the Inquiry-Based Learning approach. It also includes key components such as the problem statement, the significance of the study, the research questions, and the delimitation of the study.

1.1 Motivation

Problem-solving is one of the most crucial 21st-century skills, enabling learners to better understand their subjects (New Education Policy, 2020). In Development Studies (DS), problem-solving is recognised as a key ability that helps learners achieve the concept of education for self-reliance, a core principle that this subject aims to instill. However, during high school, both my classmates and I struggled to answer questions that required problem-solving skills. Our teachers often delivered content passively, which seemed to impede our ability to develop these essential skills.

Additionally, through my experience as a practical teacher, I observed that learners today continue to struggle with questions involving problem-solving. Both my former teachers and the colleagues I have worked with appear to find it challenging to devise effective strategies for helping learners develop these skills. One major contributing factor to this problem, in my view, is the method of content delivery. Problem-solving is inherently a learner-centered skill, and it is logical that it should be taught using learner-centered approaches.

These observations have motivated me to conduct this study, which aims to experiment with guided Inquiry-Based Learning (IBL) to assess its impact on enhancing problem-solving skills among learners in DS. I chose guided IBL over other teacher-centered approaches because it encourages learners to ask questions and explore ideas independently. My exposure to postgraduate studies has further fuelled my desire to make a meaningful contribution to the teaching and learning of DS.

The next section presents the background to the study.

1.2 Background

Development Studies (DS) as an academic discipline and school subject has existed since the World War I era when economic development was seen as a powerful tool for emancipation and overcoming societal backwardness (Currie-Alder, 2016). Following World War II, it became evident that economic development alone could not address the broader aspects of societal advancement. Consequently, the term "Development Studies" was introduced to assist post-colonial countries in their reconstruction efforts after the devastation caused by the war (Berma, 2004; Currie-Alder, 2016; Hettne, 1990; Thorbecke, 2006). This led to the introduction of DS as a school subject aimed at educating learners about various aspects of development and the strategies that can be employed for national reconstruction.

Various scholars have characterised DS as both multidisciplinary and interdisciplinary, with its aims deeply rooted in the educational system. Specifically, Arocena (2016), Hettne (1990), the Ministry of Education and Training (MoET, 2020), and Sumner (2006) view DS as a problem-based, interdisciplinary field that seeks to understand the social, political, environmental, and economic issues influencing the development process, particularly in developing countries. Among its primary objectives, DS aims to equip learners with analytical tools for understanding societal problems and to encourage their active participation in community development initiatives to address such challenges (MoET, 2020).

Several African countries introduced DS in their post-colonial education systems to eliminate colonial narratives and promote education for self-reliance. For instance, Komba et al. (2019) noted that the Tanzanian government integrated DS into secondary education to equip students with an understanding of the complexities surrounding development. Furthermore, Kontinent et al. (2022) affirm that DS was included in the Tanzanian curriculum to support the goal of education for self-reliance, a concept introduced by Julius Nyerere, Tanzania's first Prime Minister after independence.

Similarly, Botswana introduced DS around 1977 as part of its education for Kagisano (Boikhutso, 2013). This initiative aimed to create a home-grown school curriculum in junior and secondary grades that would address societal problems through education for self-reliance (Bagwasi, 2017; Boikhutso, 2013). Education for self-reliance equips learners with skills to tackle real-world

challenges within their communities (Komba et al., 2019). Bagwasi (2018) further observes that incorporating DS into Botswana's educational system was intended to maintain the relevance of education by addressing real-life issues affecting growth and development.

In Lesotho, the 1974 curriculum diversification reform included the introduction of DS. Raselimo and Mahao (2015) assert that practical disciplines such as home economics, agriculture, DS, and technological studies were added to the curriculum to signify a shift from conventional to more learner-centered teaching and learning. According to the Ministry of Education, Sports, and Culture (1982), these disciplines were also envisioned to attain the objectives of education for self-reliance through "education with production." Tanzanian philosopher Julius Nyerere viewes education for self-reliance as one that helps learners creatively apply knowledge and skills to solve societal problems (Schreiber-Barsch, 2023). Raselimo and Mahao (2015) emphasise that DS was designed to foster a shift toward learner-centered learning while promoting self-reliance among learners, preparing them for work environment and life's challenges.

Given the aforementioned perspectives on the introduction of DS in various countries, it is evident that this subject is inherently learner-centered. Its aim to promote education for self-reliance underscores the importance of problem-solving skills. Among the learner-centered techniques outlined by Sivakumar (2018), Inquiry-Based Learning (IBL) is identified as particularly effective for teaching social studies. Lesotho's education system emphasises engaging learners in inquiry processes to develop higher-order thinking skills (MoET, 2009, p.18; MoET, 2021). Furthermore, Lekhanya (2020) describes DS pedagogy as encompassing problem- or inquiry-based education, project-driven education, cooperation, problem-solving, and critical thinking.

IBL, emerging from the constructivist approach, is a learner-centered pedagogy that fosters high-level thinking skills such as problem-solving, creative thinking, collaboration, and critical thinking (Rodriguez et al., 2019). IBL is categorised into three forms: structured, guided, and open inquiry. Orosz et al. (2023) define structured IBL as a method where teachers pose a question or issue for learners to investigate, with the expected answers already known. Guided IBL involves the teacher acting as a facilitator while learners explore a problem to find solutions, fostering autonomous thinking, problem-solving, and collaboration (Pappas, 2014). Open-ended IBL allows learners to pose their own questions and design their investigations from start to finish.

Among the three types, guided IBL appears to be the most suitable for promoting problem-solving skills, which are essential for developing self-reliance. Palupi (2020) describes guided IBL as a strategy where learners are guided by the instructor through a structured inquiry framework, allowing them to take ownership of their learning by posing questions, conducting research, and drawing conclusions. More, Orosz et al. (2023) note that guided IBL enables learners to build knowledge through interaction and experience, actively engaging them in the inquiry process.

The guided IBL approach suggests that learners should be allowed to explore ideas and develop strategic measures for addressing life challenges. In the context of DS, Dambudzo (2015) highlights that DS covers topics related to sustainable development, where learners develop skills to maintain environmental sustainability. Other DS topics that engage learners in real-world issues include globalisation, population growth, foreign aid and investment, government, environmental sustainability, and sustainable development (MoET, 2020). Guided IBL can be employed to teach these topics, such as by asking learners to explore environmental sustainability issues and propose mitigation strategies.

Lesotho's Curriculum and Assessment Policy Statement (MoET, 2009) and the Basic Education Curriculum Policy (MoET, 2021) underscore the importance of IBL in primary and secondary education. The Curriculum and Assessment Policy (CAPs) specifically advocates for curriculum delivery that fosters creativity, independence, and survival skills, enabling learners to formulate and solve problems (MoET, 2009, p. 22). This policy reflects a formal endorsement of the relevance of IBL in Lesotho's educational system. Ralebese et al. (2022) also affirm that CAPs support IBL as an effective method for helping learners develop problem-solving skills and achieve self-reliance.

While IBL is recognised as important in Lesotho's curriculum implementation, Koekoe (2023) found that it is rarely used. Her research revealed that geography teachers have a positive perception of IBL but lack understanding of how to implement it in the classroom. This is attributed to a lack of clear guidelines on how to employ IBL in geography education. Orosz et al. (2023) highlight that the successful implementation of IBL in the classroom depends on teachers' willingness and understanding of how to guide learners through the inquiry process. Koekoe's

(2023) findings suggest that IBL can potentially be used to enhance problem-solving skills in DS education, contributing to education for self-reliance.

According to Ahuja (2021), problem-solving skills involve the cognitive processes of finding solutions and making informed decisions in specific situations. Learners must develop strong problem-solving abilities to be aware of local, national, and global challenges affecting development (MoET, 2018). This implies that learners should be taught critical strategies for addressing these challenges, such as devising solutions to poverty-related issues under the theme of poverty and development. Therefore, it is crucial to assist learners in developing problem-solving skills.

Lesotho's National Strategic Development Plan II (NSDP, 2018/19-2022/2023) advocates for education that emphasises equipping learners with the skills necessary to address both environmental sustainability and economic challenges. Similarly, the Lesotho Basic Education Curriculum Policy (MoET, 2021) emphasises that education should aim to provide students with the knowledge and skills required to succeed and compete in the global economy. This indicates that Lesotho's education system places significant importance on developing problem-solving abilities.

Numerous studies have documented the positive effects of IBL on learners' problem-solving abilities. For instance, Davrik et al. (2020) found that IBL enhances learners' creative thinking and problem-solving skills by allowing them to organise their knowledge systematically. Similarly, Gunawan et al. (2020), Hala and Xhomara (2022), and Sukontawaree et al. (2022) reported that IBL positively influences science teaching and learning, particularly by improving learners' attitudes toward science and their problem-solving abilities.

1.3 Problem statement

Problem-solving skills are critical in promoting education for self-reliance in Development Studies (DS), as this subject aims to equip learners with the creative abilities needed to address real-life challenges. However, the Examination Council of Lesotho (ECoL) 2019 markers' report indicated that DS learners struggle with questions requiring the application of problem-solving skills (ECoL, 2019). For instance, when asked to propose solutions to the effects of global warming on

biodiversity, learners were unable to provide adequate responses. This issue persisted in 2020, with learners failing to apply problem-solving skills and instead discussing adaptation strategies. The same problem was reported in 2022 and 2023, leading to poor performance in the subject. These recurring issues have been attributed to the ineffective instructional strategies employed in teaching DS.

Despite the Ministry of Education and Training (MoET, 2009) and the Lesotho Basic Education Curriculum Policy (LBECP, 2021) emphasising that the intended pedagogy in Lesotho's educational system should be learner-centered, with a strong focus on inquiry-based learning (IBL), DS teachers appear to rely heavily on rote learning. Lekhanya (2020) found that DS teachers frequently employ inappropriate pedagogical strategies, neglecting learner-centered approaches, including IBL. While Koekoe (2023) noted that IBL is rarely used due to teachers' lack of knowledge on its implementation, Lekhanya (2020) and Lekhanya and Raselimo (2022) did not report any significant use of IBL in DS instruction. Instead, they observed a tendency among DS teachers to prioritise rote learning and memorisation.

Given that IBL has been shown to enhance problem-solving and other 21st-century skills, it may be a suitable teaching approach for DS instruction. Although Koekoe (2023) conducted research on the application of IBL in Lesotho's geography education, there appears to be a lack of research or literature specifically addressing the use of IBL in DS education in Lesotho. In consequence, this study investigated the impact of guided IBL on learners' problem-solving abilities in the context of DS learning.

1.4 Statement of Purpose

The teaching and learning of Development Studies (DS) in Lesotho is intended to represent a transformation from teacher-centered to learner-centered approaches (Raselimo and Mahao, 2015). However, it appears that teachers often employ teaching strategies that do not align with the subject's aims. This study examined the potential of inquiry-based learning (IBL) in enhancing learners' problem-solving skills in DS.

1.5 Research questions

1.5.1 Main research question

What is the impact of guided inquiry-based learning in enhancing problem-solving skills among learners in DS?

1.5.2 Sub-research questions

What is the current level of problem-solving skills among learners in Development Studies (DS)?

What influence does guided inquiry-based learning (IBL) have on learners' problem-solving skills in DS?

What is the level of satisfaction among learners on the use of guided inquiry-based learning in DS class?

1.6 Significance of the study

This study is expected to be significant for teachers, learners, researchers, and the broader education system. Teachers may benefit as the study provides insights into the implementation of inquiry-based learning (IBL) in the classroom, offering a practical reference for incorporating guided IBL into their daily teaching practices. For learners, the study could serve as a resource for understanding how to engage in the inquiry process to effectively solve problems. The education system may find value in adopting components of this study to guide teachers in applying IBL in their instructional methods. Finally, other researchers might find the study's findings useful for identifying gaps in the existing literature and for conducting further research on IBL using different approaches to enhance their knowledge and understanding of this pedagogical strategy.

1.7 Delimitation and scope of the study

Bhosale (2024) defines delimitation and scope as the extent and boundaries of a study, which allow researchers to concentrate on specific aspects of their research. It is crucial for research to focus on essential data while avoiding irrelevant information. Clearly defining the scope and delimitation ensures that the research remains within its set parameters and achieves its objectives within the constraints of time, budget, and resources (Bhosale, 2024).

This study was limited to a single high school in Maseru that offers Development Studies as a subject, specifically focusing on grade 11 learners. Of the various 21st-century skills, the study

was delimited to examining learners' problem-solving skills in Development Studies and the use of guided Inquiry-Based Learning (IBL) as the instructional method.

1.8 Operational definition of key terms

This section defines key concepts as they pertain to the context of this study:

- **Problem-solving Skills**: Within the scope of this study, "problem-solving skills" refer to the abilities of learners to critically analyse a problem, explore pertinent information, and devise solutions to issues presented in questions requiring such skills.
- **Development Studies (DS) Subject**: Development Studies is a multidisciplinary and interdisciplinary subject aimed at equipping learners with an understanding of the political, economic, environmental, social, and cultural changes affecting development, particularly in developing countries (Sumner, 2006). In Lesotho, this subject seeks to provide learners with analytical tools to address real-world challenges and contribute to community development.
- **Impact**: In this study, "impact" denotes either a positive or negative effect or change resulting from the application of a particular teaching method.
- **Guided Inquiry-Based Learning (IBL)**: Guided IBL is a pedagogical approach derived from constructivist theories that enables learners to pose questions and engage in inquiry while receiving continuous support from the teacher.
- **Education for Self-Reliance**: This term refers to educational practices designed to equip learners with both academic and practical skills applicable not only in academic contexts but also in everyday life.
- **21st-Century Skills**: These skills encompass competencies that educational systems aim to develop in learners to promote independence and self-reliance, including problem-solving, critical thinking, and analytical skills.

1.9 Organisation of the Study

The current study is structured as follows: Chapter 1 introduces the background, problem specification, research questions, significance, and delimitations of the study. Chapter 2 covers the theoretical foundation, conceptual framework, and reviews relevant empirical literature to identify prior research pertinent to the study. Chapter 3 details the methodologies employed for

data collection and analysis. Finally, Chapter 4 presents the findings, offers recommendations, and provides an analysis along with concluding remarks.

1.10 Chapter Summary

This chapter has introduced and contextualised the problem under investigation, establishing a foundation for the study. It has elucidated the research questions the study aims to address and outlined the parameters of the investigation.

CHAPTER 2

2.0 Literature review

This section encompasses the theoretical framework, conceptualisation of key terms, empirical review, and conceptual framework. Sridhar (2020) highlights the significance of the literature review in research, noting that it aids in identifying the originality and relevance of the research problem and situates the current study within the context of existing research. Similarly, Mudavanhu (2017) asserts that a thorough literature review is crucial for understanding what has been accomplished and what gaps remain in relation to the current study. The following section provides the theoretical underpinning for the research.

2.1 Theoretical underpinning

According to Sarah (2022), a theoretical framework serves as a foundational review of an established theory, providing a roadmap for research. The current study is guided by Bransford and Stein's (1984) IDEAL model of problem-solving. This model was designed with the intention of helping educators teach critical thinking and problem-solving skills through its five components (Nickols, 2020). Given that Development Studies (DS) inherently involves problem-based learning, aimed at equipping learners with the skills and knowledge necessary to tackle real-world challenges (MoET, 2020), the IDEAL model emerges as a suitable theoretical framework for DS instruction. Supporting this choice, Sippl (2021) found that the IDEAL model facilitates the development of problem-solving strategies, promoting independent problem-solving among learners.

The acronym IDEAL represents the steps of Recognizing the problem, Establishing goals, Investigating solutions, Acting, and Looking and learning (see Figure 2.1). Sippl (2021) notes that, without structured guidance, teachers may struggle to cultivate problem-solving skills in students. As a result, the IDEAL model is selected as the optimal framework for implementing guided inquiry-based learning to enhance problem-solving skills in DS. Its straightforward acronym is easier for learners to remember and for teachers to apply (Pratiwi et al., 2021). Additionally, Annizar et al. (2020) highlight the IDEAL model as a crucial step-by-step procedure for effective problem-solving development in the classroom. Annizar (2018) further emphasises the model's role in enhancing higher-order thinking skills. Therefore, the IDEAL model provides a clear

procedural approach for employing guided inquiry to improve problem-solving skills among DS learners. Figure 2.1 illustrates the IDEAL model framework.

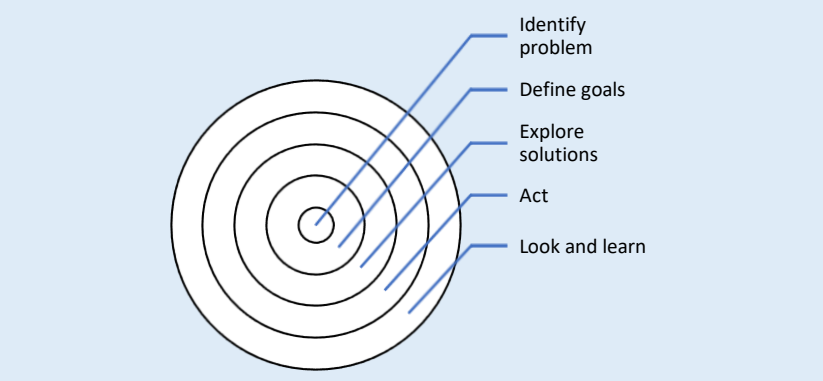

Figure 2.1 The IDEAL model of problem-solving in teaching and learning

In continuation, Figure 2.1 illustrates the first step in the problem-solving process according to Bransford and Stein (1984): identifying the problem. Setyadi and Triyanto (2019) emphasise that at this initial stage, it is crucial for learners to receive guidance from the teacher to articulate the problem in their own words. In the context of teaching problem-solving skills in Development Studies (DS), this stage involves learners identifying the problem from the provided information. Bransford and Stein (1984) stress the importance of creating a supportive learning environment where each learner feels valued and is encouraged to participate in problem identification (Gusau & Mohamad, 2020).

Following problem identification, the next stage is defining the goals. In this instance, learners, with the teacher's assistance, outline the objectives necessary to resolve the problem (Setyadi & Triyanto, 2019). Clear definition of these goals provides a structured pathway for finding solutions. For instance, in teaching about overpopulation in a DS class, learners would set objectives to guide their problem-solving efforts. Martin et al. (2024) and Wong et al. (2018) highlight that teacher support during this stage, including providing relevant learning materials, is essential for developing learners' problem-solving skills.

The subsequent step involves exploring solutions to the identified problem. Based on the established goals, learners brainstorm potential strategies for addressing the problem (Bransford & Stein, 1984; Sippl, 2021). Annizar et al. (2020) emphasise that during this stage, learners must

make informed decisions about various problem-solving strategies, ensuring that the chosen strategies align closely with the problem under investigation.

The fourth step, acting, requires implementing the selected solutions. At this stage, the strategies are reviewed and assessed to determine the most effective course of action (Pratiwi et al., 2021). Finally, the step of looking and learning involves reflecting on the entire problem-solving process and learning from the experiences gained (Gusau & Mohamad, 2020). This reflection enables learners to refine their problem-solving skills and apply their knowledge more effectively in future situations (Bransford & Stein, 1984).

2.2 Conceptual literature

This section presents a comprehensive overview of the concepts reviewed in the current study, starting with a literature review on Inquiry-Based Learning (IBL) and concluding with the conceptual framework.

2.3 Inquiry-based learning

Inquiry-Based Learning (IBL) is a pedagogical approach rooted in constructivist theory, which emphasises active learner engagement and the construction of new knowledge. Sarbah (2020) asserts that constructivism has given rise to various learner-centered approaches, including IBL. Constructivists argue that learners must be actively involved in their educational experiences to effectively build new knowledge (Olusegun, 2015). Central to constructivist theory are the concepts of assimilation and accommodation, which are pivotal as they describe how learners integrate new information with existing cognitive structures, thereby enhancing their mental representations (Golder, 2018; Sarbah, 2020). This dynamic process results in the advancement of learners' thinking and skills as they assimilate new concepts.

IBL, as an active pedagogical strategy, emphasises the construction of knowledge through social interactions (Chris, 2023; Pedaste et al., 2015; Wale et al., 2020). Lippmann (2022) highlights that IBL engages learners with complex questions and problems, encouraging exploration, investigation, and analysis to foster new understandings. Furthermore, IBL aligns with decolonial teaching strategies aimed at developing higher-order thinking and a comprehensive set of knowledge, skills, and attitudes (Fransinescu, 2018). This method is significant for teaching

Development Studies (DS), as it facilitates student involvement and the development of new competencies.

Consistent with constructivist principles, IBL builds upon learners' prior knowledge, which serves as a foundation for constructing new understanding (Mackenzie, 2016; Gholam, 2019). The approach also supports social interaction and continuous scaffolding, where learners collaborate, interact, discuss, and exchange ideas (Mackenzie, 2016). Vygotsky's (1978) principle of scaffolding emphasises the need for ongoing support throughout the learning process. Sarbah (2020) illustrates that IBL involves learners in posing questions and seeking answers, underscoring the necessity of providing continuous assistance to enable learners to reach well-informed conclusions during their inquiry.

2.3.1 Guided inquiry-based learning

Inquiry-Based Learning (IBL) encompasses three main strategies: structured inquiry, open-ended inquiry, and guided inquiry. In this study, guided IBL was chosen to enhance learners' problem-solving skills in Development Studies (DS). Guided IBL involves learners constructing knowledge through problem exploration, questioning, and analysis with the support of the teacher (Pedaste et al., 2015). The teacher's role in this approach is to facilitate the development of specific skills by presenting ideas and providing relevant learning materials to help learners achieve their goals (Orosz et al., 2023). For example, in DS, a teacher might focus on improving learners' problem-solving skills related to pollution by guiding them in investigating its causes and reduction strategies.

Guided inquiry closely aligns with the concept of "scaffolding," which Spadafora and Downes (2020) define as a process where a more knowledgeable individual provides ongoing support to help a novice learner achieve higher-level thinking. In support, Wood et al. (1976), prominent advocates of scaffolding, describe it as "a process that enables a child or a novice to solve a task or achieve a goal that would be beyond his unassisted efforts" (p. 90). In guided inquiry, the teacher offers a framework and continuous support during the stages of questioning and information retrieval.

The principles of scaffolding and guided inquiry are rooted in the work of constructivist theorists such as Jerome Bruner and Lev Vygotsky. Bruner (1978) emphasised that learners, as active participants, benefit from ongoing guidance while exploring concepts independently. Vygotsky (1978) similarly noted that continuous assistance encourages learners to ask questions and seek deeper understanding. Thus, guided inquiry facilitates a supportive learning environment where interaction, collaboration, and idea-sharing are integral to the learning process (Pedaste et al., 2015). Teachers can also leverage peer support, allowing more knowledgeable learners to assist their peers in information gathering and problem-solving. For instance, grouping learners to investigate questions or solve problems collectively can enhance their learning experience through collaboration.

2.3.2 Benefits of IBL in teaching and learning

As a product of constructivism, which is inherently learner-centered, Inquiry-Based Learning (IBL) is recognised for its potential to foster active and self-directed learning (Wale & Bishao, 2020). IBL, as a constructivist approach, positions learners as creators rather than mere consumers of knowledge (Andrini, 2016). In an IBL environment, learners are encouraged to construct their own understanding by asking questions, engaging with materials, and exploring topics to gather information (Canning & Masika, 2022). This active engagement allows learners to take ownership of their learning, promoting a deeper understanding of the subject matter. Along similar lines, Freire (1970) argues that traditional, passive learning methods are dehumanising and hinder learners' comprehension and skill development.

IBL also promotes critical thinking and problem-solving skills. Heick (2023) argues that open-ended questioning, coupled with continuous support, helps learners approach problems systematically and apply effective solutions. These problem-solving skills are crucial for both academic success and real-world applications (Gillies, 2023). In Development Studies (DS), IBL is particularly valuable as it encourages self-reliance among learners, addressing a key concern in teaching this subject. Thus, fostering problem-solving skills is essential in DS education.

Moreover, IBL fosters curiosity and exploration, cultivating lifelong learning habits. Through independent information-seeking and exploration, learners uncover important concepts and develop a passion for learning that extends beyond formal education (Marshall, 2016). Gillies

(2023) supports this by highlighting that IBL encourages innovation and creativity, enabling learners to think outside the box and develop creative problem-solving skills applicable to real-life issues. For instance, learners exposed to IBL in a DS classroom may effectively apply problem-solving skills to environmental sustainability challenges.

Another advantage of IBL is its capacity to enhance collaboration and teamwork among learners. Pedaste et al. (2015) emphasise that IBL fosters interaction as learners pose questions and seek answers collectively. This collaborative approach not only deepens their understanding but also develops essential skills for addressing real-life problems (Spadafora & Downes, 2020). In a collaborative DS classroom, more knowledgeable learners can assist their peers in grasping difficult concepts, facilitating a supportive learning environment (Wood et al., 1976). For example, peers may help each other understand challenging DS concepts, further enriching the learning experience.

2.3.3 Phases of Inquiry-Based Learning

To implement guided Inquiry-Based Learning (IBL) for enhancing learners' problem-solving skills in Development Studies (DS), the phases of IBL as outlined by Pedaste et al. (2015) were employed. The IDEAL model of problem-solving, with its five components, provided a framework for effectively applying these phases of inquiry. This model illuminated how teachers can systematically integrate the five phases of IBL to improve problem-solving capabilities among learners. See Figure 2.2 for an illustration of the phases of IBL.

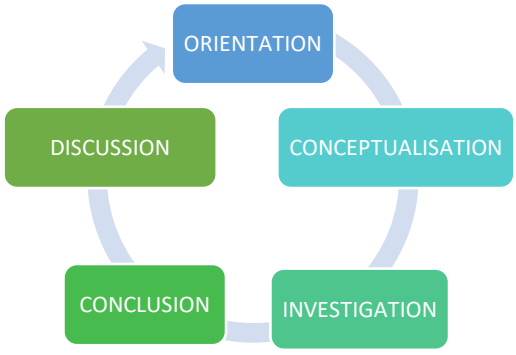

Figure 2. 2 The implementation of IBL in a classroom

Inquiry-Based Learning (IBL) is a flexible approach that does not follow a linear or uniformly prescribed process and can thus vary in its application (Pedaste et al., 2015). In this study, the phases of IBL as summarised by Pedaste et al. (2015) were selected over other models such as those proposed by Marshall (2013) and Bybee (2006). According to Chris (2023), Pedaste et al. (2015) outline five key phases of IBL that are pertinent to guided inquiry-based classrooms.

The first phase is orientation, which involves the positioning and presentation of the topic by the teacher (Beyrow et al., 2019). This phase aims to help learners understand the topic and stimulate their curiosity, potentially using resources such as YouTube videos, books, cartoons, or guest speakers (Scholl, 2023). The IDEAL model emphasises that learners should be guided to identify the problem related to the lesson topic and be encouraged to articulate the problem in their own words (Pratiwi et al., 2021).

The second phase, known as conceptualisation or formulating the research question, involves assisting learners in developing an inquiry question—a central idea around which they will build an action plan (Pedaste et al., 2015). Kori (2021) posit that the action plan should outline the procedures to address the problem identified in the first phase, including resources and steps to be followed. As presented in the IDEAL model, this phase corresponds to defining goals, where learners are guided to establish goals that directly relate to the problem (Setyadi & Triyanto, 2019). This guidance is crucial for formulating relevant solutions.

The third phase, investigation, focuses on collecting evidence and information. During this phase, learners use the procedures developed in phase two to explore, research, experiment, observe, and gather data related to the topic (Ernst et al., 2017). The teacher's role is to facilitate this process, helping learners find answers and explore various methods of discovering new knowledge, such as through fieldwork and direct observation (Lippmann, 2022). For example, when studying pollution, learners might investigate their environment or participate in field trips to observe factors contributing to pollution.

The fourth phase is conclusion, where learners reflect on and compare their findings from the investigation phase. According to Chris (2023), this phase involves evaluating the strategies explored to determine the most effective solutions to the problem, as outlined by the IDEAL model

(Gusau & Mohamad, 2020). This phase is critical for assessing whether the inquiry question has been adequately addressed and for organising and presenting the results in a coherent manner (Wale & Bishao, 2020).

The final phase is discussion, which focuses on the implications of the findings and involves stimulating high-order thinking through questions posed by the teacher (Lippmann, 2022). This corresponds to the looking and learning stage in the IDEAL model, emphasising the importance of reflecting on the problem-solving process and learning from it to enhance future performance.

2.3.4 Constraints of Implementing Inquiry-Based Learning in a Classroom

Inquiry-Based Learning (IBL) is widely recognised as a prominent teaching and learning approach in the 21st century. However, several constraints impede its effective implementation in the classroom.

Firstly, time constraints are a significant challenge. Kuykendall (2022) identifies that IBL is often more time-consuming compared to traditional teaching methods, as it requires learners to formulate questions, delve deeper into topics, and conduct research. This poses difficulties in an overloaded curriculum with strict timelines, making it challenging for both teachers and learners to cover extensive content within limited time frames (Koekoe, 2023).

Secondly, learners' readiness to engage in inquiry-based classrooms presents another barrier. Kramer et al. (2022) observe that learners accustomed to teacher-centered environments often struggle to participate or interact with peers in an IBL setting. Such learners may find it overwhelming to function independently, explore ideas, ask questions, and seek information from diverse sources (Kuykendall, 2022).

A lack of teacher training on implementing IBL also hinders its application in the classroom. Koekoe (2023) highlights that while geography teachers may understand IBL theoretically, they often lack practical skills for effective classroom implementation. Teachers need a thorough understanding of their subject matter and pedagogical skills tailored to learner-centered approaches, especially those relevant to 21st-century education. Further, Koekoe (2023) reiterates

that teachers frequently lack support from relevant stakeholders for the practical application of new teaching methods, including IBL.

Resource shortages also impact the successful implementation of IBL. In addition, Kuykendall (2022) argues that limited resources, such as computers, internet access, and textbooks, can inhibit effective inquiry-based learning. Inadequate resources may hinder both teachers and learners from engaging fully in the inquiry process (Mandina, 2024). For instance, in a Development Studies (DS) classroom, the absence of visual aids like videos can impede learners' ability to investigate topics like sustainable development, thereby limiting their capacity to ask questions and gather relevant information.

2.3.5 How the Constraints of Implementing IBL in a Classroom Can Be Addressed

While implementing Inquiry-Based Learning (IBL) presents several constraints, various strategies can be employed to address these challenges and achieve successful implementation.

Firstly, targeted teacher training by the responsible educational authorities is crucial. Pesqueira (2020) suggests that the ministry or educational bodies should facilitate professional development opportunities for teachers. Specifically, Koekoe (2023) emphasises the importance of workshops and seminars designed to equip teachers with the skills and strategies necessary for engaging learners effectively in inquiry-based processes. Furthermore, Heick (2023) advocates for collaborative efforts among teachers, where they can share techniques and best practices for creating successful inquiry-based classrooms. Collaborative lesson planning and integration of lesson content into the inquiry framework can enhance the overall effectiveness of IBL.

Time constraints, which are a significant challenge for IBL implementation, can be mitigated by aligning inquiry procedures with the syllabus's end-of-level objectives (Kuykendall, 2022). This requires careful planning to ensure that inquiry activities are designed to complement and reinforce subject content and desired skills. For instance, in a Development Studies (DS) classroom, the topic of environmental sustainability can be seamlessly integrated into the inquiry process, focusing on aspects of the content that align with inquiry-based learning objectives.

To address the issue of learners' readiness for inquiry-based approaches, particularly those accustomed to teacher-centered instruction, a gradual implementation strategy can be effective (Marshall et al., 2016). This approach involves introducing guided IBL incrementally, allowing learners to adapt gradually to the new methods. Additionally, integrating inquiry processes into existing classroom practices can facilitate smoother transitions (Gillies, 2023). For example, in DS education, incorporating field-based learning opportunities allows students to engage in inquiry by posing questions and exploring ideas in real-world contexts. This hands-on approach can help learners become more familiar with and receptive to the inquiry-based learning process.

2.4 Problem-solving

The 21st-century education system demands an approach that cultivates higher-order thinking skills, essential for learners to navigate and thrive in an ever-evolving world. According to Bloom (1969), and Nachiappan et al. (2018), the development of these skills is pivotal for enabling learners to manipulate information effectively and apply solutions to complex problems. Higher-order thinking skills encompass problem-solving, critical thinking, communication, creative thinking, and analytical thinking.

Nachiappan et al. (2018) emphasise that higher-order thinking extends beyond rote memorisation and reproduction of knowledge. It involves a deeper understanding of facts and ideas, enabling learners to evaluate and synthesise information. This underscores the need for educators to shift away from traditional teaching methods that do not promote learners as producers of knowledge. Instead, teachers should embrace 21st-century pedagogical practices and focus on skill development.

Problem-solving, a fundamental 21st-century skill, is highlighted by Rahman (2019) as a critical challenge in modern education. It involves cognitive processes aimed at achieving objectives through various strategies and techniques (Fuke, 2017). Adeoye et al. (2023) and Fissore et al. (2021) describe problem-solving as an intellectual process of exploring ideas to provide solutions to specific issues. The development of problem-solving skills is inherently learner-centered (Adeoye et al., 2023; Marshall, 2022), allowing learners to explore innovative solutions and engage in collaborative efforts to tackle problems (Rahman, 2019). In the same vein, Fuke (2017) asserts that problem-solving should be integrated into the content being taught, rather than being

presented as an abstract concept. For example, in a Development Studies (DS) classroom, problem-solving techniques should be embedded within topics such as population and development.

Since problem-solving skills are mental processes that cannot be directly observed, it is essential to identify observable measures to assess individual proficiency. Adeoye et al. (2023) indicate that learners with advanced problem-solving skills typically perform better on questions requiring such abilities. Bloom (1969) proposed that verbs such as "appraise," "synthesise," "analyse," "infer," "assess," and "suggest" are indicators of higher-order thinking and problem-solving abilities. Learners proficient in these skills demonstrate deep understanding, seek clarification, ask pertinent questions, and request necessary assistance (Bloom, 1969).

Ahuja (2021) identifies self-directed learning as a characteristic of learners with well-developed problem-solving skills. Marshall (2022) views self-directed learning as an approach that fosters creativity, autonomy, and independent decision-making. The Ministry of Education and Training (MoET, 2018) emphasises independent learning in Development Studies, linking it to problem-solving. Thus, self-directed learning is integral to teaching and learning in this context.

Bloom's taxonomy of verbs serves as an indicator of problem-solving skills. Furthermore, Bloom (1956) developed a taxonomy outlining six cognitive levels, ranging from simple to complex thinking. Armstrong (2010) and Berger (2020) observe that educators often focus on lower-order thinking questions, which do not effectively foster higher-order thinking skills. In the same way, Bloom (1969) argued that the initial levels of "remembering" and "understanding" are foundational for progressing to higher levels, such as "creating" and "analysing." Table 1 below illustrates Bloom's taxonomy of verbs.

Table 2.1 Bloom's Taxonomy of Verbs

BLOOM'S LEVEL	**DEFINITION**	**KEY VERBS**
Create	Creating new patterns	Formulate, develop, create, evaluate, invent,

Evaluate	Making judgments on the value of evidence	Evaluate, assess, describe, determine, support, argue, examine
Analyse	Breaking down information into small parts and identifying any relationships	Analyse, classify, associate, criticise, categorise
Apply	Application of relevant procedures or ideas to a situation	Calculate, solve, demonstrate, determine, illustrate
Understand	Understanding the meaning of facts	Explain, paraphrase, give, summarise, discuss
Remember	Recognising, retrieving and recalling facts	List, recite, outline, define, name, match, quote, label

Bloom (1969)

The table presented above delineates the levels in Bloom's taxonomy, their meanings, and the associated key verbs. Clark (2015) emphasised that a lack of variation in teaching and learning methods adversely affects learners' comprehension of concepts and the development of essential skills. This concern motivated Bloom to create a taxonomy of verbs designed to enable educators to diversify lesson objectives and assessment strategies, thereby fostering the development of higher-order thinking skills in learners (Armstrong, 2010; Clark, 2015).

Bloom's taxonomy, as outlined by Bloom (1969), transitions from low-order thinking to higher-order thinking through the levels of applying, analysing, evaluating, and creating. This framework assists teachers in planning lessons that promote advanced cognitive processes among students. It is evident that the effective development of problem-solving skills necessitates a meticulously planned lesson aligned with the taxonomy of verbs. Such alignment is crucial for achieving favourable outcomes in the cultivation of higher-order thinking skills.

2.5 Impact of traditionalised learning on learner's acquisition of skills

Scholars have reported that traditional teaching and learning methods have been prevalent since ancient times. Nonetheless, some prominent philosophers, such as Paulo Freire (1970) and John

Dewey (1986), view these methods as rigid and inflexible (Hu, 2024). According to Serin (2018), traditional teaching and learning describe a classroom scenario where the teacher exerts full control while learners passively receive information. Moreover, Hu (2024) illuminate that traditional teaching, often referred to as teacher-centered learning, focuses primarily on knowledge transmission to ensure that learners master their subject matter. Essentially, such a learning environment is criticised for depriving learners of opportunities to engage in creative thinking and to connect their learning experiences with real-world situations.

In his "banking approach," Freire (1970) argued that traditional instruction is disconnected from real-life contexts. He likened this educational style to a banking system, where teachers deposit information into learners, who are perceived merely as containers for that knowledge (Wang, 2015). Freire (1970) strongly opposed this method of instruction. Both Connell (2012) and Wang (2015) supported Freire's critique, indicating that teacher-centered learning hinders the development of essential skills such as problem-solving and critical thinking. They pointed out that in such environments, learners are typically discouraged from asking questions or engaging in peer interactions; instead, they passively absorb information and follow the teacher's directives.

Conversely, Dewey (1986), as a proponent of progressive education, advocates for learner-centered teaching over teacher-centered methods. Dewey contends that passive reception of knowledge limits learners' problem-solving abilities (Wang, 2015). Progressive educators, therefore, argue that allowing learners to explore and participate in hands-on activities enhances their learning experiences (Singh, 2023). In contrast, traditional teaching methods are criticised for impeding learners' understanding of concepts and the development of critical skills, as they treat learners as blank slates. Consequently, the adoption of alternative learning methodologies in the classroom can support learners in developing crucial abilities such as problem-solving.

2.6 Empirical review

A study that is well-established connects with previous research through agreement or disagreement regarding findings, methodologies, and theories. Notably, the present research incorporates empirical literature to provide evidence on the use and implementation of Inquiry-Based Learning (IBL). According to Eke (2022), an empirical review involves analysing earlier studies to offer a comprehensive understanding of a particular concept. Consequently, this section

discusses reviewed studies that utilised guided inquiry-based learning as a teaching strategy and examines its implementation.

Nisa et al. (2018) investigated the efficacy of guided inquiry-based learning in enhancing critical thinking skills among 90 senior high school learners in Indonesia. The findings revealed that, at the pre-test stage, learners demonstrated poor performance in physics static fluid. However, following the intervention with guided inquiry-based learning, learners' performance improved progressively across all three groups involved. Nisa et al. (2018) supported these results with Vygotsky's (1978) assertion that learners perform better when actively engaged. This active involvement, facilitated by guided inquiry-based learning, also appeared to enhance information retention in long-term memory, thereby fostering critical thinking, problem-solving, and mastery of concepts. Thus, it can be concluded that guided inquiry-based learning supports critical thinking in subjects such as physics and is applicable in other areas to improve higher-order thinking skills.

Similarly, Orosz et al. (2023) conducted a mixed-method study in Hungary with grade 9 chemistry learners, which demonstrated that guided inquiry-based learning significantly impacts learners' problem-solving skills. The results indicated poor performance at the pre-test level, while post-test results showed that guided inquiry, through continuous scaffolding, positively supported problem-solving skills among learners following the chemistry curriculum. This suggests that when implemented effectively, guided inquiry-based learning can enhance the teaching and learning of subjects such as Development Studies (DS). Orosz et al. (2023) recommended that teachers should elucidate ideas and offer guidance, especially when employing new teaching methods like inquiry. These findings align with those of Nisa et al. (2018).

In the context of improving problem-solving skills, Sukontawaree et al. (2022) explored the effectiveness of IBL and cooperative learning in grade 4 within the Thai educational setting. Their study found that IBL positively impacted learners' problem-solving abilities, with an improvement from 14.28% to 54.14%, thus benefiting 80% of learners in solving problems. The positive impact was attributed to IBL's ability to address barriers such as deficits in group work skills and lack of knowledge in using scientific instruments. Importantly, the teacher's role as a facilitator during the inquiry process highlighted that IBL is a learner-centered approach that fosters problem-solving skills.

Regarding teachers' perspectives on IBL, Simbarashe and Gherda (2019) conducted a study in Zimbabwe, reporting that teachers lacked the knowledge and competencies required to implement IBL effectively in advanced-level physics classrooms. Teachers expressed concerns about the demands of public examinations, limited human resources, and inadequate time for effective teaching. As a result, they recommended ongoing training for teachers on implementing IBL and support from relevant stakeholders to align public examination requirements with IBL practices. These results are consistent with Mandina's (2024) study, which explored teachers' perceptions and implementation of IBL in rural Zimbabwean schools, indicating that proper guidance and support are essential for successful IBL implementation.

Significantly, Mandina (2024) demonstrates that while chemistry teachers in Zimbabwe had a positive attitude towards IBL, its implementation faced challenges due to factors such as overcrowded classrooms, poorly resourced schools, and insufficient skills for preparing and implementing IBL. These findings highlight that resource constraints are a significant barrier to effective IBL implementation.

In Tanzania, Mwenda and Ndayambaje (2021) conducted a quasi-experimental study to evaluate the impact of inquiry-based teaching (IBT) on biology students' academic performance. The results in this study indicated that the IBT-treated group outperformed the expository group, with mean scores of 56.21 compared to 49.31, respectively. Characteristics of IBL, such as cooperative learning, self-directed learning, and active involvement, were linked to enhanced student performance in IBT. This aligns with previous research on IBL, which suggests that IBL is an effective teaching strategy that yields favourable outcomes when applied in the classroom.

Similarly, Masilo (2018) examined the use of IBL to improve grade 11 learners' problem-solving abilities in Gauteng, South Africa. Her research utilised a mixed-method design and revealed that IBL significantly improved students' problem-solving skills, with the experimental group demonstrating a substantial effect size of 0.55 compared to the control group. Masilo (2018) attributed these improvements to IBL's capacity to facilitate active engagement, cooperation, interaction, and self-directed learning. Pedaste et al. (2015) further supported these findings, noting that IBL helps learners achieve a deep understanding of concepts and problems, thereby enhancing their problem-solving abilities.

In Lesotho, Koekoe (2023) studied geography teachers' perceptions of IBL, finding that while teachers had a positive attitude towards IBL, its implementation faced challenges such as the reliance on summative assessments that do not align with IBL and the need to complete the syllabus within a specified timeframe. Teachers also reported a lack of training as a barrier to effective IBL implementation. These results are consistent with the findings of Gherda (2019) and Shadreck (2024), which identified similar constraints in Zimbabwe.

Conversely, Gholam (2019) found that students at the American University in Dubai did not hold negative views about IBL, nor did they experience issues such as a lack of engagement or frustration with inquiry activities. Instead, Gholam (2019) identified systemic factors within the school as significant obstacles to IBL implementation. Therefore, it is evident that the challenges faced in implementing IBL are not unique to Lesotho but are also present in other educational contexts.

2.7 Gap and Appraisal

In the literature examined, researchers investigated and endorsed IBL as an appropriate technique for teaching and acquiring high-order abilities such as problem-solving and critical thinking. Furthermore, the majority of IBL research has been conducted in other nations, with an emphasis on science disciplines. In Africa, including Lesotho, studies on IBL have primarily focused on perception rather than implementation. Although various studies have been undertaken, there is little research on the use of IBL in teaching DS or social studies, and Lesotho is no exception. Thus, the current study aims to fill the knowledge and pedagogic gap on the effective use of IBL in teaching and learning of DS in Lesotho.

2.8 Conceptual framework

A conceptual framework is defined by Luft et al. (2022) as an overview that researchers present to demonstrate their understanding of the study's primary concepts while also establishing linkages between the variables under consideration. Including this section in the current study was deemed advantageous to clarify the relationships between the variables in question. In research, a variable is defined as a component or foundation that the researcher can modify, observe, or control based on their research interests (Abiodun-Oyebanji, 2017; Nwankwo & Emunemu, 2014).

While various types of variables exist in research, this study specifically focused on dependent, independent, and moderating variables. According to Abiodun-Oyebanji (2017) and Bhandari (2023), a dependent variable is an outcome variable that reflects the supposed effect or consequence of an independent variable. Furthermore, Bhandari (2023) suggests that an independent variable, also referred to as an input variable, is manipulated by the researcher to influence the dependent variable. A moderating variable, as defined by Nwankwo and Emunemu (2014), is one that enhances, weakens, or cancels out the relationship between two or more variables.

In the current study, guided IBL was chosen as the key independent variable, as it directly impacts the dependent variable. Learners' problem-solving skills were considered the dependent variable because they were instrumental in determining the effect of guided IBL. Other concepts evaluated as independent variables in this study included the IDEAL model, collaboration, active learning, and mediating tools. Although these variables were not of primary interest, they helped to establish the correlations between the main independent variable (guided IBL) and the dependent variable (problem-solving abilities). Prior knowledge was deemed a moderating variable due to its potential to either strengthen or diminish the relationship between the variables under consideration. The framework in Figure 2.3 illustrates the relationships between the variables in this study.

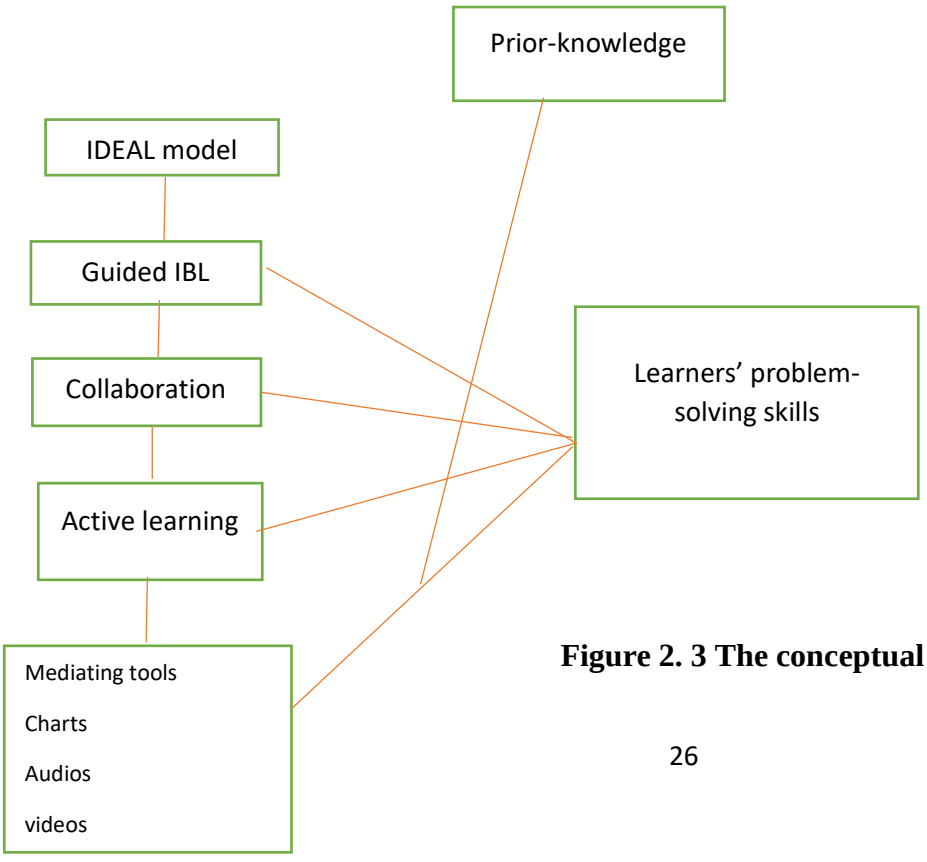

Figure 2. 3 The conceptual framework

The framework in Figure 2.3 illustrates the relationship between the dependent and independent variables in this study. The IDEAL model, which served as the theoretical foundation, is closely linked to guided inquiry-based learning (IBL), as it reinforces and provides guidelines for integrating IBL phases in the classroom. Bransford and Stein (1984) developed the IDEAL model with the intent of offering step-by-step guidance to help teachers effectively teach problem-solving skills to students. Thereupon, this model facilitated the adoption of guided IBL in the classroom due to the simplicity of its acronym, IDEAL, which is notably easier for educators to remember.

Furthermore, the framework highlights the connection between guided IBL, the primary independent variable, and collaboration. Guided IBL, rooted in constructivism, is inherently learner-centered. This instructional approach enables learners to engage with and exchange ideas while embracing their diverse perspectives (Pedaste et al., 2015). Prominent educational theorists such as Freire (1970) and Dewey (1966) have advocated for learner collaboration in the classroom, emphasising that it is the teacher's responsibility to ensure learners have opportunities to exchange ideas during the learning process.

Vygotsky (1978) also underscored the importance of collaboration as a form of scaffolding, where more knowledgeable learners assist their peers in functioning within their zone of proximal development. This underscores the high correlation between guided inquiry-based learning and collaboration in enhancing learners' problem-solving abilities. Gates (2018) further supports this by viewing collaboration as a crucial factor in developing higher-order thinking skills, including critical thinking and problem-solving. For instance, when learning about urbanization in a Development Studies (DS) class, students were encouraged to interact and pose questions. As they engaged in discussions, those with a better understanding of urbanisation helped others who struggled with the concept.

Active engagement in the classroom is essential for learners to acquire specific skills. Dewey (1966) asserted that knowledge is best acquired through action, emphasising that students who actively participate in the learning process tend to comprehend more than those who do not. The close relationship between collaborative learning, guided IBL, and active learning is evident in Figure 2.3. To facilitate learners' ability to ask questions and work collaboratively, they must be

viewed as active producers of knowledge. Freire (1970) argued that students who are given the opportunity to participate actively in their education develop critical skills and deepen their conceptual understanding. This suggests that collaboration and active learning are significantly interconnected in this study, impacting learners' problem-solving skills.

Mediating tools also played a significant role as independent variables in this study. For example, learners were shown YouTube videos and graphics to help them explore ideas and formulate questions. These mediating tools were crucial in promoting collaboration and active participation among learners. When asked to identify the causes of pollution on natural resources, learners used their textbooks and YouTube videos to gather information, which aided them in providing accurate answers. Saeidi and Ahmadi (2016) argue that learning materials are effective in engaging learners with the visual information presented to them.

While the aforementioned variables appear to have a strong relationship in influencing changes in the dependent variable—learners' problem-solving skills—the moderating variable of prior knowledge was also considered impactful. Specifically, learners with some prior knowledge of a particular topic found it easier to collaborate and actively participate in the learning process. Although some learners lacked prior knowledge, their peers shared information with them during collaborative activities. As a result, these learners became more active and engaged, asking questions throughout the inquiry process. It is therefore evident that prior knowledge played a role in either strengthening or weakening the relationship between the independent variables and the dependent variable (learners' problem-solving skills).

In conclusion, this section discussed the relationship between the primary independent variable (guided IBL) and the dependent variable (learners' problem-solving abilities). It also demonstrated how other contributing independent variables, such as collaboration, relate to the primary independent variable to enhance its influence on the dependent variable. Finally, the moderating variable of prior knowledge was shown to be crucial in either strengthening or weakening the correlation between the study's variables.

2.9 Chapter Summary

This chapter provided a comprehensive review of the literature relevant to the current investigation. Additionally, previous studies related to this research were examined to identify gaps in the existing literature. The relationships between the variables in this study were also established in this chapter. Notably, this section played a crucial role by offering a theoretical foundation that informed the implementation of guided inquiry-based learning (IBL) in the Development Studies (DS) classroom.

CHAPTER 3

3.0 Methodology

3.1 Introduction

This section presents the methodology employed in the current investigation. According to Cohen et al. (2018), methodology in academic research is a crucial component, serving as a roadmap for how the entire study will be conducted. In this study, the methodology was particularly relevant as it provided a structured approach to addressing the research questions. Resultantly, the following presentation outlines the steps undertaken in this investigation, beginning with an exploration of the research paradigm.

3.2 Paradigm

A philosophical underpinning in academic research is critical as it clarifies the epistemological, ontological, and methodological stance of the study (Creswell & Plano Clark, 2011). According to Lincoln et al. (2011), a paradigm comprises assumptions that define the researcher's worldview, representing a set of beliefs that guides the research process. Jansen (2023) identifies three key paradigms: interpretivism, positivism, and pragmatism. This study was guided by the philosophical lens of positivism.

The positivist paradigm aims to establish causal links between the study's variables (Park et al., 2019). Specifically, it facilitates the determination of the relationship between the dependent variable (the outcome) and the independent variable (the intervention). As outlined in the previous chapter, a dependent variable in research is defined as an outcome that reflects changes due to the independent variable (Bhandari, 2023; Helmestine, 2024). Conversely, the independent variable is the factor that the researcher manipulates to observe its effect on the dependent variable (Bhandari, 2023). In this study, guided inquiry-based learning (IBL) was the independent variable, with the aim of assessing its impact on the dependent variable—learners' problem-solving skills.

The positivist paradigm was instrumental in identifying the relationships between the intervention (guided IBL) and the outcome (learners' problem-solving skills). Alharahsheh and Pius (2020) emphasise that the positivist paradigm is grounded in the belief that empirical evidence is paramount and that knowledge should be derived from neutral, measurable, and quantifiable

observations. This paradigm seeks to generate numerical data that can be analysed statistically to produce generalisable and replicable results (Jansen, 2023). Guided by this paradigm, the study recorded learners' performance on problem-solving tasks to gather evidence on the impact of guided IBL.

Furthermore, positivism was particularly suitable for this study because the primary objective was to collect data that is free from human bias—data that is observable, measurable, and quantifiable, thereby ensuring replicability. Positivists maintain an ontological stance of realism, implying that a single, observable reality exists independent of human bias (Cohen et al., 2018). Epistemologically, positivists believe that knowledge is objective, observable, and quantifiable (Park et al., 2019). Whereof, the methodology of this paradigm involves using structured designs and instruments to collect and analyse data statistically, thereby reaching valid conclusions (Jansen, 2023).

Accordingly, the positivist paradigm provided a framework for gathering numerical data to address the research questions and draw conclusions about the impact of guided IBL on teaching problem-solving in DS. Creswell and Plano Clark (2018) argue that replicable, observable, and quantifiable results lend rigor to research. Moreover, Park et al. (2019) suggest that when the researcher's role is confined to data collection and analysis, without influencing the responses, the data remains unbiased, leading to robust results. The replicability of research findings is crucial, as it enhances the validity and reliability of the study (Cohen et al., 2018). Thus, the positivist paradigm was essential, not only as a blueprint for the research process but also for ensuring the production of reliable and valid results. The next section presents the research approach.

3.3 Research approach

A research approach refers to the methods and strategies employed in a study to facilitate data collection, aligning with the nature and objectives of the investigation (Cohen et al., 2018). Creswell and Creswell (2018) identified three primary research approaches: qualitative, quantitative, and mixed methods. For the current study, the quantitative approach was selected.

In accordance with, Bhandari (2023), the quantitative approach involves the use of structured instruments to collect numerical data, which is subsequently analysed using statistical methods.

This approach is particularly suited to studies that aim to establish causal relationships between variables, resulting in observable and quantifiable outcomes (Cohen et al., 2018). In the context of this study, the quantitative approach was essential for utilising statistical tools to gather numeric, quantifiable, and observable data concerning the impact of guided inquiry-based learning (IBL) on learners' problem-solving skills in DS. For that reason, statistical instruments such as the Likert scale, observation checklists, and tests were employed to ensure the rigour and validity of the findings.

The next section discusses the research design utilised in this study.

3.4 Research design

Whereby: O1 Pretest

X Treatment

O2 posttest

Figure 3.1 Experimental group

Whereby: O1 Pretest

Y Traditional method

O2 Posttest

Figure 3. 2 Control group

The research design employed in this study, as illustrated in the figures referenced earlier, serves as a critical framework for guiding the overall approach of the investigation. Conforming to McCombes (2021), a research design acts as a blueprint that directs the entire study process. Building on this, Creswell and Plano Clark (2018) identify various types of quantitative research designs, including survey, non-experimental, quasi-experimental, descriptive, and experimental designs. In light of these options, the present study adopted a quasi-experimental design featuring two groups—a pre-test and a post-test.

Importantly, Cohen et al. (2018) describe quasi-experimental designs as experimental investigations where randomisation is challenging due to pragmatic or ethical constraints. Given these challenges, the quasi-experimental design was deemed the most suitable approach for this study. Specifically, in Lesotho, where not all schools offer Development Studies (DS) as a subject,

the difficulty in randomly assigning participants became apparent. Therefore, a single high school in Maseru that offers this subject was deliberately chosen for the study.

Furthermore, Thomas (2024) highlights the advantages of this design, particularly its high level of external validity, which is attributed to the use of real-world interventions rather than controlled laboratory experiments. Thus, in this study, guided inquiry-based learning (IBL) was implemented as a practical intervention. To facilitate a comprehensive comparison, the study considered two groups—the experimental and control groups—as depicted in Figures 3.1 and 3.2. This comparison aimed to assess the effects of guided IBL on enhancing learners' problem-solving abilities relative to traditional teaching methods, thereby underscoring the relevance and applicability of the chosen research design.

3.5 Population, Sample, and Sampling Techniques

3.5.1 Population

In academic research, defining the population is crucial as it forms the basis for drawing generalisable conclusions. According to Bhandari (2023) and Cohen et al. (2018), the population refers to the entire group of individuals that the researcher aims to study and make inferences about. Additionally, Creswell (2018) underscores that the importance of identifying the population lies in its capacity to enable the generalisation of findings from a selected sample to the broader group. In this study, the population consisted of three Grade 11 classes from a high school in Maseru. Specifically, two of these classes comprised 20 learners each, while the third class contained 23 learners. This delineation of the population ensures that the study's findings can be applicable to a larger group of Grade 11 students.

3.5.2 Sample

While the population encompasses the total group from which conclusions are drawn, the sample represents a subset of this population from which data is collected (McCombes, 2023). Thus, sampling is pivotal in research as it facilitates the collection of data from a manageable group that can be generalised to the entire population (Bhandari, 2023). For this study, a sample of two intact Grade 11 classes from the Maseru high school was selected to represent the overall Grade 11 population concerning the impact of guided Inquiry-Based Learning (IBL) on enhancing problem-

solving skills in Development Studies (DS). Specifically, the sample comprised 40 students, with the experimental group including 20 learners (7 males and 13 females) and the control group also consisting of 20 learners (9 males and 11 females). This sampling strategy ensures a representative analysis of the impact of guided IBL.

3.5.3 Sampling Techniques

Sampling techniques play a critical role in determining how participants are selected for a study. According to McCombes (2023), these techniques can be categorised into probability sampling and non-probability sampling. Given that this study employed a quasi-experimental design where randomisation was not feasible, non-probability sampling was deemed the most appropriate method. Cohen et al. (2018) specify that non-probability sampling involves the selection of participants in a non-random manner. In support of this, Bhandari (2023) explains that non-probability sampling selects participants based on convenience, preference, or the researcher's judgment. Therefore, purposive sampling, utilising intact classes, was employed in this study.

Purposive sampling involves selecting participants based on specific characteristics or judgments made by the researcher (Creswell & Creswell, 2018). Furthermore, intact sampling, a subtype of purposive sampling, refers to using pre-existing groups without altering their composition (Ali, 2024; Swami, 2016). These techniques were found to be suitable for this study due to the fact that not all schools in Lesotho offer DS as a subject. As a result, the school that offered DS was purposively selected. Moreover, the Grade 11 intact classes were chosen because they were expected to have a better understanding of DS concepts, which would facilitate their engagement in the guided inquiry process. Importantly, these classes were used in their entirety, without being divided or altered (intact classes), thereby ensuring the study's integrity.

3.6 The Choice of the School and Its Profile

This section outlines the characteristics of the school where the intervention was conducted. The selected school, situated in the Maseru district of the southern region, offers Development Studies as one of its subjects. The school accommodates approximately 800 learners and 25 teachers and provides a range of subjects, including Fashion and Design, Agriculture, Development Studies, Accounting, Sesotho, and English. The Grade 11 learners were purposively included in the study

because they were believed to possess a more advanced understanding of DS concepts, which would enhance their ability to engage in the inquiry-based learning process.

Upon arriving at the school, the principal reported that the institution previously had a strong performance record in DS, although this had recently declined. This observation presented an opportunity to implement guided IBL and assess its potential impact on learners' problem-solving skills.

3.7 Data Collection Instruments

This section delineates the instruments utilised for data collection in the study, providing a comprehensive overview of their roles and applications.

3.7.1 Pre-test

To address the first research question, which aimed to assess the current level of problem-solving skills among learners in Development Studies (DS), a pre-test was administered prior to the intervention. As noted by Budert-Waltz et al. (2023), a pre-test functions as a diagnostic tool designed to evaluate learners' prior knowledge or current status before the application of the treatment. Both the control and experimental groups participated in this pre-test. This initial assessment was crucial in establishing a baseline for comparing the effects of guided Inquiry-Based Learning (IBL) with traditional teaching methods in enhancing problem-solving skills.

3.7.2 Observation Checklist

In response to the second research question, which investigated the impact of guided IBL on learners' problem-solving skills in DS, an observation checklist and a post-test were employed. The observation checklist was specifically utilised for the experimental group that engaged in the guided IBL treatment. Cohen et al. (2018) define an observation checklist as a structured tool used to evaluate specific behaviours or attributes. In this study, the checklist was designed to assess learners' behaviours during the guided IBL intervention. The checklist included statements aligned with the five phases of IBL, and each statement was rated as either "yes" or "no" to reflect the extent to which the treatment influenced learners' behaviour. A Development Studies teacher from

the study site observed the intervention sessions in the experimental group, while the researcher facilitated the process.

3.7.3 Post-test

Subsequent to the treatment, a post-test was administered to evaluate whether guided IBL had affected learners' problem-solving skills. This assessment served as a follow-up to the behaviours recorded on the observation checklist. According to Stratton (2019), a post-test is conducted after participants have received a specific treatment to measure its impact on the dependent variable—in this case, learners' performance in problem-solving tasks. Both the experimental and control groups completed the post-test, and the results were compared with pre-test outcomes to determine the effectiveness of guided IBL relative to traditional teaching methods.

3.7.4 Likert Scale

To address the third research question, which sought to measure learners' satisfaction with guided IBL, a five-point Likert scale was utilised. This scale, applied exclusively to the experimental group, included ratings from "strongly disagree" to "strongly agree." Cohen et al. (2018) describe the Likert scale as a tool for assessing various factors such as satisfaction, attitudes, and opinions, using a range of statements rated on a scale. The Likert scale used in this study incorporated both positive and negative statements to gauge learners' satisfaction with the guided IBL approach. The inclusion of varied statements was intended to ensure consistent and reliable responses from learners as they selected the options that best reflected their views.

The following section will detail the procedures implemented to carry out the inquiry process within the classroom setting.

3.8 Treatment procedure

The process detailed in this section outlines the implementation of guided Inquiry-Based Learning (IBL) for teaching Development Studies (DS) students how to solve problems. Specifically, the experimental group was the sole cohort subjected to the guided IBL procedure, while the control group received instruction through the conventional teaching method. The guided IBL treatment was conducted over a four-week period, with five lessons scheduled each week. Notably, two of

these lessons were allocated 80 minutes each, and the remaining three lessons were allotted 40 minutes each. This lesson allocation was consistent for both the experimental and control groups.

During the intervention, the topic of population and development was taught, following the advice of the co-teachers in accordance with their scheme of work. Prior to the commencement of the intervention, both the control and experimental groups underwent a pre-test. Additionally, before the guided IBL treatment began, learners in the experimental group were oriented on the principles of guided IBL. This orientation included guidance on expected behaviours, roles, responsibilities, and the teacher's role during the inquiry process.

Throughout the guided IBL intervention, lessons in the experimental group were observed by another DS teacher from the participating school, while the researcher facilitated the inquiry process. In contrast, the control group was instructed using the conventional method. In this traditional approach, learners were required to listen to the teacher, take notes as dictated, and complete tasks individually. No classroom observations were conducted for the control group.

In the implementation of guided IBL with the experimental group, the five illustrative phases of IBL, as delineated by Pedaste et al. (2015), were utilised. These phases were discussed in detail in the previous chapter. Figure 3.3 on the following page provides an illustration of these phases, followed by a detailed description of how the inquiry process was executed.

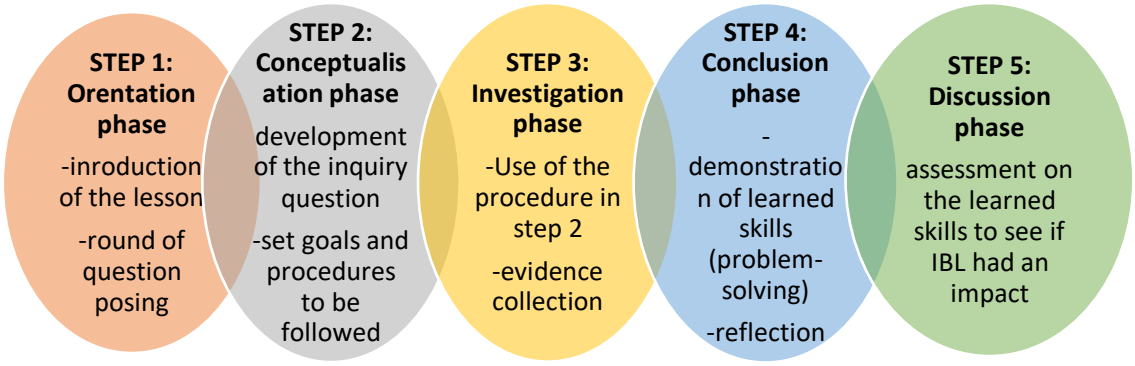

Figure 3.3 The steps engaged in teaching problem-solving using guided IBL

STEP 1

The orientation phase represents the initial step in the Inquiry-Based Learning (IBL) process. During this phase, learners were encouraged to voice any questions or thoughts they had regarding the subject matter. This stage was crucial for assessing learners' prior understanding of the day's topic. By drawing on the learners' existing knowledge, the orientation phase helped guide the direction of the inquiry process and clarify the topic being discussed. A key component of this phase involved prompting learners to articulate the day's topic in their own words, thereby facilitating their comprehension. For instance, when introducing the concept of overpopulation, learners posed questions such as, "What happens when there are too many people in one area?" "What factors lead to overcrowding?" and "How do resources get affected when there are more people than usual in one area?"

STEP 2

Following the orientation phase is the conceptualisation phase. In this stage, the development of the inquiry question or problem of investigation occurs. Building upon the questions generated by learners during the introduction of the topic in phase one, learners, with continued support from the teacher, formulated the inquiry question. This stage also involved setting specific goals and outlining the procedures necessary to address the inquiry question. For example, in the lesson where overpopulation was introduced, the inquiry question focused on the problems caused by overpopulation and potential strategies for mitigating these issues. The problem of investigation was derived from the questions posed in the first phase. Additionally, learners devised a procedural outline to describe the problems caused by overpopulation and strategies to address them. This procedure was displayed in bullet points on the board and included definitions, contributing factors, and the impact on natural resources.

STEP 3

The third step in the IBL process is the investigation phase, where evidence is gathered. In this phase, learners utilised the procedures developed in the previous stage to collect relevant information related to the inquiry problem. For instance, in the lesson on overpopulation, learners gathered data from textbooks (LGCSE Development Studies) and online sources. During this

phase, learners were encouraged to work collaboratively in groups to share and discuss ideas pertinent to the topic and the investigation problem. My role as the teacher was pivotal in presenting visual aids, such as pictures related to population and overpopulation, to facilitate a clearer understanding of the subject matter (see Figure 3.4).

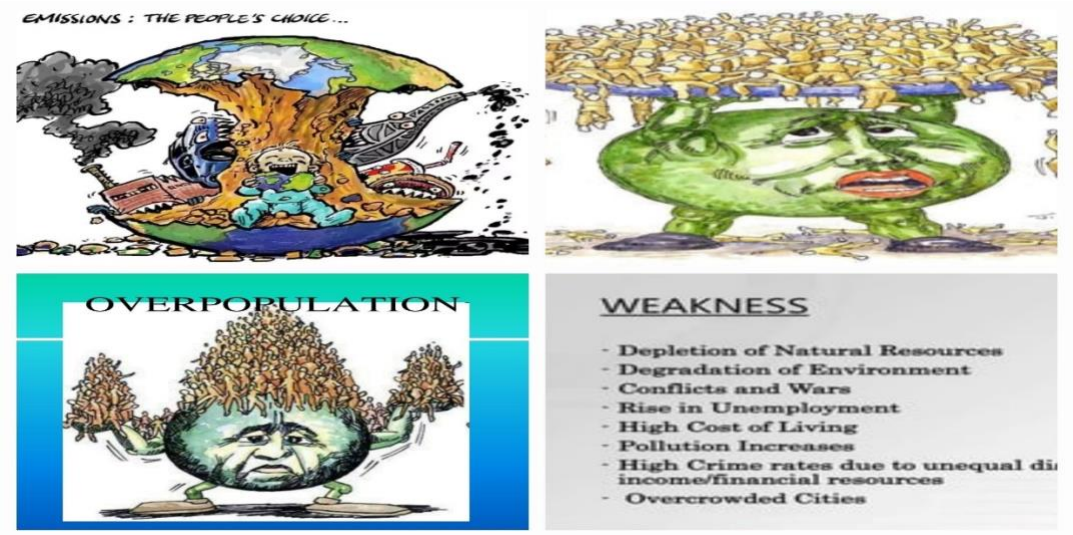

Figure 3. 4 Example of the pictures that were presented to learners

https://www.coggnserve-energy-future.com/causes-effects-solutions-of-overpopulation.pghpg

As learners collected information, they were encouraged to ask questions and collaborate both within their groups and with other peer groups. This collaborative approach facilitated the gathering of more comprehensive information and enabled learners to find answers to their questions. The teacher provided guidance on how to organise the information in relation to the problem of investigation. Based on the earlier phases, learners defined overpopulation as "the situation whereby the total number of people living in a particular area exceeds its carrying capacity." Additionally, they identified factors contributing to overpopulation as "high fertility rates," "migration," "tourism," and "lack of access to modern contraceptives."

STEP 4

The demonstration phase follows the collection of information. In this phase, learners attempted to provide solutions to the problem of investigation based on the information gathered. For

instance, in the context of overpopulation, learners suggested solutions such as implementing social campaigns on resource management to mitigate the misuse of natural resources. They also proposed that empowering women and educating both men and women about the importance of contraceptives could help reduce overpopulation.

This phase also served to demonstrate whether the inquiry process effectively assisted learners in formulating solutions to the problems. According to Pedaste et al. (2015), it is crucial for the teacher to continually support and encourage learners to understand the concept thoroughly before attempting to solve the problem. This support plays a significant role in helping learners develop problem-solving skills as they gain a comprehensive understanding of the issues related to the topic. As exemplified, learners first defined overpopulation and related issues before proposing solutions.

STEP 5

The final phase is the discussion, which involves assessing the skills acquired through the inquiry process. In this phase, learners were given individual assessments, including a short exercise, to evaluate whether they had developed problem-solving skills through the guided inquiry process. This assessment was accompanied by guidance and ongoing support from the teacher. Additionally, learners reflected on the procedures undertaken, including question-asking and information gathering, to identify areas for improvement in future inquiries.

In conclusion, the IDEAL model, represented by its acronym, was instrumental in implementing guided IBL. It provided a structured framework that facilitated learners' recall of each phase of the IBL process. Moreover, during the intervention, observations were made on learners' behaviors while they engaged with the guided IBL. Following the intervention, all learners from both the experimental and control groups were administered a post-test to evaluate the effectiveness of the guided IBL approach.

3.9 Data analysis methods

Data analysis encompasses various techniques utilised to identify patterns, trends, and insights within a dataset (Taherdoost, 2020). This process is crucial in research as it provides a comprehensive overview of the statistical tools or methods employed to draw conclusions from

the data (Chia, 2023). In this study, I employed both descriptive and inferential statistics using the Statistical Package for the Social Sciences (SPSS, Version 26) software. SPSS is a robust statistical tool developed by IBM, designed to facilitate complex statistical analyses, including regression, ANCOVA, MANOVA, t-tests, and correlations. Its user-friendly interface allows researchers to organise and present data precisely (Williams, 2024).

Inferential statistics, as described by Stapor (2020), are employed to make predictions and generalisations about a larger population based on sample data. In contrast, descriptive statistics are used to summarise and describe the characteristics of the dataset, including measures of central tendency (mean, median, and mode), variability, and distribution (ibid).

In this study, statistical tests in SPSS were conducted at a confidence level of 95% and a significance level of 0.05. A 95% confidence level is commonly used in research as it provides a standard benchmark for decision-making regarding statistical results (Beavans, 2023). The significance level of 0.05 is particularly important as it indicates whether the results are statistically significant. Typically, this significance level is associated with a 95% confidence interval (Hayes, 2024).

The significance level is often represented by a p-value, which denotes the "probability value." A p-value less than 0.05 (<0.05) is considered significant, indicating that observed differences in the results are likely to be meaningful (Beavans, 2023; Menon, 2024; Virag, 2024). Conversely, a p-value greater than 0.05 (>0.05) suggests that there are no significant differences between the observed groups' results (Menon, 2024). In essence, the p-value serves as a threshold for determining the statistical significance of the observed findings.

3.9.1 Pre-test data analysis

To analyse the data obtained from the pre-test on learners' current level of problem-solving skills in Development Studies (DS), an independent sample t-test was conducted to calculate the mean and significance levels of the groups prior to treatment. This analysis was crucial as it enabled the identification of statistical differences between the two groups, providing insights into their problem-solving skills before the intervention. Establishing these differences was essential for assessing the homogeneity of the groups.

According to Kulkarni and Patil (2022), ensuring that the groups being compared are homogeneous, or possess equal variance, is fundamental. Homogeneity implies that the groups have similar characteristics before the treatment is applied. This uniformity is vital in minimising the effects of confounding variables that could otherwise skew the results.

Furthermore, identifying group differences before the treatment allows the researcher to attribute any observed changes to the specific intervention applied. As Kulkarni and Patil (2022) assert, this approach helps in clearly determining whether the intervention had an effect. Resultantly, the independent sample t-test was instrumental in assessing the differences between the control and experimental groups before the treatment commenced, thereby providing a baseline for evaluating the impact of the intervention.

3.9.2 Observation Checklist Analysis

To analyse the data obtained from the checklist, which recorded information on the influence of guided Inquiry-Based Learning (IBL) on learners' problem-solving skills, descriptive statistics were employed. Specifically, frequencies were calculated to determine the percentages of responses rated as "yes" and "no" concerning the statements related to observed behaviour. The calculation of frequencies is crucial in research, as it facilitates the presentation of data in a clear and comprehensible manner, often through frequency tables or charts (Kaplan, 2024; Rhodes, 2023). This approach enabled a detailed assessment of how guided IBL affected learners' problem-solving skills in Development Studies (DS), whether positively or negatively.

3.9.3 Post-Test Analysis

The data collected from the post-test, which complemented the observation checklist, were analysed using Analysis of Covariance (ANCOVA). ANCOVA was employed to compare the performance of learners from both the experimental and control groups regarding their problem-solving skills in DS. According to Shieh (2020), ANCOVA is a statistical method used to determine differences between group means while accounting for potential confounding variables. This technique enhances the traditional Analysis of Variance (ANOVA) by addressing the limitations of ANOVA, such as its failure to account for outliers.

Consequently, ANCOVA was deemed appropriate for analysing the post-test results as it incorporates the influence of covariates. A covariate is defined as a factor that varies with the response variable and potentially impacts it (Ford, 2023). In this analysis, the pre-test scores were treated as a covariate to control for their potential effect on the post-test outcomes, which measure learners' problem-solving skills following the intervention. This method was chosen for its ability to compute means and p-values effectively, thereby evaluating the extent to which guided IBL influenced learners' problem-solving skills in DS. For a visual representation, refer to Figure 3.5

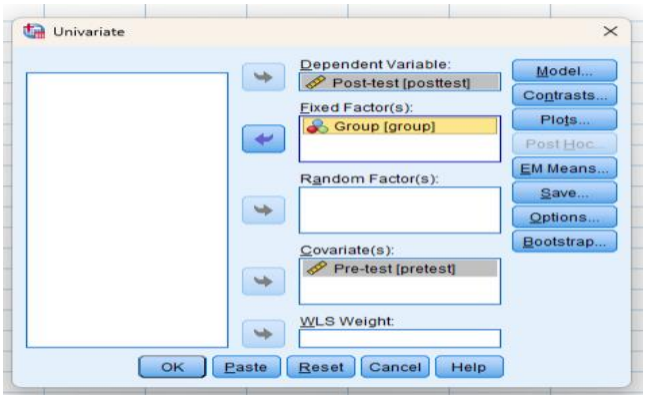

Figure 3. 5 An illustration of how the analysis was carried out

Figure 3.5 above illustrates the execution of the Analysis of Covariance (ANCOVA) in SPSS, aimed at assessing the impact of guided Inquiry-Based Learning (IBL) on learners' problem-solving skills in Development Studies (DS). As depicted, the pre-test scores were designated as a covariate to account for their influence on the relationship between the intervention and learners' problem-solving skills post-treatment. This approach was crucial for controlling any potential effects that the pre-test might have on the outcomes.

In this analysis, the post-test scores were treated as the dependent variable, as they reflect the effect of the guided IBL on learners' problem-solving skills. By analysing the post-test scores, the study was able to determine the impact of the treatment, measured through test scores, on the learners' skills in DS. This methodological setup ensured that the assessment of the intervention's effectiveness was accurate and reliable.

3.9.4 Likert scale analysis

To address the final research question, frequencies were calculated to gauge learners' satisfaction with the use of guided Inquiry-Based Learning (IBL) in the classroom. This approach was chosen because frequency counts provide a clear and immediately understandable summary of the data. The results are displayed in a frequency table, which presents learners' responses, as measured by a five-point Likert scale, for each phase of IBL.

The subsequent section will discuss the assumptions that were verified prior to conducting the analysis.

3.10 Assumptions that were followed before running the SPSS tests

It is crucial to adhere to specific assumptions before conducting parametric tests in SPSS. Parametric tests, by definition, rely on the assumption that the population data is normally distributed to ensure the effectiveness and accuracy of the results obtained (Campbell & Shantikumar, 2016; Campbell & Swinscow, 2009). In the current study, the parametric tests employed were the independent sample t-test and the Analysis of Covariance (ANCOVA).

To ensure the validity of these tests, several assumptions were verified beforehand. Firstly, it was confirmed that both the dependent variable and the covariate were measured on a continuous scale, as illustrated in Figure 3.6 below.

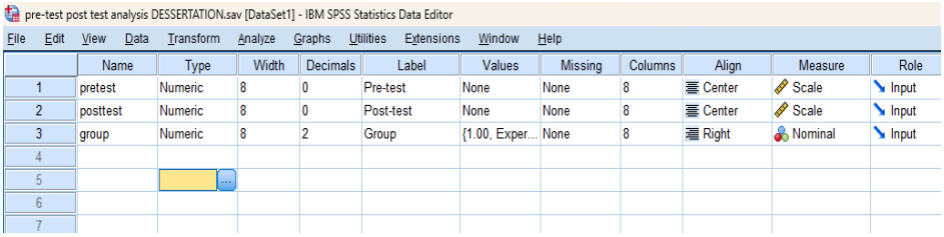

Figure 3. 6 Variable view of dataset loaded in SPSS

The above figure demonstrates that the dependent variable, when conducting the t-test and ANCOVA, was measured on a continuous scale. This is evident from the column labelled "measure," where the post-test was recorded as a scale. Additionally, the first assumption for ANCOVA stipulates that the covariate must also be measured on a continuous scale (Field, 2018).

As shown in the same column, the pre-test, which served as the covariate, was also treated as a scale, thus meeting this assumption prior to running the tests.

The second assumption for both ANCOVA and the independent sample t-test is that the independent variable should consist of two or more categorical groups (Field, 2018). In this study, the independent variable was represented by the group, determined by the type of treatment or intervention administered. Hence, this assumption was satisfied as both the control and experimental groups were involved, with each group receiving the appropriate intervention.

Furthermore, the parametric tests require homogeneity of variance among the groups involved (Campbell & Shantikumar, 2016). To verify this, Levene's test for equality of error variances was conducted. The results indicated that equal variance was assumed across the groups, as the p-value obtained was greater than 0.05, specifically 0.895, confirming that the groups were homogenous.

Finally, Field (2018) notes that the dependent variable should be approximately normally distributed for each group of the independent variable, ensuring accurate results. To meet this assumption, the Shapiro-Wilk test was employed. Values below 0.05 indicate an abnormal distribution, while values greater than 0.05 suggest normal distribution. An illustration of this test result is provided below.

Table 3.1 The normality test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Group	Statistic	Df	Sig.	Statistic	Df	Sig.
Experimental	.188	20	.063	.903	20	.046
Control	.170	20	.133	.968	20	.707

Table 3.1 presents the Shapiro-Wilk test results, showing significance values of 0.46 for the experimental group and 0.707 for the control group, both of which exceed the threshold of 0.05. This suggests that the dependent variable was approximately normally distributed within each group. In consquence, the accuracy of the results obtained from running the ANCOVA in this study is affirmed.

Additionally, the Kolmogorov-Smirnov test further supports this conclusion, as it also yielded significance values greater than 0.05 for both groups. Specifically, the significance value for the experimental group was 0.063, while for the control group it was 0.968.

This section is crucial as it confirms that the tests used in this study were conducted appropriately. Adhering to these assumptions ensures the validity and robustness of the results. Therefore, it can be concluded that the data in this study was normally distributed, reinforcing the reliability of the findings.

3.11 Validity and Reliability

Reliability is defined by Middleton (2023) as an indicator of how consistent and replicable a chosen method is. In contrast, validity refers to the extent to which an instrument measures what it is intended to measure (Carroll & Goodfriend, 2023). To ensure reliability, the statistical tests used to analyse data with SPSS software were conducted at a 95% confidence level, a measure that enhances the replicability and consistency of the results (Mark, 2020). This confidence level supports the reliability and robustness of the findings in this study. Furthermore, parametric assumptions, including tests of normality, were conducted prior to the analysis using SPSS software. These assumptions are crucial for ensuring reliability, as they indicate the population distribution, which contributes to producing true and consistent results.

For internal validity, the study employed ANCOVA as a data analysis method. Field (2012) reports that ANCOVA effectively controls for extraneous variables, thereby enhancing internal validity. External validity was addressed by using guided inquiry-based learning (IBL) to improve learners' problem-solving skills, rather than relying on a laboratory-based treatment that may not be applicable to real-world situations. According to Bhandari (2023), real-world interventions like guided IBL add rigor to a study because they can be more easily generalised to other contexts. Content validity was ensured by aligning the pre-test and post-test instruments with the DS grade 11 syllabus to confirm their relevance and accuracy. Additionally, these tests were reviewed by other DS teachers to verify whether they effectively measured learners' problem-solving skills. Content validity pertains to how well an instrument represents the construct it is designed to measure (Bhandari, 2023).

3.12 Ethical Considerations

Ethics is crucial for enhancing the validity of research. According to Patton (2015), ethical considerations involve adhering to guiding principles to ensure valid and robust findings. In this study, ethical standards such as informed consent were meticulously observed. Participants and their parents were informed about the study's purpose and benefits. Consent forms were distributed to parents to ensure they were aware of their children's participation in the treatment and observation. Additionally, participants were assured of anonymity and confidentiality regarding their personal details, and they were informed that their involvement in the study was voluntary. To gain access to the school, an introductory letter from the Faculty of Education, under the Department of Language and Social Education (LASED), was presented to the principal to explain the research interest. Finally, to maintain academic integrity, the Turnitin plagiarism checker was utilised to confirm that the work was free from plagiarism.

3.14 Chapter Summary

This chapter outlined the methodology employed in the study, which utilised a quantitative quasi-experimental design involving both control and experimental groups to teach problem-solving in DS. It detailed the instruments used for data collection and the measures implemented to ensure rigorous results. In summary, this chapter served as a comprehensive blueprint for the entire study, detailing the methodological framework and procedures that underpin the research.

Chapter 4

4.0 Results Presentation and Interpretation

4.1 Introduction

The previous chapter addressed the methodological aspects of the study. This chapter focuses on presenting and analysing the data collected from the pre-test, observation checklist, post-test, and Likert scale. As outlined earlier, the analysis was conducted using SPSS version 26 software. It is important to reiterate that the independent sample t-test and ANCOVA were performed at a 95% confidence level and a significance level of 0.05, as specified in the previous chapter. Hayes (2024) notes that a 95% confidence level in statistical analysis indicates the degree of certainty with which we can infer that the results derived from the sample reflect the broader population in the study.

Descriptive statistics were computed using SPSS, with the results represented through frequency percentages. Frequencies were chosen for their clarity and ease of interpretation. This chapter begins with an overview of the demographic profile of the participants, which provides insight into the types of individuals involved in the study and their characteristics.

The study aimed to address the following research questions:

1. What is the current level of problem-solving skills among learners in DS?
2. What influence does guided inquiry-based learning (IBL) have on learners' problem-solving skills in DS?
3. What is the level of satisfaction among learners regarding the use of guided IBL in DS classes?

In addressing these questions, the results are organised around several key themes: the current level of problem-solving skills among learners in DS, the impact of guided IBL on learners' problem-solving abilities, post-test results, and learner satisfaction with guided IBL in DS classes. The following section presents the demographic characteristics of the participants involved in the study.

4.2 Demographic Information of Participants

This section outlines the characteristics of the participants in the study. Such demographic information is crucial for ensuring ethical research practices and for understanding the participant group (Bartschi, 2020). According to Bartschi (2020), providing detailed demographic profiles is an ethical obligation, as it helps researchers consider diversity and inclusivity, thereby minimising biases and enhancing the robustness of the conclusions. Additionally, demographic information provides context for the generalisability of the results. Tables 4.1 and 4.2 present the demographic characteristics of the participants in this study.

Table 4.1 Profile for Experimental group

Age group	Gender		
	Male	Female	Total
15-17	4	6	10
18-20	2	4	6
21-22	1	3	4
TOTAL	**7**	**13**	**20**

Table 4.2 Profile for the Control group

Age group	Gender		
	Male	Female	Total
15-17	5	7	12
18-20	2	2	4
21-22	2	2	4
TOTAL	**9**	**11**	**20**

Table 4.1 presents the characteristics of learners in the experimental group. Of the 20 learners, 7 were boys and 13 were girls. The age distribution of these learners is also detailed. Specifically, among the 7 male learners, four were aged between 15 and 17 years, and two were aged between 18 and 20 years. Additionally, one male learner was aged between 21 and 22 years.

In contrast, among the 13 female learners in the experimental group, six were aged between 15 and 17 years, four were aged between 18 and 20 years, and three were aged between 21 and 22 years.

Table 4.2 provides the demographic characteristics of the control group. This group also comprised 20 learners, with 9 males and 11 females. Among the male learners, five were aged between 15 and 17 years, two were aged between 18 and 20 years, and two were aged between 21 and 22

years. On the female side, seven learners were aged between 15 and 17 years, two were aged between 18 and 20 years, and two were aged between 21 and 22 years.

In summary, the study involved a total sample of 40 learners, comprising 24 females and 16 males.

4.3 The current level of problem-solving among learners in DS

To address Research Question One, an independent sample t-test, along with frequency calculations, was employed to assess the existing level of problem-solving skills among learners in DS prior to the intervention. The independent sample t-test was particularly instrumental in identifying differences between the control group (which utilized the traditional method) and the experimental group (which engaged in guided inquiry-based learning, or IBL) before the treatment commenced. This comparative approach was essential for ensuring that the results accurately reflected the impact of guided IBL on problem-solving skills in DS.

The learners' mark scores were utilised to calculate both the mean scores and the significance levels within each group. The application of statistical tools, such as SPSS software, in quantitative research helps ensure the validity of results by minimising human bias during calculations (Mark, 2020).

Table 4.3 presents the frequencies and percentages of learners' pre-test scores. Initially, the data reflects the overall performance of learners on problem-solving questions without distinguishing between the groups (refer to Table 4.3).

Table 4.3 The mark scores of learners at the pre-test level

Mark scores	Number of learners *(N=40)*	Percentage (%)
1	6	15%
2	5	12.5%
3	6	15%
4	2	5%
5	8	20%
6	4	10%

7	4	10%
8	5	12.5%

Table 4.3 provides a detailed breakdown of the pre-test scores for learners, which were evaluated out of a maximum of 20 points. The first column lists the specific test scores achieved by the learners, while the second column indicates the number of learners who received each score. The third column presents the percentage of learners who achieved each corresponding score.

From the data, it is evident that, out of the 40 learners who completed the pre-test, none achieved a score of 10 or higher, which was set as the passing mark. Specifically, 15% of learners scored only 1 mark out of 20. Additionally, 12.5% of learners achieved a score of 2 marks. Notably, 15% of learners scored 3 marks on the test.

Continuing with the results, 5% of learners attained a score of 4 marks, 20% scored 5 marks, and 10% scored 6 marks. Furthermore, another 10% of learners received 7 marks. The highest mark obtained was 8, achieved by 12.5% of learners. These results indicate that overall, the problem-solving skills of the learners in DS are notably low, as none reached the 50% threshold considered a passing mark. The scores ranged from as low as 1 mark to a maximum of 8 marks out of 20, reflecting a generally poor level of problem-solving skills among the learners.

To provide a more comprehensive analysis of their problem-solving abilities, the mean score and standard deviation (SD) were calculated, and these results are detailed in Table 4.4.

Table 4. 4 The mean score of learners in DS who took a pre-test

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
Pre-test	40	4.35	.371	2.348
Valid N (listwise)	40			

Table 4.4 shows the mean score and standard deviation (SD) for a sample of 40 learners prior to the treatment. The mean score was m=4.35, and the SD was SD=2.348. These figures reveal a notably low level of problem-solving skills among the learners in DS.

Despite these results, it remains challenging to ascertain whether there were any differences in problem-solving skills between the control and experimental groups based solely on the pre-test scores. As a result, to determine if there were any significant differences between the groups before the intervention, an independent sample t-test was conducted. This statistical test was employed to assess potential disparities in problem-solving abilities between the learners in the control and experimental groups prior to the treatment.

Table 4.5 An independent sample t-test of the control and experimental groups before treatment

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pre-test	Equal variances assumed	.149	.702	-.133	38	.895	-.100	.752	-1.623	1.423
	Equal variances not assumed			-.133	37.976	.895	-.100	.752	-1.623	1.423

The results presented in Table 4.5 indicate that there were no significant differences in problem-solving skills between the control and experimental groups at the pre-test stage. Specifically, Levene's test of equality of variances confirmed that equal variances could be assumed between the two groups. According to Mark (2020), a p-value greater than 0.05 in an independent sample t-test suggests that the assumption of equal variance is valid. Thus, the results in the first column of the table should be interpreted.

Variance, as defined by Thompson and Wesolowski (2018), refers to the numerical distribution used to assess differences between groups or compare distributions. In this study, the p-value

(denoted as "sig.") in Table 4.5 was greater than 0.05, supporting the conclusion that there were no significant differences between the control and experimental groups at the pre-test. Specifically, the p-value was p=0.702, indicating that the variance between the groups was similar.

Furthermore, Mark (2020) emphasised that when the 95% confidence interval for the difference in means includes both negative and positive values, it indicates no significant difference between the groups' performances. In this study, the confidence interval ranged from -1.623 to 1.423, reinforcing the conclusion that the prior problem-solving skills of learners in DS were equivalent across the groups at the pre-test.

The analysis further revealed that the problem-solving skills of learners, as measured by their test scores, were notably poor in both the experimental and control groups, as reflected in Table 4.4. The independent sample t-test was instrumental in demonstrating that both groups had comparable levels of problem-solving skills before the implementation of guided IBL. Whereof, it was concluded that the control and experimental groups were homogeneous prior to the treatment. For further clarification, Table 4.6 provides the mean scores of each group at the pre-test stage.

Table 4.6 The mean scores of Control and Experimental groups before treatment

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	20	4.30	2.408	0.539
Control	20	4.40	2.349	0.525

As illustrated in Table 4.6, the mean score for the experimental group prior to treatment was m=4.30, while the mean score for the control group was m=4.40. This minor difference of 0.10 indicates that the two groups were statistically comparable at the pre-test stage. As a result, it can be inferred that the level of problem-solving skills among learners in DS was similar in both groups before the treatment was applied.

These findings suggest that learners in both groups exhibited poor problem-solving skills, particularly in tasks requiring such skills. This observation is consistent with the data presented in Table 4.3, where no learner achieved a score of 50%, equivalent to 10 out of 20. Such results corroborate the earlier assertion that the two groups were homogeneous at the pre-test, given that equal variance was assumed between them. Thus, the analysis confirms that both groups entered the treatment phase with similar baseline problem-solving abilities.

4.4 The influence of guided inquiry-based Learning on learners' problem-solving skills in DS

The second research question aimed to investigate the influence of guided inquiry-based learning on the problem-solving skills of learners in DS. To address this, an observation checklist was utilised during the intervention, and a post-test was administered following the intervention. Specifically, the observation checklist was employed throughout the teaching process using guided inquiry-based learning. It is important to note that classroom observations were conducted exclusively with the experimental group—the focus of this study—where changes in learners' problem-solving skills were anticipated.

Observations were conducted during the first lesson, the third lesson, and the final day of the intervention. The selection of these specific instances was intended to monitor changes in learners' behaviour and their problem-solving skills as they engaged with the inquiry process. Prior to beginning the observations, I provided a comprehensive explanation of the inquiry process and outlined the expected behaviours and phases of inquiry-based learning to the learners.

The observation checklist comprised ten statements, with each phase of inquiry being represented by four statements. The observer recorded responses by ticking "yes" or "no" based on their observations. The resulting data from these checklists are summarised in frequency tables reflecting the observer's judgments. Table 4.7 presents the analysis of the first observation checklist, detailing the initial findings.

Table 4. 7 An observation checklist for the first lesson on guided inquiry-based learning

Phases of inquiry-based learning	**Statements (4 per phase)** ***(yes)***	**Percentage (%)**	**Statements (4 per phase)** ***(no)***	**Percentage (%)**
Orientation	1	25%	3	75%
Conceptualisation	2	50%	2	50%
Investigation	3	75%	1	25%
Conclusion	0	0%	4	100
Discussion	3	75%	1	25%

Table 4.7 presents the observation data across the five phases of inquiry, detailing the number of statements and their respective percentages. In the orientation phase, 75% of the statements were marked as "no," while only 25% were marked as "yes." This suggests that, during the orientation phase, learners exhibited some interest in the lesson, but their familiarity with the inquiry process was limited, as it was a new concept for them. For instance, a statement assessing learners' ability to identify the problem of investigation when posing questions was marked as "no," indicating that learners struggled to understand their tasks at this stage.

In the conceptualisation phase, the results were more balanced, with 50% of the statements marked as "no" and the remaining 50% marked as "yes." This phase is crucial as it involves setting goals and procedures to address the problems identified in the previous phase. The fact that 50% of the statements were marked as "yes" indicates that learners exhibited some inquiry features, such as collaboration with peers. This suggests that, although learners were starting to adapt to the inquiry process, challenges persisted. For example, a statement regarding learners' ability to identify relevant materials was marked as "no," reflecting difficulties in locating resources needed for information retrieval during the initial lesson.

The investigation phase, as shown in Table 4.7, revealed that 75% of the statements were marked as "yes," while 25% were marked as "no." This phase involves exploring solutions to the identified problems. The high percentage of "yes" responses indicates that learners were more engaged in

collaborative activities, such as sharing ideas with peers. However, they faced challenges in seeking relevant information to solve the problems effectively, as reflected in the "no" responses. An example from this phase includes an activity where learners worked in groups to assess possible solutions for reducing global warming in Lesotho. Despite their efforts, difficulties in gathering pertinent information were evident.

Overall, these observations highlight that while learners showed some progress in collaboration and engagement with the inquiry process, significant challenges remained in effectively identifying and utilizing resources to address the problems presented. The accompanying figure provides a visual representation of the information learners generated during their group activities in the investigation phase.

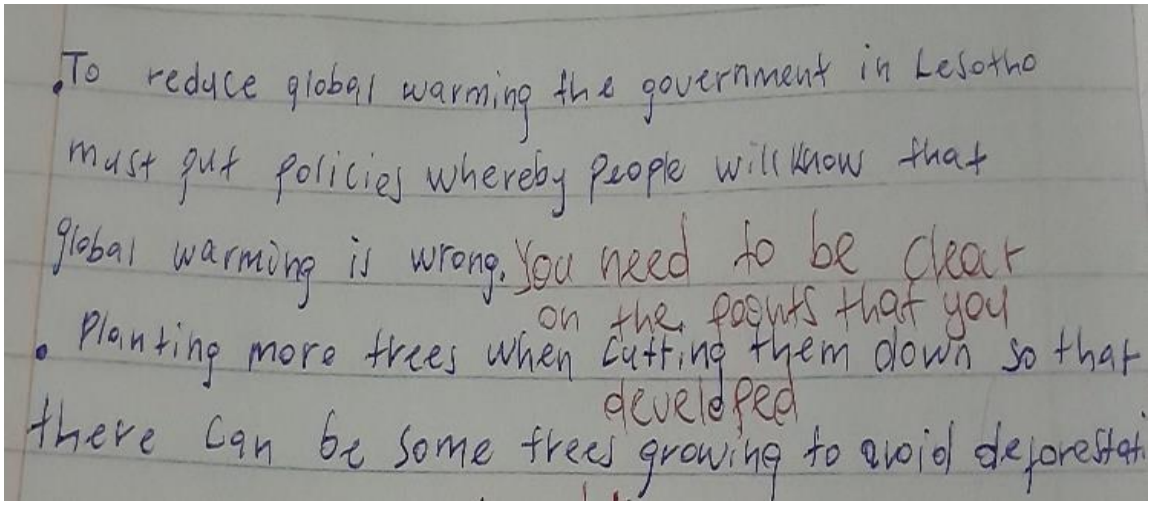

Figure 4.1 An illustration of learners' responses on a given activity

The figure above demonstrates that learners exhibited a limited understanding of environmental issues and struggled to apply practical solutions to the problems presented. Instead of exploring information that could directly address the activity, learners proposed general actions without clearly articulating how the information gathered could be utilised to tackle global warming. This suggests that, during the initial lesson, learners encountered difficulties in developing effective solutions for the problem at hand.

In the fourth phase, the conclusion phase, Table 4.7 reveals that learners were unable to provide solutions to the identified problems, as indicated by the fact that none of the four statements were marked as "yes." Specifically, the percentage for statements marked as "no" was 100%, reflecting a complete lack of success in this phase.

Conversely, in the final phase, the discussion phase, 75% of the statements were marked as "yes," indicating that learners were able to reflect on their shortcomings during the inquiry process. However, 25% of the statements were marked as "no," suggesting that learners partially struggled to complete this stage effectively. Notably, observations showed that learners failed to deliver a detailed summary of the solutions proposed for the identified problems, primarily due to their earlier difficulties in identifying the problem of investigation.

Overall, the results presented in Table 4.7 indicate that learners faced significant challenges during the initial inquiry lesson, as it was their first experience with a problem-solving approach through guided inquiry. My role was crucial in providing substantial guidance and support to help learners engage effectively in the inquiry process, including identifying problems from the given text or lesson content and developing solutions.

The subsequent presentation of the observation checklist results for the third week of the intervention will offer further insights into the learners' progress and continued challenges.

Table 4.8 Results from observation checklist of the third lesson of the intervention

Phases of inquiry-based learning	Statements (4 per phase) *(yes)*	Percentage (%)	Statements (4 per phase) *(no)*	Percentage (%)
Orientation	3	75%	1	25%
Conceptualisation	4	100%	0	0%
Investigation	3	75%	1	25%
Conclusion	4	100%	0	0%
Discussion	4	100%	0	0%

Table 4.8 presents the results of the observation checklist for the third week of the intervention. A comparison of these results with those from the initial observation reveals a marked improvement. Specifically, during the orientation phase, 75% of the checklist statements were marked as "*yes*," whereas only 25% of the statements, which equates to one statement, were marked as "*no*." This indicates a significant change in learners' behaviour as they became more familiar with the inquiry process. According to the checklist, the only challenge encountered during the orientation phase was learners' difficulty in relating their questions to real-world scenarios.

In the second phase, conceptualisation, learners demonstrated notable success in executing the inquiry process by establishing goals and procedures to address the identified problem. As shown in Table 4.8, all statements in this phase were marked as *"yes."* This suggests that, with ongoing support and guidance from the teacher, learners became adept at formulating appropriate procedures for problem-solving and understanding the necessary steps to follow.

Regarding the investigation phase, 75% of the statements were marked as *"yes,"* while 25% were marked as *"no."* These results represent a substantial improvement from previous observations, as learners displayed a greater understanding of guided inquiry and were more effective in exploring solutions to the identified problems. Moreover, at this stage, learners exhibited curiosity by posing questions that facilitated the search for suitable solutions to the investigation problem.

For example, when tasked with describing solutions to address the infant mortality rate, learners asked pertinent questions such as *"What happens if a baby is born underweight?"* and *"What measures can ensure that pregnant mothers consume a balanced diet?"*

In the conclusion phase, all four statements were affirmatively marked as *"yes,"* signifying that learners successfully applied the information acquired in preceding phases to resolve the problems presented. This outcome, as illustrated in Table 4.8, reflects a 100% success rate for this phase. Such a high percentage indicates a progressive enhancement in learners' problem-solving skills through guided inquiry, as they grew increasingly adept at navigating the nature of their lessons.

Furthermore, Table 4.8 reveals that learners exhibited substantial improvement during the discussion phase. Each statement evaluating learners' behaviour in demonstrating the development of problem-solving skills was marked as *"yes,"* resulting in a 100% success rate for this phase.

This observation suggests that by the third week, learners had markedly improved their capacity to engage in reflective discussions and articulate solutions effectively.

In summary, Table 4.8 shows that throughout the third week of the intervention, most statements across all phases were marked affirmatively as *"yes."* Moreover, the proportion of statements marked as *"no"* ranged from 0% to 25%, indicating that only one out of four statements was marked as *"no."* These results underscore a significant enhancement in learners' problem-solving skills within the inquiry-based classroom compared to previous assessments.

The observer's note on the checklist remarked that *"learners demonstrate the ability to solve problems. Their ability to ask questions shows that they are accustomed to the process of inquiry."* This observation suggests that increased familiarity with the inquiry process has positively influenced learners' classroom behaviour, contributing to improved problem-solving capabilities.

Finally, the observation checklist for the last lesson of the intervention was examined to assess learners' behaviour on their final day of participating in guided inquiry. This conclusive assessment was pivotal for evaluating the impact of inquiry-based learning on learners' problem-solving skills. Figure 4.1 on the subsequent page presents the results of this observation

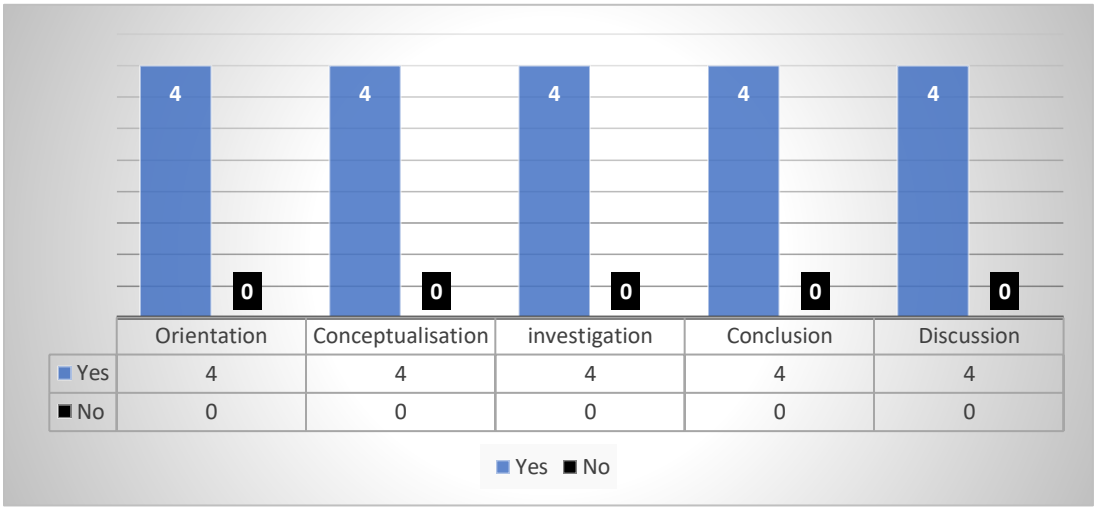

Figure 4. 2 An Observation Checklist for the last lesson of the intervention

Figure 4.2, presented above, displays the results from the observation checklist utilised during the final lesson of the intervention. The data reveal that learners exhibited exemplary behaviour across all phases of inquiry on this day. Specifically, in the orientation phase—the initial stage—all four statements were marked as *"yes,"* as previously indicated. This observation suggests that learners, at this phase, effectively demonstrated the capacity to formulate insightful questions aimed at identifying the problem under investigation.

Furthermore, the results for the conceptualization phase show that none of the statements were marked as *"no";* rather, all four statements were affirmatively marked as *"yes."* This pattern is consistent across the investigation, conclusion, and discussion phases as well. Consequently, these findings underscore that the observed improvements in learners' behaviour can be attributed to the implementation of guided inquiry-based instruction. The results imply that such an approach not only facilitates learners' engagement with the inquiry process but also enhances their ability to reflect on and improve their inquiry skills for subsequent lessons.

The previously presented observations had indicated some challenges faced by learners during their inquiry process. However, Figure 4.2 demonstrates that, by the final lesson, learners had successfully navigated the inquiry process, suggesting they had reflected on and addressed their earlier difficulties, potentially with the assistance of their teacher. This improvement is indicative of the effectiveness of guided inquiry-based learning in fostering learners' development and adaptation. An example of the exercise administered to learners during the final class of the intervention is illustrated below

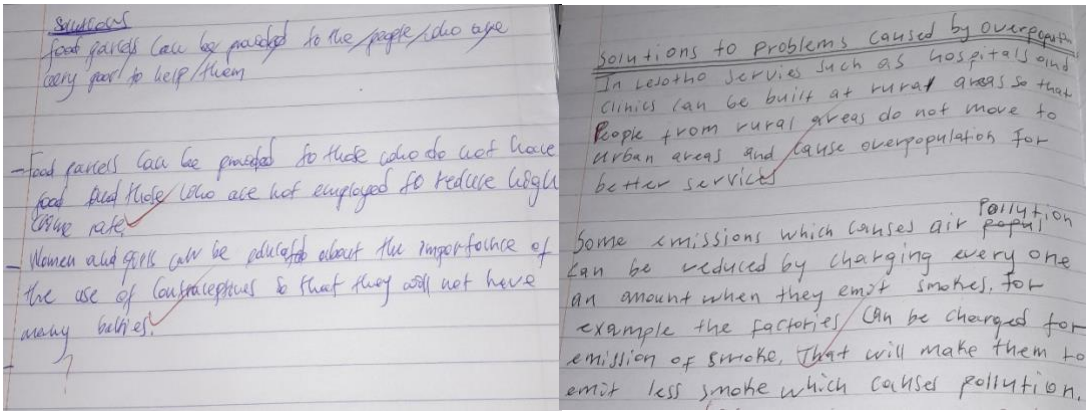

Figure 4. 3 Learners' exercise on problem-solving

The figure above illustrates the responses of learners to an exercise administered in a classroom setting on the topic of overpopulation. Learners were tasked with evaluating potential solutions to the challenges posed by overpopulation. Their responses revealed a certain level of understanding and demonstrated their capacity to propose viable solutions to the identified problems. This exercise was instrumental in confirming that as learners become more accustomed to the process of inquiry, their performance and behaviour in problem-solving progressively improve.

In summary, the three observation checklists presented indicate a notable improvement from the first lesson of the intervention to the final one. Specifically, during the initial lesson, learners encountered difficulties in solving problems within a guided inquiry-based learning framework. However, as the intervention progressed, they increasingly succeeded in providing solutions to the problems presented. This improvement is evidenced by the observer's comment regarding the learners' behaviour in the inquiry-based classroom.

The observer noted that *"learners can ask questions and provide appropriate solutions, which in turn facilitated collaboration and led to more effective responses to the questions posed."* This observation suggests that with proper guidance and sustained support, learners were able to engage successfully in the inquiry process and generate solutions to the issues related to the topic at hand.

4.5 Post-test results presentation

Following the intervention described above, a post-test was administered to evaluate the impact of guided inquiry-based learning on learners' problem-solving skills in DS. This post-test was conducted for both the control and experimental groups, with the objective of comparing the outcomes to assess the influence of

traditional versus inquiry-based learning approaches on these skills. To analyse the data, the Analysis of Covariance (ANCOVA) was performed using SPSS version 26 software. The ANCOVA facilitated the computation of key statistical measures, including the mean, standard deviation, and p-values. The results of this analysis are presented in Tables 4.9 and 4.10.

Table 4.9 The mean scores of learners after treatment

Group	Mean	Std. Deviation	N
Experimental	13.35	3.689	20
Control	6.15	3.031	20

Table 4.9 presents the mean scores and standard deviations reflecting the performance of learners following the administration of the treatment to each group. As shown, the experimental group achieved a mean score of M = 13.35, SD = 3.689, whereas the control group had a mean score of M = 6.15, SD = 3.031. These results indicate that the experimental group significantly outperformed the control group on the post-test. This finding contrasts with the results in Table 4.6, where minimal or no difference was observed between the mean scores of learners in both the experimental and control groups during the pre-test.

However, it is important to note that the calculation of the mean does not account for confounding variables that may influence the accuracy of the results obtained. Resultantly, SPSS provides both the mean table and the ANCOVA summary table to address this issue. Below is the ANCOVA summary of learners' post-test performance, which determines whether the treatment had a significant effect on learners' problem-solving skills after controlling for the confounding variable. In this analysis, the pre-test, as discussed in the previous chapter, was treated as a covariate, as it was expected to co-vary with the outcome variable, represented by the post-test scores

Table 4.10 The ANCOVA summary of the test scores of experimental and control groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	553.362[a]	2	276.681	25.713	.000	.582
Intercept	565.724	1	565.724	52.574	.000	.587
Pretest	34.962	1	34.962	3.249	.080	.081
Group	523.979	1	523.979	48.695	.000	.568
Error	398.138	37	10.760			
Total	4754.000	40				
Corrected Total	951.500	39				

In Table 4.10, the most significant values, which provide insight into the impact of the treatment on the dependent variable, are highlighted in light blue. However, it is also important to explain the other factors represented in the table. Firstly, the corrected model shows the results after adjusting for the effect of covariates on the dependent variable (Howell, 2017). This adjustment helps to clarify the true effect of the independent variable, guided inquiry-based learning, on the dependent variable, which in this case is learners' problem-solving skills. The intercept represents the expected value of the dependent variable when the covariates are set to zero (Howell,2017). Additionally, the pre-test reflects whether there was a significant difference between the groups before the treatment was administered (Pallant, 2016).

The "group" variable represents the actual impact of the independent variable on the dependent variable (Field & Miles, 2012). Specifically, the value under "group" pertains to both the control and experimental groups. The results here are instrumental in understanding the potential of guided inquiry-based learning (IBL) to enhance problem-solving skills among learners in DS. The type III sum of squares indicates the amount of variance explained by each variable while accounting for other variables (Howell, 2017; Pallant, 2016). The degrees of freedom (D.F.) represent the number of independent pieces of information available. Meanwhile, the mean square provides an estimate of variance within groups (ibid). The F-value is the ratio that compares the variability within groups (Field & Miles, 2012), and the significance value (Sig.) determines whether the

results are statistically significant relative to the chosen alpha value, also known as the p-value (Beavans, 2024). Finally, partial eta squared represents the strength or the effect size of the independent variable on the dependent variable (Pallant, 2016).

The results in Table 4.10 indicate that guided inquiry-based learning had a positive impact on learners' problem-solving skills in DS. The level of significance for the group value in the table was $p = 0.00$, which is less than 0.05, thereby showing that the results are significant. This finding suggests that after learners were exposed to different teaching methods—guided IBL and traditional methods—their performance differed significantly, with the significant improvement attributable to guided inquiry-based learning. This conclusion is supported by the value of the pre-test in Table 4.11, where the recorded significance was $p = 0.80$, which is greater than 0.05. Thus, the pre-test results indicate no substantial difference between the groups before the intervention. Further, as demonstrated in Table 4.10, the mean score for the experimental group was higher than that of the control group, confirming the effectiveness of the intervention.

Statistically, the impact of the treatment on learners' problem-solving skills is presented as follows: $F(1,37) = 48.695$, $p < 0.05$. These results suggest that at the post-test level, the scores for the intervention and comparison groups differed significantly, confirming that guided IBL had a positive impact on enhancing learners' problem-solving skills. The significance value of $p < 0.05$ ($0.00 < 0.05$) further illustrates that when learners engage in inquiry-based processes, their problem-solving abilities improve more than when they engage in traditional learning methods. The strength of the association between guided inquiry and learners' problem-solving skills, as indicated by the partial eta squared ($n = 0.568$), suggests a moderate effect size, which is highlighted in blue in the row representing the group statistics.

According to Brydges (2019), effect sizes can be categorised as small, medium, or large, with corresponding ranges of approximately 0.2, 0.5, and 0.8. It is important to emphasise that the ANCOVA results in Table 4.11 helped to ensure the accuracy of these findings by controlling for the effect of the covariate (pre-test), which had the potential to distort the association between the treatment and the dependent variable (problem-solving skills, as measured by post-test scores). Therefore, it can be concluded that guided inquiry-based learning has significant potential to enhance learners' problem-solving skills in DS compared to conventional teaching methods.

4.6 The level of satisfaction among learners in DS on the use of guided inquiry-based learning in teaching problem-solving skills.

The third research question focused on assessing learners' satisfaction with the use of guided inquiry-based learning in DS. To capture their responses, a five-point Likert scale was employed, consisting of 10 statements from which learners could indicate their level of satisfaction. It should be noted that this Likert scale was administered exclusively to the treatment group, comprising 20 learners. Table 4.11 presents the frequency percentages corresponding to learners' responses. For the purpose of calculating the median, responses ranging between 1 and 2.5 were categorized as "disagree," while those falling between 2.6 and 5 were categorized as "agree."

The analysis of median values was conducted using SPSS software (version 26). It is noteworthy that the level of satisfaction percentages was calculated based on responses from the 20 learners in the treatment group, as illustrated below. The calculation of the median was deemed highly appropriate for analysing learners' responses. As discussed in the previous chapter, the median calculation is particularly valuable because it has the potential to control for outliers that could otherwise affect the validity of the results. Accordingly, it was considered essential to validate the frequency percentages of learners' responses through the calculation of the mean, ensuring that the results presented are robust and reliable

$$\frac{\textit{Number of learners who responded}}{\textit{Total number of learners involved}} = \textit{Level of satisfaction (\%)}$$

Above is the formular that was used to calculate the percentages in Table 4.11.

The values that indicate the degree of agreement were five thus the scale was a five-point Likert scale. The Likert Scale points were abbreviated as follows: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree and SA=Strongly Agree.

Table 4.11 Learners' satisfaction on the use of guided inquiry-based learning

Statement	Level of satisfaction in percentage (%)					Median value
	SD	D	N	A	SA	
1. Guided IBL helped me to grasp difficult concepts more easily	0%	0%	15%	60%	25%	4
2. With guided inquiry, I was able to apply solutions to real-world problems	0%	10%	15%	30%	25%	4
3. I found it interesting to be given an opportunity to ask questions during the process of inquiry	0%	0%	10%	25%	65%	4
4. I felt overwhelmed and confused during the process of inquiry	40%	40%	15%	5%	0%	2
5. Guided inquiry encouraged collaboration among us in the classroom	0%	5%	5%	30%	30%	5
6. Collaboration with my classmates challenged me as others had differing opinions	30%	30%	10%	20%	10%	2
7. I enjoyed being actively involved in the classroom as I had a better understanding of the topic taught	0%	0%	10%	50%	40%	4
8. In guided inquiry class, I was unable to choose best solutions to the identified problems	35%	30%	15%	10%	10%	2
9. I like being continually supported in the process of learning	0%	0%	15%	50%	35%	4
10. I was able to identify solutions to the problems independently in guided IBL classroom	0%	0%	20%	55%	25%	4

As presented in Table 4.11, learners were generally satisfied with the use of guided inquiry-based learning (IBL) in their classroom for developing problem-solving skills. Notably, 60% of learners agreed with the first statement on the scale, indicating that guided IBL helped them grasp difficult

concepts in the DS classroom. Additionally, 25% of learners strongly agreed with this statement. Meanwhile, 15% of learners neither agreed nor disagreed, remaining neutral. The table further shows that none of the learners strongly disagreed with the statement, implying that all respondents, except those who remained neutral, marked their responses as "agree" or "strongly agree," indicating a majority consensus on the positive impact of guided IBL.

The data in Table 4.11 reveal a median of four for the first statement, which was categorised as "agree" regarding learners' satisfaction with guided IBL. This finding reinforces the notion that most learners perceived guided IBL as effective in enhancing their problem-solving skills. Moreover, 0% of learners strongly disagreed with the second statement, and 10% of learners disagreed. On the contrary, 15% of learners (three out of 20) remained neutral, while 30% agreed that guided inquiry helped them apply solutions to real-world problems. Similarly, 25% of learners strongly agreed that guided inquiry played an important role in allowing them to provide solutions to real-world problems. This suggests that a substantial number of learners—approximately 15 out of 20—expressed satisfaction with the use of guided inquiry in their classroom. The median value for the second statement also indicated general agreement, suggesting that learners were satisfied with guided inquiry for learning problem-solving skills in DS.

Regarding the statement "I found it interesting to be given an opportunity to ask questions," learners generally agreed that they were satisfied. Specifically, 65% of learners (13 out of 20) strongly agreed that they found it interesting to be given an opportunity to ask questions in an inquiry-based class as they sought solutions to problems. Additionally, 25% of learners agreed with this statement, indicating their satisfaction with the inquiry process that allowed them to ask questions. Notably, 10% of learners remained neutral on this statement, while 0% disagreed or strongly disagreed, suggesting widespread satisfaction with the opportunity to ask questions in a guided IBL classroom. The median of four further supports this conclusion, statistically indicating significant agreement on learners' satisfaction.

In response to the fourth statement, a large proportion of learners disagreed that guided IBL overwhelmed or confused them during problem-solving. Specifically, 40% of learners strongly disagreed, and another 40% disagreed, totalling 80% of learners who disagreed that guided inquiry was confusing or overwhelming. Again, 15% of learners remained neutral, and only one learner

agreed that guided inquiry was confusing and overwhelming, with 0% strongly agreeing. The median of two, categorised as "disagree," suggests that learners generally did not find guided inquiry to be confusing or overwhelming.

The fifth statement on the Likert scale, "Guided inquiry encouraged collaboration among us in the classroom, which helped us provide solutions to problems more easily," received positive responses. As presented in Table 4.11, 0% of learners strongly disagreed, while only one learner (5%) disagreed with the statement. Importantly, 30% of learners agreed that collaborating with peers helped them develop problem-solving skills, while 60% strongly agreed. The median of five, indicating high satisfaction, suggests that learners found collaboration beneficial for problem-solving in a guided IBL classroom.

When asked about their satisfaction with the statement, "Collaboration with my classmates challenged me as others had differing opinions which confused me," learners generally disagreed. As indicated in Table 4.11, 30% of learners strongly disagreed, and another 30% disagreed with the statement. However, 20% of learners agreed that collaboration posed a challenge due to differing opinions, and 10% strongly agreed, while 10% remained neutral. Despite some learners acknowledging challenges, the median of two, categorized as "disagree," suggests that learners were generally satisfied with collaboration in guided IBL.

Regarding the seventh statement, "I enjoyed being actively involved in the classroom as I had a better understanding of the topics taught," the results indicate high satisfaction among learners. The median of four, categorised as "agree," suggests a strong level of satisfaction. None of the learners strongly disagreed or disagreed with the statement, while 10% remained neutral, 50% agreed, and 40% strongly agreed, indicating that active involvement in the classroom through guided IBL contributed to their understanding and satisfaction.

In response to the eighth statement, "In a guided inquiry class, I was unable to choose the best solutions to the identified problems," learners generally disagreed. Specifically, 35% of learners strongly disagreed, and 30% disagreed, indicating that they did not perceive guided IBL as inhibiting their ability to choose the best solutions. Only 15% of learners remained neutral, while 10% agreed and another 10% strongly agreed. The median of two, indicating disagreement,

suggests that learners were satisfied with their ability to choose solutions in a guided IBL classroom.

For the ninth statement, "I like being continually supported in the process of learning," the results show strong satisfaction among learners. None of the learners strongly disagreed or disagreed with the statement, although some (15%) remained neutral. A significant majority—50% of learners—agreed, and 35% strongly agreed that they liked receiving continuous support during the learning process. The median of four indicates that learners generally agreed, suggesting that ongoing support during guided IBL contributed to their satisfaction.

Finally, in response to the last statement, the results indicate that learners were satisfied with the use of guided IBL in their classroom. Specifically, 25% of learners strongly agreed that they were able to identify solutions to problems independently in a guided inquiry-based classroom, while 55% agreed. Only 20% of learners marked their responses as neutral, and 0% disagreed or strongly disagreed. The median of four indicates that learners were generally satisfied with the use of guided IBL, particularly in fostering independent problem-solving skills

4.7 Chapter summary

The results presented in this chapter indicate that learners' problem-solving skills were initially at the same level before the intervention, as reflected in the pre-test scores. Principally, none of the learners involved in the study scored at least 50%, equivalent to 10 out of 20. However, following the administration of a specific treatment to each group, those taught using guided inquiry-based learning (IBL) demonstrated superior performance compared to those instructed through conventional methods. Observations further revealed that learners' behaviour and performance in problem-solving activities progressively improved as they became more accustomed to the guided inquiry process.

Additionally, the findings suggest that a significant number of learners were satisfied with the use of guided inquiry in their classroom. Although some learners chose not to express their views on certain statements, the number of those who agreed with the positive statements exceeded those who remained neutral. Only a small minority of learners found collaboration during the inquiry process to be stressful, resulting in a marked response of dissatisfaction. Nevertheless, the majority

of learners disagreed with the negative statements concerning inquiry-based learning. Therefore, it can be concluded that learners perceived guided IBL as beneficial to their learning, as evidenced by their overall satisfaction with the inquiry process.

Chapter 5

5.0 Discussion of the results, conclusion and recommendations

5.1 Introduction

The present study investigated the effectiveness of guided Inquiry-Based Learning (guided IBL) in enhancing problem-solving skills among 11th graders in Development Studies (DS). The primary objective was to determine whether guided IBL could significantly improve learners' ability to address complex problems, such as evaluating potential solutions to climate change in Lesotho. This chapter critically discusses the research findings in relation to the existing literature and the research questions outlined below.

Research questions

- ✓ What is the current level of problem-solving skills among learners in DS?
- ✓ What influence does guided IBL have on learners' problem-solving skills in DS?
- ✓ What is the level of satisfaction among learners on the use of guided inquiry-based learning in DS class?

5.2 The current level of problem-solving skills among learners in DS

The first research question aimed to determine the level of problem-solving skills among learners in Development Studies (DS). To address this question, a pre-test was conducted, as described in the preceding chapter. The findings revealed that learners' problem-solving abilities were significantly deficient prior to the intervention. Primarily, none of the 40 participants in the study achieved a passing mark, with no learner attaining the minimum of 10 out of 20 marks required for a pass. The highest score recorded was 8 out of 20 marks.

These results are consistent with those reported by Oroz et al. (2023), who found that grade 9 chemistry learners also performed poorly on problem-solving tasks during the pre-test phase. Similarly, in the current study, both the control and experimental groups exhibited low scores in

problem-solving assessments. Supporting this, the test of homogeneity for the groups at the pre-test level indicated that $p = 0.895 > 0.05$, suggesting that the performance of learners was comparable between the two groups. Sippl (2021) suggested that without a structured, step-by-step approach like the IDEAL model of problem-solving, teachers struggle to effectively develop students' problem-solving skills.

Furthermore, Wang (2015) argued that traditional learning approaches hinder learners' ability to cultivate essential skills, such as problem-solving and critical thinking. Freire (1970) similarly criticised traditional education methods for failing to support active learner participation, describing them as dehumanising and perpetuating the status quo, where learners are denied epistemological access. This implies that the poor problem-solving performance observed among learners may be linked to the teaching approaches employed. In alignment with this view, Hu (2024) emphasised that traditional learning methods deprive learners of the opportunity to understand concepts deeply and develop vital skills.

While the poor performance in DS may be accredited to the nature of teaching and learning provided, Adeoye et al. (2023) and Marshall (2022) argued that problem-solving is inherently learner-centred and should be taught accordingly. Adeoye (2023) further argued that learners with well-developed problem-solving skills tend to perform better on tasks requiring such abilities. Pratiwi et al. (2021) recommended the IDEAL model as an effective guide for teachers to help learners more easily build problem-solving skills. Additionally, the Lesotho Basic Education Curriculum Policy (LBECP) advocates for an educational approach in Lesotho that emphasises the development of critical thinking and problem-solving skills, highlighting the importance of learner-centred teaching and learning (MoET, 2021).

The discussion now proceeds to the second research question.

5.3 The influence of guided inquiry-based learning in enhancing problem-solving skills of learners in DS

The second research question aimed to evaluate the influence of guided inquiry-based learning (guided IBL) on enhancing problem-solving skills among learners in Development Studies (DS).

To address this question, two phases were utilised: observations during the intervention and a post-test conducted at the end of the intervention. This section discusses the observations made during the intervention with the group that was treated with guided IBL.

The observations from the first lesson, as presented in Table 4.7, indicated that learners were unfamiliar with the process of inquiry. Although they exhibited some interest in the lesson, they struggled to actively participate and pose questions related to the presented problem or topic. The evidence supporting these assertions is drawn from the first statement on the orientation phase, where 75% of the responses were marked as "no," indicating that learners were not well-acquainted with guided inquiry. Similarly, in the conclusion phase, where learners were expected to reflect on the information gathered in previous stages and apply it to the identified problems, all responses were marked as "no." This initial lack of engagement was attributed to learners' limited exposure to teaching approaches such as guided IBL.

At this stage, it was reported that the teacher played a crucial role by providing continuous support to learners during the inquiry process. The IDEAL model of problem-solving, which informed this study, emphasises that teachers can adopt this model to effectively teach problem-solving skills (Annizar et al., 2020). Furthermore, Setyadi and Triyanto (2019) highlighted that during problem-solving, teachers must continuously support learners, particularly in identifying the problem of investigation as the first step. Pedaste et al. (2015) similarly argued that in guided inquiry, teachers should consistently support learners and provide them with necessary learning materials throughout the lesson. Resultantly, it can be concluded that the IDEAL model played an important role in the initial stage of the lesson, as the teacher utilized its components to guide learners through the inquiry process.

The third lesson of the intervention, as shown in Table 4.8, demonstrated significant improvement in learners' behaviour in conducting inquiry-based problem-solving. Learners were reported to have improved in identifying investigation problems and proposing solutions. For instance, in the first lesson, during the orientation phase focused on topic presentation and problem identification, 75% of the responses were marked as "no." However, by the third lesson, 75% of the responses were marked as "yes," suggesting that as learners became accustomed to the inquiry process, their performance and behaviour in solving problems improved significantly.

Supporting this finding, Nisa et al. (2018) observed that senior high school learners in Indonesia gradually improved their performance after being exposed to inquiry-based learning. Similarly, Sukantawaree et al. found that in the Thai context, 4th graders' problem-solving skills improved from 14.28% to 54.14% after exposure to IBL. This suggests that guided IBL has the potential to enhance learners' problem-solving skills. As a product of constructivism, this finding aligns with Andrini's (2016) view that the learner-centred nature of guided IBL allows for active classroom participation, fostering the development of essential skills.

Active participation in the learning process appears to be crucial for developing problem-solving skills. The IDEAL model underscores the importance of learner engagement by allowing them to explore ideas and satisfy their curiosity through interaction with various materials to solve problems (Gusau & Mohamand, 2020). It can thus be concluded that as learners become more familiar with the inquiry process, their problem-solving skills improve compared to their initial encounters.

In the final lesson of the intervention, learners appeared to have developed all the essential characteristics indicative of problem-solving skill development. Markedly, all statements on the observation checklist were marked as "yes." This record indicates that the inquiry process, with the teacher's guidance, significantly enhanced learners' ability to identify problems, develop procedures to address them, explore relevant materials, and apply appropriate solutions to the identified issues.

To support this assertion, Canning and Masika (2022) illuminated that guided IBL encourages active learner participation, enabling them to construct their own knowledge and shape their understanding. Further, Heick (2023) added that engaging learners in question-posing helps them develop effective problem-solving skills and apply these solutions to real-world scenarios. This evidence suggests that guided IBL is a valuable tool for fostering problem-solving skills among learners in DS. As an advocate of scaffolding, Wood et al. (1976) emphasised the importance of continued support during learning, arguing that learners need proper guidance from a more knowledgeable other to grasp difficult concepts. This suggests that in guided IBL, the teacher's support positively impacted learners' inquiry processes, aiding their development of problem-solving skills.

In summary, the observations indicate that when learning is guided and learners are actively involved through question-posing and collaboration, their problem-solving abilities improve. Additionally, when teachers have clear guidelines, such as the IDEAL model for implementing IBL, it becomes easier to assist learners throughout the process.

5.4 The post-test results discussion

This section presents the outcomes of the post-test administered after the completion of the intervention. The purpose of the post-test was to assess the impact of guided Inquiry-Based Learning (guided IBL) on learners' problem-solving skills. Both the interest group, which received guided IBL, and the comparison group, which was taught using traditional methods, were post-tested to identify any differences in performance following the treatment.

The results revealed that learners who were taught using guided IBL demonstrated significantly better performance compared to those who were taught using conventional methods. Specifically, Table 4.10 indicates that the mean score for the experimental group was m=13.35m, whereas the mean for the control group was m=6.15m. Furthermore, a significance level of p=0.00 was recorded, signifying $p<0.05$, which suggests that there were significant differences between the results of the two groups at the post-test level. This difference is further supported by the higher mean scores of the experimental group compared to the control group.

These findings highlight the superior potential of guided IBL over traditional approaches in enhancing learners' problem-solving skills in Development Studies (DS). Exceptionally, at the pre-test level, no significant differences were observed between the two groups, as evidenced by a significance level of p=0.895, which is greater than 0.050.

The results are consistent with previous research by Masilo (2018), Mwenda and Ndayambaje (2021), Nisa et al. (2018), and Sukontawaree et al. (2022), all of which found that IBL significantly improves learners' problem-solving skills and critical thinking abilities compared to traditional methods. Specifically, Mwenda and Ndayambaje (2021) propounded that the components of IBL, such as cooperative and self-directed learning, facilitate out-of-the-box thinking and the development of higher-order thinking skills. This study corroborates that allowing learners to

interact and engage in problem-solving activities enhances their performance in addressing complex questions.

Nachiappan et al. (2018) emphasised that high-order thinking skills, including problem-solving, enable learners to manipulate information and apply solutions effectively. Similarly, Marshall (2021) suggested that problem-solving extends beyond mere memorisation and reproduction of knowledge to include understanding and applying facts to real-world situations. Therefore, effective problem-solving is crucial in the teaching and learning of DS. Traditional learning methods, which tend to inhibit the development of essential skills, should be reconsidered. Freire (1970) further argued that conventional teaching approaches create unjust learning environments that do not foster learners' ability to actively engage and construct their own understanding.

In conclusion, the post-test results indicate that properly guided learners can successfully develop and apply problem-solving skills. According to Bloom (1969), learners who achieve high levels of problem-solving proficiency are capable of synthesizing, appraising, analysing, and assessing situations. This study demonstrates that guided IBL can effectively stimulate learners' curiosity through questioning, exploration, and knowledge construction, leading to enhanced problem-solving skills. Thus, it is recommended that DS teachers consider adopting guided IBL as a pedagogical approach to support learners in acquiring these crucial skills. The next section will discuss learners' satisfaction with the use of guided IBL in DS classrooms.

5.5 The level of satisfaction among learners on the use of guided inquiry-based learning in DS class

In an epistemologically accessible and equitable learning environment, the feelings and satisfaction of learners are highly valued (Andrini, 2016; Freire, 1970; Heick, 2023). Accordingly, the final research question of this study aimed to assess learners' satisfaction with the use of guided Inquiry-Based Learning (guided IBL) in their Development Studies (DS) classrooms. Despite its novelty, learners reported a high level of satisfaction with guided IBL when evaluated on a five-point Likert scale, particularly in relation to developing problem-solving skills. Specifically, as detailed in Table 4.11, a substantial number of learners expressed that guided IBL was an effective approach for enhancing their problem-solving skills, with 60% indicating that it facilitated their understanding of difficult concepts in DS.

Moreover, learners greatly appreciated the opportunities to ask questions and collaborate during the inquiry process. The IDEAL model of problem-solving supports the notion that allowing learners to ask questions contributes to a sense of belonging within the classroom. Mackenzie (2016) emphasised that IBL promotes social interaction among learners, which aids them in addressing various problems. Similarly, Vygotsky (1978) highlights the significance of social interaction in the classroom, arguing that it enables novice learners to receive guidance from more knowledgeable peers. This implies that facilitating interaction and inquiry enhances learners' problem-solving abilities.

Prominent advocates of learner-centered teaching, including Brunner (1978), Freire (1970), and Vygotsky (1978), underscore the necessity of ongoing support during the learning process. They argue that continuous guidance improves learners' ability to perform tasks and complete activities independently. The IDEAL model, as articulated by Bransford and Stein (1984), insists that effective problem-solving instruction requires learners to receive assistance in identifying problems from the outset to successfully complete the problem-solving process. In this study, learners reported meaningful satisfaction with the inquiry process, noting that it enabled them to identify relevant solutions to problems.

Nevertheless, despite these positive findings, the literature reveals ongoing challenges in implementing IBL in various contexts. For instance, Simbarashe and Gherda (2019) identified that in Zimbabwe, the implementation of IBL is hindered by the demands of public examinations, which limit the time available for such approaches. Similarly, Koekoe (2023) acknowledged that while teachers in Lesotho hold a positive attitude towards IBL, they often lack the necessary competencies and skills for its effective classroom implementation.

To address these constraints, several scholars propose potential solutions. Koekoe (2023) and Pesqueira (2020) suggest that the responsible ministries should provide ongoing teacher training through workshops or seminars focused on IBL implementation. Furthermore, Heick (2023) advocates for collaborative efforts among teachers to share skills and strategies for conducting inquiry-based learning. Regarding public examination results, Kuykendall (2022) proposes that teachers align inquiry procedures with the syllabus's end-of-level objectives to better integrate IBL within the assessment framework.

In summary, while learners expressed satisfaction with guided IBL and its benefits for problem-solving skills, challenges in its implementation persist across various contexts. Addressing these challenges through targeted training and alignment with assessment objectives could enhance the effectiveness and adoption of IBL in diverse educational settings

5.6 Conclusion

This study investigated the impact of guided Inquiry-Based Learning (guided IBL) on enhancing problem-solving skills among Grade 11 learners in Development Studies (DS) at a high school in Maseru. Employing a quantitative quasi-experimental design, the study included two groups: an experimental group that experienced guided IBL and a comparison group that was taught using conventional methods. Initially, pre-test results showed no significant differences between the two groups, establishing a baseline for comparison. However, post-test results demonstrated that the experimental group, which underwent guided IBL, exhibited substantial improvement in problem-solving skills compared to the control group. Additionally, classroom observations revealed that learners' understanding of concepts, collaboration skills, information retrieval, and problem-solving application meaningfully improved as they adapted to the inquiry process.

The findings suggest that guided IBL has considerable potential for fostering a deeper understanding and active engagement with learning materials, thereby enhancing learners' problem-solving abilities. Feedback collected via a Likert scale reflected high levels of satisfaction among learners with the guided IBL approach. The results underscore the transformative potential of guided IBL in educational practices within DS teaching and learning. Furthermore, the IDEAL model of problem-solving provided a clear, step-by-step framework for implementing IBL phases, which was highly valued for its simplicity and effectiveness in teaching problem-solving skills.

In conclusion, the study affirms that guided IBL positively impacts problem-solving skills among Grade 11 learners in DS. The results indicate that learners benefit more from active inquiry compared to passive learning environments. Active learning approaches, therefore, emerge as more effective in fostering problem-solving skills.

5.7 Recommendations

Recommendations in research are crucial, as they offer guidance and advice from the researcher to various stakeholders (Nair, 2024). Such recommendations typically stem from the findings of the current investigation. Thus, this study proposes the following recommendations:

Implementation of Guided Inquiry-Based Learning (IBL) in Lesotho's Education Context

1. **Incorporation of IBL in Curricula:** The literature review indicates that teachers generally do not harbour negative attitudes toward IBL. Therefore, it is recommended that schools in Lesotho integrate this teaching approach into their curricula, particularly in Development Studies (DS). This recommendation is supported by the Curriculum and Assessment Policy Statement (CAPS) and the Lesotho Basic Education Curriculum Policy (LBECP), which emphasize that education in Lesotho should aim to enhance learners' abilities to tackle real-life situations (MoET, 2018; MoET, 2021).
2. **Professional Development for Teachers:** Echoing the suggestions of Koekoe (2023), it is recommended that the Ministry of Education and Training implement on-going professional development programs for teachers. These programs should focus on equipping educators with the skills and knowledge necessary to implement 21st-century teaching methods such as guided IBL. Professional development could include workshops, seminars, and guided group discussions. Additionally, this study advocates that the Ministry encourage collaborative efforts among teachers. By sharing ideas and experiences, teachers can better implement IBL and enhance their teaching practices.
3. **Engaging Learners in Active Learning:** It is advisable for teachers to engage learners in active learning processes. When introducing new approaches, such as guided IBL, active engagement will help learners relate more easily to the new methods. In DS, the theme "education and development" encompasses topics such as pollution, resources, and climate change. Allowing learners to construct their own knowledge on these topics can significantly boost their classroom engagement.

5.8 Limitations of the Study

Despite successfully demonstrating the effectiveness of guided IBL in improving problem-solving skills among DS learners, this study acknowledges certain limitations. Primarily, the focus on problem-solving skills was a limitation, as it excluded other essential skills such as critical thinking, assessment, communication, and leadership, which are also vital in DS education. Furthermore, financial constraints and limited research time restricted the study's scope.

5.9 Areas for Further Research

Further research should look into the long-term impacts of guided IBL across various grade levels and subjects. Additionally, this study's results provide insights into conducting inquiry-based learning in the classroom with a focus on problem-solving skills. Subsequent research could explore how guided IBL can enhance other critical skills, such as creativity, critical thinking, communication, and computational skills. Furthermore, examining different types of IBL across various subjects could provide valuable insights into their impact on teaching and learning.

5.10 Reflections

Reflecting on this research journey reveals several insights into the use of guided IBL in DS classrooms. Importantly, learners excel in problem-solving when they actively participate and engage in the learning process. The enthusiasm observed during the guided IBL intervention accentuates the importance of creating a conducive learning environment that motivates learners to explore ideas independently.

Despite facing financial and health challenges, this study reaffirms the value of innovative teaching approaches tailored to the diverse needs of learners while fostering essential skills like problem-solving. In conclusion, this research offers valuable contributions to understanding effective pedagogical strategies for developing 21st-century skills among learners.

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Appendices

Appendix 1 Observation checklist

CLASSROOM OBSERVATION CHECKLIST

This checklist aims to assess learners' behaviour during the process of guided inquiry to develop problem-solving skills in the Development Studies classroom. The checklist has been designed with the five phases of Inquiry-Based Learning according to Pedaste et al. (2015).

Observe learners' behaviour and mark the responses; "yes/no" according to the relevant criteria

No.	**Criteria**	**Responses**	
A	**Orientation phase:** assessment of insightful question posing to identify the problem of investigation.	***Yes***	***No***
1.	Learners demonstrate interest by asking relevant questions to the current investigation.		
2.	Learners can identify the problem of investigation during the process of question posing.		
3.	Learners often ask questions during the process of learning.		
4.	Learners can relate questions to real-world scenarios or problem-solving tasks.		
B	**Conceptualisation phase:** learners' ability to set goals and procedures to be followed in finding solutions to the problem.		
5.	Learners can identify important objectives to achieve.		
6.	Learners can collaborate and share opinions about the objectives to be achieved.		
7.	Learners can formulate a procedure on how to respond to the identified problem.		

8.	Learners identify the resources or materials that will be needed.		
C	**Investigation phase:** learners' ability to explore solutions to the identified problem.		
9.	Learners demonstrate curiosity and persistence in seeking relevant information.		
10.	Learners seek answers on their own before asking help from the teacher.		
11.	Learners are able to access resources independently.		
12.	Learners actively collaborate with their peers by sharing ideas to explore solutions.		
D	**Conclusion phase:** the provision of solutions to the identified problem.		
13.	Learners are able to evaluate the identified solutions to choose the most appropriate.		
14.	Learners are able to place in order of importance the identified solutions.		
15.	Learners shows strong critical thinking skills by making logical connections on the identified solutions.		
16.	Learners provide relevant examples of the identified solutions.		
E	**Discussion phase:** learners demonstrate problem-solving skills, reflect on their process of inquiry and identify areas of improvement.		
17.	Learners evaluates their problem-solving process.		
18.	Learners reflect on their behaviour during inquiry process.		
19.	Learners provide a summary of the identified solutions to demonstrate the development of problem-solving skills.		
20.	Learners reflect on their strengths and weaknesses during the lesson for future improvement.		

Appendix 2 Likert scale

LIKERT SCALE

Aim: To assess learners' satisfaction on the use of guided inquiry-based learning to enhance problem-solving.

NO.	State your level of satisfaction regarding underlisted factors	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	Guided inquiry approach helped me to grasp difficult concepts more easily.					
2.	With guided inquiry, I was able to apply solutions to real world problems.					
3.	I found it interesting to be given an opportunity to ask questions in class.					
4.	I felt overwhelmed and confused during the process of guided inquiry.					
5.	Guided inquiry encouraged collaboration among us in classroom which helped us to provide solutions to problems easier.					
6.	Collaboration with my classmates challenged me as others had differing opinions which confused me.					
7.	I enjoyed being actively involved in the classroom as I					

	had better understand of the topics being taught.					
8.	In guided inquiry class, I was unable to choose best solutions to identified problems.					
9.	I like being continually supported in the process of learning.					
10.	I was able to identify solutions to the problems independently in guided inquiry-based classroom.					

Appendix 3 Pre-test, Post-test

GRADE 11 DEVELOPMENT STUDIES MARKS (20)

GENDER:

AGE:

1. Define the following terms in relation to development:
   Population:_____
   _____
   Overpopulation:_____
   _____
   Infant mortality:
   _____
   _____ (3)

2. Assess the impact of overpopulation on Development in Lesotho
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   (4)

3. Analyse ways in which infant mortality rate can be reduced in Lesotho
   _____
   _____
   _____
   _____
   _____

_____
_____
_____
_____
_____ (4)

4. Define the term
   urbanisation_____
   _____ (1)

5. Examine the impact of urbanisation in both rural and urban areas
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____(4)

6. Describe the possible solutions to the problems brought by urbanisation in both rural and urban areas
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____ (4)

Appendix 4 Introductory letter

The National University of Lesotho

Telephone: +266
22340601/3631P.O. Roma 180

Lesotho

FACULTY OF EDUCATION

Date 15th April, 2024

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

A Letter of introduction to undertake research

This letter serves to introduce Ms. Puseletso Mathaha, who is a Master of Arts in Education (M.A. ED) student in the Faculty of Education at the National University of Lesotho (NUL). The student is undertaking research on Development Studies Inquiry-Based Learning approach and problem-solving skills. The study involves classroom-based experimental research for a period not exceeding one month.

Kindly accord him the necessary assistance and support in this important activity.

Your cooperation is highly appreciated.

Yours sincerely,

Dr. Makhulu Makumane (HOD)

Appendix 5 Informed consent

INFORMED CONSENT

Dear parents or guardian

My name is Puseletso Mathaha. I am a Master's candidate at the National University of Lesotho under the Department of Language and Social Education. I am conducting research aimed at exploring the impact of guided Inquiry-based Learning on enhancing problem-solving skills among grade 11 DS learners. In conducting this study, I am hoping to significantly contribute to your children's educational journey if you agree or allow them to participate. Participation shall involve group discussions, hands-on activities, exploration of the physical environment and many more.

All information collected in this study will be kept confidential and stored securely. Again, your child's identity will not be included in any reports or publications regarding this study. Equally important, participation in this study is voluntary. Therefore, you are free to withdraw your child at any time if you find a need to do so.

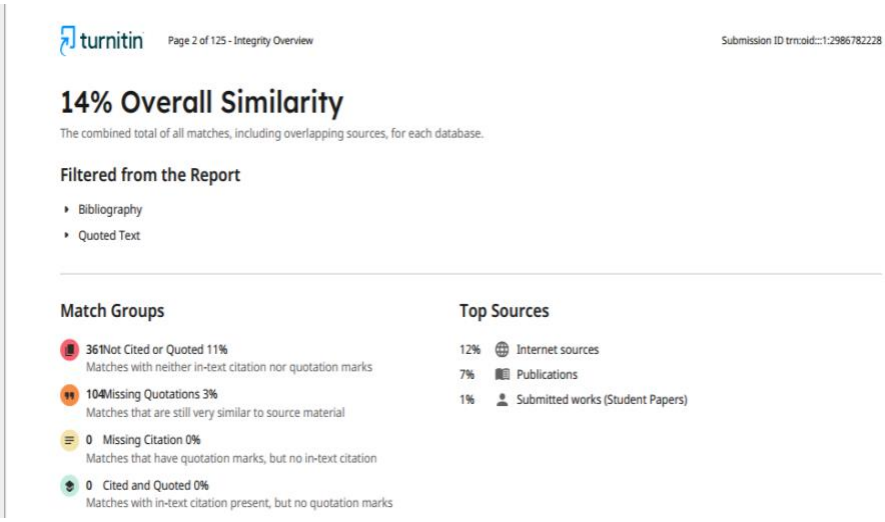
For any questions, feel free to contact me at puseletsomathahaanna@gmail.com or 51936063

PLEASE READ THE SECTION BELOW AND PROVIDE YOUR SIGNATURE

I have read and understood the above information regarding my child's participation in the study mentioned above.

_____

Appendix 6 Turnitin Report



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