Explicit and Systematic Pedagogy in Mathematics Education in Namibian Primary Schools

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**Tiivistelmä – Abstract**

Explicit and systematic pedagogy is an effective and efficient method of promoting learning, in comparison to other approaches. It is vital for primary school mathematics students, as it enhances their factual, procedural, and conceptual knowledge. It is effective in maintaining a meaningful learning experience for students of all mathematical abilities and assists them to develop their expectations, subsequently enhancing their mathematical aptitudes and reducing achievement gaps between low and higher performers. In this study, the researcher investigated the presence of ‘explicit and systematic pedagogy’ features in Namibian primary schools’ mathematics learning situations. Components such as ‘I do,’ ‘we do’ and ‘you do’ form core features of explicit and systematic pedagogy, which encompasses several additional attributes.

To obtain qualitative data of this case study, the researcher employed research tools such as analysis of curriculum conception (documents), semi-structured interviews for teachers, classroom observations, and semi-structured questionnaires for students. Four mathematics teachers and 16 students were participants in this study. The researcher analysed the information obtained by using an interpretive orientation. To develop data codes, groups, and themes; an inductive approach was pursued through the analysis process. Data interpretation plays a significant role in the formation of theories.

The findings of this study reveal that the expectations of explicit and systematic pedagogy and learner-centred education, in the Namibian context, have similarities and variations. Prior knowledge, meaningfulness, creating new understanding, new skills and applications, assessment and competencies, ICT, differentiation of methods and special units are universal ideas among these concepts. Introducing lesson objectives, skills mastery before independent practice and maintenance are ideas absent from learner-centred description. It further reveals that students’ motivation toward mathematics is unsatisfactory, their understanding is poor, and collaborative learning attitude is worrisome. Teachers concentrate on prior content knowledge over prior everyday knowledge; respondents do not discuss lesson objectives with students. However, they demonstrate concepts, and they give a combination of effective and ineffective assessment and feedback. It further revealed that, in contrast to teachers’ perceptions, students prefer pair or group work. Students are unable to incorporate a majority of the concepts they learn into their livelihood and possess mixed feelings towards assessment. Some students use it to enhance their determination, while others criticise themselves.

**Avainsanat – Keywords**

Mathematics education, explicit and systematic pedagogy, primary schools, curriculum conception, teachers’ perceptions, lesson observations, students’ perceptions
# Table of contents

1 Introduction .......................................................................................................................... 1
   1.1 International mathematics education ............................................................................ 1
   1.2 Mathematics education in Namibia .............................................................................. 2
   1.4 Intervention method: Explicit and systematic pedagogy (ESP) .................................. 5
   1.5 Research objectives ....................................................................................................... 7
2 Social constructivism as a pedagogical framework in mathematics education .................... 8
3 Mathematics literacy as an integral facet of mathematics education .................................... 12
   3.1 Developing mathematics literacy .................................................................................. 13
   3.2 Challenges of mathematics literacy ............................................................................. 16
      3.2.1 Teachers’ training .................................................................................................. 16
      3.2.2 Mathematics difficulties ....................................................................................... 16
      3.2.3 Policy guidelines ................................................................................................. 17
4 Explicit and systematic pedagogy in mathematics ................................................................ 20
   4.1 ‘I do’ component ......................................................................................................... 22
   4.2 ‘We do’ component ..................................................................................................... 26
   4.3 ‘You do’ component .................................................................................................... 27
   4.4 Importance of explicit and systematic pedagogy implementation in mathematics education at primary school level ........................................................................... 28
   4.5 Explicit and systematic pedagogy is a form of direct instruction .................................. 30
   4.6 Core explicit and systematic pedagogy ........................................................................ 30
   4.7 Supplementary explicit and systematic pedagogy ....................................................... 31
   4.8 Disadvantages of explicit and systematic pedagogy .................................................... 33
   4.9 Summary of the theoretical framework ...................................................................... 33
5 Research task and research questions .................................................................................. 35
6 Research methodology ......................................................................................................... 36
   6.1 Qualitative study ......................................................................................................... 36
   6.2 Interpretive paradigm .................................................................................................... 37
   6.3 Case Study .................................................................................................................. 37
   6.4 Data collection methods .............................................................................................. 38
      6.4.1 Analysis of policy documents .............................................................................. 39
      6.4.2 Semi – structured Interview for teachers ............................................................ 39
      6.4.3 Lesson observations ............................................................................................. 40
      6.4.4 Semi- structured questionnaire for students ....................................................... 41
   6.5 Sampling and data ...................................................................................................... 42
   6.6 Building rapport .......................................................................................................... 44
6.7 Data collection process ...........................................................................................................44
6.8 Data analysis .............................................................................................................................47
  6.8.1 Inductive .............................................................................................................................47
  6.8.2 Transcribing .........................................................................................................................48
  6.8.3 Content analysis ..................................................................................................................48
6.9 Validity of the study ...................................................................................................................51
  6.9.1 Credibility ...........................................................................................................................51
  6.9.2 Transferability ......................................................................................................................52
  6.9.3 Dependability .....................................................................................................................53
  6.9.4 Confirmability ....................................................................................................................53
6.10 Considerations of ethical principles .......................................................................................54
7 Results and discussions ...............................................................................................................56
  7.1 Features of explicit and systematic pedagogy present in the teaching and learning conception guiding the Namibian basic education ..............................................................................56
    7.1.1 Curricular guidelines for pedagogy in Namibia .................................................................56
    7.1.2 ESP ideas in the curriculum conception ..........................................................................58
    7.1.3 ESP ideas deficient from the curriculum conception .......................................................63
    7.1.4 Summary of the first research question ..........................................................................65
  7.2 Perceptions of Namibian primary school teachers towards mathematics education ..............66
    7.2.1 Motivation in mathematics .............................................................................................66
    7.2.2 Performance in mathematics .........................................................................................68
    7.2.3 Students’ attitudes toward mathematics learning ............................................................71
    7.2.4 Summary of the second research question ....................................................................75
  7.3 Features of explicit and systematic pedagogy in the Namibian’s primary schools’ mathematics learning situations and teachers lesson plans ...............................................................76
    7.3.1 Introduction ......................................................................................................................77
    7.3.2 Lesson presentation .........................................................................................................81
    7.3.3 Conclusion .......................................................................................................................92
    7.3.4 Summary of the third research question .......................................................................94
  7.4 Relationship of students’ perceptions toward mathematics to characteristics of explicit and systematic pedagogy ........................................................................................................96
    7.4.1 Practiced and preferred Instructional arrangement in mathematics ..................................96
    7.4.2 Application of knowledge into real-life scenarios .............................................................98
    7.4.3 Support mechanisms in mathematics .............................................................................99
    7.4.4 Reactions toward assessment in mathematics ................................................................100
    7.4.5 Summary of the fourth research question ....................................................................102
8 Concluding Remarks

8.1 Summary of key findings of the study

8.2 Contribution of the study

8.3 Recommendations of the study

8.4 Recommendations for further studies

8.5 Limitations of the study

References

Appendices
List of tables

Table 1: Parameters of each ESP components.................................................................22
Table 2: Example of a teacher’s demonstration on measuring length by using a ruler, adapted from Doabler and Fien (2013). .................................................................24
Table 3: Data codes formation examples........................................................................50

List of figures

Figure 1: Students’ ZPD model. ..................................................................................9
Figure 2: Teaching and learning mediation model. ......................................................10
Figure 3: Components describing ESP. Adapted from (Jorgensen, 2015)....................22
Figure 4: Determining students interventional needs, adapted from Hanover Research (2014). ......32
Figure 5: Data collection process. ..........................................................................45
Figure 6: Phases in this qualitative analysis...............................................................49
Figure 7: Example of sub-categories formation.........................................................50
Figure 8: Example of categories formation...............................................................51
Figure 9: ESP ideas present in the learner- centred conception................................58
Figure 10: ESP concepts missing from the learner-centred conception.........................63
Figure 11: Teachers’ perceptions towards mathematics education.............................66
Figure 12: Fragments of a lesson presentation.........................................................76
Figure 13: Respondents’ practices during the introduction phase .........................77
Figure 14: Constituents of lesson presentations.......................................................81
Figure 15: Cuboid illustration....................................................................................82
Figure 16: Categories of students learning needs.....................................................89
Figure 17: Concluding techniques. ...........................................................................92
Figure 18: Students perceptions...............................................................................96
Figure 19: Solitary students.....................................................................................97
Figure 20: Sociable students....................................................................................97
Figure 21: Application of mathematical ideas in real-life........................................98
Figure 22: Means of student support......................................................................99
Figure 23: Students perceptions toward assessment.............................................101
## List of acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-R-A</td>
<td>Concrete Representational Abstract</td>
</tr>
<tr>
<td>di</td>
<td>Direct Instruction lower case</td>
</tr>
<tr>
<td>DI</td>
<td>Direct Instruction upper case</td>
</tr>
<tr>
<td>DNEA</td>
<td>Directorate of National Examination and Assessment</td>
</tr>
<tr>
<td>ETSIP</td>
<td>Education and Training Sector Improvement Program</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>JSC</td>
<td>Junior Secondary Certificate</td>
</tr>
<tr>
<td>MKO</td>
<td>More Knowledgeable Others</td>
</tr>
<tr>
<td>NCTM</td>
<td>National Council of Teachers of Mathematics</td>
</tr>
<tr>
<td>NDP2</td>
<td>Second National Development Plan</td>
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<tr>
<td>NDP3</td>
<td>Third National Development Plan</td>
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<tr>
<td>NSSC</td>
<td>Namibia Senior Secondary Certificate</td>
</tr>
<tr>
<td>NSSCO</td>
<td>Namibia Senior Secondary Certificate Ordinary Level</td>
</tr>
<tr>
<td>SACMEQ</td>
<td>Southern and Eastern African Consortium for Monitoring Educational Quality</td>
</tr>
<tr>
<td>SATs</td>
<td>National Standardised Achievement Tests</td>
</tr>
<tr>
<td>S TV</td>
<td>Television</td>
</tr>
<tr>
<td>ME</td>
<td>Science and Mathematics Education</td>
</tr>
<tr>
<td>UNAM</td>
<td>University of Namibia</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations International Children’s Emergency Fund</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Education, Scientific and Cultural Organisation</td>
</tr>
<tr>
<td>ZPD</td>
<td>Zone of Proximal Development</td>
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</table>
1 Introduction

The United Nations Education, Scientific, and Cultural Organisation (UNESCO) underscored the significance of Science and Mathematics Education for all (SME), that is appropriate and of quality to enhance critical and creative sophisticated thinking. These paradigms encourage a change in behaviours to put the world in a more sustainable route. SME could contribute essentially to the attainment of Millennium Development Goals adopted by the world leaders in the year 2000 (UNESCO, 2012). High mathematics literacy is essential for individuals and the country’s economic success, as it helps to maintain competitiveness in the global economy (Reyna & Brainerd, 2007), through novice teaching techniques, intersubjective approaches and promotion of programmes that lead to innovative impacts in education. It additionally shapes the future society and encourages responsible global citizens (Duke & Hinzen, 2016). Mathematics understanding inspires personal, social, and public decision-making (Anthony & Walshaw, 2009).

The researcher is part of the Namibian mathematics teachers’ community and is aware of multiple challenges facing mathematics education. Students’ lack of interest in the subject, poor teaching methods, teachers’ qualifications, changing of teachers, lack of parental support and learning culture and style are some examples of challenges experienced (Ministry of Education, 2009). However, the education ministry is trying greatly to overcome this conundrum. It is part of the researcher’s responsibilities to proffer assistance and possible alternatives towards improving instructions in mathematics. The researcher attended a mathematics course at the University of Eastern Finland, and eventually discovers a concept Explicit and Systematics Pedagogy. Consequently, decides to study it in the Namibian context. Hence, it could be a remedy to the challenges facing mathematics education in Namibia.

1.1 International mathematics education

International evaluations indicate that students’ mathematics knowledge and competencies lack behind the anticipated level. These inequalities detected between and within countries are worrisome. Numerous students (even those who obtain satisfactory grades) despise mathematics, and they do not understand why there is so much emphasis about it (UNESCO, 2012). Students perceive mathematics as an abstract subject that only emphasises on learning computing skills and memorisation of facts. It focuses on getting correct answers and labels those who remember mathematical facts as the brightest (Rossi et al., 2013).
During examinations, students become anxious, which reduces their intellectual capacity and subsequently cause them to underperform. The perceptions of mathematics as an abstract subject limit the students’ ability to recognise how it relates to the real world (Rossi et al., 2013). They perceive it as an isolated subject, separated from the world’s actual problems. Furthermore, many views it as an incomprehensible subject; particularly females are prone to experience more difficulties in learning mathematics than males, causing their disinterest towards mathematics outside the school context (Panthi & Belbase, 2017). These misconceptions affect the instructional process and impede the quality of mathematics education. Therefore, UNESCO hopes for pedagogical practices that mobilise teachers, students, and parents’ enthusiasm towards improving mathematics education (UNESCO, 2012).

Riccomini, Smith, Hughes and Fries (2015) highlight that; students face many challenges in their efforts to learn mathematics. Their ability to use mathematics language, to communicate effectively is an example. Competent language proficiency is imperative to form necessary mathematics understanding. For example, students need awareness that quotient implies division. Rossi (2015) identified that students are battling with negative attitude and stereotypes associated with mathematics, which they acquired from society and the media. Subsequently convincing them that mathematics is difficult and unexciting before they actually start learning it. Gates (2006) expresses that many mathematics teachers in various parts of the world face challenges when teaching in multilingual classrooms, teaching students from different ethnic groups, migrants, and refugee children. The researcher agrees with Gates’ perspective. Classrooms in many countries, including those of Namibia, match the explanation above. Many children come from diverse linguistic and cultural background. Challenges arise due to these issues, which eventually affect the deliverance of mathematics lessons. Therefore, research is required to investigate this development to create understanding and conquer the challenges.

1.2 Mathematics education in Namibia
The framework for vision 2030 and the Second National Development Plan (NDP2) of the government of Namibia in collaboration with Namibia’s Development Cooperating Partners implemented a 15-year Strategic Plan, Education and Training Sector Improvement Program (ETSIP). ETSIP aims to refine the education sector to contribute to the accomplishment of national development goals as identified in NDP3 (National Planning Commission, 2008). ETSIP would facilitate Namibia’s vision to achieve a knowledge-based society as stipulated in
the vision 2030 framework. The framework recognises mathematics and science as significant subjects, which could tremendously contribute to socio-economical, scientific, and technical fields. They are imperative in the citizens’ daily lives and for the advancement of science and technology (Ministry of Education, 2009).

Namibia amongst other countries in the world, place a sturdy emphasis on mathematics, which manifests through the efforts that the government and other stakeholders’ dedication in improving mathematics training courses. There are great needs for technical and scientific expertise in various countries including Namibia. These needs influence the government to underscore the importance of effective pedagogy in mathematics and science. Effective pedagogy facilitates the students’ ability to excel in these subjects. Mathematics is crucial in accomplishing “technical, scientific and economic goals and transforms the society into a knowledge-based economy” as cherished in the vision 2030 goals and NDP3 (Ministry of Education, 2009, p. 14).

Mathematics solves problems related to medicine, architecture, engineering, commerce, and technology literacy (Sheldrake, Mujtaba & Reiss, 2015). Hence, students are encouraged to specialise in mathematics and science (Ministry of Education, 2009). However, despite acknowledging the quintessence of the two subjects and the government determination to improve the performance in the two subjects as well as investments aimed at boosting the development of the subjects, the low performance in the two subjects and particularly, mathematics is apparent. Stating that, in all the schools that sent in their papers, the marks were very poor, and it seems as if no teaching took place during the year (p. 7). Kachepa and Jere (2014) express similar concerns, indicating that mathematics performance in Namibian schools is becoming poorer. The mathematical pedagogical process is incomprehensible to students, they do not understand its importance, and they despise it. It is further perceived that mathematics is designed to benefit a particular group of individuals, relatively based on intelligence or gender. These perceptions are due to the type of professions that mathematics precedents. Although mathematics is highly regarded in Namibia, the preceding assertions reveal that the subject is undoubtedly very problematic, and children are struggling to comprehend it.

The Namibian government recognises mathematics as a critical instrument for everyday life. It contributes immensely to the advancement of commerce, technology, and science. Mathematical aptitude enables students to explore, model and deduce numerals. It further acknowledges primary education as the foundation of any education system (Ministry of Education, 2010). It is vital to introduce students to concepts at primary level using techniques
that enable them to reflect on it throughout their school careers. It is essential that teachers and other stakeholders address mathematics problems at initial stages. Addressing these problems early prevents them from transforming and proliferating into other complications in the students’ future learning situations (Hanover Research, 2014). In this regard, the Namibian Curriculum for Basic Education recommends a student-centred teaching approach. This approach suggests that learning should begin with what students already know and can perform. They acquire new knowledge through methods of working which are appropriate and meaningful for them and discover ways to use their knowledge creatively and innovatively (Ministry of Education, 2016). To enable sufficient instructional time, mathematics lessons at senior primary level have a time allocation of 4hrs 40 minutes per 5-day cycle. That is the longest time allocated per subject, in comprehensive school in Namibia (Ministry of Education, 2009).

Mathematics challenges are well documented in the Namibian context. A report based on grade 7 results of 2007 external examinations reveal that the highest number of students from all primary schools achieved below average. A grade 5 and 6 achievement test indicated that most grade 5 students encountered difficulties in attaining the basic competencies in fractions. Similarly, students’ performance in grade 6 was unimpressive, as only few percentages could perform simple calculations in few competencies (Ministry of Education, 2009). Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) assessment test positions the Namibian grade 6 students mathematics literacy at the bottom and lower end for 3 consecutive times (Ministry of Education, Arts and Culture, 2015). Junior Secondary Certificate (JSC) and Namibia Senior Secondary Certificate Ordinary Level (NSSCO) in the 2012 reveal that a significant number of students performed below average (Education Management Information System, 2013).

Lesson observations conducted by UNICEF identified various weaknesses in the qualities of teaching in Namibia. These weaknesses range from ineffective teaching skills to inadequate content knowledge. Teachers are unable to present information to students in a logical sequence, which would systematically transfer knowledge from the concept they understand to a novice understanding. Therefore, teachers rather present information in a manner that confuses students. Teachers have trouble in setting up examples subsequent to explanations. After explanations, teachers ought to give an example and follow it up with another one of a similar complexity. However, they often succeed the initial example with the considerably distinct one. They further pose questions, which failed to engage all students and stimulate their critical thinking. Teachers frequently relied on textbooks to explain concepts.
and ignore tangible objects to scaffold students’ understanding. They lack skills to determine the effectiveness of their own descriptions of concepts and they often commit errors such as mispronunciations, confuse explanations of fundamental concepts, and misappropriate units of measurements. There are further challenges on the usage of the blackboard as teachers’ work was muddled and difficult for students to follow (UNICEF, 2011). In similar assertions, Kachepa and Jere (2014) alluded to the incidence of undesirable pedagogic methods, unavailability of instructional resources and challenges in understanding learner-centred teaching philosophy.

The Ministry of Education (2010) indicated that problem-solving skills have been at the core of the Namibian mathematics examinations. However, mathematics lessons are composed of limited opportunities of learning for understanding, and discussions of students’ problem-solving approaches and provision of feedback seldom happens (Ellion, 2016). These findings solicit for a critical intervention to improve these emerging poor performances and ineffective teaching approaches. Especially, that mathematics is a compulsory subject throughout comprehensive school in Namibia (Ministry of Education, 2009), and relative achievement is decisive on whether to specialise in technical disciplines or not. Subsequently, students face challenges to enrol in institutions of high learning, since they should meet entry pre-requisites. Especially, to enrol for technological, medical, or engineering courses (Kachepa & Jere, 2014). To respond to these challenges, various literature acknowledges the ability of explicit and systematic pedagogy to stimulate students’ prior knowledge to facilitate effective learning. Therefore, the researcher decided to base this study on the implementation of the features of explicit and systematic pedagogy in primary mathematics education.

1.4 Intervention method: Explicit and systematic pedagogy (ESP)

To enhance students’ mathematics learning, teachers should follow recommended pedagogical methods to teach critical topics (Riccomini et al., 2015). A study on mathematical problem-solving performances of students with mathematics disabilities reveals that mathematics problems, which require them to apply knowledge, skills and strategies to novel problems is a form of transfer that is difficult to affect. The authenticity of this stance is confirmed, especially to students with mathematics difficulties, for whom the instruction is differentially demanding (Fuchs et al., 2002. p. 90). Talks regarding mathematics and its difficulties, in this case, refer to students whose performance is below average (Doabler & Fien, 2013). Therefore, to promote mathematical problem solving, ESP is seen as a new teaching strategy that explicitly transfers knowledge, to create a link between new and familiar problems. The National Council of
Teachers of Mathematics (NCTM) and What Works Clearing House found that ESP methods are greatly effective approaches (Fuchs et al., 2002). Subsequently, the American Institute for Research and the What Works Clearing House recommends that teachers should monitor all students to identify those that require additional assistance (Hanover Research, 2014). Doabler and Fien (2013) suggested that teachers need assistance to meet the educational needs of students. The assistance should focus on how to integrate ESP components; ‘I do’ component, ‘we do’ component and ‘you do’ component into their everyday mathematical teachings.

Hudson et al. (2006) identified that the NCTM have been advocates in promoting reform and fostering of pedagogical practices. Addressing diversity in the classroom and enhancing educational equity as the primary all-embracing principle to influence mathematics programming as a central element of this reform. It is stated that irrespective of the students’ background or physical characteristics, they should have opportunities and desirable assistance to learn mathematics. Recently, the educational opportunities to learn mathematics should occur in general inclusive classrooms as opposed to special education classrooms. Hence, general classrooms teachers need to adopt ESP, which is an appropriate mathematical instructions technique to students who are performing or thinking at diverse academic levels (Hudson et al., 2006). Although many studies on the applications of ESP have been conducted in small group instructional format, recent studies have started to indicate that the practice is critically beneficial in whole class instruction (Doabler & Fien, 2013).

ESP is an intervention to curb poor performance and low comprehension of mathematical concepts. Therefore, it is critical in influencing students to acknowledge reasons for developing a mathematics culture beyond “basic numeracy, measurements, and calculations” (UNESCO, 2012, p. 10). ESP ensures that students of various learning abilities are adequately addressed during the instructional process. Through practices such as integration of background knowledge, teacher demonstrations, guided practice, scaffolding, continuous assessment, feedback, instructional adjustment and independent practice. Parameters of ESP oblige teachers, schools and educational systems to enhance their pedagogical proficiencies (Doabler & Fien, 2013). This perspective invokes a sense of urgency to foster mathematics teaching which positively responds to the emphasis on improving students’ performance (Aguirre & Zavala, 2013). The essentiality of this perception is to embark on a journey that ensures that mathematics instructions at elementary grades are sufficient to meet the learning requirements of students with mathematics difficulties (Doabler & Fien, 2013). Traditional instruction methods impede students’ mathematical aptitude and problem-solving abilities. Hence, they
disregard contemporary studies that provide the latest recommendations on how to contact mathematics lessons (Kachepa & Jere, 2014).

Three recent reports sponsored by the U.S. Department of Education branded ESP as a competently supported pedagogical approach. In 2008, the National Mathematics Advisory Panel recounted that the method has steadily presented positive effects on the mathematics comprehension of students in computation and problem-solving. In a matching event, a report availed in the year 2009 consists of evidences and recommendations supporting ESP. It states that ESP is the strongest method to employ in teaching mathematics skills to primary and junior secondary school students, irrespective of their mathematical learning abilities (Archer & Hughes, 2011).

1.5 Research objectives
This study aims to analyse the teaching and learning conception guiding the Namibian basic education, to determine whether it contains features that influence teachers to implement an explicit and systematic ‘like’ lesson during their mathematics instructions. The research investigated teachers’ perceptions of teaching mathematics and observed whether they employ explicit and systematic pedagogy features during their mathematics lesson planning and learning situations. It further evaluates whether Students’ perceptions toward mathematics education manifest features driven by explicit and systematics pedagogy ideas.
Social constructivism as a pedagogical framework in mathematics education

The study is conducted under the lenses of Vygotsky theory of social constructivism. This perspective acknowledges that children are social beings who learn because of their interaction with others (Tracey & Morrow, 2012). Learning initially occurs on a social level before it happens to an individual (Van de Pol, Volman & Beishuizen, 2010). Therefore, their learning development is mainly based on the transformation of socially shared activities into the internalisation process. The interactions the child makes with people in his world and tools that the culture provides to support thinking helps to facilitate their learning of new knowledge, ideas, attitudes, and values. They learn these aspects from the people around them, with whom they frequently interact (Tracey & Morrow, 2012). Similarly, it is stated that we construct our own way of thinking through active learning from the way we think and interact with the world and with people. It is further stated that we perform actions to achieve goals or carry out intentions (Brown, 2015).

It encompasses concepts such as, scaffolding, zone of proximal development (ZPD) and learning mediation. According to Van de Pol et al. (2010), scaffolding learning perspective refers to a directive instructional approach that recognises that students are not passive participants during their interaction with teachers. In a narrow view, it is defined as the collaborative process that occurs between teachers and students, both partaking vigorously in the procedures. Scaffolding is a foundation that encourages pedagogy in which all participants are actively engaged, and the support is being offered by teachers to students to perform tasks, which they might not otherwise have accomplished. Both participants engage in the building of a common understanding through the exchange of ideas in which students learn from those regarded as more knowledgeable others (MKO). The scaffolding process is continual, and it strongly depends on the individualities of a specific situation and the students’ responses. Therefore, scaffolding techniques vary in different situations (Van de Pol et al., 2010).

Through scaffolding, teachers introduce students to new basic skills and eventually, to more complex skills about a specific aspect. For example, before discussing methods of finding algebraic values such as the value of x in the expression x + 6 = 9, they could begin by finding the missing number such as □ + 6 = 9, which is easily identifiable that the problem requires finding an unknown number. This practice could help them to sustain their learning success and gradually transform to independent users of the skill (Archer & Hughes, 2011). Teachers
give attainable activities to facilitate learning mastery and maintain students’ self-efficacy (Sheldrake et al., 2015). However, the success of the scaffolding process depends on the extent of support offered to students at the initial stages and the system of withdrawing it. Hence, teachers need to minimise the amount of support, depending on the degree of accuracy of the students’ responses. When guidance is diminished, students should execute tasks with growing independence until they can perform activities on their own (Archer & Hughes, 2011).

Zone of Proximal Development (ZPD) concept refers to the “distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peer” (Shabani, Khatib & Ebadi, 2010, p. 238). Ultimately, the way a student performs is mediated socially. The shared understanding is relatively achieved through moving the students from existing capabilities to a higher mediated level of development. Teachers give work that is marginally above students’ skills levels to encourage advancement (Sheldrake et al., 2015). Vygotsky indicated that the next attainable level is achieved using facilitative communications. Therefore, education should uphold the students ZPD by providing meaningful tasks that are considerably more challenging than those they can perform independently. However, students’ ZPD falls outside what they already know and what they would not be able to accomplish even with the assistance of the more knowledgeable others MKO (Shabani et al., 2010). The idea of ZPD is summarised in figure 1.

![Figure 1: Students’ ZPD model.](image)

Students are at the centre of learning. Therefore, teachers assess them to determine their existing knowledge (Zone 1), thereafter, they use the prior knowledge they detected in Zone 1 together with intervention techniques to assist students in attain the highest possible knowledge.
(Zone 2) during learning instruction. They would not be able to reach Zone 3 straight from Zone 1. However, if students successfully attain Zone 2, teachers could use that knowledge to move them to zone 3 in future – see figure 1 (Shabani et al., 2010).

Askew (2013, p. 7) refers to teaching and learning mediation as concepts used to,

Understand the sorts of relations and actions between the more knowledgeable other that enable the less experienced to internalize psychological tools. Learning mediation has three components; firstly, apprenticeship, a community activity where the learner moves from novice to expert. Secondly, guided participation, supporting the learner towards achieving a specific object. Thirdly, appropriation whereby individuals develop through their involvement in joint activities.

The teacher possesses the knowledge that students are possibly not aware of and in this case, students’ complete tasks and gain the appropriate knowledge, not only receiving cues to complete the available task. A systematic relationship in teaching and learning mediation in a classroom situation is summarised in figure 2.

![Figure 2: Teaching and learning mediation model.](image)

Teachers and peers that are more advanced spearhead the transmission of knowledge to all the students. However, the teacher’s lesson plan and mediating tools are the intermediates of the transmission of such knowledge. Hence, the teacher is responsible for designing an extensive lesson plan, stipulating the process of transferring knowledge. The teacher’s plan would consist of a layout of what he is intended to perform during the lesson and the kind of resources that he will engage to ensure that students understood the concept comprehensively.
The interaction involves the teacher/ the advance peer, students and the mediating tools. These tools could be physical objects, information communication technology, certain behaviours/attitudes or language (refer to figure 2).

In summary, the social constructivism theoretical perspective is relevant to ESP because it is an intervention strategy, which encourages teachers to scaffold students learning through modelling, collaborative guidance, and provision of independent practice. Collaborative guidance enables students to learn socially, as they interact with fellow students and their teachers, who function as the MKO. Furthermore, during this intervention practice, teachers engage with various learning materials such as manipulatives and models and use familiar terminologies, which can efficiently mediate students into learning new concepts. The provision to learn through materials or mediating tools enhances the explicitness of the lesson and encourages students to discover their own knowledge. Hence, they get opportunities to perform tasks; they understand concepts more efficiently and master it. Therefore, it improves their ability to internalise and eventually externalise the skills they acquired. During guided and independent practice, students play an active role in acquiring new knowledge. They use their experiences and lesson discourse to construct meanings. ESP intervention encourages teachers to determine students’ prior knowledge and adjust the instruction process accordingly, which eventually harmonise the conception of ZPD. Teachers evaluate students’ prior knowledge, establish aspects they already know and understand appropriate methods to foster the knowledge to the next probable developmental level.
3 Mathematics literacy as an integral facet of mathematics education

According to Ziegler and Loos (2010, pp. 11-12), mathematics education is described in 3 ways.

Firstly, as the collection of basic tools, part of everyone’s survival kit for modern day life, which includes everything. Secondly, a field of knowledge with a long history, which is part of our cultures and an art, but also a very productive basis for all modern technologies; it is a story-telling subject. Thirdly, an introduction to mathematics as a science – highly developed, active, huge research field.

However, the most significant portion of mathematics instruction in elementary and high school are constituents of the first description, where the emphasis is on instruction on arithmetic, correct computing steps and problem-solving skills. Components of teaching the meaning of mathematics that could ultimately encourage students to study mathematics as science is missing. Mathematics education is about telling stories that human transfer among each other for ages. These stories could be about mathematical meta-information, which is of great assistance to transfer mathematics itself (Ziegler & Loos, 2010).

Mathematics education is a continual process whereby participants construct meanings through comparing carefully chosen stimulating situations. This process occurs at individual capacity or socially, through collaboration among students as well as between teachers and students (Anthony & Walshaw, 2009). It emphasises on the content and significance of students’ everyday experience. Collaboration enables teachers and students to share duties. However, it requires competent teachers, who are capable of recognising students’ mathematical potentials. It further requires teachers who can assist students to understand the link between contextual findings and the institutional target knowledge. Mathematical knowledge and practice need regular modification to fit the developments in mathematical sciences and their connection to the outside world, transformation in societal needs and improvements in working conditions (UNESCO, 2012).

Assessment is a crucial component of mathematics education. It promotes a sense of fulfilment and self-growth. Thus, it should support students to express their understanding and capabilities as much as possible (UNESCO, 2012). Effective teachers employ diverse forms of assessment to examine learning accomplishments, identify learning difficulties, and determine how to progress. Wide ranges of assessments are essential because a single method cannot satisfy all elements of individual fulfilment. However, assessment needs to focus on aspects that the tools can legitimately accomplish (Anthony & Walshaw, 2009).
3.1 Developing mathematics literacy
Mathematics literacy refers to individuals’ aptitude to recognise and comprehend the role of mathematics in their world, to deduce fundamental judgements and engage in mathematics in ways that benefit their contemporary and future life. It is primarily concerned with the individual’s mathematics usage and underscores the practical skills of daily lives. It is an extensive understanding and appreciation of possible elements that mathematics can achieve (Ojose, 2011). Mathematics literacy is measured on the individual’s ability to plan, articulate and resolve in relation to mathematics problems in distinct contexts (Firdaus, Herman & Herman, 2017). Such capabilities comprise of map reading and interpretation, understanding plans of new buildings, budgeting and determining profit and loss in a business. The preceding examples of skills suggest that the individual should possess awareness to solve problems that are not entirely mathematical although they invite mathematical consciousness (De Lange, 2006). Mathematics literacy is invaluable because it enables individuals to use, perform, and identify mathematics in diverse circumstances, as choices of methods depend on situations in which the problem is presented (Ojose, 2011). In response to the aforementioned aspects, the following paragraphs present general approaches that can significantly assist in developing settings that support successful mathematics literacy. They would be helpful in changing undesirable experiences such as incomprehension and failure that numerous students have had in mathematics learning situations.

Encourage early intervention to low performing students. Studies have established that intervention at early stages is suitable to mediate learning of low performing students and potentially, limit ultimate learning challenges (Wang, Firmender, Power & Byrnes, 2016). Problems that persist at high grades are due to the lack of mastery from initial grades. According to Aunio, Mononen, Ragpot and Törmanen (2016) students who perform low at initial grades remain behind their peers in “number reading, basic arithmetic, number line acuity, spontaneous focusing on numerosity and numeracy-related logical knowledge” (p. 1) throughout their schooling careers. Early low mathematics performance is detected among students from impoverished economic and less educated backgrounds (Geary, 2013a), due to limited opportunities to learn necessary mathematical skills (Aunio et al., 2016). Teachers can initiate early intervention by evaluating the proportionality of students’ knowledge to the grade level and use the subsequent understanding to frame the way forward (Leone, Wilson & Mulchahy, 2010).

Employ culturally responsive pedagogy during lessons. This perspective refers to the instructional practice that recognises the cultural framework of students into problem-solving
opportunities. The cultural framework involves the integration of students’ experience, representations, linguistic features, and cultural stories (Leone et al., 2010). Teachers develop students’ mathematics literacy through engaging their experience, during mathematical discourse to enable them to create their own meanings (Hudson, Miller & Butler, 2006). When mathematical problems are culturally appropriate, students easily recognise them, subsequently helping them to form mental representations and improve their potential to produce a correct solution (Kim, Wang & Michaels, 2015). The experience ranges from mathematical intellect, culture, register, social acceptability and mediating tools (Aguirre & Zavala, 2013). They engage by interacting with different mediating tools to assist them to represent mathematical concepts and procedures (Hudson et al., 2006). To implement this view successfully, teachers should understand students’ desires, background, and experience to link it to the instructional process (Leone et al., 2010). Instruction should occur in a native-like context, to assist students in linking the activity to the real world. A native-like context refers to the platform that creates a direct bond to the students’ livelihood, immediate needs, and age appropriate. This instructional view will adjust the old system of transferring information (Dubé, Bessette & Dorval, 2011). The mathematical discourse should further support students to create a link between their local languages and the mathematical register to increase students’ chances of attaining mathematical understanding (Jorgensen, 2015).

Most students with mathematical difficulties are from educationally or economically disadvantaged backgrounds (Doabler & Fien, 2013). However, implementing culturally responsive instruction will oversee the impact of power relations, cultural background, ethnicity, and language (Aguirre & Zavala, 2013, p. 165). Instructions employing routine activities such as cooking, playing dice or cards, using timetables to teach time, and farming are culturally responsive. These resources stem from concrete students’ experiences. Therefore, they are beneficial in mediating learning (Turner et al., 2012). Although the strategy does not tackle power disparities directly, it gives the platform that increases the authenticity of the learning situation and meaning to students from all backgrounds. Using authentic examples enable students to interpret mathematics according to their own world. Hence, interpretations occur in multiple ways rather than solitarily (Aguirre & Zavala, 2013). For example, when teaching how to arrange objects in ascending order, teachers in cities could use examples of transport (Bicycles, Motorbikes, Car, Mini-buses and Buses) to arrange from smallest to biggest, while teachers in rural areas use livestock (Goat, Sheep, Donkey, Cow, and Horse). Although the concept is the same, these contextual examples make the learning experience more personal to both students (Steedly, 2008).
Adopt collective planning methods for mathematics lessons in schools between special education and general classroom teachers. Due to diverse students’ capabilities (low achievers, average achievers and top achievers), it is imperative to consider all students’ needs. Collective planning elevates the possibilities of matching the needs of students from each category (Hudson et al., 2006). It equips teachers with knowledge to individualise instructions and enhance chances of different degree of support, according to diverse levels of student capabilities (Dubé et al., 2011). To develop students’ reasoning and interactive skills, teachers should offer this support (Hudson et al., 2006). Furthermore, this collaborative planning helps teachers to become attentive to the way students construct their mathematical concepts and subsequently, support them to engage in the instructional discourse meaningfully (Aguirre & Zavala, 2013).

Use Concrete Representative Abstracts (C-R-A) to teach mathematics. C-R-A is a pedagogical perspective that is grounded on 3 dimensions, “visual representation, pictorial representation and abstract representation” (Kim et al., 2015, p257). Firstly, the teacher shows a physical object such as a piece of the triangle shaped model, cut from a box (Leone et al., 2010). At this level, students solve math problems utilising manipulatives (Lembke, Hampton & Beyers, 2012). Secondly, the teacher demonstrates the object in an illustration forms such as drawing on the blackboard. This demonstration is done to link the pictorial and the concrete object (Leone et al., 2010). Lastly, the teacher demonstrates in symbolic form such as numbers or scientific symbols (Steedly, Dragoo, Arafeh & Luke, 2008), without using a pictorial or concrete illustration (Lembke et al., 2012). Suppose the lesson is about 2-dimensional shapes, particularly a triangle and square, the teacher could display pieces of boxes cut in a triangle and square shapes, respectively. The teacher could cut the boxes in these shapes in front of students. Then, draw pictures of different triangles and a square on the chalkboard. Lastly, they discuss features of a triangle (such as they all have 3 edges and vertices), square (such as it has 4 equal sides, all interior angles are 90˚, and all opposite sides are parallel), and record them on the chalkboard. Explicit C-R-A instruction is successful in enhancing conceptual understanding in mathematics to students with different abilities (Kim et al., 2015, p257).

Organise constructive competition among students. Involving students in constructive competitions is a significant method to enhance their motivation. Games can adopt sports rules such as the one with the highest score wins (Leone et al., 2010). Suppose the lesson is focusing on developing students’ understanding of squares, the teacher divides students into groups and gives manipulatives such as rubber bands and a geoboard to each group. Students then illustrate squares on the geoboard, using the rubber bands. The group that manages to find more squares
than the rest emerge victorious over others groups. A mathematics quiz between different classes, schools, or regions is a viable way for students to compete against each other. Employing such games has the potential to enhance students’ enthusiasm and successfully engage them in the learning process. It further encourages students to believe in their ability to learn and comprehend mathematics (Anthony & Walshaw, 2009).

3.2 Challenges of mathematics literacy

3.2.1 Teachers’ training
The mathematical, instructional, and didactical training of teachers in some countries has been unsatisfactory. Consequently, teachers are experiencing challenges in their own mathematical skills and they have an undesirable impression of the subject (UNESCO, 2012). Inadequate math skills and pedagogical proficiency among teachers limit their ability to produce suitable instructions to students with various degrees of academic achievements (Hudson et al., 2006). They experience difficulties understanding important mathematics skills that students should learn. Moreover, they have limited abilities to plan lessons effectively to address student challenges successfully (Aunio et al., 2016). This skill deficit violates the students’ rights to access quality education in mathematics in general classrooms (UNESCO, 2012). When teacher training equips them with appropriate strategies to create a constructive learning environment for students with different abilities, they become better practitioners. Teachers acquire skills to create learning environments and material which enable efficient and effective engagement of students’ academic abilities. The engagement involves stimulation of students thinking and reasoning skills during the instructional process (Pakarinen et al., 2017). Teachers who employ quality instructional procedures give students a productive learning opportunity (Hamre, Hatfiel, Pianta & Jamil, 2014).

3.2.2 Mathematics difficulties
Students with mathematics difficulties pose a challenge to mathematics education. These students are generally underachievers or perform slightly above average in mathematics activities. Mathematics disabilities emerge early in their school years and continue throughout their schooling (Doabler & Fien, 2013). Early mathematical abilities toward factors such as numerical aptitudes are indicators of later successes (Mononen, Aunio, Koponen & Aro, 2014). Primarily, they are vulnerable to failure due to the limited informal mathematics experience in counting and mathematical register. Therefore, they struggle to acquire a profound understanding of mathematical concepts. Comprehension of number sense is among challenges
that affect these students. They are unaware and do not understand the connotation of numbers, which can essentially assist them to develop approaches to solving demanding mathematics questions (Dohaler & Fien, 2013).

Several students enter mathematics classrooms with negative a mindset toward numeracy development, less confidence in their mathematical aptitudes and lack of determination to persevere through complex activities (Leone et al., 2010). In addition, the general society’s attitudes contribute remarkably toward mathematics learning. Parents readily admit to their children that mathematics is hard, and they do not like it. Some parents would testify that they did not even bother to do mathematics because it is impossible. Similarly, the media portray mathematics to be unfavourable (Rossi, 2015). For example, the TV advertisement of new devices of facilitating students’ mathematics learning would always start by painting a negative image before they announce their invention to remedy the situation. Students from these societies may develop negative perceptions due to these stereotypes and eventually, find mathematics terrifying. As Boaler (2015) indicates that, the way we communicate to children and students contain hidden messages, which change their perception and performance in mathematics drastically. Low achievement invoked misconceptions, mostly grounded on the difficulty of the subject, intellectual level and gender stereotype. On the other hand, there are intellectual misconceptions regarding the type of occupations which studying mathematics leads into. Engineers, IT technician, and architecture are among examples of those professions (Ministry of Education, 2009).

3.2.3 Policy guidelines
Although blended learning is recognised as one of the beneficial learning methods (Rossi, 2015), the curriculums of some countries form an obstacle. For example, the policy guidelines for Namibian education restrict the use of technological tools such as cell phones in the classroom. Students as main stakeholders are not even permitted to bring their cell phones inside the school (UNESCO, 2012). Blended learning refers to the combination of the teachers’ directed instructions and technology (Blair & Serafini, 2014). Most students have cell phones, which could be used to their advantage in various learning situations (Rossi, 2015). For example, teachers can assist students to find useful sites for learning mathematics such as YouTube and mathematical games. On YouTube, they would watch videos focusing on the topic under discussion, and the teacher consolidates, using simple and familiar expressions.

Languages of instruction used in mathematics lessons hinder literacy. The language of learning at the school level causes a gap in mathematics education (UNESCO, 2012).
Mathematics proficiency highly depends on students’ ability to communicate and deduce through verbal and written language. Students’ broad understanding of mathematics language predicts their mathematics understanding (Riccomini et al., 2015). This mathematics language is a challenge, especially to students whose home language differs from the language of instruction (Jorgensen, 2015). Using one’s mother tongue is the most effective and efficient way to develop the meaning of mathematical concepts. The pedagogical language that varies from students’ home languages restricts their mathematical abilities (Panthi & Belbase, 2017). This practice is a common concern, especially in various developing countries. For example, several African countries adopt colonial languages such as French and English as their medium of instruction. Due to language limitations, students are unable to explicitly understand and express mathematical concepts (UNESCO, 2012). Hence, they have the responsibility of learning mathematics and the language of mathematics simultaneously. On the other hand, the language limitation affects the teachers’ ability to express themselves clearly (Jorgensen, 2015), due to the deficit in their linguistic development (Riccomini et al., 2015). Taylor and Von Hintel (2016) states that students who learn in their home language, perform better in numeracy compared to those who learn in the second language.

Constant curriculum changes form an obstacle in the teachers’ instructional ability. Another challenge, especially in developing countries is emerging from the constant changes of the curriculum due to the influences of international agencies. These curriculums are usually implemented with minimal teacher training workshops. These training usually last for a few weeks or months before the introduction of a new curriculum, and then they expect teachers to implement the curriculum successfully during lessons. Due to limited training, teachers cannot perform an appropriate job, and the results are poor. Eventually, within a short timeframe, another curriculum emerges to resolve the continuation of bad results (UNESCO, 2012).

Lack of innovation due to ancient teaching methods challenge the transmission of knowledge. The mastery of foundational numeracy skills and measurement, which is an essential part of mathematical understanding needed for participation in the social life, is not adequate anymore. Due to the presence of technology in our contemporary societies, the conception of mathematical literacy needs review. Foundation has changed; therefore, old methods have become inadequate to satisfy the needs of nascent societies (UNESCO, 2012). Modern equipment is essential in mediating mathematics concepts. However, some schools, especially those in remote areas of developing countries, lack access to these resources. Consequently, it limits the teachers’ flexibility (Ministry of Education, 2009). This trend happens especially in public schools (Aunio et al., 2016). On the other hand, mathematics
education cannot single-handedly solve mathematical literacy challenges. It relies on collaboration with other disciplines such as science education (UNESCO, 2012). Meanwhile, mathematics curriculum and instruction are excessively driven by old-fashioned views and content (Hudson et al., 2006).
Explicit and systematic pedagogy (ESP), as per Steedly et al. (2008, p. 3) definition is a, detailed instructional approach in which teachers guide students through a defined instructional sequence. During this pedagogic practice, learners learn to regularly apply strategies that effective learners use as a fundamental part of mastering concepts.

This instructional method is distinguished by a sequence of supports, whereby students are assisted throughout the pedagogical process. It promotes unambiguous explanations about the objectives and motivations for acquiring the new skills (Archer & Hughes, 2011). Unambiguous explanations and consistent language minimise misunderstandings by simplifying students’ expectations during an exercise (Doabler & Fien, 2013). Example, when teaching the addition of whole numbers by using a paper and pencil method, a teacher would encourage students to add the units before they add the tens; 23 + 41 (1 and 3 are units while 2 and 4 are tens). Suppose, the teacher decides to use different numbers such as 64 and 92, he should not now refer to 4 and 2 as ones, as this wording will confuse students. However, at the end of the lesson, teachers could explain to students that units and ones are synonymous.

ESP includes demonstrations of the intended learning outcomes, accompanied by exercises and feedback until students accomplish independent practice. Teachers enhance progress by following small steps, evaluating comprehension, and attaining vigorous participation by all students (Archer & Hughes, 2011). Teachers measure students’ progress through concrete and feasible outlines for delivering effective instructions and enable instructional encounters of high quality (among teachers and students) through ESP layout. ESP expands the amount of instructional possibilities that struggling students receives (Doabler & Fien, 2013). Hence, diverse possibilities are vital in supporting students with different level of intervention – core or supplementary intervention (Mononen et al., 2014). Thus, teachers have multifaceted responsibilities. A teacher is a facilitator, guide, and model. Teacher as a facilitator, develops creative thinking, problem-solving skills, collaboration, and leads to discovery. As a guide, the teacher mediates personal growth and connects language disparities. Teacher as a model, link information to the students’ prior knowledge, motivates and demonstrates learning techniques (California Department of Education Sacramento, 2015).

The process begins with an assessment of students. The teacher assesses students’ background knowledge and skills about the topic and modifies instructions according to what students already know and what they still need to teach (Steedly et al., 2008). Background knowledge enables continuous modifications of the instructional method to match students’
experience (Aguirre & Zavala, 2013). ESP employs a pedagogical practice that prudently constructs interactions between students and their teachers. In addition, it emphasises that teachers clearly describe the lesson objectives (Steedly et al., 2008). For instance, when teaching counting from 1 to 20, teachers should inform students about this target in advance. Explaining lesson objectives from the beginning is crucial because it facilitates students’ understanding of the way forward. It further assists them to evaluate their own progress and direct their attention toward accomplishing the vision they are required to attain. When students evaluate their own learning based on clear objectives, they make unambiguous conclusions (Smeigh, 2013). Furthermore, explicit lessons follow a well-defined instructional structure, and the teacher enables students to practice skills repetitively. Although, teachers should regulate the timeframe for practising, according to their understanding of students’ learning needs and progress (Steedly et al., 2008). Teachers could give students a set of problems and determine the period they need to complete these exercises (Duhon, House, Hastings, Poncy & Solomon, 2015).

ESP in mathematics requires the instructional process to “clearly teach the steps involved in solving mathematical problems using a logical progression of skills” (National Center on Intensive Intervention, 2016, p. 3). ESP includes educating students on how they may use manipulatives or other strategies of solving more advanced mathematical concepts. Hence, it is argued that selecting meaningful examples is significant to the successful implementation of ESP. Examples influence students to adopt the rules and subsequently, apply them in different situations. The practices of understanding new mathematics problems in relation to familiar concepts are an effective cognitive instrument for learning new concepts (Kim et al., 2015).

On the students’ part, ESP is skill centered. However, students are actively engaged during the pedagogic process (Goeke, 2009), developing their procedural and conceptual understanding of mathematics concepts (California Department of Education Sacramento, 2015). Students’ competency level, self-efficacy, and sense of accountability develop through ESP (Dubé et al., 2011). Students’ motivation is enhanced through assisting them to reduce mistakes and give positive reinforcement after they have accomplished certain concepts (Plavnick, Marchand-Martella, Martella, Thomson & Wood, 2015). This instructional method is holistic, as it enables teachers to teach everything, which is required in mathematics. Problem solving, computations, drawing, measurements, and reasoning are among examples of skills, which are teachable through ESP. It engages students throughout the pedagogic encounter (Goeke, 2009). Eventually, developing their metacognitive skills, and enabling them to take control of their own learning (Steedly et al., 2008). Metacognition refers to the students
understanding of their own learning and thinking processes, subsequently empowering them with skills on how to plan and choose suitable learning methods (Leone et al., 2010). Students have opportunities to monitor their own progress and redirect the learning and participation approach. This engagement helps them to convert related sub-learning entities into meaningful wholes (Goeke, 2009). Figure 3 shows components that briefly define ESP.

![Image](image-url)

**Figure 3: Components describing ESP. Adapted from (Jorgensen, 2015).**

Each of the 3 components is composed of different concepts, which specify the role of teachers and students. Table 1 presents concepts that guide and form parameters of the ‘I do, we do’, and ‘you do’ components of the lesson.

**Table 1: Parameters of each ESP components**

<table>
<thead>
<tr>
<th>‘I do’ component</th>
<th>‘We do’ component</th>
<th>‘You do’ component</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lesson objectives</td>
<td>- Guided practice</td>
<td>- Independent practice</td>
</tr>
<tr>
<td>- Demonstration (Modelling)</td>
<td>- Continuous assessment</td>
<td>- Feedback</td>
</tr>
<tr>
<td>- Assessing background knowledge</td>
<td>- Immediate feedback</td>
<td>- Maintenance</td>
</tr>
<tr>
<td></td>
<td>- Instructional adjustment</td>
<td>- Application of knowledge</td>
</tr>
<tr>
<td></td>
<td>- Collaborative working</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Skill mastery</td>
<td></td>
</tr>
</tbody>
</table>

### 4.1 ‘I do’ component

This is the phase where the teacher sets the stage for learning to occur (Goeke, 2009). The teacher starts the lesson by describing *lesson objectives* (Doabler & Fien, 2013) to enable students to concentrate on acquiring the target knowledge (Archer & Hughes, 2011). For
example, the teacher explains to his/her students that the goal for the lesson is to learn how to measure length in mm and cm. The teacher should explain why the task is vital (Goeke, 2009). This information helps students to recognise the connection between the activities they perform in class and the expected learning outcome (Smeigh, 2013). After students are aware of what they are required to know, the *demonstration* phase follows. For example, the teacher model for them how to hold a ruler, how to place the ruler on the object being measured, and indicate which side of the ruler shows cm and mm. The teacher could demonstrate on different objects with different lengths and shapes. The teacher selects models according to a range of elements such as the number of struggling students, exercise’s level of difficulty, students’ prior knowledge, and their reactions to the instruction. Teachers who have fewer struggling students are likely to perform fewer demonstrations, in comparison to teachers whose classrooms have a significant number of these students. More struggling students oblige the teacher to perform numerous demonstrations to ensure that they comprehend the concept (Doabler & Fien, 2013).
Table 2: Example of a teacher’s demonstration on measuring length by using a ruler, adapted from Doabler and Fien (2013).

- Today we are going to discuss how to measure length using a ruler.
- Measuring length using a ruler is not necessarily different from using steps, it starts at one point and ends at another (the teacher writes 50 mm on the board).
- The teacher expresses that the instruction says measure 50 mm length on a particular distance.
- The activity has 3 facts;
  - First fact, identify the 2 points.
  - Second fact, how to place a ruler,
  - Third fact, how to read the length correctly

- Now, I am going to work you through on how to measure length.
- The math facts about length measurement, the first fact is about identifying and marking point zero (starting point) and 50 mm (cut-off point) on the object.
- The second fact indicates how to place a ruler on the object you are measuring. The starting point is always proportional to zero on the ruler. The cut-off point is determined by the given length.
- The third fact is about reading the length between these 2 points correctly and ensuring that it does not short or exceed required distance.
- All students go through the same problem with the teacher. They could perform these using different objects.
Through thoughts provoking elements, the teacher models the process of operating a mathematical problem by “reading, setting up and solve word problems; use a strategy or demonstrate a concept” (National Center on Intensive Intervention, 2016, p. 4). Modelling give students an opportunity to physically observe and follow procedures on things occurring the same way the teacher expects them to perform it. These observations give them a better chance of performing well in similar activities (Goeke, 2009). During this stage, teachers need to consider using mathematical terminologies and select relevant examples to use during instruction. Models should indicate the mathematics concept for learning. Teachers introduce this concept using clear and consistent language to avoid overwhelming students who may already be facing difficulties with mathematics (Doabler & Fien, 2013).

The teacher assesses students’ prior knowledge to establish whether they have mastered the required skills to guarantee successful problem solving during the new concept (National Center on Intensive Intervention, 2016). Students recall previous learning and organise to use it in the present discussions (Storeygard et al., 2010). Prior knowledge branches into 2 forms; prior content knowledge and prior everyday knowledge. Prior content knowledge includes students' academic experience. While prior everyday knowledge refers to students' real-life experience (L. Campbell & Campbell, 2009). Students acquire knowledge more efficiently when teachers organise the new information and assist them to link it to their prior knowledge. Considering students background knowledge improves their chances of understanding the new situation (Kim et al., 2015). Additionally, teachers examine how students implement the tasks and support them through feedback during classroom discourse and activities (Archer & Hughes, 2011).

It is important to consider the students’ background knowledge because it is based on their geographical setting, which contributes positively to learning (Kachepa & Jere, 2014). Furthermore, teachers evaluate whether students can generalise previously learned ideas to the new concept (National Center on Intensive Intervention, 2016) and encourage them to find information utilising methods they previously acquired (Kim et al., 2010). Activating students’ background knowledge assists them to establish the relationship between new and existent skills (Smeigh, 2013). Learning a new skill greatly depend on the foundational understanding students acquired prior to the new encounter (Leone et al., 2010). Learning is deeply rooted in the accuracy, type and level of skills that students bring to the classroom (Smeigh, 2013). Questioning, using prompts and “advance organisers” (p. 7) are good methods of identifying students’ background knowledge. Questions encourage students to retrieve previously acquired knowledge on the topic under discussion and evaluate the information they lack. Prompts alert
students about the topic being introduced and advance organisers are instructional aid such as photos, videos clips, and stories that challenge students to use their prior knowledge (Smeigh, 2013).

4.2 ‘We do’ component
During this stage, teachers employ guided practice, engaging students by asking questions and direct learning and comprehension. This practice encourages students to participate actively in problem-solving (National Center on Intensive Intervention, 2016). The guided practice involves the kind of support that one should provide when discussing procedures on how to perform practical matters successfully (Doabler & Fien, 2013). This scaffolding is systematically eliminated as students’ reaches proficiency in a concept. The teacher gradually empowers students to take responsibility (Goeke, 2009). Assessment of students learning occurs throughout this phase, followed by detailed feedback on their immediate accomplishments and setbacks (National Center on Intensive Intervention, 2016).

Assessment is central in a classroom discourse because it guides teachers, through collecting information about students’ performance and make suitable evaluations of the instructional interaction. This practice ultimately improves instruction and eventually students’ comprehension (Lembke et al., 2012), and it is essential to correct mistakes in their emergent stages, as delayed assistance constrains the learning process. Feedback is critical in monitoring the students’ performance diligently (Smeigh, 2013) and alerts them of their own abilities, eventually advancing awareness on self-regulation techniques (Sheldrake et al., 2015). It determines how students could improve their approach whenever they encounter a similar task (Goeke, 2009). Based on the assessment outcome, the teacher continually adjusts instruction to fit the students’ emerging needs so that they can achieve learning mastery (National Center on Intensive Intervention, 2016). For students, assessment is essential to facilitate collaborative work. Collaborative learning refers to the pedagogical approach that comprises of a cooperative intellectual determination by students or students and teachers together. During collaborative learning, students work in pairs or groups, searching for answers, building meanings and inventing products. This form of learning is significant because it promotes active and constructive learning (Smith & MacGregor, 2014).

Students should be conscious of the expectations facing them. They must execute tasks; therefore, they should work toward attaining that goal, as an optimal ESP lesson comprises of an effective, energetic teacher and an active, engaged student (Goeke, 2009). During this
interactive process, teachers should use students’ responses to explore ideas prompting their thinking and pronounce aspects that render their responses right or wrong (Leone et al., 2010). This feedback is essential in alleviating possible misunderstandings and proffer support in facilitating conceptual understanding (Doabler & Fien, 2013). It should be more than just a procedure to determine the accuracy of students’ responses. Therefore, teachers should continuously measure students’ understanding, to ensure that they have acquired accurate meanings from the instructional discourse. Monitoring examines students’ levels of participation and understanding of lesson objectives (Goeke, 2009). The participation level should be measured both in writing and verbally (Leone et al., 2010), to facilitate the corrections of faults at the initial stages. When students are assured that, their responses are correct, such feedback increase their motivation. Hence, they realise that their learning was successfully (Doabler & Fien, 2013).

Through tangible or skill-specific orientation, learning procedures should support students to learn until they can independently perform the task - *skill mastery*. These procedures should employ organised tools to assist in incorporating ideas. These tools function as stimuli to mediate learning. Therefore, they should exhibit a systematic physical reference and focus more on observations than words. Whenever students need clarity, they can go back to these references. These references are essential in streamlining activities representing the target concept and assist students to shift from the teachers’ supervision to autonomous application of knowledge acquired. During these procedures, students receive hints and questions; through their responses, the teacher discerns their comprehension pattern. The teacher engages them in cognitive activities, which would enhance their understanding (Goeke, 2009). Questioning assists in maintaining students’ concentration during the discourse (Hudson et al., 2006). To enhance students understanding, and avoid overworking them, teachers should chunk information into manageable instructional entities. However, these instructional entities should be in small units, and it should comprise of a maximum of nine separate items of information. Human beings can comprehend and recall nine items of information at a time, and the quantity of items decline as complexity accumulates (Smeigh, 2013).

**4.3 ‘You do’ component**

After achieving mastery during the ‘we do’ component, teachers expect students to demonstrate their newly acquired knowledge and skills independently – *independent practice*. During independent demonstrations, students receive exercises to complete without the teacher’s assistance (Ewing, 2011). However, teachers should only give independent practise when they
establish that students are incapable of making significant errors (Smeigh, 2013). Different mediums such as “worksheets, peer tutoring, computer software programs, cooperative learning and self-correcting” (Hudson et al., 2006, p. 23) are useful materials to facilitate independent practice. While they practice steps on their own, the teacher walks around the classroom, monitoring and providing timely feedback to individuals who need it. Furthermore, students should receive activities that relate to the content learnt during the ‘I do ‘and ‘we do’ components. If students exhibit difficulties, teachers are encouraged to adjust instructional strategies and repeat the procedures (National Center on Intensive Intervention, 2016).

On different intervals, the teacher revises ideas that have been lately discussed or reviewed at different intervals. Teachers could accomplish this practice by stating facts and students recite them. Alternatively, students can illustrate the concept through tangible models (Jorgensen, 2015). ESP aims to communicate the thinking processes that assist students to solve mathematical problems extensively, not just for attaining good marks in school tasks (Cohen, 2018). Models should focus on specific skills, strategies, or ideas that remind students of the concept and teachers should continuously ensure that students maintain their knowledge. Otherwise, a skill that is not polished with practice rusts (National Center on Intensive Intervention, 2016). The instructional process concludes with an informal or formal assessment to evaluate the students’ attainment of the learning objective and indications of possible scenarios in which the newly acquired knowledge is applicable, in real life (Goeke, 2009).

4.4 Importance of explicit and systematic pedagogy implementation in mathematics education at primary school level
ESP promotes “factual, procedural and conceptual knowledge” (Leone et al., 2010, p. 6) and it is the best intervention for teaching students with mathematics difficulties (Doabler & Fien, 2013). It is an effective and efficient method to promote learning, in comparison to other approaches (Riccomini et al., 2017). Numerous studies indicated the benefits of early mathematics intervention to form basic concepts. Without adequate classroom intervention at primary level, children performing low in mathematical skills, most often continue to perform low throughout their schooling careers. This shortcoming is due to the time they take to acquire mathematics knowledge compared to students without disabilities (Mononen et al., 2014). This stance is further supported by the Ministry of Education (2009) by stating that mathematics is critical to the success of scientific and technical education. Unless the foundations are secured at the primary level, it will be intricate to build mathematics at the secondary level.
Achievement gaps between early low performers and their peers increases as they progress to higher grades (Ragpot, Mononen, Törmanen, Henning & Aunio, 2016). These low performers typically have a substantial gap in their mathematical aptitudes that diminishes their ability to reason numerically (Leone et al., 2010). These are good reasons to suggest for early screening of mathematics achievement predictors before students fall extremely behind (Jordan, Glutting & Ramineni, 2010). When teachers detect mathematics difficulties, they could use ESP to prevent the reproduction and accumulation of the problem (Goeke, 2009). ESP enhances students’ strengths and shapes weaker skills (Leone et al., 2010). Planning is an example of skills commonly weak in students; thereby ESP is a favourable remedy. This skill is central to effective problem solving due to its role in assisting students to describe the problem and obtain a suitable solution (Mataka, Cobern, Grunert, Mutambuki & Akom, 2014). The preceding arguments on the importance of ESP concur with ‘early intervention’ as a method of developing mathematics interventions, which is indicated in chapter 3.

ESP maintains a meaningful learning experience for all students (The access centre, 2004), without additional costs from their caretakers (Riccomini et al., 2017). Moreover, it provides an educational environment that appreciates students’ level of mathematics competency (Dubé et al., 2011). ESP is developmentally suitable because it is designed to enable students to learn and cater to their attention desires simultaneously (Goeke, 2009). Students transform into independent learners; hence it acquaints them with skills of how they can use resources available in their classes. ESP facilitates the learning process until students develop the desire to learn on their own (Jorgensen, 2015). Conversely, it encourages reflective practice among teachers (Dubé et al., 2011).

ESP improves students’ capability to solve place value activities. Understanding place values is crucial for attaining proficiency in more advanced mathematics, such as their ability to workout addition and subtraction problems efficiently (Doabler & Fien, 2013). Unless mathematics instructional encounters deliver ESP frequently, students are likely to continue struggling in learning mathematics effectively (Gersten et al., 2009). Interventions that show a systematic illustration of solving mathematics problem are successful in helping students who are at risk of underachieving (Doabler & Fien, 2013). Most intervention studies have identified that students receiving ESP intervention have outshone their peers, with a margin ranging from minor to big (Mononen et al., 2014), especially in unfamiliar topics (Kruit, Oostdam, Van den Berg & Schuitema, 2018).

ESP is consistent; therefore, it promotes the development of expectations among students, which is beneficial because they understand the layout of mathematics instruction.
They are aware of what and why things are being done in a specific, way and the skills they should exhibit to demonstrate that they have achieved the basic understanding of a certain concept (Jorgensen, 2015). Expectations encourage students to develop fundamental skills such as organisation and responsiveness (Steedly et al., 2008). During an experimental study, it manifests that students in the treatment group were more organised, in comparison to their peers in the control group (Mataka et al., 2014). They further achieved great sentiments of fluency and confidence in their comprehension (Decaro & Rittle-Johnson, 2012).

4.5 Explicit and systematic pedagogy is a form of direct instruction.
ESP is a product of 2 broad categories; lower-case direct instruction (di) and the upper-case direct instruction (DI). The DI design is a collection of instructional practices. It follows a layout that involves reappraise, presentation, scaffoldings, amendments, feedback, individual practice, and weekly and monthly reviews. On the other hand, DI design is research-based, combined techniques of the curriculum and effective pedagogy. It involves the organisation of content, duties, duty chains, and activities, sequences of activities, lessons and presentation of information (Plavnick et al., 2015). Moreover, it comprises of a prudently constructed curriculum, which contains a series of directives. These directives indicate the learning units that students should grasp before they progress to the next phase. The learning process occurs individually or in small collaborative groups of students with similar intellectual abilities. The teacher determines the student groups by administering a placement test. The test outcome reveals the abilities and challenges. Then teachers assign those who require similar assistance to the same group (Mataka et al., 2014).

4.6 Core explicit and systematic pedagogy
This instructional strategy is constructed around the most important mathematics matters, and it exhibits the current knowledge about the instructional features that are effective for improving mathematics performance. This kind of intervention is designed for the entire group in the classroom (Mononen et al., 2014), where instruction substitutes some parts of the traditional mathematics lesson (Sood & Jitendra, 2011). Students can practice in pairs or subgroups within the classroom, as it does not consistently require students to work in the entire group setting (Gersten et al., 2009). Furthermore, students should not leave the classroom to attend lessons separately with another teacher or specialist (Mononen et al., 2014). The intervention does not borrow time from the time assigned for other subjects (Gersten et al., 2009).
In addition to the content knowledge, core ESP teaches students other valuable dispositions such as social and communication skills. It provides a platform to educate students with a variety of skills. Hence, teachers allocate students to groups, according to their strengths and weaknesses. Group members assist teachers in attaining the overall growth of all students (Dubé et al., 2011). In this case, teachers should plan lessons that focus on information that is relevant to all students, to support students of all abilities to attain objectives defined within individualised programs (Riccomini et al., 2017). Those who attain the mastery level briefly can then receive enrichment activities (Leone et al., 2010).

4.7 Supplementary explicit and systematic pedagogy
Supplementary ESP is an instructional intervention designed for students who are struggling to grasp key concepts that are critical for future learning. Instructions are more directed toward a definite mathematical skill, complementing the strategies used during regular instructions. It is usually designed for individual students or small groups, separated from the entire group by the teacher, or mathematical specialist (Mononen et al., 2014). Particularly after they have been exceptionally unable to learn mathematics in the whole group (Leone et al., 2010). This intervention philosophy is adopted when the original strategy was inadequate to yield intended outcomes (Duhon et al., 2015). Teachers separate students with learning difficulties from the main classrooms and refer them to a specialist for specific lessons (Dubé et al., 2011), whereby the instruction focuses on students’ specific needs (Leone et al., 2010). The specialist or teacher modifies and enhances the intervention to correspond to the severity of students’ needs (Riccomini et al., 2017).

Supplementary intervention is offered at different times, sometimes after formal school hours or during other organised times (Leone et al., 2010). Learning difficulties refer to students who could not reach minimal learning standards after the implementation of remedial pedagogical measures for a sufficient or extended period (Ministry of Education, Recreation and Sport, 2007). In this case, the teacher or specialist address students’ individual needs, guide, simulates, and give personal responses (Fuchs, Fuchs, Hamlett & Appleton, 2012). The learning environment strives to meet the needs of individuals with learning difficulties without affecting the progress of advanced students (Jorgensen, 2015), usually in a special classroom. Figure 4 shows the sequence of phases to determine the students’ intervention needs.
Figure 4 illustrates detailed criteria that outline students’ success and their academic needs, with the purpose of developing them to the position where they do not require intervention. Each phase models a pattern of instructions that varies according to students’ academic needs. In phase 1, the instructional format is standard and presented to the regular classroom, employing both small and whole group model. Teachers monitor all students to identify those in danger of mathematics difficulties. Phase 2 delivers specified supplemental instruction to students whose progress has been inadequate, determined through phase 1. Phase 3 offers intensive, evidence-based instruction for students who could not sufficiently respond to phase 2 instructions. These phases either operate as additional or substitute for core classroom. However, it only replaces the core classroom when students’ achievement is substantially below grade standards (Hanover Research, 2014).

To satisfy students’ individual needs successfully, the teacher should receive enough time and resources for implementation (Fuchs et al., 2012). On the other hand, teachers should regularly monitor students’ improvement, to establish whether the instruction can yield a successful outcome. Supplementary intervention is essential because it gives students a suitable opportunity to practise from a tangible level to symbolic representations on an increased instructional duration (Mononen et al., 2014). The extended time enhance students’ opportunities to interact with knowledgeable others individually (Riccomini et al., 2017).
4.8 Disadvantages of explicit and systematic pedagogy
Supplementary ESP stigmatises against students who are withdrawn from the class to receive specialised instruction elsewhere. Consequently, they miss the opportunity for regular classroom instruction. Skills and behaviours, they learn through special program lack generalisation. Moreover, there is a limited coherence and coordination between general education teachers and special program teachers concerning the content, lesson plans, teaching aid and vocabulary. In turn, teachers find it challenging to use a core ESP. They teach classes with students of various difficulties and simultaneously perform individual follow-ups to integrate these students’ needs while enhancing their mathematical competencies to the expected level (Dubé et al., 2011). DeCaro and Rittle-Johnson (2012) stated that ESP diminishes the attainment of problem-solving. Students attempt fewer methods to solve tasks after a demonstration by a more knowledgeable other than after free trials. Cohens (2018) reports that some mathematics teachers dispute ESP, asserting that it is narrow and often rigid. Moreover, it is teacher-guided and sequential. The instructional format minimises students’ opportunities to grapple with the content. Therefore, it defies the non-routine perspective of problem-solving. On the other hand, high rate of mistakes was found in classes where teachers had to stop by students’ desks to provide explanations during class activities (Tobias & Duffy, 2009), while ESP highly advocates for such a practice.

4.9 Summary of the theoretical framework
Social constructivism is the umbrella theory that formed a framework of this study. This theory perceives learning as a social phenomenon. When individuals interact with other human beings, tools and all aspects of the world, they acquire knowledge. Thus, social constructivism encompasses 3 concepts; scaffolding, zone of proximal development (ZPD) and learning mediation. Scaffolding refers to the interactive process that occurs between teachers and students. ZPD is the distance between the actual development level and the potential development level a student can achieve under guidance. Mediation is the understanding of the sort of relations and actions between the MKO and a student, which enable internalisation of psychological tools.

Mathematics education refers to the collection of basic tools of everyone’s survival kit, a field of knowledge and an introduction to mathematics as a science. Mathematics education is a continual process and assessment is its essential component. Enhancing the development of mathematics literacy requires early intervention; culturally responsive pedagogy, collective planning, and concrete representational abstract and constructive competition. Early
intervention assists in mediating learning of low performing students and reduce the persistence of problems at higher grades. Culturally responsive pedagogy recognises the cultural framework of students into problem-solving opportunities. Therefore, it enables the integration of students’ experiences, representations, linguistic features, and cultural stories. Collective planning between special education teachers and classroom teachers is imperative in developing different degrees of support, according to the students’ levels of capabilities. Concrete representational abstract focuses on 3 dimensions; visual representation, pictorial representation and abstract representation. Constructive competition deals with games that enhance students’ motivation. However, mathematics literacy faces challenges such as lack of innovation, inadequate teacher training, frequent curriculum changes, language of instruction, mathematics difficulties, poor attitudes toward mathematics and restrictive policy guidelines.

Besides the methods of improving mathematics literacy the researcher eluded in the preceding paragraph, there is a contemporary strategy called ESP, which receives exclusive consideration in this manuscript. ESP is a detailed instructional sequence in which teachers guide students through a defined instructional sequence. Teachers assist students through 3 components; ‘I do’ component, ‘we do’ component and ‘you do’ component. ‘I do’ component, the teacher set the stage for learning to occur, through informing students about the lesson objectives, do demonstrations, and assess their background knowledge. ‘We do’ component; the teacher engages students through guided practice, continuous assessment, feedback, instructional adjustment, collaborative working, and skill mastery. While ‘you do’ component, students demonstrate learning, through performing the independent practice. While the teacher assesses, give feedback, and encourage the maintenance and application of knowledge. ESP is vital; it promotes factual, procedural, and conceptual knowledge. It reduces the gap between early low performers and their peers. Subsequently, shaping students’ weaker skills and enhance their strengths. It further builds expectations and maintains a meaningful learning experience for all students. ESP has 2 forms; core and supplementary. Core ESP, the whole group, receives the intervention. Students do not leave the classroom to attend lessons separately. While supplementary ESP is designed for, individual students who are struggling to understand key concepts and they are usually separated from the entire group.
5 Research task and research questions

Mathematics status as a tool to innovation in modern society and a driving force in everyday routines such as budgeting and counting contribute significantly to its prominent position over other subjects (Ministry of Education, 2016). Through UNESCO, many world leaders, including Namibians have consented to deliberations on mathematics education, as a gesture to accelerate pedagogy toward the realisation of vision 2030 (UNESCO, 2012). Although many education systems regard mathematics educations highly, its challenges persist. They face high failure rates and unfavourable attitudes toward the subject.

A reasonable number of researchers and organisations have conducted studies on teaching philosophies such as general learner-centred education, inclusive education and various avenues of mathematics education in the Namibian context. Studies on mathematics challenges and ways of addressing them are typical examples. However, no study has been conducted on ESP despite it being proven successful in countries such as USA, Singapore, and Australia. And a sequence of benefits it offers to students of different abilities, as acknowledged by numerous studies identified in sub-chapter 4.4. Similarly, there are limited studies specifically focusing on interventions to enhance mathematics pedagogy, irrespective of mathematics being a prioritised subject. Various studies focus on general learning perspectives such as learner centred, which do not specify concrete methods of addressing mathematics problems. Therefore, this study focuses on investigating the features of ESP in mathematics instruction in Namibian primary schools. The research questions are as follows:

1. What features of explicit and systematic pedagogy are present in the teaching and learning conception guiding the Namibian basic education?
   - For this question, the description of learner-centred education presented in the Namibian Curriculum for Basic Education was analysed.
2. What are the perceptions of Namibian primary school teachers towards mathematics education?
   - These are general perceptions obtained from respondents through interviews.
3. What features of explicit and systematic pedagogy are present in the Namibian primary mathematics learning situations and teachers’ lesson plans?
   - Data were obtained through interviews, lesson observations and lesson plans.
4. Do students’ perceptions toward mathematics relate to characteristics of explicit and systematic pedagogy?
   - Data to this question was obtained from students, through semi-structured questionnaires.
6 Research methodology

Research methodology refers to strategic plans that researchers use to maintain the practicality of the study (Cohen, Manion & Morrison, 2011). These strategies are usually general approaches, and they influence the choices of methods and techniques the researcher employs (Silverman, 2005). It further underscores an understanding of the rationality underlying the research, through critical assessment (Loseke, 2013). Practice assessment depends on the techniques, methods, and skills applied to complete a study. Hence, it indicates the appropriateness and effectiveness of practices used during the study. The quality of the research findings hinges on this section. It presents the researcher’s ability to acquire, comprehend, and utilise complex data sources (Remler & van Ryzin, 2011). This section presents in-depth details of the methods, which the researcher perceives would appropriately describe the reality of the case under study. Therefore, these methods are employed to systematically gather and analyse data to produce facts later presented in this study.

6.1 Qualitative study

A qualitative research is a systematic critical investigation that intends to promote the improvement of knowledge and understanding. It is used to gain an understanding of variables such as underlying reasons, practices, opinions, and motivations. These variables create an understanding of the phenomenon under study, the research process, and the researcher’s subjectivity. The discursive relationship between occasions, practical relations, abstract concepts, and organisation defines the critical element of qualitative research. It focuses on things in their natural establishment, attempting to interpret events or incidents as they connote to participants. Various empirical methods help to describe customs, challenging instances and meanings to individual’s livelihood (Stephens, 2009). A qualitative researcher must gather information and extract meaning from it (Hesse-Biber & Leavy, 2011). The information is mainly textual (notes, interview records, analysis of documents and visual data rather than numerical (Cousin, 2009).

The fundamental approach of this study is qualitative, and it is the suitable method for this research because the process involves the investigation of data from formal educational documents, from which the researcher extracted the learning conception, individuals’ views, and practices. The findings of these investigations were used to draw conclusions relative to a single case. There are descriptions of the researcher’s concrete experiences and thoughts about
ESP in mathematics lessons, which are obtained through analysis of learning conception, interviews, and observations. It provides a platform for an in-depth assessment and commentaries on the existing conception and current practices. Through examining this study, policymakers and education stakeholders get acquainted with information which can assist them to make informed decisions to address mathematical challenges in the Namibian context.

6.2 Interpretive paradigm
An interpretive paradigm is appropriate for this study because it strives to investigate features, which could support the implementation of the ESP approach during lesson planning and delivery. It engages respondents through interviews, observations and evaluation of documents (Bertram & Christiansen, 2015). Interpretive paradigm assumes that meaning is socially constructed through interaction, among people or between people and objects. The purpose of this interaction is to pursue a deep understanding of a phenomenon, with those that are involved within it. It further asserts that meanings do not exist independently (Hesse-Biber & Leavy, 2011). Due to reasons, which develops during the interpretive process, meanings form. Reasoning begins with data, through multiple interpretations and advances into more abstract generalisations (Loseke, 2013). In turn, meanings inspire behaviours and assist people to establish appropriate acts in diverse circumstances (Hesse-Biber & Leavy, 2011).

This paradigm was chosen because it authorises the researcher to interpret data accordingly and derive conclusions about ESP as they manifest from participant responses. These conclusions eventually create an understanding of the application of this teaching phenomenon in the Namibian context. Further conclusions emanate from analysis of document recommendations of the ideal method of pedagogy and observations of classroom practices. Categories emerge from the study. Prior to the empirical study, pre-categories to determine how data should be classified were not formed. The purpose was to explore theories according to the respondents’ views. Although, research questions assisted greatly, by guiding the process, the focus grounds more on the respondent’s statements. All categories and sub-categories derive from the data.

6.3 Case Study
This study is a qualitative case study about the ESP approach. A case study is a detailed research on a certain individual, group, policies, systems, incident, or organisation (Bertram & Christiansen, 2015). To generate a profound and holistic understanding of a phenomenon in its social setting, an in-depth investigation is done from numerous perspectives (Hesse- Biber &
Leavy, 2011). It systematically examines situations to obtain an understanding about it, and it focuses on a single case or compares cases that occur naturally (Cousin, 2009). The researcher chose a case study, due to its ability to provide information that creates an understanding of the case in entirety (Kumar, 2011). Through investigations of one or few cases, sufficient information is collected and analysed and subsequently, enhances the comprehension of the subject, because the study covers multiple dimensions of the phenomenon. A case study involves procedures of inquiry of a specific case and the outcome of the inquiry. It develops understanding by responding to the research questions and continuously explains the descriptions obtained. To develop the readers’ curiosity and presence, an adequate description of the physical situation is essential (Hesse- Biber & Leavy, 2011). The parameters of a case study are restricted by time and context (Stephens, 2009).

This approach was chosen because it administers ESP as a unique mathematics intervention case in the Namibian context. Findings of this study are essential to advocate for changes in the implementation practices; thus, it provides a distinctive example of actors in concrete situations. Therefore, findings of this study possess the potential to inform policymakers and all educational stakeholders with information that will assist them to evaluate current policies and practices. Furthermore, it provides an opportunity to expand contextual realities immersed in broad research settings. ESP is a case among several others, and the research outcomes could help readers to understand why things are done or should be done in a certain way, through increasing the possibilities of meaningfulness to them. The naturalistic notion of this study enables readers to reflect on their experiences within the case, and it employs numerous sources of evidence (analysis of learning conception, Semi-structured interviews, observations, and Semi-structured questionnaires). Hence, the fundamental aim of the case is to understand the perceptions of respondents that are targeted through this study and draws conclusions to the population in the same context.

6.4 Data collection methods
It is essential to use a variety of tools when collecting data to gather them in different ways and increase its reliability and validity. Therefore, during this study; analysis of documents (conception of learning), semi-structured interviews, observations, and semi-structured questionnaires were used. These tools are trustable, as they provide sufficient information to compile this research and they are discussed below.
6.4.1 Analysis of policy documents

This method refers to the examination of administrative documents compiled for reasons other than the research (Loseke, 2013). Administrative documents involve anything ranging from syllabi, policies, reports, circulars, minutes of meetings and textbooks (Mayan, 2009). Document analysis allows investigations of various existing documents for patterns and categories. Investigations are done to produce and provide an understanding of the policy directions, governmental intentions, and best practices in a certain system and programmes for change (Webley, 2012). Information from documents creates awareness in the researchers’ own understandings, the perception of people of interest and the viewpoints stipulated in the documents (Drew, Hardman & Hosp, 2008).

Analysis of documents was done because documents are informants to social practices and structures people daily and long-term decisions. For example, the content that students experience during instructions mainly basis on the vision of the curriculum. Teachers typically align their practices with the curriculum requirements (Webley, 2012). Documents are accessible and cheaper method to collect data. Although the researcher may need to visit libraries, museums and archive collections at times (Curtis, Murphy & Shields, 2013), no large budget for travelling costs is needed. Hence, documents are often available on the internet (Mayan, 2009); as various search engines provide efficient access to documents instantly (Curtis et al., 2013).

In this study, the conception of teaching and learning in the Namibian Curriculum of Basic Education (quoted in 7.1.1) and the participating teachers’ lesson plans were explored. The information obtained from the conception was used to supplement the data collected through interviews, observations, and questionnaires. Hence, they provide various perspectives (Drew et al., 2008). The focus was on evaluating whether the conception encompasses features, which can efficiently facilitate the conscious or unconscious implementation of ESP during classroom interactions (Bertram & Christiansen, 2015).

6.4.2 Semi–structured Interview for teachers

An interview is an official conversation with someone asking oral questions to elicit data, perceptions, and beliefs (Kumar, 2011). A semi-structured interview hangs on a prepared set of questions that guides the conversation to endure within the framework (Hesse-Biber & Leavy, 2011). The researcher introduces the topic and develops follow-up questions according to the informants’ responses (Bertram & Christiansen, 2015). A semi-structured interview is appropriate for this study, as it enabled the researcher to set guiding questions (appendix A)
and to adjust, change and supplement the questions prepared according to interviewee’s responses (Cousin, 2009). While respondents expressed their stories with minimum interludes, the researcher listened carefully to comprehend all details which they utter and use these specifics to design follow-up questions (Richard & Morse, 2007). The researcher interpreted, created relationships and use respondents’ perceptions to sustain and guide the dialogue in a constructive direction. In fine, the researcher established the broad interview parameters for responses and offered respondents suitable conditions to conceptualise issues. Then the interviewee and researcher collaborated to create understandings. To minimise misunderstandings, complex ideas were explained to respondents immediately (Kumar, 2011).

The use of semi-structured interviews was chosen because it allows respondents to elaborate their viewpoints and opinions freely. It is free of strict restrictions, which guide respondents how and on what aspects to base their expressions. They can relate to any information within the confinement of the central topic. While, the researcher identifies patterns that arise from the respondent’s thick explanations of their reality (Hesse-Biber & Leavy, 2011) and form necessary components for the study (Bertram & Christiansen, 2015). Semi-structured interviews conferred the researcher with the power to determine the theme of the interview. However, the researcher’s power to dominate the interview is minimal, due to the conversational style that it promotes. The conversational style is imperative because it maintains trust and encourages respondents to be truthful. It gives respondents fewer chances to answer for the sake of gratifying the researcher (Cousin, 2009).

Recording of audios was preferred, as it enables the researcher to concentrate on the conversation and extract main points on which to base the follow-up questions (Richards & Morse, 2007) rather than noting the respondents’ expressions manually. Recording reduces the possibility of asking the respondents to repeat phrases they already stated. Recording audio is further effective in managing time, to complete the interview within the planned period.

6.4.3 Lesson observations
This method refers to the practice whereby the researcher visits a site and empirically explores the actual procedures of how things occur (Bertram & Christiansen, 2015) or people’s actions as opposed to their expressions (Loseke, 2013). It helps researchers to enter the respondents’ daily lives that could otherwise be inaccessible through other methods of data collection such as questionnaires and interviews. For example, observing features of ESP in the class offer the researcher an opportunity to witness the teachers’ gestures, language use, responses, scaffolding, and the amount of activities students complete in each lesson that is difficult to
The researcher reports on attributes witnessed physically, in the context of the study rather than on secondary data. Observations enhance the researcher’s chances of noticing things that respondents unintentionally skip or consciously avoid uttering during interviews or questionnaires. The researcher gets the opportunity to gather a range of information such as the classroom physical settings and interactions that influence the understanding of the concept (Bertram & Christiansen, 2015).

Observations on lessons to obtain a concrete view of classroom practice in relation to ESP features were done. This method enables the researcher to witness phenomena manifesting in their authentic context, exclusive of the filtering impacts of the language (Rugg & Petre, 2007). The researcher’s observations are invaluable in legitimising the data obtained through the analysis of documents, interviews, and questionnaires. Hence, it provides an opportunity to experience a genuine atmosphere of the subjects’ daily practices (Mayan, 2009). Respondents were further requested to provide a copy of their lesson plans.

The ‘I do,’ ‘we do,’ and ‘you do’ component descriptions of ESP form a substantial part in the development of indicators in the observation schedule. Observation schedules summarise key issues to investigate during lessons. For example, during the introduction phase, the researcher’s observations focused on the features of ‘I do’ component, such as teachers’ demonstrations, models, assessment of students’ background knowledge as well as observing whether teachers explicate lesson objectives to students (Kim et al., 2015). During lesson presentation, the focus is on the features of ‘we do’ components, such as collaborative working, guided practice, skill mastery, continuous assessment, scaffolding and instructional adjustment (Goeke, 2009). At the conclusion, observations focused on features of ‘you do’ component such as independent practice, demonstration of learning, collaborative feedback, knowledge maintenance and application of knowledge (Doabler & Fien, 2013).

6.4.4 Semi-structured questionnaire for students
These are written set of questions given to many people to answer (Appendix B). The purpose is to collect much information in a short time (Bertram & Christiansen, 2015). Unlike on interviews where the researcher records the respondents’ responses, in questionnaires they write answers themselves after they read and interpret the questions (Kumar, 2011). Questionnaires are usually prepared in advance, and respondents answer in their own words or select from a set of options (Rugg & Petre, 2007). Specifically, in this study, the researcher employed semi-structured questionnaires that predominantly consist of open-ended questions than closed-ended questions (Bertram & Christiansen, 2015). Close-ended questions probe for
information required for categorisation, therefore respondents’ reply by selecting their preference from the available options. Open-ended questions explore and capture free expressions. Open-ended questions do not limit respondents on how to phrase their answers (Sharma, 2007).

Questionnaires are notable methods of collecting data in this study due to their ability to create a distance between the researcher and respondents. This distance helps respondents to express themselves freely (Sharma, 2007). It further gives respondents an opportunity to answer even uncomfortable questions freely because their identity is protected. They are not necessarily in direct interaction with the researcher, and the questionnaires are anonymous. Thereby increase the researcher’s possibilities of collecting information that is more accurate (Kumar, 2011). Questionnaires give respondents sufficient time to think and express their notion explicitly (Sharma, 2007). Lastly, respondents receive an identical set of questions, probing different perceptions, subsequently diversifying the data and enhance the researcher’s understanding of aspects related to the research topic (Bertram & Christiansen, 2015).

In this study, questionnaires contain 2 sections; section A serves as preparatory part. Questions in this section comprise the students’ general information such as grade, age, favourite subjects and gender. However, this section did not contribute to the conclusions drawn in this report. Section B consists of dichotomous close-ended questions such as yes or no, drawings and open-ended questions that require students to give explicit descriptions of their viewpoints regarding the relationship between formal and informal mathematics learning. Furthermore, each dichotomous question precedes an open-ended question to encourage students to elaborate their answers.

6.5 Sampling and data
The core sampling technique of this study is convenience-sampling technique. Convenience sampling involves selecting the nearest individuals as research respondents. The research site was chosen conveniently based on accessibility, due to monetary and time constraints (Cohen et al., 2011). It could have been best to get opinions and observe a significant number of lessons of different teachers across the whole of Namibia. However, such practice is costly and the timeframe to collect data was inadequate. Schools were chosen considering that; they are easily reachable from the researcher’s hosts. There was no need to budget for extra finances to fund accommodation, meals and transport to and from schools (Bertram & Christiansen, 2015).

Research respondents were mathematics teachers from selected schools. Respondents were chosen using a purposeful stratified sampling perspective and through the assistance of
their headmasters and headmistresses. Purposeful sampling involves choosing respondents or documents based on specific characteristics and the context. These characteristics and the setting determine which respondents would provide appropriate information (Mayan, 2009). It targets individuals who are knowledgeable of mathematical phenomena, due to their experience, professional role or expertise (Cohen et al., 2011). Stratified sampling involves dividing the population into classes according to the available information about them such as years of experiences and draw respondents from each class. The purpose of stratifying the study is to enhance the chances of similarities in the classes (Sharma, 2007).

Purposeful stratified sampling technique matches the researcher’s conditions because the selection criteria used to select teachers to participate in the study predicates on their mathematics teaching experience. The first respondent needs a maximum teaching experience of 5 years. The second respondent requires a teaching experience ranging from 6 to 10 years. The third respondent needs a teaching experience ranging from 11 to 15 years, and the 4th respondent should have a teaching experience of more than 15 years (Cohen et al., 2011). Respondents’ years of experience were insignificant in the data analysis, as they do not influence the process of drawing conclusions. They are purely strategies to ensure that outcomes ultimately delineate from different experiences and they could be generalised across the case. This diversification prevents opinion biased, as teachers with the same teaching experience may teach in a similar fashion, due to the programme and curriculum they experienced during their training. Therefore, exclusively concentrating on teachers with equivalent working experience, could lead to conclusions that may not necessarily be representative of the case (Bertram & Christiansen, 2015). The documents (teachers’ lesson plans, the curriculum of basic education) were purposefully chosen for the study. They contain theoretical guidelines that facilitate the instructional process. Therefore, they provide crucial information about mathematics pedagogy (Mayan, 2009). Students were selected purposively, through the assistance of their teachers.

This study focused on 2 regions; Khomas region, in central Namibia and Ohangwena region, in northern Namibia. Two teachers and two schools from each region were selected. The two schools in the Khomas region are classified, as urban schools while in Ohangwena region are rural schools. The schools’ names are withheld to maintain anonymity (Kumar, 2011). The regions were selected on the basis that Khomas was among the 3 Namibian regions, which achieved an above average grading in SACMEQ III rating, while Ohangwena is among the lowest t 3 regions (UNICEF, 2011). This stratification aims to prevent opinion biased that could develop from respondents’ school environment, surrounding communities and other
cultural aspects (Mayan, 2009). Students’ eagerness to learn, beliefs toward mathematics and classroom interaction may vary due to their environments. Hence, conducting the study solely in urban schools or vice versa could incite questions on the validity and generalisability of the findings onto the entire case (Bertram & Christiansen, 2015).

6.6 Building rapport
A rapport is a constructive working relationship and connection that involves trust and communication between the researcher and respondents. It is symbolised by sincere interest, synchrony, and fundamental positive esteem (Vallano & Compo, 2015). A working relationship centres on a mutual appreciation of each other’s ambitions and needs, which efficiently leads to valuable information (Kelly, Miller, Redlich & Kleinman, 2013). A positive rapport establishes a comfortable and relaxed setting that ultimately enhances the inclusiveness of the respondents’ interpretations (Meissner et al., 2014). Confidence is growing among researchers that building rapport is fundamental to an effective investigative interview (Abbe & Brandon, 2013). It enhances the quality and quantity of data generated from respondents and improving remembrance accuracy in both young and old interviewee (Almerigogna, Ost, Bull & Akehurst, 2007).

6.7 Data collection process
Data collection involves successions of actions linked to each other, subsequently enabling researchers to obtain answers to their research problems. Data collection steps establish parameters for the study that suggests how to collect suitable information. It further designates the nature of data to collect and assist researchers to choose locations and persons for the proposed study (Creswell, 2009). A qualitative study poses a broad range of questions to respondents that enable them to express their perceptions unconstrained. Moreover, the researcher spends sufficient time with these respondents at the location where they engage in the phenomenon under study (Creswell, 2005). The data collection process of this research commences with a decision on the country where to conduct the study than the sampling techniques, which were useful in selecting the site and respondents. Convenience sampling, purposeful stratified sampling and purposive sampling are suitable techniques for this study. After a clear vision of the potential participants, the researcher tackled ethical matters and building rapport, which was ultimately succeeded with the actual data collection through semi-structured interviews, lesson observations, and semi-structured questionnaires. In addition to
the preceding methods, the researcher obtained data from analysing documents. Figure 5 briefly illustrate these steps.

**Figure 5: Data collection process.**

A significant part of fieldwork emerges according to plans. The target research respondents and principals of respective schools were cooperative and supportive. The researcher did not encounter rejection at any site or from target respondents. Thus, succeeded to proceed with interviews, observation and allocate questionnaires efficiently. The researcher collected the data from 28 May 2018 to 20 June 2018.

To maintain the interview’s neutrality, avoid perception bias and questions determined by the observations, the researcher scheduled interviews before entering the respondents’ classrooms. To avoid distracting lessons, the researcher negotiated with each teacher to conduct the interview when they had an administration period (free period), preferably morning hours, when they are in-exhausted. They further negotiated for the venue that was conducive for a verbal interaction where colleagues and students would seldom interrupt the conversation. Three of the four interviews were held indoors; in the teachers’ classrooms and the office of the Head of Department. To avoid disturbances, the researcher and respondent closed themselves inside. Due to the lack of free classrooms and constant inward and outward movement in the staffroom at one site, the interview was held outdoors. During interviews, questions ranging from describing the mathematics situations in respondents’ classrooms were
posed. Descriptions of how respondents teach mathematics and the assistance they give to individual students to learn. Each interview lasted for approximately 30 minutes. An audio of each interview proceeding was recorded. However, the researcher had prepared manual interview schedules for respondents who were uncomfortable with recording their voices.

After the interview, the researcher observed each respondent’s mathematics lessons for 2 days, as a non-participant observer. The situation was observed without getting involved in the respondents’ everyday activities (Mayan, 2009), to minimise chances of influencing the observation outcome (Kumar, 2011). The researcher sat silently at the back of the class where he was out of the students’ sight and refrained from contributing to the lessons’ proceedings to enable a natural interaction between teachers and students or among students. Observations are conducted in a structural format, where the researcher had a pre-planned observation schedule (Appendix C) stipulating elements and categories to be measured. The researcher observed whichever topic, from the beginning of the lesson to the end to ensure that all components, which transpired, are noted (Bertram & Christiansen, 2015). In addition to lesson observations, the researcher requested each respondent to provide a copy of their lesson plan. However, only 3 of the 4 respondents managed to produce lesson plans. The other respondent indicated that she does not write lesson plans.

The researcher administered 16 semi-structured questionnaires to students from the 4 classrooms at 2 schools where observations were conducted. Hence, this is a qualitative study, and questionnaire data are analysed qualitatively; the researcher requested 4 students per class to participate. Half of the students responded to questionnaires in their home language (Oshiwambo), specifically students from Ohangwena region. The questionnaires (Appendix D) were translated into their local language in response to the outcome of the piloting process that indicated that they could not adequately express themselves in English. For students who responded to the English version, concepts were written in understandable English terminologies (at the level of an English second language speaker at a primary school) to avoid possible misunderstands of questions, which could lead students into frustrations. When students encounter difficulties in understanding questions, they are likely to get discouraged from filling the entire questionnaires, or they are forced to skip some parts. Subsequently, the probability of students returning questionnaires diminishes (Sharma, 2007). Teachers recommended students for the questionnaires based primarily on their abilities to express their views. Questionnaires were distributed to them during their first lessons to enable flexibility to those who do not finish immediately. Those who delayed completing the questionnaires in the given lessons finalised it elsewhere before the school knocks out.
The researcher encouraged students to complete questionnaires in class, in accordance with the subject teachers’ convenience. Subject teachers suggested time they thought was right for students to fill the questionnaires. Students completed the questionnaires in the researcher’s presence to ensure that they are actually the ones who responded to the questions. This practice eradicates the possibility of events where the more knowledgeable others complete the questionnaires on the students’ behalf and eliminate chances of unforeseen circumstances (Cohen et al., 2011). Considering that questionnaires targets primary school students, possibilities were high that these students could lose or deform the questionnaires. Furthermore, the researcher was readily available for students to immediately request for clarifications if misunderstandings arise (Bertram & Christiansen, 2015).

6.8 Data analysis
Data analysis refers to what the researcher performs on the data to extract descriptions of events. Descriptions include event causes, reasons, and processes to form theories and generalisations in relation to the research objectives (Stephens, 2009).

6.8.1 Inductive approach
Induction is the process whereby the researcher infers, combines, conceptualises and re-contextualise data from his or her research instruments. It begins with pondering about the topic, setting, and learning through the literature (Mayan, 2009). The inductive approach enables coding, grouping and theming according to the data (Cho & Lee, 2014). It is data-focused rather than researcher-focused, as it promotes the interpretation of meanings from respondents’ statements rather than the researcher’s interests (Cousin, 2009). The researcher moves individual viewpoints presented in the data; prudently examining and combining those (Mayan, 2009). Thus, generating theories from the data rather than evaluating an existing theory (Cousin, 2009).

The data were analysed using an inductive approach, where the researcher focused on the descriptive revelation of the data. However, the data were grouped according to the objectives and research questions (Hesse-Biber & Leavy, 2011), although the aim was not to forcefully align the data toward specific interests. The focus was on working out what the data is manifesting, in an interpretive form; examining what the data articulates. Furthermore, the data were analysed in accordance with the readings of the literature, to combine this information to form a relative theory (Bertram & Christiansen, 2015).
6.8.2 Transcribing
Transcribing refers to the practice of listening to the audio footage and systematically records the speech verbatim into words (Curtis et al., 2013). It is a translation of verbal language such as audiotapes or videotape into print materials. It engages the researcher into listening to the data profoundly, explore, and decode. The transcription process occurs manually through jotting into notebooks or typing into computer programs such as Microsoft word and through utilising computer software (Hesse-Biber & Leavy, 2011). It is beneficial for a researcher to transcribe their own data to begin to think and familiarise with the data they gathered (Curtis et al., 2013) and vigorously engage with their research instruments (Hesse-Biber & Leavy, 2011).

This study includes 4 audiotaped interviews, and it relies on manual transcriptions. The researcher transcribed it by listening to the audios several times and took verbatim notes, capturing the entire audio report. To capture statements as specified by respondents, paraphrasing of their expressions was avoided at this stage (Cousin, 2009). However, tentative expressions such as ‘you see’ or ‘you know’ were omitted because they seem to be warnings that the person does not trust what he/she is about to say. They doubt their knowledge on that specific aspect (Hesse-Biber & Leavy, 2011). Respondents’ school names, teaching experiences and all other identifications information were withheld from the transcripts. However, interview codes (interviewee 1, interviewee 2, interviewee 3, and interviewee 4) were allocated to represent these respondents. Labelling interviewees, this way enables quick access to the raw information, in instances where the researcher must confirm certain parts or whenever someone questions the authenticity of the findings (Mayan, 2009).

6.8.3 Content analysis
Content analysis is a method used to analyse written, oral, or visual texts. It is used to classify expressions, terminologies, and sentences into meaningful categories. Categories represent either unambiguous or deduced communications (Cho & Lee, 2014). The researcher studies the meaning of a section within the data and establishes appropriate categories (Mayan, 2009) to minimise the material to a manageable quantity while preserving the validity of the necessary content (Cohen et al., 2011). It defines the connotations of qualitative materials and reduces data by analysing attributes that are appropriate to the research questions (Schreier, 2012). Furthermore, it is central in analysing communications such as videos, government documents, newspapers, magazines and recorded conversations (Kalof, Dan & Dietz, 2008). The core idea is to minimise the amount of content in these communications to categories, which
characterises the research concern (Sharma, 2007). Content analysts concentrate on identifying frequencies and patterns of certain concepts, descriptions and themes found in a transcript (Cousin, 2009).

During the analysis of documents such as the conception of teaching and learning, interview transcriptions, observation schedules, teachers’ lesson plans, and questionnaires, the researcher employed a content analysis perspective. Content analysis is employed to study texts or recorded requirements showing the occurrence of ESP features in the documents. The researcher coded the data and used these codes to form sub-categories and eventually categories. This process is summarised in figure 6.

![Diagram](image)

*Figure 6: Phases in this qualitative analysis.*

Coding refers to the process of breaking down, scrutinising, contrasting, conceptualising, and classifying data to devise meanings. The thorough study of the information and it is comparison to other parts steer the formation of codes (Seal, Gobo, Gubrium & Silverman, 2007). A code is a labelling the researcher assigns to a text that has an idea or necessary information (Cohen et al., 2011). Coding establishes a connection between data collection and their description of meanings. The researcher generates codes to indicate detected patterns, categories and theories (Saldana, 2011). These categories are either determined in advance or formed in response to the data (Cohen et al., 2011). It focuses on what texts, pictures and conversations signify (Kalof et al., 2008) and identify parts of those mediums which aligns to the research topic, to develop abstractions from the information (Richards & Morse, 2007). Coding occurs through underlining terms, sorting words, aiming at a certain part of a visual, labelling specific words and interfacing information. It is an initial phase in attempting to understand the data; hence, it facilitates comparison of different parts of the information and enables the researcher to determine what is valuable and what to dispose of (Mayan, 2009).

In this study, the researcher formed codes by labelling the descriptions from documents, observations schedules, interviews, and questionnaires with the relevant messages (meanings)
which they convey, using Atlas.ti8 program. The same code was assigned to the information, which is communicating a similar meaning. Table 3 illustrates how codes were assigned to the data. The information is in italic and codes in bold letters. Keywords, which specify the meaning of each statement, were further underlined.

Table 3: Data codes formation examples.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do not assess attitudes</strong></td>
<td>I do not assess attitude, we leave that one to the life skill teachers. We only have a misconduct book.</td>
</tr>
<tr>
<td><strong>Sometimes if you focus on the attitudes of the learners you will end up losing time.</strong></td>
<td>Do not assess attitudes</td>
</tr>
<tr>
<td><strong>They say that they are enjoying working with numbers.</strong></td>
<td>Because sometimes in mathematics, you do not need to spend sleepless nights memorising, few of them can give you that answer. They like numbers and they like solving problems. Positive attitudes</td>
</tr>
<tr>
<td><strong>Positive attitudes</strong></td>
<td>They say that they are willing to work with the teacher especially those that work together with the teacher especially those that participate in class in a lesson. Positive attitudes</td>
</tr>
<tr>
<td><strong>Positive attitudes</strong></td>
<td>We always choose the top 10 at the end of every term, I think that is causing a problem among the learners. Since some of them they feel like they are not going to help other because they may score better than them.</td>
</tr>
<tr>
<td><strong>Causes of negative attitudes</strong></td>
<td>They fear to miss out from the top 10, I think that is the main reason. Causes of negative attitudes</td>
</tr>
<tr>
<td><strong>Age and lack of discipline.</strong></td>
<td>Like they ones in grade 7, they are the one who are always late or absent in most cases. And they are always making noise. They can also make learning of the young ones difficult. Because they disrupt the class and so on. They have that lack of concentration and may be some of them are just here for the sake of being in school. Causes of negative attitudes</td>
</tr>
<tr>
<td><strong>Causes of negative attitudes</strong></td>
<td>But for me I use different strategies, just to make them like the numbers. Kids in grade 7 mostly do not understand how life is, so you need to motivate them, reward them when they do well, monitor them each and every time (Addressing negative attitudes)</td>
</tr>
<tr>
<td><strong>Addressing negative attitudes</strong></td>
<td>I tell them that mathematics is not about being good at it. It all come with practice, the more you practice, the better it becomes so just like you say practice make perfect (Addressing negative attitudes)</td>
</tr>
<tr>
<td><strong>Assessment of attitudes</strong></td>
<td>Addressing negative</td>
</tr>
<tr>
<td><strong>Negative attitudes</strong></td>
<td>Causes of negative attitudes</td>
</tr>
</tbody>
</table>

Categories are the central groupings of ideas or crucial attributes of the text that illustrates associations between parts of the analysis. For example, extracts regarding mathematics challenges could have classes such as ‘challenges of mathematics education,’ ‘ways of addressing mathematical challenges’ and ‘sources of mathematics challenges. Creating categories comprises of classifying units into domains, bunches, classes, patterns, rational sets, themes and arguments if they contain a common meaning (Cohen et al., 2011). The researcher locates patterns within the data, code those parts of the text, and place them into categories, where they would develop into a sensible story (Richards and Morse, 2007). During the analysis of data of this report, the researcher moved from codes to categories, using Atlas.ti8 program. Codes were separated into subcategories and main categories (themes). Figure 7 shows an example of how sub-categories are summarised (assessment of attitudes and negative attitudes) using codes in table 3.

Figure 7: Example of sub-categories formation.
Furthermore, figure 8 shows an example of a category (Attitudes) created using sub-categories in figure 7.

![Figure 8: Example of categories formation.](image)

### 6.9 Validity of the study

According to Noble and Smith (2015), validity refers to the situation in which the judgements correctly replicate the data. Validity appreciates the existence of numerous realities, based on personal experiences and standpoints and accurately communicates the respondents’ perspectives. Evaluating the validity of the study findings entail researchers to make decisions about the accuracy of the study, in relation to the suitability of the methods used and the truthfulness of conclusions. As per Thomson (2011) views, validity is a phenomenon used to verify data obtained qualitatively and qualitative methods reveal subjective perspectives. According to Cohen and Crabtree (2008), these perspectives are obtained from a rich and substantive amount of data, with strong demonstrations of interpretations and conclusions.

Irrespective of the researchers’ paradigm, they need to address the issues of the validity of their studies. To maintain readers’ confidence in their findings, encourage the applicability and consistency of their conclusions. Therefore, researchers are required to address the credibility, transferability, dependability, and confirmability of their studies.

#### 6.9.1 Credibility

This concept describes the certainty that can be placed in the accuracy of the findings of a study. It establishes whether the findings present sound conclusions, inferred from the respondents’ original data. It further represents the accuracy of interpretations made from respondents’ actual perspectives (Anney, 2014). Qualitative researchers maintain the credibility through “triangulation, member checking, peer examination and prolonged-varied field experience” (p. 276). Triangulation method refers to the exploration of different data sources, using different methods to obtain findings (Cousin, 2009). Triangulation identifies substitutes and different viewpoints on social reality. The research validity increases when different methods obtain similar findings (Hesse-Biber & Leavy, 2011). Member checks involve consistent assessment of data and interpretations. It requires researchers to incorporate
respondents’ expressions in their analysis and interpretations of data, to prevent biasness. The information inferred from the data is send to respondents to assess the interpretations made and propose for changes, in the case of misinterpretations. Peer examining, refers to the practice where the researcher seeks assistance from other professionals. These professionals’ give comments, critique and pose searching questions to help the researcher to draw conclusions (Anney, 2014). Prolonged-varied field experience underlines the significance of the researcher to get an understanding of the context of the study. The researcher’s presence in the environment can reduce the chances of information flow at the initial stages. However, as the researcher stays for a longer period, respondents’ comfortability, trust and understanding improve, enabling the researcher to obtain valuable data (Onwuegbuzie & Leech, 2007).

During this study, the researcher employed the triangulation, and members check techniques. Triangulation manifests, as data are generated through different methods such as analysis of curriculum conception, interviews, observations, and questionnaires. The aim of using various means of data collection is to authenticate the conclusions. Distinct tools increase the chances of a range of different opinions from different respondents and resources. Thus, in this study, views are obtained from policymakers through analysis of curriculum conception, teachers, through researcher’s own observations and from students. On the other hand, members check influenced the credibility, as respondents’ direct expressions are quoted to substantiate inferences made, throughout this analysis. Although lesson observations were only conducted for 2 days per site, the researcher acted as a non-participant observer to avoid compromising the naturalistic setting of lesson interactions.

6.9.2 Transferability
This concept refers to the extent to which the findings of the study is transferable to other settings, with different respondents – interpretively, it corresponds to the generalisability of the results (Anney, 2014). Readers of the study determine the transferability question, through recognising specific features of the research context and associate them to similar conditions, which are more familiar to them. Readers consider the study more plausible when the details are comparable to familiar situations. Therefore, it is imperative that the study provides thick descriptions of the context and the methods (Cohen et al., 2011) and employ purposeful sampling (Anney, 2014). Thick descriptions facilitate appropriate evaluation of how well the research context corresponds to other contexts. Thick descriptions involve clarifying the research processes, beginning with the data collection tools, data collection process, the setting of the study and the production of the final report. The clarification of the research process
enables other researchers to replicate the study with similar features, in different contexts. Purposeful sampling involves selecting constituents such as individual respondents, group of respondents’ and sites, based on defined purposes. This form of sampling enables researchers to focus on respondents who are knowledgeable about their research interests. It further enables researchers to determine the reasons for using specific classes of respondents in the study and produce detailed findings than other sampling techniques (Barnes et al., 2012). In this study, the researcher used purposeful sampling to select respondents who are knowledgeable about mathematics practices and frequently engage it. Furthermore, a detailed description of the respondents, context, and strategies used to obtain information is given, to enable readers to determine the applicability of the study on their own contexts.

6.9.3 Dependability
Dependability refers to the consistency of the research findings if they are repeated over time. It involves respondents assessing the findings, interpretations and the recommendations of the study, to ensure that they are all supported by the data (Anney, 2014). Dependability can further be addressed through stepwise replication, where 2 or more researchers analyse the same set of data and compare the conclusions. Dependability is achieved when these researchers obtain similar results from their analysis (Ary, Jacobs, Razavieh & Sorensen, 2010). Dependability is further addressed through peer examination, where the researcher discusses the research findings and process with a neutral person, who has experience in qualitative research methods (Anney, 2014).

In this study, the researcher enhanced dependability through discussing issues with fellow researchers who are doing qualitative studies synchronously. The researcher presented the findings to them to critique, and they assisted through recognising incoherent and inconsistent ideas; firstly, within the research plan and later in the research report. Prior to data collection, a research plan was presented to fellow students and supervisor. Afterwards, the research findings were presented to audition, which allowed them to scrutinise the information gathered and used it to support and question the conclusions. The researcher further received assistance from the supervisor, by occasionally sending the manuscript to her to evaluate the progress and provide suggestions.

6.9.4 Confirmability
Confirmability refers to the extent to which the findings of the study could be corroborated by other researchers (Anney, 2014). It is a procedure of ascertaining whether the researcher has
been biased during the inquiry. This procedure is due to the qualitative method’s provision of permitting researchers to bring their own unique perspectives to the inquiry. Therefore, external evaluators can assess whether the researcher has been biased or not, by studying the data collected during the actual field inquiry (Cohen et al., 2011).

In this study, the researcher has maintained conformability in numerous ways. Firstly, parallel to the credibility question, data triangulation was employed, as different methods of data collection were used (analysis of the document, interview, lesson observation and questionnaires) to observe whether they obtain similar findings. Secondly, interviews were conducted before classroom observations, to avoid questions directed by the observations. Respondents were not informed about the specific questions to anticipate during the interview beforehand. Hence, if they are aware in advance, they will use the opportunity to locate the answers they consider as most appropriate to these questions (Bertram & Christiansen, 2015). Thirdly, questionnaires were piloted before they are administered to the actual participants. Several students from the first school, which hosted the researcher, were used as piloting samples to the questionnaires. These students were selected randomly from classes that are not taught by the host teacher. These trials were employed to evaluate whether the language register used in the questionnaires is suitable and explicitly understandable by the target group. The trial group was further used to approximate the timeframe the actual respondents require to complete the questionnaires satisfactorily. They need enough time to complete the questionnaires. When the time is limited, students are likely to rush and diminish their critical thought in the process. Fourthly, students completed the questionnaires in the class, enabling the researcher to maintain that they are the authentic authors of the views or contents reflected in the questionnaires. Permitting them to complete questionnaires at home increase the possibility of receiving assistance from someone else (Kumar, 2011).

6.10 Considerations of ethical principles

The researcher explained the purpose of the study (verbally and in writing) and the possible benefits it could contribute to the mathematics field. Respondents of this study were further informed of their rights (Cousin, 2009). For instance, they conceded to become research respondents out of their own prerogative, and they were free to withdraw at any point without necessarily providing a valid reason (Rugg & Petre, 2007). However, the researcher further informed them that their identity would be protected. Individuals’ names will not be released
to the public or any discourse where these data could be used. Respondents and their schools’ names could rather be identified by using pseudonyms (Bertram & Christiansen, 2015).

Permission to conduct the study in the schools’ ground was obtained from the relevant educational directorates (Khomas and Ohangwena Education Directorate) (Appendix E) and the schools’ management through a letter (Appendix F). The management confirmed their acceptance to the request by providing a signature and a school stamp (Aunio et al., 2016). The researcher further requested permission from direct respondents (teachers and students) and a consent letter be attached to each interview schedule and questionnaire (see Appendix A, B and C, respectively). The letter specifies the aim of the study, information about the respondents’ rights and a place where they can indicate their acknowledgement to partake in the study, through a signature. Additionally, consent letters for minor respondents, in these case students, were addressed to their parents or legal guardians (Appendix G) to inform them and enquire for permission whether their children could participate (Cousin, 2009). Parents confirmed their decision by providing a signature on a space provided or leave it blank if they opt their children out. These consent letters were sent a day before students were due to complete the questionnaires. Although, students were requested to indicate their willingness, relying entirely on their consent was insufficient. Other permission letters (see Appendix C) were issued to host teachers, requesting them to permit the research to conduct observations in their classrooms. To prove the researcher’s authenticity to respondents, a data collection approval letter from the university was presented to them (Appendix H).
7 Results and discussions

The purpose of this section is to enable the researcher to present key findings of the study. It further gives the researcher an opportunity to comment on the research and assert how the study answered the research questions. Eventually, these comments and assertions convey meanings and implications of the findings. Results may be presented variously, including summaries, figures, photographs, tables, and quotations (Bertram & Christiansen, 2015). Results structure gradually answers to the research questions (Oliver, 2010). Thus, the results of this study answers to the following questions. The first research question, features of ESP present in the teaching and learning conception guiding the Namibian basic education. This question focused on investigating the conception of Namibian basic education, presented in the National Curriculum for Basic Education. The second research question, perceptions of Namibian primary school mathematics teachers toward mathematics education. The results to this question draw from interviews the researcher conducted with 4 mathematics teachers. Research questions predominantly centre on their general experiences during mathematics lessons. The third research question, features of ESP present in the Namibian primary school mathematics learning situations and teachers’ lesson plans. To substantiate teachers’ reports from the interviews, lesson observations followed. The observations focused on the interaction between teachers and students and among students. The fourth research question, the relation of students’ perceptions toward mathematics to ESP. Answers to this question were obtained through administering questionnaires to certain students to express their views toward mathematics and interpret these views in relation to ESP.

7.1 Features of explicit and systematic pedagogy present in the teaching and learning conception guiding the Namibian basic education
The first research question was “what features of ESP are present in the teaching and learning conception guiding the Namibian basic education”? The information in this section relies entirely on analysing the learner-centred notion stipulated in the National Curriculum for basic education, which is the ideological baseline for Namibian comprehensive schools.

7.1.1 Curricular guidelines for pedagogy in Namibia
The researcher’s interest is to examine the general meaning of learner-centred and determine how it relates to ESP philosophy. The extract below gives a detailed definition of learner-centred as per the Ministry of Education, Arts and Culture (2016, p36-37):
“Learners-centred approach to teaching and learning means that the point of departure is always what the learners already know and can do, then acquiring new knowledge through ways of working which are relevant and meaningful for them, and learning how to apply their knowledge creatively and innovatively. Knowledge is not learned for its own sake but must always lead to a new understanding and new skills and the creation of new knowledge. At each step of the way, learners must show how competent they are in what they understand and can do.

An integral part of this approach is the integration of ICT as a tool to enhance teaching and learning. The curriculum and syllabuses describe the competencies which they should attain, so that teachers know exactly what to assess in order to be sure that the learners are progressing and achieving. Teaching emphasises the varied processes and learning experiences needed for the creation of knowledge, rather than relying predominantly on the transmission of knowledge by the teacher.

Basic education also prepares for the society envisaged in Namibia Vision 2030 by being inclusive. Learners with special educational needs and other individual needs will be included in mainstream schools and their needs will be given particular attention through differentiation of methods and materials as needed. Learners who are so severely impaired that they cannot benefit from attending inclusive mainstream classes and schools, will be provided for according to their needs in special units, classes or schools until such time that they can join the mainstream school. The curriculum, teaching methods and materials will be adapted to learners with special educational needs.

Learners’ progress and achievements will continually be assessed. Diagnostic tests will be administered in Pre-primary (School Readiness Test) and reading skills (Early Grade Reading and Writing) in Grades 2 and 3. In Senior Primary, learner achievement in selected subject areas will be monitored nationally in Grades 5 and 7 using national Standardised Achievement Tests (SATs). There will be semi-national examination at the end of Grade 9, and national examinations at the end of Grades 11 and 12. The results of assessment and examinations in these grades provide information on how learners achieve at the end of the phase and also how the system as a whole is performing.”

When the description of this conception of learning was analysed, the researcher inferred and establish that it centres on certain perspectives that are advocated for by ESP. However, some ESP concepts are absent. In subtopic 7.1.2 and 7.1.3, detailed descriptions of the similarities and variation between ESP and the curriculum conception are presented.
7.1.2 ESP ideas in the curriculum conception
In reference to the quotation in 7.1.1, the researcher summarised key ideas that constitute a student-centred pedagogic philosophy, and simultaneously analyse their relationship to ESP. Throughout the analysis, specific extracts from the learner-centred description that makes concepts relevant are directly quoted. Figures 9 outlines key ideas that match the requirements of ESP.

![Diagram of ESP ideas]

Figure 9: ESP ideas present in the learner-centred conception.

(i) Prior knowledge
As illustrated in figure 9, the curriculum recommends instruction to commence with the students' background knowledge. This perspective corresponds with the requirements of ESP. In accordance with ESP, examining students’ prior knowledge before engaging in comprehensive instruction is one of the initial responsibilities that teachers should perform. Determining prior knowledge is a reliable method to establish how to begin guiding students to achieve lesson objectives. The curriculum recognised the significance of prior knowledge by stating that:

“Learners-centred approach to teaching and learning means that the point of departure is always what the learners already know and can do, then acquiring new knowledge through ways of working which are relevant and meaningful for them, and learning how to apply their knowledge creatively and innovatively.”

Prior knowledge encompasses the idea of students’ zone of proximal development that focuses on students’ existing competence and the skills, which are comprehensible to them (Sheldrake
et al., 2015). Hence, it specifies whether students possess the necessary basic skills, which could influence how they receive new knowledge. As indicated by Kachepa and Jere (2014), prior knowledge is based on students’ geographical setting; therefore, it enormously contributes to their learning. The curriculum identifies this concept for teachers to incorporate into their lessons as the first step to experience an explicit interaction, which implies that policymakers have recognised its significance.

Policymakers have documented the essentiality of prior knowledge; the final challenge is on teachers to execute this recommendation during their instructional process. Teachers who abide by this guideline have moved a step towards the right direction. While those who do not inquire and integrate students’ prior knowledge into their lessons are doing so on their own accord and they defy a critical facet of learner-centred education. Therefore, such teachers simultaneously reject explicitness and students in their classes are likely to struggle with comprehending ideas they try to communicate.

(ii) Meaningfulness

The previous subheading deliberates onto the prior knowledge that eventually produces meaningfulness. Hence, to promote meaningfulness, teachers need to use examples of objects, which are readily available in their students’ lives. The latter part of the following quotation recognises meaningfulness, as it emerges from prior knowledge:

“Learners-centred approach to teaching and learning means that the point of departure is always what the learners already know and can do, then acquiring new knowledge through ways of working which are relevant and meaningful for them, and learning how to apply their knowledge creatively and innovatively.”

This concept has a link with ESP because when students find the content meaningful, they are most probable to find such knowledge clear and easily understandable. Unlike students who abstractly learn similar content. Kim et al. (2015) agree with the ideas of meaningfulness and ESP by stating that selecting meaningful examples is significant to the successful implementation of ESP. Then these examples can influence students to adopt the rules they have learned and apply them. In fine, the curriculum encourages teachers to use examples that are meaningful to their students, which on the bases of ESP it enhances and determine the level of their explicitness. Therefore, those who prefer their lessons explicit, they would follow this curriculum recommendation.
(iii) New understanding, new skills, and applications

It is noted in the curriculum that knowledge is learned to affect a new understanding and new skills (Ministry of Education, Arts and Culture, 2016). As it is stated that:

“Knowledge is not learned for its own sake but must always lead to a new understanding and new skills and the creation of new knowledge.”

Correspondingly, under ESP it is indicated that learning a new skill greatly depends on the understanding acquired prior to and during the new encounter (Leone et al., 2010). These statements further highlighted the significance of prior knowledge as a central architect of learning. When the new knowledge derives from contextualised examples, it creates a new advanced way of thinking about issues and finds means of solving them. These pedagogical lenses inform students on how and where to apply the knowledge they acquired. Therefore, teachers who understand and abides by this standpoint should be able to give a series of activities to ensure that students have mastered the skills. Through practice, especially in mathematics, students acquire a new understanding and skills, which they could apply on an individual basis. Goeke (2009) proffered a similar suggestion that through tangible and skill-specific orientations, learning procedures should support students to learn until they can independently perform the task. This view suggests that if students can independently perform a task, they have successfully acquired a new understand and skill. Subsequently, this forms part of the requirements of ESP. After an ESP interaction, students should be able to perform task unguided.

(iv) Assessment of learning and students’ competencies

This is another combination of concepts that is emphasised by both the Namibian Curriculum for basic education and the ESP philosophy. In the curriculum, it is indicated that teachers need to assess students’ progress and achievements (Ministry of Education, Arts and Culture, 2016). The extracts stated that:

“At each step of the way, learners must show how competent they are in what they understand and can do.”

A different section of the conception description states that:

“The curriculum and syllabuses describe the competencies which they should attain, so that teachers know exactly what to assess in order to be sure that the learners are progressing and achieving.”
As ESP philosophy recommends that students’ assessment should frequently occur, followed by detailed feedback on their immediate learning (National Centre on Intensive Intervention, 2016). These two perspectives concurrently advocate for teachers to conduct an assessment during classroom interactions. Thus, encouraging explicitness among curriculum agents, since after teachers have assessed, they establish the goals that students have achieved, and the aspects they are still lacking. Hence, they will introduce alternative methods to assist them in explaining concepts successfully. Lembke et al. (2012) have supported the preceding statement by stating that the assessment of students ultimately improves instruction and students’ learning. On the other hand, when the assessment process reveals that students can perform the task independently, it means they have been empowered. Therefore, they are regarded as competent individuals in that area. In a nutshell, parallel to the ESP philosophy, assessment is recommended in the curriculum, and since it is considered critical during the learning process, teachers who implement this guideline are likely to produce competent students in many areas than those who disregard or focus less on it.

**(v) Use of Information and communication technology (ICTs)**

In recent times, technology is an essential tool for expanding limited reach of humanity in learning and communication (Siemens and Tittenberger, 2009). This basis is identical to the reason provided for the inclusion of ICTs in the Namibian curriculum. As it stated that:

> “An integral part of this approach (learner-centred approach) is the integration of ICTs as a tool to enhance teaching and learning.”

While ESP suggests for a systematic scaffolding of students until they become proficient in using the material, they need to use to obtain understanding in a particular concept (Goeke, 2009). Similarly, the social constructivism perspective emphasises on learning mediation as one of its focus areas. ICTs are the mediation tools in this regard. They are used as the teaching and learning mediators to assist (scaffold) students to acquire knowledge efficiently. They act as agents to communicate the information from the teacher to students explicitly. These ICTs can be in the form of movies, projectors, internet sites and recorded videos. These tools express the message which teachers want students to be acquainted about, in an easy and exciting way. Since some ICT tools are programmed to produce an audio and visual image simultaneous, they minimise possibilities of ambiguity in the message. In sum, the concept ICT in the curriculum enables teachers to use technological tools to scaffold students learning systematically and eventually enhance the explicitness of their interaction. Whether ICTs are
available in schools for teachers’ usage is another question. At least curriculum designers recognise its significance and the challenge are upon teachers to make alternative arrangements on how to acquire these tools when their schools do not own one.

**(vi) Differentiation of methods and inclusivity**

The curriculum recommends for the accommodation of students of both abilities (special educational need and fast students) in mainstream schools and receives differentiated instructions (Ministry of Basic Education, Arts and Culture, 2015). In the extract below, it is specified that:

> “Basic education also prepares for the society envisaged in Namibia Vision 2030 by being inclusive. Learners with special educational needs and other individual needs will be included in mainstream schools and their needs will be given particular attention through differentiation of methods and materials as needed.”

Correspondingly, core ESP is designed to support students of all abilities to attain lesson objectives defined within individualised instructions (Riccomini et al., 2017). This literature from 2 different sources (curriculum document and article based on ESP) promotes the same idea. They concur that inclusivity is imperative in education. Hence, education is not exclusively about subject contents, but it is similarly a medium for transmitting social and communication skills. Dubé et al. (2011) contribute to the preceding view, stating that when students of all abilities collaborate, they assist each other in attaining overall growth. This quote and the curriculum statement encourage teachers to evaluate and familiarise themselves with students' abilities and develop measures to respond to dilemmas which they may detect explicitly. When teachers are aware of inclusivity, as per the curriculum's intentions, they are better equipped to design lesson plans that favour and cater to the needs of all students. This knowledge ultimately enables students and teachers themselves to experience an explicit interaction. In fine, differentiation of methods and inclusivity is another concept in the Namibian Curriculum of Basic Education, which aligns with the requirements of ESP. It further provides a scope for the implementation of the social constructivism perspective. Hence, the responsibility of educating now rests in a triangle, between the teachers, advanced students, and special educational need students. Advanced students can support others, who struggle to achieve lesson objectives, while the teacher assists them all.
(vii) **Special units**

Although the curriculum recommends for inclusive classrooms, it does not preclude the possibilities of creating special classes or schools when conditions substantially suggest for such. As it advises that:

"Learners who are so severely impaired that they cannot benefit from attending inclusive mainstream classes and schools, will be provided for according to their needs in special units, classes or schools until such time that they can join the mainstream school. The curriculum, teaching methods and materials will be adapted to learners with special educational needs."

This alternative is suggested by the idea of supplementary ESP, that individuals, who have shown exceptional inability to learn mathematics during the entire group instruction, can be separated from the whole group to attend lessons elsewhere (Leone et al., 2010). The suggestions benefit students who need more time and special materials to acquire knowledge. In addition, they give more flexibility to teachers to tackle issues that are complex to these students. Therefore, this section of the curriculum mandates teachers to organise alternative avenues when they realise that it is impossible to be explicit to certain students during normal classroom interaction. Once more, the Namibian curriculum and a section of ESP harmonise the same idea; the implementation of special classes or schools, as it enables teachers to work with students intensively.

### 7.1.3 ESP ideas deficient from the curriculum conception

As the researchers studied the conception of the Namibian basic education, quoted in 7.1, and compare it to ideas advocated for by ESP, it was discovered that certain practices are not recommended in the curriculum. However, they are valuable for explicit classroom interactions. Therefore, figure 10 gives a brief outline of the missing concepts.

![Figure 10: ESP concepts missing from the learner-centred conception.](image)

(i) Lesson objectives

(ii) Skills mastery for independent practice

(iii) Maintenance
(i) Lesson Objectives
ESP philosophy indicates that teachers should begin the instructional process by describing lesson objectives to enable students to focus on acquiring the target knowledge (Doabler & Fien, 2013; Archer & Hughes, 2011). However, the conception of Namibian basic education is silent on this issue. Although disclosing lesson objectives to students is accepted to have a remarkable influence on their learning, teachers may overlook it because there are no directives mandating them to implement it. Moreover, there are possibilities that some teachers are unaware of this practice and even those who know are prone to forgetting. They need stable souvenirs to remind them perpetually. Additionally, whether they practice it or not, there is nothing to hold them accountable. These perceptions are not intended to undermine teachers’ autonomy of what they practice in their classrooms. However, the curriculum should set standards that holistically inform all educational agents on how to operate within the system and ensure uniformity. Otherwise, those who are knowledgeable will implement the practice while their counterparts continue relying on ineffective interventions. Eventually, this inconsistency causes disequilibrium in the performance of the system.

(ii) Skill mastery for independent practice
ESP philosophy urges teachers to give independent practice only when they establish that students are incapable of making significant errors (Smeigh, 2013). While the closest statement in the Namibian Curriculum for Basic Education states that students must show how competent they are in what they understand and can do (Ministry of Education, Arts and Culture, 2016). Although these statements are parallel, their variation surfaces on the degree of emphasis. The curriculum only suggests students show competency, while ESP requires them to reach mastery level. The curriculum is ambiguous; it does not specify the level of competency that students must achieve before they proceed to independent practice. Hence, teachers themselves decide when to progress to assessment, even without clear evidence of the students learning success. The ESP philosophy asserts that students should master the competencies prior to independent practice, subsequently inhibiting chances of ambiguity on the teachers’ side. Due to the haziness of the curriculum statement, teachers may give students independent practice prematurely, which could trigger frustration in them. Eventually, these emotions lead to low comprehension and instigate hatred toward the subject.
(iii) Maintenance

The ESP philosophy states that teachers should continually ensure that students preserve their knowledge. Otherwise, a skill that is not polished with practice rusts (National Center on Intensive Intervention, 2016). While the Namibian curriculum does not recognise this view, which means it does not oblige teachers to integrate contents of topics they previously covered or return to previous chapters when necessary. The possible existence of teachers who are familiar with this practice cannot be eliminated, because the curriculum conception does not have evidence to justify such conclusions. However, teachers who implement it, they execute it on their own accord and probably based on the knowledge they acquired somewhere else. Those who are unaware of this practice are at a greater risk of proceeding through themes without creating avenues for linking the knowledge. This lack of knowledge could ultimately minimise the probability of students to remember previously learned content.

7.1.4 Summary of the first research question

The conception of the Namibian basic education is learner-centred education, and the curriculum set parameters of this teaching philosophy, as quoted in 7.1, according to the aspects that are deemed necessary by the designers. The main concepts of learner-centred and requirements of ESP are compared. Recognition of students’ prior knowledge, meaningfulness of the subject content, creation of new understanding, new skills, and applications of knowledge, continuous assessment to evaluate student competencies, use of ICTs, differentiation of methods to enable inclusivity and building of special units are common ideas in learner-centred education and ESP philosophy. Therefore, it is rational to conclude, until proven otherwise, that these are the ESP practices Namibian teachers are most likely to consciously or unconsciously implement, based on their familiarity and understanding of the goals of learner-centred education. These guidelines make it apparent for teachers who neglect the stipulated ideas to be held accountable. Inversely, the curriculum does not require teachers to introduce lesson objectives to students, neither to ensure skills mastery before independent practice and maintenance of knowledge that are among fundamental compositions of ESP. In the absence of these concepts, teachers are unable to conduct explicit lessons exclusively, especially those who lack alternative mediums to acquaint themselves with such knowledge. Therefore, it is highly likely that many Namibian teachers do not implement these concepts due to their absence from the curriculum.
7.2 Perceptions of Namibian primary school teachers towards mathematics education

The second research question was “what are the perceptions of Namibian primary school teachers towards mathematics education?” respondents were briefed during interviews that this question aims to divulge broad aspects surrounding mathematics understanding and practice. Respondents were encouraged and permitted to share any kind of information pertaining to mathematics. Although they have initially struggled with which mathematics issues, to begin with, they later found their feet and turn the interview into a more comfortable conversation. During analysis of the information, it was established that respondents focused on 3 themes - motivations, attitudes and performances. Figure 11 shows a summary of these themes and the concepts they embodied.

![Figure 11: Teachers’ perceptions towards mathematics education.](image)

### 7.2.1 Motivation
- Students motivation
- Building motivation

### 7.2.2 Performance
- Students performance
- Students understanding
- Performance hindrances
- Improving performance

### 7.2.3 Attitudes
- Positive attitudes
- Collaborative learning attitudes
- Mathematics problems as a social construct
- Addressing negative attitudes

**Figure 11: Teachers’ perceptions towards mathematics education.**

#### 7.2.1 Motivation in mathematics
The first category contains views of mathematics teachers regarding motivation. The concept of motivation was used in relation to the description by Malloy et al. (2013) as the inclination
to engage in a task and the inclination to persevere in that task, even when it becomes challenging. Individuals’ motivation is influenced by their views of prosperity in performing the task. Respondents’ responses enabled the development of 2 sub-categories that are illustrated in figure 11.

(i) Students motivation

Three respondents have referred to the nature of motivation their students possess about mathematics education in their speeches. They expressed how they view motivation of students during their lessons - good or poor motivation. In this category, only 1 teacher alluded that the motivation to learn mathematics is good. Two teachers are not convinced by their students’ motivation, in which a respondent stated that:

“The situation is not so good, many learners are not motivated to learn mathematics and it is also being influenced by the environment itself (sic)” (Interviewee 3).

Rossi (2015) statement agrees with the above extract, as she expressed that the general society’s attitudes contribute remarkably toward mathematics learning. Parents can readily admit to their children that mathematics is hard, and they do not like it. Some parents would testify that they did not even bother to do mathematics because it is impossible. Additionally, the media portray mathematics to be unfavourable. Both Rossi’s expressions and the quotation communicate that mathematics challenges are indeed constructed socially. Parents’ phrases and the role of media indicated in the paragraph have the potential of developing demotivating perceptions into students.

Respondents attributed the lack of motivation to inadequate resources or teaching aid at their disposal. They believe that teaching aid enhances students’ motivation. Indicating that:

“Some of the things that are failing to motivate them are teaching aid. We are lacking teaching aid and sometimes they are the ones that motivate the learners to participate.” (Interviewee 4).

Goeke (2009) share similar views to the stance signified in the quotation above. He argues that learning procedures should support students to learn until they can independently perform the task. These procedures employ organised tools to assist in incorporating ideas. The tools act as stimuli to mediate learning. Both Goeke’s viewpoints and the information in the extract promotes the same perspective that suggests that when teachers use mediating tools, students learn better and when they learn, their motivation improves. As Goeke (2009) further asserted that through tools, students get the platform to witness the systematic physical reference. Therefore, lack of teaching aid could actually lower students’ motivation.
(ii) **Building students’ motivation**

All the respondents, including the one who did not directly specify the nature of motivation in his classes, have expressed some methods, which teachers can employ to improve students’ motivation. These methods range from interesting teaching methods, monitoring of students’ work, encouraging students to perform well through offering rewards for good work, integrating prior knowledge in lesson presentations, developing awareness on knowledge applications, allocating teaching aids, giving students more activities to complete, and assisting them to realise the continuity in mathematics. One respondent narrated that she explains the aspect of continuity as:

“The only thing we have to do at school is to make them realise that what they were doing at home is this. Imagine at home you are eating porridge and you are four and your mother put there may be 5 pieces of meat, what do you do? If they say we share, we need to let them know that share means divide” (Interviewee 3).

According to respondents, prior knowledge appears to be one of the significant forms of motivation to students. The respondent’s viewpoints support Kim et al. (2015) notion that considering students background knowledge improves their chances of understanding the new situation. Smeigh (2013) expanded on the view by stating that activating students’ background knowledge assists them to establish the relationship between the new and existent skills. These literature and the respondent’s narrative defend the significance of prior knowledge. They all recognise how prior knowledge enhances learning opportunities and subsequently improve motivation. When students effectively attain learning, their motivation improves.

### 7.2.2 Performance in mathematics

The second category encompasses perceptions of mathematics regarding of performances. Performance in this context refers to the act of completing something up to standard – to thrive, to excel. Performance symbolises identity and communicates stories of individuals (Schechner, 2006).

(i) **Students performance in mathematics**

Two respondents labelled the students’ performance as bad. Despite the mechanisms they adopt to try to improve it, it appears that the outcome remains unsatisfactory—stating:

“That their performance is not bad, I want to do more. I try to improve them by using different teaching methods, if one does not work then I go to another at least just to improve my results” (Interviewee 2).
This information complements the report by the Ministry of Education (2009), based on grade 7 results for the year 2007, which reveal that the highest proportion of students from all primary schools achieved below average. Although the report was released 9 years ago, similar mathematics performance challenges persist at the primary phase in the recent generation, as the respondent indicated in the quotation. This information suggests that we could not successfully overcome our challenges to improve mathematics performance in the last 9 years.

(ii) Students’ understanding of mathematics

The researcher included this subcategory under this category because understanding and performance are proportional. Students’ understanding influences their performance (Schechner, 2006). Three respondents have criticised students’ mathematics understanding. According to them, many students do not understand mathematics, a respondent strongly emphasised his argument that:

“The performance is very poor, they do not really perform well, they take time to catch up, and they need more time” (Interviewee 4).

The respondent’s assertion confirms Kachepa and Jere (2014) concerns that despite that mathematics is highly regarded in Namibia, the pedagogical process is incomprehensible to students, and they do not understand its importance. The Ministry of Education (2009) further revealed that in 2007 grade 7 external examinations, many students scored below average. The incomprehensibility of mathematics pedagogy that Kachepa and Jere eluded is the potential contributing factor to students’ lack of understanding and subsequent low performance. As this information is gathered longitudinally, and the findings are similar, it indicates that mathematics has been persistently problematic. When teaching strategies are perplexing, they will eventually manifest their ineffectiveness, as students will struggle to learn. As per the Ministry of Education (2009), effective pedagogy facilitates students’ ability to excel in the subject, which suggests that the lack of understating mentioned by the respondent is due to ineffective strategies.

(iii) Aspects that hinders performance

All respondents have specified various aspects, which perpetuates poor performances. Availability of resources, too much work, limited time, overcrowded classes, insufficient foundation knowledge, language barriers, absenteeism and late coming are the common challenges that respondents encounter. One respondent expressed that absenteeism and late coming subject explicitly by stating that:
“Absenteeism and late coming also contributes to poor performance because you can introduce the topic today, tomorrow the learner is absent, which means when the learner comes the other day, and it is already a problem because there is now a gap. Late coming, especially for the first period” (Interviewee 3).

Respondents indicated that these challenges press severely when the workload accumulates, as it is always better in the first trimester in comparison to the second and third trimester. Subsequently, half of the respondents only strive to ensure that most students achieve at least 50% grading, which is averaged. In this regard, Ragpot et al. (2016) recommended ESP as the best intervention method to assist students who appear to have mathematics difficulties early on. Hence, when the content increases, students are due to struggle more, as it is revealed by respondents on the disparities of students’ performances between the semesters.

(iv) Teachers methods to improving performance

To tackle the challenges facing mathematics education, respondents have recommended teaching practices, which they perceive as possible remedies to the situation. These practices involve setting up performance targets with students, flexible teaching methods – switching between teaching methods when the initial one fails to yield desired outcomes and rewarding students for good work. Furthermore, organising alternative support mechanisms for students who are unable to cope with the pace of mainstream classes, incorporation of prior everyday knowledge and commencing mathematics instructions in the pedagogical language at early grades are common identified practices. One respondent defines her opinion on the language and foundation matter as follows:

“I find mathematics a difficult subject for the learners. Even when we are analysing results here at school, you can see the mathematics results are very low. I think the problem is with the foundation. So I think the foundation of mathematics needs to be builds up during the early stages. I think language used in mathematics is also a problem to them. If the learner cannot express him or herself in English, then when it comes to word problems it will be hard for that learner to respond. Since she or he does not understand the language” (Interviewee 4).

The respondent’s concerns on language barrier complement Riccomini et al. (2015) argument that mathematics proficiency highly depends on the students’ ability to communicate and deduce through verbal and written language. It is further parallel to Panthi and Belbase (2017) argument that school languages which vary from students’ home languages restrict their mathematical abilities, as the curriculum adopt English as a medium of instruction while most
Namibian students are non-English first language speakers. When students cannot profoundly understand the language, the message becomes inexplicit and eventually, restricts their degree of comprehending ideas. Since English as a medium of instruction only begins at senior primary phase, respondents have advised for mathematics pedagogy in English to begin at initial grades to increase the students’ possibilities to learn mathematical terminologies from young ages.

7.2.3 Students’ attitudes toward mathematics learning
The last category of the respondents’ perceptions focuses on attitudes. This concept refers to a collection of attained feelings about learning that constantly inclines an individual to engage in or preclude mathematics learning (Jang et al., 2015). Interests and values foster students’ attitudes. These interests and values are acquired systematically because of students’ experience with learning mathematics. Teachers’ knowledge of students’ specific interests can assist them to counteract negative attitude by availing resources that match those interests (Schunk & Zimmerman, 2007).

(i) Positive attitudes toward mathematics learning
Two respondents indicated that they have students in their classes who are fond and appreciate mathematics. Although according to them, the number of these students is considerably low, they are willing to work with numbers and to participate during classroom interaction. The following quotation is extracted from a respondent’s emphasise on the reason for these students to like mathematics:

“They say that they are enjoying working with numbers because sometimes in mathematics, you do not need to spend sleepless nights memorising. Few of them can give you that answer” (Interviewee 3).

Although the quotation conveys a positive message toward mathematics, the focus is not entirely because students find it useful. They seemingly prefer it because it consumes less of their time. The quotation presents no information indicating that students find the subject useful in their daily lives, eventually upholding Rossi et al. (2013) argument that students perceive mathematics as an abstract subject, and they do not recognise how it relates to the real world.

(ii) Collaborative learning attitudes between students, and students and teachers
Three respondents have shared concerns about the students’ willingness to collaborate. Most students from these respondents’ classrooms prefer working individually than in pairs or
groups. Instead of helping each other, they competing to prove who is better and occasionally refuse to contribute whenever they receive a group activity. Besides competition, respondents could not establish other concrete reasons for the students’ inability to collaborative, but they further suspect shyness and selfishness, as a respondent puts it:

“They only like to work individually, I do not know if they are selfish or what. But they do not really like to contribute in groups, they prefer working alone. I used to tell them that if you are working together you can help each other. And you are learning from others, but I do not know if they are shy or why they do not like to participate in groups” (Interviewee 4).

This respondent’s assertion suggests that it is challenging to implement ideas of social constructivism. Tracey and Morrow (2012) believe that students are social beings and they learn from their interactions with others. However, in the extract above, respondents revealed that students do not appreciate working with others. Poor understanding of mathematics concepts and performance mentioned in 7.2.2 (ii) is a possible outcome of this lack of collaboration. As Tracey and Morrow further argued for social constructivism, stating that learning first occurs socially before it happens to individuals. Smith and MacGregor (2014) support the same sentiment that collaborative work promotes active and constructive learning. However, students refuse to collaborate and assist each other to attain solutions to given problems, which subsequently imply that they object to the idea of this perspective.

Inversely, the other respondent commented on some form of collaboration that he experiences during his lessons. While students’ actions deserve credits, it appears that only a particular group of students are prepared to collaborate or help, and it is apparent from the respondent’s narrative that they perform it to fulfil their own desires – as a form of communicating their superiority rather than out of open-mindedness. The extract below quotes how the respondent narrated this scenario:

“They do collaborate. Fast learners in the class, when they get something, they want to show that at least me, I know what we are doing today. At first when I started it, I use to pick up some learners, those that are already sharp (sic). Whenever I mark then I know this one understands something, then I allocate them to go help others, while I am also helping the other once individually. They enjoy it when they are assigned to people to assist them that is why they try so hard to get the answer right so that the teacher can assign them to help others” (Interviewee 2)

In accordance with the respondent’s assertion, communicating their understanding level is the main reason students are enthusiastic about helping others. They are doing it to show that they
understand the topic of the day. This statement signifies that these students are not engaging in building knowledge together from the initial stage as suggested by (Smith and MacGregor, 2014) that during collaborative learning, students should work in pairs or groups, searching for answers, building meanings and inventing products. Therefore, their collaborative competencies could be challenged in the circumstances, which require them to solve problems together through sharing ideas from the beginning, as opposed to students completing the task individually before they could proceed to help others. Furthermore, signs of willingness to assist may disappear when none of the students could successfully solve the problem at hand. Again, this shows that the notion of social constructivism is not correctly implemented, as Tracey and Morrow (2012) argued that learning development is mainly based on the transformation of socially shared activities into internationalisation process.

Besides the work ethic among students, a respondent explained that she struggles to persuade students to collaborate with her. She reveals that her attempts to monitor students understanding during class activities and ultimately assists are often unappreciated. Students prevent her from observing them while performing their calculations. When this respondent asks students to explain how they obtained an answer, they hardly respond. This predicament is more prevalent among low mathematics achievers, in comparison to high achievers. The quotation below communicates this message:

“Only some are willing to work with the teacher. Most of them, especially those that are struggling, if you come near them, they keep quiet. You ask the kid is just quiet. The person just freezes (sic) and then they do not respond” (Interviewee 4)

This respondent’s revelation supports Tobias and Duffy (2009) argument against ESP that high rate of mistakes was found in classes where teachers had to stop by students’ desks to provide explanations during class activities. Eventually, declaring that something is indeed wrong with the students’ confidence, as they become anxious and commit more mistakes when the teachers attempt to assist them, instead of appreciating the offer.

(iii) Mathematics problems as a social construct

Two respondents attributed mathematical problems to societal paradigms. They denounced the societies for sending incorrect messages to students on how unfavourable mathematics is. Students and their parents both display similar tendencies, as a respondent state:

“I sometimes think that the fear is coming from the parents. Sometimes the parents say mathematics is difficult, I never passed mathematics and then kids will enter up saying the same. The kids say in our family, we do not pass mathematics, so it will just remain
like that. The kid will end up saying no we do not perform well in mathematics” (Interviewee 4).

This statement symbolises a belief that transmits through generations, although these beliefs may not necessarily be accurate. Parents consistently tell their children that mathematics is difficult and that they have never passed it themselves. Subconsciously, they instil a sense of fear towards mathematics into students. These remarks complement Rossi (2015) observations that the societies general attitudes contribute remarkably toward mathematics learning. Some parents easily admit that mathematics is hard, and they do not like it. While others testify that, they did not even bother to do mathematics. Due to these complementary views, it is reasonable to believe that mathematics challenges develop from society.

(iv) Teachers methods of addressing students’ negative attitudes toward mathematics

Concurrent to various challenges that respondents have identified, they presented some recommendations of measures, which could ultimately improve the situation. They proposed that teachers should pair or group students themselves, whenever they give collaborative work, as students do not work well when working with their friends. Teachers should try to mark students’ books every time they give an exercise; it motivates them to take learning seriously as a respondent indicated:

“I give them homework and I do not give them reasons to complain. I always mark their books. That is what motivates them to do the work. They only complain when you give them work but at the end of the day, you do not mark. Or you ask them to exchange their books to do peer marking, they will have problems. But if you mark and give feedback then there is no problem” (Interviewee 1).

The content of the extract indicates that teachers have recognised that students value assessment and the feedback thereafter. Students want their activities evaluated by the teacher and receive some feedback about it. Regarding these assertions, Doabler and Fien (2013) made similar remarks that when students are assured during the ‘we do’ that their responses are correct such feedback increases their motivation. Therefore, respondent’s assertions, Doabler, and Fien comment both suggest that assessing and availing feedback is among the best ways to halt negative attitudes towards mathematics, as it creates awareness of the students learning abilities. Steedly et al. (2008) contribution support the same notion that assessment and feedback develop students’ metacognitive skills and enable them to take charge of their own learning.
7.2.4 Summary of the second research question
Respondents stated that students’ motivation toward mathematics is unsatisfactory and they attributed this deficiency on inadequate resources. These respondents suggested that it is possible to enhance students’ motivation through monitoring students work, promising, and offering rewards, integrating prior knowledge, nurturing knowledge application awareness, giving more activities and employing varieties of teaching aid. Most of these respondents alluded to prior knowledge as a major element of building motivation. An average performance complements unsatisfactory motivation. However, some students’ performance has progressed well, despite the challenges. Respondents declared that students’ mathematics understanding is poor. This state of understanding is due to challenges such as availability of resources, too much content to cover, limited time, overcrowded classes, insufficient foundational knowledge, language barriers, absenteeism and late coming. Setting up performance targets, adopting flexible teaching methods, organising alternative support mechanisms and teaching mathematics in the language of teaching and learning from an early age are among measures suggested to improve students’ performance.

Some respondents mentioned that few students appreciate mathematics; they are willing to work with numbers and participate during lessons. However, their collaborative learning attitude is worrisome, as most respondents stated that many students prefer to work individually. They compete instead of assisting each other, and they hardly contribute when respondents assign them to groups. Only one respondent observed that some students are willing to help others. Although, he simultaneously eluded that these specific students seem to be motivated by their desire to demonstrate their understanding. Besides the collaborative deficiency among students, most students are similarly unwilling to collaborate with teachers. Eventually, complicating the monitoring process, as they prevent teachers from observing their work while calculating and hardly respond to questions when teachers attempt to find out the method, they used to get the response. Some respondents recognised the negative attitudes towards mathematics as a social construct, as students and their parents display similar tendencies. They tell their children that they never passed or liked mathematics themselves. The educational fraternity can overcome these attitude problems through constantly marking students’ activities, offering rewards, incorporating prior knowledge, and recommending that teachers group student themselves.

Due to factors such as inadequate resources to conduct lessons, too much content to cover, limited time, overcrowded classes, language barriers, students’ unwillingness to collaborate which hinder teachers' efforts to monitor their learning process and negative
attitudes towards mathematics restrict the explicitness of mathematics lessons. Subsequently, mathematics pedagogy does not meet the requirements of ESP.

7.3 Features of explicit and systematic pedagogy in the Namibian’s primary schools’ mathematics learning situations and teachers lesson plans

The third research question is “what features of ESP are present in the Namibian primary mathematics learning situations and teachers lesson plans?” the approaches the researcher employed to obtain information to this question varies considerably- interviews, observations and respondents’ lesson plans. The interview questions encouraged respondents to discuss their teaching practices, by reflecting on the teaching methods, which they typically employ in their mathematics lessons. How they introduce topics to students, how they present the new knowledge and how they conclude their lessons. Respondents’ mathematics lessons were further observed, and their lesson plans were acquired. Information that enables the researcher to investigate features of ESP present in their lesson interactions was extracted from lesson plans.

During interviews, respondents indicated that they divide their lessons into 3 fragments, illustrated in figure 12. These fragments are further present in their lesson plans, and they act as frameworks within which they operate for that lesson. They prepare students to receive new knowledge, engage in comprehensive interactions, and conclude the lesson based on these fragments. They further asserted that the content of these fragments differs significantly. For example, respondent stated:

“It consists of introduction. In the introduction I can play a little bit of games with the kids. And also refresh on the previous lesson and the presentation, it includes activities for the teachers and learners and the conclusion after the lesson” (Interviewee 2).

![Diagram of Lesson Presentation](image)

*Figure 12: Fragments of a lesson presentation.*
7.3.1 Introduction
The introduction section was present in all respondents’ lesson plans, and during interviews, they explicitly described methods they use to conduct it, to stimulate students desire to learn.
Sub categories that formulate an introduction are presented in figure 13.

![Diagram of introduction categories](image)

**Figure 13: Respondents’ practices during the introduction phase.**

(i) Consideration of prior knowledge
Prior knowledge refers to the knowledge of different areas that students bring to the lesson that is learnt through previous real life and academic experiences (L. Campbell & Campbell, 2009). Two respondents have mentioned during the interviews that they consider their students’ prior knowledge during the introductory phase. However, their contributions suggest that they primarily focus on the students’ prior content knowledge. According to L. Campbell and Campbell (2009), this is the knowledge that is acquired through academic experiences. For example, a respondent says:

“I include the prior knowledge because whenever you are introducing a topic, mathematically we can say topics are continual. Sometimes, I give the exercise to the learners, just a simple one so that I can see whether the learners can recall what they have learned about the same topic in the previous grades, for example, if its grade 7, if they recall what they have done in grade 5 and 6” (Interviewee 3).

The extract above demonstrates that these respondents only measure the content knowledge that students learnt previously on the same topic, which is inadequate to students who could
not understand the topic in previous grades. They neglect the students’ everyday knowledge. Everyday knowledge in this context means the knowledge acquired through real-life experiences (L. Campbell & Campbell, 2009). Disregarding students’ everyday knowledge alienate them from making a connection to the topic of the day. Hence, lessons lack concrete familiarity that students’ experiences. The lack of integrating everyday knowledge has been affirmed during lesson observations. All the observed teachers failed to integrate students’ prior everyday knowledge. Interestingly, among respondents who maintained that they assess the students’ prior knowledge, only 1 has managed to implement it during lesson observations. However, this teacher often failed to get students to remember what they have done on particular topics, subsequently compelling him to give answers himself. These evidence indicates that most respondents act against the recommendation of the National Centre on Intensive Intervention (2016) which urge them to conduct ESP lessons by assessing and stimulating students’ prior knowledge before they engage in comprehensive instructional processes.

(ii) Monitoring of homework
Two respondents have mentioned that they monitor their students’ homework and give feedback during the introduction, stating that:

“Sometimes I monitor the learners work, do correction a little bit” (Interviewee 2).

Although other respondents did not testify that they monitor activities at this stage of the lesson, the same trend occurred in all the classrooms where observations were conducted. All the teachers who were observed launched their lessons by requesting students to produce their solutions for the homework given the previous day and eventually teachers avail the correction. Thereafter, they proceeded directly into discussing the content of the next topic, without scaffolding and preparing students to receive new information. Eventually contending the idea of Goeke (2009) which argues that in an ESP lesson, an introduction is a phase where teachers are responsible for setting the stage for learning to occur. They leave students unaware of the building blocks, which lead to new information, that they are expected to comprehend. Suppose a teacher introduced a topic as indicated in the quotation below:

“I give them activities especially through diagrams so that they can work out. Example, when I am teaching fraction, I can draw a diagram on the chalkboard then I divide it, from there I ask them to write the fraction that is being shown by the diagram. I do not really come up with a topic, sometimes, I just write something then I ask, what is that, and they say it’s a fraction or something” (Interviewee 4).
The content given in this extract contains deficient information to prompt students to develop a fundamental understanding of fractions. Firstly, the teacher gives a definite activity that directs students’ thoughts to concentrate solely on the information provided on the chalkboard. This practice limits students’ abilities to think about fractions in a general and different context. Secondly, the respondent commences the lesson by drawing and requesting students to write down the fraction. Meaning this practice does not afford students an opportunity to think critically and deduce the topic by themselves, which could accelerate their abilities to contextualise broad aspects. Beginning the lesson through drawing and asking students to write fractions signifies that teachers consider students’ prior content knowledge (L. Campbell & Campbell, 2009). However, their silence on students’ everyday context indicates that they deny students the opportunity to use their prior knowledge wholly. Although, Kim et al. (2015) have argued that it is an imperative constituent of prior knowledge, regarding improving the chances of understanding a new situation.

(iii) Explication of lesson objectives
Lesson objectives refer to the statement that defines the knowledge that teachers anticipate students to demonstrate as a product of the instructional process and it can be used to measure the success of lessons (Nesari & Heidari, 2014). All respondents have identified lesson objectives in their lesson plans, and during interviews, they alluded that it is among elements that they consider in preparation of their lessons, as a respondent stated:

“I put the learning objectives, the basic competencies and sometimes monitoring of homework in my lesson plan, because if there is a homework given first, I have to monitor and see if they did it” (Interviewee 4).

According to (Doabler & Fien, 2013) teachers need to explain lesson objectives to students to enable them to concentrate on acquiring the target knowledge. Although availing lesson objectives to students is considered imperative for selective learning, respondents defy this recommendation. During interviews, none of the respondents hinted that they explicate lesson objectives to students before they begin discussing the content. Similarly, during lesson observations, none of these respondents has introduced lesson objectives to students. On the other hand, it is ostensible that some respondents record the objectives in their lesson plans solely for their own references and satisfy the standards enforced by their managers. Since respondents are aware of the lesson objectives, the goals they should accomplish is transparent to them. While students are deprived of the details on the information they should retain, which could challenge their ability to focus their attention on specific details.
(iv) Misconceptions toward lesson introduction

Through the interviews, it emerged that respondents had different views of when to introduce a topic. These views are influenced by the diverse understanding of a concept ‘new topic,’ which respondents possess. An example of this diversity appears on samples of extracts, from 2 different respondents quoted below:

“It is a subtopic within a topic place value under whole numbers, when we finish with place value of whole numbers to rounding off right away, I have to introduce rounding off of whole numbers again” (Interviewee 3).

“Introduction is always done when we have a new lesson, the beginning of topic. So, in the middle there, the introduction is the follow up of the previous lesson or to make sure that the books of the learners are marked. I only introduce on the main topic, not subheadings” (Interviewee 1).

As presented in these extracts, respondents emphasised on different elements in their speeches. One introduces every subtopic while the other introduces the main topic and adopts monitoring at the initial stages of every subtopic. To interpret Interviewee 1 using a synonymous terminology, it infers that he only introduces the theme. These practices suggest a gap in the respondents understanding of the accepted procedures. Respondents know that they need to begin with an introduction, but it is evident that they are unaware of the guidelines of what they should perform. Furthermore, when respondents say ‘new topic’ they refer to 2 different facets. Subsequently, this signifies that there is a need to set distinctive standards on when and how to conduct an introduction. This phenomenon legitimatises Hudson et al. (2006) expression that teachers possess inadequate mathematical skills and pedagogical proficiency that limit them from producing suitable instructions to students with various degrees of academic achievements. This scenario indicates that teachers lack a common understanding on how to conduct an introduction; therefore, the training system that they went through was ineffective in this case.

It has emerged during the interviews that some respondents do not perceive introduction as part of the lesson. Although they mentioned that they start with the introduction, they subsequently pronounced indicators, which reveal a discrepancy in their understanding of introduction and lesson. For example, a respondent state:

“They consist of introduction. In the introduction I can play a little bit of games with the kids. And also refresh on the previous lesson. To remind them of what they did the
previous day. Sometimes I monitor the learners work, do correction a little bit. And start with the lesson” (Interviewee 2).

In accordance with the extract, the latter phrase communicates a new beginning, where the respondents start with something novel from the initial part. Such a misconception suggests that certain respondents are likely to struggle with implementing practices that create a link between the introduction and other stages of the lesson. Smeigh (2013) argues that in an ESP lesson, the information given should assist students to understand the connection between all activities and the expected learning outcome. The extract further reveals that respondents are unsure of the purpose of the introduction. Otherwise, such understanding would enable them to appreciate the influence that the introduction has on the entire lesson.

7.3.2 Lesson presentation
At this stage, teachers and students engage in an intensive exchange of ideas to build knowledge of concepts, using various tools, assessments, and colloquial discussions. Figure 14 shows aspects observed and identified by respondents as major constituents by which their lesson presentations revolve.

![Figure 14: Constituents of lesson presentations.](image)

(i) Demonstrations of skills
Demonstrations emerge as a considerably familiar practice to respondents. Three respondents mentioned that they give their students 2 to 3 examples before they allow them to perform the independent practice. A respondent stated:
“I give 2 or 3 examples then 4th you let the learners work it out, walk around helping the learners individually and then I monitor and give a classwork that is the most important”

(Interviewee 2).

In addition to the interviews, it manifested during lesson observations that 3 of the respondents demonstrated how to perform calculations before giving activities to students. Although, the models they used were occasionally ambiguous. Some respondents could not sufficiently demonstrate all the steps that students needed to understand certain problems. Students eventually employed the same approach when performing calculations. These insufficient and inaccurate demonstrations include free sketching of figures, omitting units, and descriptions of concepts. For example, figure 15 and the calculations thereafter illustrate a respondent’s demonstration, which could transmit a misconception.

![Figure 15: Cuboid illustration.](image-url)

Calculations:

\[
\text{Volume} = \text{Length} \times \text{Width} \times \text{Height} \quad \text{(Step 1)}
\]
\[
= 18\text{cm} \times 13\text{cm} \times 7\text{cm} \quad \text{(Step 2)}
\]
\[
= 234 \times 7 \quad \text{(Step 3)}
\]
\[
= 1638\text{cm}^3 \quad \text{(Solution)}
\]

In the calculations, step 1 shows the formula of calculating the volume of a cuboid. At step 2, the respondent substituted the labels with relative numbers and their units. Step 3 does not include units, and suddenly the solution has cubed units. The inconsistency in this demonstration conveys an unintended message on the importance of units. It teaches students to disregard the significance of units in a problem, subsequently affording them the power to choose when to indicate and abandon units, as they prefer. The cubed units on the answer could confuse students. There is no visible systematic approach which hints the origin of the cubed units to students, making it difficult for them to master the method and it is fundamental meaning. These errors are critical; hence, students follow the same procedures to complete similar activities. Such examples rather promote an abstract understanding of the concept and conflict the primary purpose of conducting a demonstration. The respondent afforded students
an opportunity to physically observe and follow procedures of things occurring, as per Goeke (2009) suggestion. However, it does not automatically qualify the lesson to meet the standards of ESP, as the procedures used were inaccurate.

Respondents failed to promote the linguistic element of mathematics. They did not pay attention to the grammatical errors that students commit. In addition, they are guilty of making mistakes, which could be detrimental to the development of students’ mathematical jargon. For example, on a certain occasion a respondent gave students a class activity, then she asks them, “how far are you?” A student responded, “Number C.” Although the student shouted number C instead of letter C, the respondent did not attempt to correct him. Furthermore, it was apparent that some respondents use casual terminologies, which they do not clearly align to scientific terms. For example, some students do not understand the meaning of ‘division.’ When the respondent asks them “what is 18 divided by 6?” All students remained silent and immediately after the respondent rephrased the question to “how many times do 6 goes into 18?” Most students suddenly indicated that they know the answer and they were eager to express it. This incident suggests that students were unfamiliar with the term ‘divide’ or they are unacquainted with its fundamental meaning. Subsequently, creating a degree of discomfort, which prevents them from expressing themselves. These insufficient demonstrations cause a mismatch with the idea of the California Department of Education Sacramento (2015), which suggests that in an ESP lesson, teachers need to act as guides. They mediate students’ personal growth and connect linguistic disparities. It further suggests that teachers defy Daabler and Fien (2013) advice that in ESP lessons teachers must use unambiguous explanations and consistent language to minimise misunderstandings by simplifying students’ expectations during an exercise. As students lack awareness and understanding that ‘how many times something fits in the other’ represent division, implies that teachers did not clarify these concepts.

A similar event based on students understanding of mathematical basic operations happened in another respondent’s class. It emerged that students did not understand the difference between addition and subtraction sign. In addition, the respondent did not describe the meanings of these operations during that specific lesson. This respondent seemingly assumed that students already know their meanings. However, during feedback after she had given a class activity, some students displayed a lack of knowledge. The topic of the day was about numeric sequence, where the respondent gave students a sequence of numbers as follow, 2, 4, 6, 8, _, _, _, and request them to fill the next 3 numbers. Many students succeeded to obtain correct answers. However, when she questioned them to state the rules, they used to find
the next number, a student mentioned that they “subtracted two from the preceding term” (nth – 2). The correct response was rather adding 2 to the preceding term (nth + 2). Although students had the correct numbers in the sequence and they knew what to do, they exhibited a lack of understanding between addition and subtraction sign. Irrespective of the deficit that students exposed, the teacher solely rectified that it is supposed to be an addition rather than subtraction. She did not profoundly demonstrate the difference between these operations and the relation of these variations to the phenomenon.

A respondent demonstrated addition of fractions in a way that could create an incorrect understanding of the equal sign. The demonstration was as follows:

\[
\frac{2}{5} + \frac{1}{4} = \frac{4 \times 2}{20} + \frac{5 \times 1}{20} = \frac{8}{20} + \frac{5}{20} = \frac{13}{20}
\]

The way the equal signs are used in the expressions above could become an obstacle. It prevents students from attaining the profound meaning and purpose of the equal sign. Hence, it is used as a comma rather than a symbol to show expressions of the same value (Knuth et al., 2008). A symbol used to signify that the expressions on the left-hand side and right-hand side are equivalent. The position of the equal signs on this respondent’s expressions does not clearly demonstrate and encourage students to recognise the reason for using it. This practice undermines the requirement of ESP, which according to the National Centre of Intensive Intervention (2016), it affirmed that mathematics requires the instructional process to clearly teach steps involved in solving mathematics problems using a logical progression of skills. Despite that those demonstrations lead to a correct answer, the logic portrayed in the calculation is inappropriate. Enabling students to put equal signs exactly as they observed on the teacher's demonstration and reduced their ability to advance their conceptual competence. Therefore, this inaccurate demonstration reduces the explicitness of the lesson.

(ii) Guided practice

According to the National Centre on Intensive Intervention (2016), the guided practice involves engaging students by asking questions, and direct learning and comprehension. According to the researcher’s observations, some practices emerged as constructive, destructive, and possible alternative practices.

**Constructive guiding practices**

All respondents were observed giving hints on how to complete certain tasks to students, in various ways. For example, a respondent whose lesson focused on drawing tally charts assisted students by code-switching to their dominant language. This respondent teaches in an area
where a substantial number of students speak a common home language. Therefore, code-switching was beneficial to all of them. Hence, they all understand the language. Code-switching parallels the request of Goeke (2009) that learning procedures should employ organised tools to assist in incorporating ideas. Code-switching between languages is a good mediating tool; it accelerates the pace at which students learn by scaffolding them toward attaining the desired knowledge or goals. This scaffolding makes the instructional process explicit and meaningful, especially to students with low proficiency in the language of teaching and learning.

**Destructive guiding practices**

Some respondents were observed producing utterances which could be detrimental to student's passion for mathematics. Hence, the expressions were seemingly discouraging to them. For example, when a certain student did an activity incorrectly, the respondent lashed out on him with “things are there in your book, I did not teach you to do things like this.” Although the earlier version of the respondent’s expression signal to students that the information, which could lead to correct answers, are available in their books, it is unguaranteed that they will find it. Hence, students were observably confused and terrified to ask further. These assertions suppress students’ confidence and subsequently defy Plavnick et al. (2015) perception on enhancing motivation in a learning situation. Where they argued that teachers should assist students to reduce mistakes and give positive reinforcement. In this case, some respondents criticised students instead of assisting them.

**Alternative guiding practices**

Although respondents used strategies such as code-switching and prompt, they overlooked other guiding methods, which could benefit students of different abilities. Techniques such as showing videos, peer tutoring or visual aid could present students with diverse ways of acquiring knowledge. The more diverse the instructional process, the more likely teachers can complement individual student’s learning ability, as suggested by Riccomini et al. (2017), that a core ESP lesson needs a plan that supports students of all abilities to attain the main objectives defined within individualised programs.

**Continuous assessment**

During interviews, respondents have variously identified that they assess throughout this phase. They further argued that they design assessment activities to assist them to measure students’ strengths and determine whether and when to modify lesson approaches if the initial approach
proves unsuccessful to help them to achieve the lesson objectives. Since respondents assessed in distinct ways, some methods were labelled as constructive and ineffective, respectively.

**Constructive assessment practices**

Respondents and the researcher’s observations reckon these assessment procedures as effective over others. The most of these are written class activities. All respondents indicated that they mainly give immediate class activities to determine whether the instructional process was successful, as a respondent maintained:

“I just give activities, class activities then I will mark them again for them to calculate and for me to evaluate each and every one.” *(Interviewee 3)*

They predominantly give these activities for students to complete individually; only 1 respondent mentioned an alternative method that some of her activities are designed for group practice. These respondents’ preferences suggest that most of them contradict the idea of the social constructivism perspective, which stresses that children are social beings, who learn due to their interaction with others *(Tracey & Morrow, 2012)*. Similar utterances by Brown *(2015)* reveal that we construct our own way of thinking through active learning from our thoughts, and interaction with the world and with people. Conversely, most students in these respondents’ classes do not get the opportunity to exchange ideas through practising together.

Most respondent indicated that they give homework for students to complete on their own. Except 1 respondent who does not give homework, citing that:

“I do not give homework due to the fact that homework learners go and copy. Copy each other and sometimes give to their elder sisters and brothers. Even for assessment, I do not give homework for assessment. They can do tasks in the class, where I know that they are doing it now and assess, but not to let them go home. Whenever you give homework most of them do well. But if you give a similar activity, you will find out that the ones who did well in the homework will not do well in the classwork” *(Interviewee 3)*.

According to this respondent’s experience, homework does not serve the purpose, as students produce correct answers although they cannot demonstrate the actual skills. These outcomes give teachers a superficial reflection of the level of students’ knowledge. This scenario illustrates an exercise where students received independent practice when they are incapable of completing it solitarily – before they mastered the skill. Smeigh *(2013)* suggested that teachers should only give independent practice when they establish that students are incapable of making significant mistakes. However, the respondent’s expression reveals that students resorted to copying things that they do not understand. Hence, they are mandated to complete
the homework, but they did not extensively understand the relative content. Therefore, they must find alternative measures to satisfy the teacher’s demands. In fine, homework is a constructive assessment method when students have acquired sufficient knowledge and ineffective when the topic is inadequately addressed before it is given.

**Ineffective assessment practice**

Respondents indicated that they assess through ‘question and answers. In this case, the teacher poses questions and students randomly answers. Respondents practice it, although they are aware that it is unfavourable to all students, as a respondent's remarks:

“*Sometimes presenting a lesson in a big number, there are those sharp ones, when you ask a question, then they shout already instead of raising their hands, so when you give learning support to these once, sometimes it also improves the results*” (Interviewee 2).

Leone et al. (2010) suggested that students’ participation level should be measured both in writing and verbally. However, the verbal questioning was observably a feeble method in this case, as it constrains teachers from taking total control of the class and ensures that all students have acquired the knowledge. It mostly benefits active students, as compared to their reserved counterparts. When respondents ask oral questions, only the active students were engaged, they could raise their hands or shout answers randomly.

When respondents ask students about their general understanding of the topic, students give dishonest answers. When they verbally inquire whether students understood, responses are typically positive. For example, a respondent stated:

“*When you ask if they understand the moment their friends say yes they will say yes too. But the moment you give them something as an assessment as classwork or homework, then the next day you monitor, you realise that they said they understand but what you see in the activities you gave them is not correct. Then you will be forced to change and repeat the lesson for them to at least understand what you are doing*” (Interviewee 4).

The extract reveals dishonesty or lack of openness that students possess toward their own learning. It further exposes that questioning alone is an unreliable form of assessing students understanding. It is highly unlikely that teachers will receive genuine responses. It is advisable that teachers who intend to obtain factual evaluation should seek alternative measures that will expose student actual understanding and facilitate an explicit lesson. Lembke et al. (2012) outline that assessment is central in a discourse because it guides teachers through collecting information about students’ performance and it is suitable for evaluations of the instructional interaction. However, according to the observations and respondents’ expressions toward dishonesty from students, questioning them orally limit teachers from making appropriate
evaluations, which could lead to informed decisions on how to proceed. Subsequently, it becomes challenging to adjust instructional strategies to favour students effectively.

(iv) Feedback
Feedback refers to the information delivered by a mediator such as a teacher concerning attributes of an individual’s performance or comprehension. Feedback can be in the form of corrective evidence, complementary strategies and clarification of thoughts (Hattie & Timperley, 2007). The researcher established that respondents used different ways to offer feedback and they could not give feedback at times. In certain instances, respondents overlooked incidents, which should have been addressed. For example, a student provided an incorrect response, instead of assisting him to recognise the error in his calculation and scaffold him toward the correct answer, the teacher re-directed the question to somebody else. Another respondent alluded to this ignorance during the interview by stating:

“I encourage them to give me a correct answer, sometimes I guide them to give me the correct answer, if not now I say thank you then he can sit, and another one can give because of the time” (Interviewee 3).

Such a practice could deter students’ progress and allow possibilities of repetitive errors. The practice further contends Goeke (2009) argument that in an ESP, teachers should give feedback to enable students to improve their approach whenever they encounter a similar task. Inversely, it was found that teachers give feedback both constructively and destructively.

Constructive feedback
Some respondents exercised peer teaching during the feedback session. In the cases observed, respondents practised peer teaching by requesting individual students among those who obtained correct answers to discuss the methods they used with others on the blackboard. Then the rest can follow and ask questions where they do not understand. This practice could be beneficial, as students can communicate in a way that is understandable to their fellows. Askew (2013) argues that teacher and more advanced peers can spearhead the transmission of knowledge to all the students. This contribution means that advanced students are recognised mediating tools to complement the teachers.

Respondents always record feedback of written activities on the blackboard and discuss it verbally with students. This practice was observed in all respondents’ lessons. Written and verbal feedback supports diversity in the classroom, as it enables students to observe and listen simultaneously. This diversity affords students dual possibilities to acquire the same information. Some respondents’ code switched to students’ indigenous language, from the
language of pedagogy, when most students struggle to comprehend the meaning of a certain concept.

_Destructive feedback_

Some respondents criticise students instead of helping them to understand the correct method of completing tasks. When students get incorrect answers, they utter statements such as “this means you were not listening, what is wrong with you? Have you seen a formula like this in your book? The summary is in your book.” Sheldrake et al. (2015) argue that feedback is a form of intervention to alert students of their abilities, eventually advancing awareness on self-regulation techniques. However, these kinds of feedbacks contradict Sheldrake et al. (2015), because they do not specifically articulate aspects which students are doing well or wrongly and possible ways to improve. It is rather based on complains which may diminish students’ eagerness to learn.

Individualised feedback is often given only to active students. As they are prepared to notify teachers, whenever they reach an obstacle and or when they finish with a given activity. Respondents seldom specifically target reserved students, who are diffident to ask questions when they encounter difficulties or request teachers to evaluate their work during the learning discourse. Therefore, certain students never receive specified feedback on their own work. Rendering them unable to distinguish precisely between what they are able and incapable of performing. Riccomini et al. (2017) state that during ESP, teachers should give support to students of all abilities to attain objectives defined within individualised programs. Respondents violate the idea indicated in the preceding statement, as they mostly focus on students who are enthusiastic to learn and fail to inspire those who are struggling.

_(v) Skills mastery_

Respondents have identified various mediums of assisting students with different learning abilities, to help them reach mastery in assorted concepts. Abilities of the students considered by the respondents illustrated in figure 16.

![Figure 16: Categories of students learning needs.](image-url)
Assisting high achievers

Respondents have indicated that they help high performers to enhance their understanding by giving enrichment activities with more advanced tasks, which they perform while the teacher assists those that are struggling to comprehend the concept. A respondent mentioned this:

“When you give them work to do, the fast ones usually finish first, when they finish first, sometimes I use to give something else to them. While I am busy helping the slower ones. At the end of the lesson you can tell that they all catch up or they all got something”

(Interviewee 4).

Leone et al. (2010) suggest that teachers should support all students to attain lesson objectives. However, those who attain mastery level briefly can then receive enrichment activities. This practice is significant as it enables inclusivity, although students can operate at a different pace, they all receive support in the same setting, which is vital for facilitating forms of development other than cognitive. In support of this stance, Dubé et al. (2011) stated that core ESP teaches students other dispositions such as social and communication skills.

Assisting low achievers

Respondents indicated that they help struggling students mostly by following the ‘learner support’ program. They invite students to come to their offices or classrooms during break time, administrative periods or after official school hours for extra support. Learner support session is designed for students who showed a deficiency to learn a certain concept in mainstream classrooms. It enables a student/s to have a one on one interaction with the teacher. This exercise corresponds with the idea of supplementary ESP, which suggests for the separation of students who are struggling to grasp key concepts from the entire group. Complementary to learning support, supplementary ESP is usually adopted when the original strategy was inadequate to yield the intended out (Duhon et al., 2015). Learner support is imperative, as it maximises the amount of time the teacher can spend with a certain student, in comparison to mainstream lessons where classes are overcrowded. Although teachers endorse learning support, there seem to be other emergent problems as the following respondent narrates:

“I do it with the learners that fail, after first term is when I pick up which learners have a problem that needs extra support. Then I send letters to their parents that I will need them for learning support classes so obviously the parents allow the learners to come, no one will refuse learners to be assisted. It is not quite a big number; mostly I have around 20 to help for that hour individually. First, I just present as usual then I come
now helping them individually, checking who is struggling with what aspect and all those things. Mostly my learning support is about those things we already covered in class, but they did not understand” (Interviewee 2).

The middle part of the quotation states that students are about 20 and the teacher only allocate an hour. Fuchs et al. (2012) argue that to satisfy individual student’s needs successfully, teachers should receive enough time. To help the number of students indicated in just an hour could be challenging. The time is insufficient to address shortcomings of each student adequately. Subsequently, leaving some students unattended or with unsolved problems.

**Assisting ‘special need’ students**

Some respondents have introduced the issue of students with ‘special need’ into the discourse, who supposed to attend mainstream classrooms. These respondents cite challenges they encounter when working with these students, which sometimes leave them helpless. Suggesting that students with ‘special needs’ do not belong in mainstream classes. Their expressions suggest that they feel there is nothing effective they could potentially do to assist these students in mastering concepts. For example, respondent stated:

“Sometimes I refer these learners to the life skills teacher to call in the parents so that we can at least get some reference so that the learners can go to the special schools. Especially, the one that cannot write is the major problem, they best we can do is to refer” (Interviewee 2).

The respondent’s idea to refer students to special schools complements the aspirations of a supplementary form of ESP. According to Mononen et al. (2014), supplementary ESP is an intervention designed for students who are struggling to grasp key concepts that are critical for future learning. Leone et al. (2010) contributed that supplementary ESP is recommended for students who have been exceptionally unable to learn mathematics in the whole group. Leone’s statement is parallel to the respondent’s assertion about students who cannot write; therefore, teachers are unable to help them. Jorgensen (2015) agrees with the respondent’s notion of referring certain students to special schools, as she maintained that specialists should address students’ learning difficulties in a special classroom. Although the respondent mentioned special school, while Jorgensen referred to special classrooms, they are both advocating for a similar idea, which is to withdraw target students from mainstream classrooms.

**Balanced pedagogy**

The concept of balancing pedagogy is used to explain practices that teachers employ to enable them to address concerns of high and low achievers concurrently. Balancing pedagogy
empowers teachers with competencies to enhance mastery for all categories of students simultaneously. They specified that the process starts with lesson planning, where they prepare activities based on 3 levels of difficulty; Level 1, 2 and 3. The different levels of difficulties are designed to cater for students of different learning abilities and enhance their confidence. A respondent stated:

“The activities that I am going to present to the learners, I have to make sure that there are activities which allow the less gifted to score a mark there that is why I just cannot give difficult exercises. But I have to make sure that there is one of those exercises that the less gifted can do and difficult ones so that learners can understand” (sic) (Interviewee 3).

The connotation in the extract above is synonymous to Dubé et al. (2011) perceptions that students’ motivation is enhanced through assisting them to reduce mistakes and give positive reinforcement after they accomplished a certain concept. It further complements the ZPD idea that according to Sheldrake et al. (2015) teachers must give activities that are marginally above students’ skills levels to encourage advancement.

7.3.3 Conclusion
This is the last stage of the lesson presentation. All respondents mentioned this phase as the closing part of their lesson presentations. They further identified procedures they follow to culminate their lessons, which ensures that knowledge is retrievable to students for an extended period. Figure 17 shows a repertoire of techniques which respondents consider using to conclude their lessons.

![Figure 17: Concluding techniques.](image)

(i) Questioning
(ii) Copying
(iii) Homework

(i) Questions regarding discussed aspects
Some respondents mentioned that due to restrictions such as time and number of students, they conclude the lesson by asking questions. They consider questions vital as they enable them to emphasise on the key points of the lesson. As a respondent note:
“Sometimes I can conclude orally, just by asking questions, just for them to give the steps on how to find something or how to calculate something. Then I will just conclude by emphasising on the main points of the lesson” (Interviewee 4).

Goeke (2009) shares similar viewpoints regarding questioning in the quotation above, stating that during the ‘we do’ component of ESP, students receive hints and questions and through their responses, the teacher discern their comprehension pattern. Hudson et al. (2006) contributed that questioning assists in maintaining students’ concentration during the discourse. However, according to the observations, oral questioning is an infective method to measure students’ understanding. It provides loopholes for students to become dishonest and even when the teacher realises that the student’s response is incorrect, it is difficult to determine the origin of the problem. Therefore, it becomes challenging to address the predicament wholly. Furthermore, Leone et al. (2010) suggested that teachers should use students’ responses to explore ideas prompting their thinking and pronounce aspects that make their answers right or wrong. However, respondents complain about time constraints, which reveals that their purpose to ask oral questions at this stage is not necessary to further the discourse. However, the respondent’s expressions that they conclude by emphasising the main point corresponds to Jorgensen (2015) suggestions that in the ‘I do’ component of ESP teachers should revise ideas which have been latterly discussed, through stating facts or representing ideas through tangible models.

(ii) Copying of notes
A significant number of respondents mentioned that they give students the opportunity to copy examples from the blackboard as part of their concluding activities. They only encourage students to copy procedures of how to complete calculations at the closing moments, as a measure to minimise possible destructions. As listening, observing and copying synchronously during discussions is challenging, due to its divisive effects, it may split students’ attention. As a respondent stated:

“Most of the time I make sure that whatever I put on the board that needs to be copied is copied. If it is the homework, I make sure that they copy down everything. When I have time, I ask them questions based on what I have explained to them to see whether they understood. If time is giving me problems, that is when I make sure that they took notes and they copied down the homework” (Interviewee 1).

In this quotation, the respondent referred to 2 different ideas simultaneously, which are questioning and copying of notes and tasks that are given as homework. Goeke (2009)
recognises the importance of keeping a systematic physical reference where students can revert whenever they need clarity. This argument encourages students to keep notes that can remind them how to perform certain aspects, and it supports the respondents’ practice of ensuring that students have copied down everything before the lesson concludes. However, this case considers sufficient time as the factor, which motivates questioning. When time is inadequate, the respondent encourages students to copy down examples and tasks solely. Subsequently, contradicting other respondents in (7.3.3(i)) who rather resorts to questioning due to time constraints - when students are incapable of finishing copying the examples within the time limit.

(iii) Homework activities
Most respondents mentioned that they use this section of the lesson to give students homework that they need to complete independently before the next lesson. Only one respondent opposed to giving homework, noting that students typically produce responses using procedures, which they are unable to defend or explain. During observations, homework emerged as a prominent procedure that leads to the closure of most lessons. Hence, students complete the homework in the absence of teachers; these tasks qualify to be a constituent of independent practice. This practice corresponds with Ewing (2011) perception on ESP, which expresses that independent practice means that students receive activities to complete without the teachers’ assistance. Therefore, it is essential that teachers give homework for students to practice individually.

7.3.4 Summary of the third research question
During the introductive phase, respondents have indicated that they recognise students’ prior knowledge. However, they primarily focus on their prior content knowledge and disregard their prior everyday knowledge. Eventually, leading to an incomplete form of prior knowledge, hence it lacks one of its major portions. A trend of respondents monitoring their students’ homework and give feedback during the introduction and subsequently fails to introduce the new topic adequately have manifested from various lessons, which were observed. Furthermore, respondents did not explain lesson objectives to students during lesson observations, and it is evidently their normal practices. As even during interviews, they did not show any indication of being knowledgeable that they are required to brief students about the lesson objectives.

In the lesson presentation phase, some respondents indicated that they demonstrate each concept before students and it was affirmed through observations. Whereby, the trend occurred
in 3 classes. However, due to elements such as inaccurate usage of mathematical language and misconceptions on mathematical thinking, some respondents’ demonstrations lack effectivity. Respondents guide students throughout the instructional process. However, the researcher established that respondents employ guided practice in ways that possess both constructive and destructive effects. Constructive guided practices such as prompting students and code-switching to students’ dominant languages. In addition, destructive guided practices include demotivating statements. They further employed constructive and ineffective continuous assessment practices. Constructive assessment methods include written classwork and homework. An ineffective assessment was based primarily on verbal questioning. Feedback succeeds assessment and the way respondents implemented it differs. At times, some respondents failed to avail feedback to students while others delivered it constructively, through peer teaching and recording the correction on the blackboard or destructively by criticising students’ work. Moreover, respondents essentially focus their attention on active students.

Respondents stated that they plan enrichment activities for higher achievers, give learning support to lower achievers and plan activities based on 3 levels of difficulties, as a strategy to ensure that students of different abilities learn. However, issuing of enrichment activities and activities of different levels of difficulties was unapparent, during lesson observations. As part of the conclusion phase, some respondents pose questions to students based on the content they discussed. In addition, some respondents give students a chance to copy examples and solutions to the activities that they performed during lesson presentations. While several respondents’ gives homework, which students complete before the next lesson.

Conclusively, it was conceded that the practical engagements during learning situations do not meet the requirement of ESP as it deprives students of imperative information such as learning objectives and inadequately stimulate their prior everyday knowledge, which clarifies and contributes positively to their ability to attain the knowledge. Furthermore, guided practice does not necessarily address the needs of all students, as respondents’ utter statements that shutter students’ motivation. Demonstrations that respondents give are often inaccurate. Assessment and feedback are ineffective to all students, due to discrepancies such as usage of unreliable assessment methods, criticisms, and lack of individualised feedback. Although, respondents availed strategies for ensuring skills mastery, a substantial portion of them did not emerge during observations. At the closing stages of learning situations, respondents and students do not discuss options of applying the knowledge in real-life situations and possibilities of implementing it in their localities. As per Goeke (2009) recommendations,
teachers should indicate possible scenarios in which the newly acquired knowledge is applicable.

**7.4 Relationship of students’ perceptions toward mathematics to characteristics of explicit and systematic pedagogy**

The fourth research question is “do students’ perceptions toward mathematics relate to characteristics of ESP?” The researcher obtained the information that answered this question through administering questionnaires to 16 grade 6 and 7 students. Open-ended questions in the questionnaires enable students to interpret and respond in various ways, according to their relative experiences. The question was mainly based on aspects such as how students experience mathematics lessons, prior knowledge, and possible implementation of acquired skills. Then the information that enables investigation of the presence of ESP features in their experience was extracted. Figure 18 provides a summary of themes that were inferred from the information provided by students, discussions follow thereafter.

![Diagram](image)

*Figure 18: Students perceptions.*

**7.4.1 Practiced and preferred Instructional arrangement in mathematics**

Through drawings and written explanations, all students have identified that they are required to sit solitarily in their mathematics lessons. They sit alone listening to the teacher and complete activities on their own. Figure 19 shows drawings from 2 students, illustrating how they are expected to sit in the class.
Conversely, when students were asked to draw models of a mathematics lesson that they preferred if they were teachers, all students had produced pictures showing that they desired a pair or group setup. Figure 20 shows models of 2 students, illustrating the classroom arrangements they preferred.

These pictures show that students dissent with their teachers’ practices. As a student indicated:

“When they are two, they understand, they will understand each other well because they will be assisting each other. When one does not understand, the one who understands can help him. I want them to understand so that they can pass at the end of the term”

(Student 12).

The student’s perceptions in the quotation show appreciation for collaboration with others, as they find it helpful. It further submits that students support the notion of social constructivism, which expresses that students are social beings who learn from interaction with others (Tracey & Morrow, 2012). It further urges that both participants engage in building a common
understanding through the exchange of ideas (Van de Pol et al., 2010). This information opposes the teachers’ version in 7.2.3 (ii), where they indicated that students prefer to work in solitary than in pairs or groups.

7.4.2 Application of knowledge into real-life scenarios
Application of knowledge refers to the availability of a real-life scenario in which students have previously applied the skill or probable to implement it after the instructional process (Goeke, 2009). Figure 21 illustrates the main categories on how mathematics is applicable in real-life.

Figure 21: Application of mathematical ideas in real-life.

(i) Mathematics pedagogy as a reminder
Most students mentioned that mathematics instructions in their current grade remind them of the knowledge they acquired in previous grades. For example, a student stated:

“It reminds me of my previous grades, example addition of similar numbers, multiplication, subtraction and division. The way you learned in the previous grade is the same way; you may use the method although the numbers are different” (Student 13).

While an additional 4 students indicated that mathematics reminds them of what occurs at their homes, indicating:

“Yes, when I see something that I can count. I always remember the information or if I am bored, I will remember the information that we learned” (Students 7).

The preceding quotations from students indicate that their teachers recognise and integrate their prior knowledge as suggested by Kim et al. (2015). However, a significant number of these students refer to prior content knowledge rather than prior everyday knowledge. These interpretations complement lesson observation findings in 7.3.1 (i), as it was found that teachers who introduce new topics, mostly recognise students’ prior content knowledge and neglect their everyday knowledge. They fail to contextualise the content and narrow students’ reflective competency.
(ii) Adopting mathematics in everyday life
All students have indicated that they are currently implementing mathematical philosophies in their daily routines. However, twelve of these students have pointed out counting and money as the knowledge they get to exercise on their daily basis. As two respondents stated:

“My mother asks me to count for her money that she makes from her businesses. Then I determine whether she made a profit or loss. My mother makes me do what we learn at school” (Student 12).

“I learn mathematics so that I can use it at home. When I am home, I can count livestock, such as cow and goat or if I find myself at a place, where I will need to count things, I can handle such challenges because I have the knowledge” (Student 16).

Only two students mentioned using division and measurements, respectively. This information suggests that teachers do not discuss, or they partially discuss possible avenues students can employ to implement concepts they learn into their livelihood. Counting and money which most students repeatedly acknowledges are more natural phenomena, which can be understood and implemented intuitively. When discussions are held on how to integrate different concepts in real-life, students would mention various approaches. Therefore, students' narrations give information, which maintains that teachers defy Goeke (2009) recommendation that teachers need to indicate possible scenarios in which students can apply the knowledge. The omission of the application techniques in instruction is further confirmed by the comments of the other 2 students that they do not need mathematics in their lives. These comments clearly signify that students are not pragmatically familiarised with concepts. Hence, they find it impossible to incorporate them into their daily routines. For example, a student stated:

“Many times, we learn new things like algebraic notation. It is difficult to understand something you are learning for the first time” (Students 11).

7.4.3 Support mechanisms in mathematics
This section focuses on the kind of initiatives that students employ when they deal with subject matters that they do not understand. In fine, how students obtain learning assistance. Figure 22 presents categories that emanate from students' responses on how they confront their challenges.

(i) Consult teachers  Support mechanisms  (ii) Consult peers

Figure 22: Means of student support.
(i) Consult teachers
A significant number of students stated that when they have questions on specific mathematics content, they approach their teachers. Students mostly question after the teacher explains the content and they could not comprehend the calculation procedures, or after they fail classwork, homework, or test, a student mentioned this:

“When I fail an exercise, I like asking the teacher so that he or she can help me where I do not understand. When I receive an exercise, I will pass it” (Student 10).

Students further identified that they consult teachers due to trust reasons. Additionally, they have confidence that teachers are mostly compliant to assist them, although these teachers make errors sometimes. This information illuminates that most students are doubtful to collaborate among themselves. Teacher’s practices potentially contribute to students’ low willingness to collaborate. As in figure 19 (7.4.1), students have indicated that teachers always expect them to sit solitarily and complete most tasks by themselves. This practice narrows the students’ confidence and knowledge of asking others for assistance.

(ii) Consult peers
A handful of students stated that they consider requesting their classmates for further explanations when they are failing to complete activities successfully. For example, a student stated:

“If you do not understand something, it is possible to ask someone that is sitting near you, if they also do not understand, you can ask the teacher then they will assist you to understand” (Student 13).

The student cited in the quotation considers enquiring among others before advancing to ask the teacher if other students do not understand as well. This information certifies that there are students who are prepared to collaborate, although the majority prefers asking the teacher. Furthermore, this practice supports the idea of teaching and learning mediation that enables more knowledgeable others (MKO) to assist those who are struggling to comprehend the concept (Askew, 2013). In this case, students as MKO support their fellows.

7.4.4 Reactions toward assessment in mathematics
This section contains students’ perceptions toward assessment activities that they receive to complete during and after instructions. Figure 23 contain themes derived from students’ views toward assessments.
(i) Constructive reactions to assessment
All students directly maintain that they view mathematical exercises such as classwork, homework, and tests as constructive mediums of learning, due to the exciting challenges they pose. Furthermore, students appreciate these activities, as they enable them to explore alternative methods of solving mathematical problems. For example, a student stated:

“As I do my homework, I try to figure out new methods. It is very enjoyable and as you learn you open up to more of math, you figure out questions and solve them by getting new methods” (Student 2).

Conversely, students argued that exercises prepare them for the end of the year examinations. They assert that those who do not take these activities seriously often fail at the end of the year. They further stated that exercises encourage them to enhance or adjust the pace and maintain their determination, especially when they obtain good marks in an exercise. The preceding viewpoints correspond to Doabler and Fien (2013) argument that when students are assured that their responses are correct, such feedback increases their motivation. When they fail an exercise, the advice they receive thereafter helps them to learn from the experience. As a student stated:

“When I fail, I know that it was a mistake but if I do correction, I can learn from the mistake” (Student 6).

The quotation indicates that the student accommodates the error and is poised to proceed with the learning process. Eventually, acting according to Goeke (2009) views that feedback determines how students could improve their approach whenever they encounter a similar task. When students get assessment tasks and receive feedback approximately, they appreciate their mistakes and use it to enhance their knowledge.
(ii) Adverse reactions

Although all students strongly regard assessment as a positive practice, which eventually enhances their resilience, some students struggle with the outcomes of these activities. They respond negatively when they fail an activity and eventually begin to criticise themselves. The self-criticism mainly grounds on the possible consequences of their failures, such as infliction of punishment by teachers and fear to repeat the grade. As a student mentioned:

“The consequence is that if you fail an exercise, then you can fail mathematics. However, it will make me feel bad” (Students 16).

Regarding the content of the extract, Plavnick et al. (2015) encourage teachers to enhance students’ motivation through assisting them to reduce mistakes and give positive reinforcement. Students’ inability to perform well in tasks, especially class activities divulges a lack of support. Class activities are completed during the lesson, which gives teachers the platform to scaffold students accordingly. However, student expressions suggest that teachers are not assisting them adequately. Otherwise, they would have intervened through offering guidance before students fail.

7.4.5 Summary of the fourth research question

Students indicated that they sit in solitary during mathematics instructions, which is an unpopular approach in their preferred arrangements. Drawings divulge that students desire to work in pairs or groups – completing activities collaboratively, rather than individually. They further revealed that teachers consider their prior knowledge. They refer to the content they learned in the previous grades. However, students’ revelations suggest that teachers predominantly focus on their prior content knowledge. Students could only identify counting and money as the concept which they integrate, in real-life and they mostly approach their teachers for assistance, when they have questions or when they lack understanding. A handful of students approach fellow students or parents. Furthermore, they react differently to assessment activities and feedback. Some students perceive it positively, as it encourages them to enhance or maintain their determination. They recognise it as a measure to improve their performance. However, some students possess a hostile view of assessment, especially when it produces unfavourable results. These students criticise and blame themselves for wrong answers and the possible punishment they could face. Since there is a limited integration of prior everyday knowledge during instructions and failure to establish a collaborative working atmosphere. In addition to teachers’ failure to impart positive perceptions of students toward assessment, the explicitness of mathematics lessons is undermined. Therefore, the lessons are below the requirements of ESP.
8 Concluding Remarks

8.1 Summary of key findings of the study
Namibia is amongst other countries in the world that place a sturdy emphasis on mathematics. This stance manifests through the efforts of the government and other stakeholders dedicate in improving mathematics training (Ministry of Education, 2009). For example, ETSIP aims to refine the education sector to contribute to the accomplishment of national development goals as identified in NDP3 (National Planning Commission, 2008). The framework recognises mathematics and science as significant subjects, which could tremendously contribute to the socio-economical, scientific, and technical fields. It further maintains that they are imperative in the citizens’ daily lives and for the advancement of science and technology (Ministry of Education, 2009). Although mathematics is highly regarded in Namibia, the subject is found to be undoubtedly very problematic, and children are struggling to comprehend it. Challenges in mathematics are due to reasons such as the incomprehensibility of its pedagogical process, inability to understand its importance, and students’ lack of affection toward it (Kachepa & Jere, 2014). A report based on the results of 2007 grade 7 external examinations reveal that the highest number of students from all schools received below average symbols (Ministry of Education, 2009). Furthermore, SACMEQ assessment test for grade 6 students positions Namibian mathematics literacy at the lower end (Ministry of Education, Arts and Culture, 2015). This outcome calls for a critical intervention to improve these emerging poor performances and understanding. Especially, that mathematics is a compulsory subject throughout the comprehensive school in Namibia. Considering the history of ESP in the USA, Canada, and Australia, it is appropriate that this study focuses on ESP interventional perspective.

ESP is a detailed teaching method in which teachers guide students using a distinct instructional arrangement (Steedly, 2008). The instructional arrangement includes 3 different components; ‘I do,’ ‘we do’ and ‘you do.’ ‘I do’ component require teachers to start lessons by describing lesson objectives to enable students to concentrate on acquiring the target knowledge and by giving clear demonstrations of the intended concept, through examples (Doabler & Fien, 2013). Assessment of students’ prior knowledge to establish whether they have mastered the required skills for successful problem solving during the new concept is important. The ‘We do’ component comprises of engaging students in guided practice through asking questions and direct learning and comprehension. Guided practice is followed by
frequent assessment, detailed feedback on students’ immediate learning and continual adjustment of instruction to fit students’ emerging needs to facilitate skills mastery (National Center on Intensive Intervention, 2016). ‘You do’ component includes the teachers giving students independent practice when they establish that students are incapable of making significant mistakes, monitoring and providing timely feedback to those who need it (Smeigh, 2013). Teachers’ further help students to maintain the knowledge and indicate possible scenarios in which the newly acquired knowledge is applicable, in real life (Goeke, 2009).

Three recent reports sponsored by the U.S. Department of Education branded ESP as a competently supported pedagogical approach. In 2008, the National Mathematics Advisory Panel recounted that the method has steadily presented positive effects on the mathematics comprehension of students in computation and problem-solving. Correspondingly, a report availed in the year 2009 consists of evidence and recommendations supporting ESP abilities (Archer & Hughes, 2011). It is critical in influencing students to notice reasons for developing a mathematics culture beyond basic numeracy, measurements, and calculations (UNESCO, 2012). Although many studies on the applications of ESP have been conducted in small group instructional format, recent studies have started to indicate that the practice is critically beneficial in whole class instruction (Doabler & Fien, 2013).

This study aims to analyse the teaching and learning conception guiding the Namibian basic education, to determine whether it contains features that could influence teachers to implement an explicit and systematic ‘like’ lesson during their mathematics lessons. Investigate teachers’ perceptions of teaching mathematics and observe whether they employ ESP features during their mathematics lesson planning and learning situations. Evaluate whether the students’ perceptions toward mathematics manifest features driven by ESP. The first research question; what features of ESP are present in the teaching and learning conception guiding the Namibian basic education? Second research question; what are the perceptions of Namibian primary school teachers towards mathematics education? Third research question; what features of ESP are present in the Namibian primary mathematics learning situations and teachers lesson plans? Fourth research question; do students’ perceptions toward mathematics relate to characteristics of ESP?

The researcher obtained the data in various ways. Such as, analysing the Namibian teaching and learning conception for basic education. A purposeful stratified sampling perspective was used to choose 4 mathematics teachers, from 4 schools for interviews and lesson observations. Interviews were directed in a conversational spirit, and lesson observations
were conducted using principles of a non-participant observer. Furthermore, 16 students were selected to respond to questionnaires. The conception content, interview verbatim, observation schedules and questionnaires are analysed using an inductive approach.

The first research question found that both the ESP perspective and the conception of teaching and learning (learner-centred approach) in the Namibian basic education advocates some common practices. Integration of prior knowledge into instruction, meaningfulness, creation of new understandings, new skills and applications, assessment of students’ competencies, use of ICT tools, differentiation of methods to enable inclusivity and usage of special units for students who are unable to learn in mainstream classes are common practices for both perspectives. However, a variation exists, as ESP perspective requires teachers to inform students about lesson objectives, ensure skills mastery and maintenance of knowledge, which the curriculum conception lacks. ESP ideas that are missing from the learner-centred conception are potential hindrances to the explicitness of the lessons.

The second research question established that students’ motivation to learn mathematics is unsatisfactory, due to inadequate resources. However, respondents suggested that it is possible to enhance students’ motivation through monitoring their work, promising, and offering rewards, integrating their prior knowledge, nurturing knowledge application awareness, giving numerous activities and using varieties of teaching aid. Students’ understanding is poor, due to factors such as availability of resources, too much content to cover, limited time, overcrowded classes, insufficient foundational knowledge, language barriers, late coming, and absenteeism. Furthermore, students’ attitudes towards mathematics are unsatisfactory. Few students appreciate mathematics. In addition, a majority of them do not like to collaborate with fellow students or with teachers. Some respondents labelled mathematics challenges as social constructs. They believe students ought to inherit stereotypical views toward mathematics from society. However, they are confident that through regularly marking students’ activities, incorporating prior knowledge, rewarding, and teachers grouping students according to set criteria are possible remedies to negative attitudes. The preceding challenges impede mathematics lessons from meeting ESP criteria.

The third research question found that respondents only address a single facet of prior knowledge, prior content knowledge and ignore students’ real-life situations. Respondents monitor students’ homework during the introductory part of the lesson, instead of preparing them to receive new knowledge. Moreover, they do not explain lesson objectives to students. During the presentation phase, respondents demonstrate each concept to students. However, demonstrations were not entirely correct, as they use inaccurate mathematical language and
transmitted misconceptions. The guided practice was both constructive and destructive. Respondents’ prompts of students and code-switching are constructive practices, while demotivating statements are destructive. Assessment practices that respondents’ employ are both constructive and ineffective. They are constructive when respondents give written classwork and homework, while it is ineffective when it primarily based on verbal questioning. After activities, some respondents could not provide feedback, while others availed it constructively and destructively. Feedback was constructive when respondents employed peer teaching and record the correction onto the blackboard for students to view. It was destructive when respondents criticised students and mostly focused on those who are active. Respondents stated that they plan enrichment activities for higher achievers. Furthermore, to ensure that students of different abilities learn, respondents stated that they plan activities on 3 levels of difficulties. However, this practice was unapparent during lesson observations. When concluding lessons, respondents pose questions to students and give homework. They do not discuss how knowledge is applicable in real life. In fine, details under this section reveal that mathematics-learning situations do not address ESP requirements.

The fourth research question found that students often sit solitarily, while they aspire pair or group sitting arrangements. They further revealed that teachers consider their prior knowledge. However, the details of their explanations indicate that it mainly bases on prior content knowledge. Students could only identify counting and money as mathematics concepts, which form part of their daily lives. Furthermore, students possess different views toward assessment; some perceive it positively while others negatively. Positively, as it assists them to enhance their performance. Negatively as some students blame themselves for incorrect responses and fear possible punishments, they could face. According to these students’ revelations, mathematics lessons do not meet ESP requirements.

8.2 Contribution of the study
There are varieties of problems such as illiteracy, failure, and hatred concerning mathematics in the Namibian basic education. Generally, teachers’ awareness in relation to possible methods of explicitly describing concepts to students has been essentially neglected. No study was conducted in comprehensive schools in Namibia that focuses on ESP in mathematics education. Therefore, this study attempts to close this gap.

This study provides clarity about the relationship between mathematics pedagogy and ESP. In this study, the researcher reveals that teachers adopt mathematical pedagogy differently. These findings will hopefully procure interests of anyone wanting to understand
the curriculum conception and information transmission process during learning situations, in relation to ESP. These findings are helpful to individual teachers to reflect on their own instructional practices, determine where they stand regarding ESP components of ‘I do,’ ‘we do’ and ‘you do’ and adjust their lessons accordingly. They further provide an initial point for deliberation between teachers and their colleagues, to discuss ideas concerning how they can reconsider existing instructional practices and employ ESP dimensions in their own teachings. It assists teachers to re-evaluate their responsibilities and students’ roles during lesson interactions.

The researcher found that the learner-centred conception omits some crucial ESP concepts. Therefore, these findings communicate to policymakers how they can modify the curriculum conception to facilitate efficient and explicit lessons. Furthermore, it is established that there are inconsistencies in the methods teachers use to introduce topics, to demonstrate concepts, and to conclude lessons during mathematics instructions. Therefore, these results could be useful to teacher training institutes, such as the country’s major institution, University of Namibia (UNAM). They could use the findings to minimise inconsistency in their training programs and ensure that graduates are capacitated to teach mathematics analogously. In fine, this study presents findings that appeal for a change of practices towards mathematics instructions.

8.3 Recommendations of the study
Implications of this study point at various educational stakeholders. Therefore, recommendations are summarised regarding teachers, schools, and curriculum designers.

For curriculum designers
As indicated by the Ministry of Education, Arts and Culture (2016, p.1) the curriculum “is an official policy for teaching, learning and assessment.” Due to the preceding description, the curriculum requires educational institutions, educators, and students to follow its recommendations. It enforces a balance and coherence in lesson delivery countrywide and frames the development of teaching aid, textbooks, and syllabuses. On the other hand, research evaluates and informs practice. Therefore, curriculum designers should align their decisions with local and international studies (Thijs & van den Akker, 2009). Furthermore, teachers complain about the number of students in their classes, amount of content they are required to cover, lack of teaching aid and limited time as challenges that restricts them from successfully achieving curriculum goals in mathematics education. Policymakers should put these aspects into consideration when they review the education system. Curriculum designers should
consider making the conception of learning explicitly clear, especially regarding the responsibilities of teachers and students during a learner-centred lesson. It should further recommend for teachers to explicate lesson objectives to students and in addition to content knowledge, encourage teachers to discuss various ways how the knowledge they just acquired is applicable in real life.

For schools
Collegial collaboration, where teachers discuss methods of teaching is required, to enable them to discover collective strategies that are favourable for students’ experience and local settings. It ensures that all teachers employ a uniform approach and guarantee a similar platform for all students. Schools should support teachers who are willing to enrol for in-service training programs or other forms of studies. According to Mizell (2010), professional development is advantageous for students, as their learning and achievement improve. When teachers participate in effective professional development programs, they are capacitated with skills they need to address student challenges and eventually assist them to overcome learning obstacles. In-service training further helps teachers to maintain their standards. It is found that a dispute regarding homework exists as some teachers disagree with the entire conception of giving homework while others give homework and spend a significant part of the subsequent lesson discussing it. When teachers spend a significant amount of time monitoring the homework, they switch directly into the content of the successive topic, without preparing students. Therefore, schools should find the best relative solutions to addressing this matter.

For mathematics teachers
Individual teachers determine what transpires during classroom interactions. They plan the implementation process according to their understanding and beliefs. They further interpret the curriculum and decide on aspects that they deem pragmatic. Dedicating efforts in trying to amend teachers’ beliefs hold the potential to modify instructional practice. Reading this study’s findings and ponders on how they align with their own practice is an example. Therefore, based on this study and literature of other researches, as discussed in this manuscript, the researcher would like to recommend ways on how ESP philosophies could be enhanced in mathematics lessons:

- Study necessary students’ prior everyday knowledge and constantly integrate it in instructions daily.
- Make mathematics instruction more optimistic. Avoid negative remarks towards students’ activities; give positive feedback that explicitly informs students of their strengths and areas for improvement.
- Classroom activities that involve students working collaboratively should be promoted, as students possess the abilities to explain to others in a clearer manner, using familiar expressions.
- Instead of pure procedural knowledge that mathematics education traditionally advances, the relation of conceptual knowledge and students’ immediate and gradual livelihood should be discussed.
- Clear guidelines of the teachers and students' responsibilities during instructions should be set, to ensure that both parts contribute significantly to knowledge construction. Awareness of these guidelines eradicates chances of a single party dominating the interaction.
- Homework is an integral part of learning, as it enables students to seek assistance elsewhere. However, if it does not serve the purpose as some respondents argue, then teachers should make sure students gain an understanding of what to do before giving them homework.
- When teaching aids are insufficient, teachers should take initiatives and improvise materials with similar structures, using readily available resources.
- Many respondents expressed that students possess negative perceptions toward group work and pair work. While students asserted the opposite, which indicates that a misunderstanding exists. Therefore, the onus is on the teachers to find means to overcome this discrepancy.

8.4 Recommendations for further studies.
The focus of this study was ESP at primary schools, where the study found that the level of ESP in the learning situation is unsatisfactory. Many recent teacher graduates in primary education, including those who majors in mathematics, undertook their studies at the University of Namibia (UNAM), as the country’s major teacher training institute. Therefore, there is a need to conduct a study at UNAM to determine students training mechanisms and evaluate the possible integration of ESP in their programmes. The findings of such a study could be of great significance to UNAM and other tertiary institutions, as they can use the results to make informed decisions. The results are beneficial in producing teachers that are aware and can discuss concepts with students explicitly and help to improve students’ understanding and proficiency level, especially in mathematics education.
The purpose of this study was to investigate the presence of ESP in the learner-centred conception, teachers’ perceptions, learning situations and students’ perceptions toward mathematics. There are possibilities of other studies to evaluate whether ESP perspective could be effective, in the Namibian context. These studies would raise awareness of the functionality of the perspective, determine the positive aspects and possible challenges, and provide recommendations to the Namibian basic educational fraternity. These recommendations will enable curriculum designers and individual teachers to make informed decisions and minimise the possibilities of operating in a vacuum. Existing studies on ESP are conducted in contexts that vary considerably to the Namibian setting, regarding resources and classroom sizes. Therefore, results specifying the techniques, effects and implications of implementing ESP in the Namibian contexts are required.

This study focused on primary school teachers, learning situations and students. A similar study could be conducted at the secondary school phase, to help determine the extent of ESP perspective they employ. It could further establish similarities and differences that exist between primary and secondary schools, in relation to mathematics pedagogy. Secondary school context is unique, due to the students’ age, teachers training, and the subject’s levels of difficulty. It is vital to conduct a separate study at the secondary school level, as we cannot rely on the findings of this study to influence pedagogy at a different level.

8.5 Limitations of the study
Teachers are unknowledgeable regarding the pedagogical methodology under study (ESP). Therefore, questions concerning the concept during the interview could not be directly asked, as it is a new phenomenon to the respondents. The researcher had the possibility to explain the concept to the respondents. However, giving out the information regarding the subject under investigation could compromise the findings, as respondent would act accordingly or they would adopt the concept for the specific time that the researcher is present.

The research is restricted by the convenience sampling employed due to monetary and time constraints. In the absence of these variables, it could have been good to take a sample across the whole country to enhance the representativeness of the case. Furthermore, this research is a qualitative case study; the findings are restricted to this case, they do not allow generalisation. The fundamental idea was to interpret respondents’ views, curriculum conception and observational findings, and keep them within the context thereafter.
References


Dear respondent

Kindly be informed that the purpose of this interview is to investigate the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The information obtained from the interview will be used to compile a research report. However, your identity remains confidential; conclusions will be drawn unanimously. The information you will provide does not serve any other purpose besides this research project. Please feel free to answer the questions as honest as possible.

Please sign below to indicate that you voluntarily agreed to partake in this research.

Signature ……………………

Date …………………………

Simson Fuma
University of Eastern Finland
simsonf@uef.fi
1. What is the situation with mathematics in your classroom?
   a) Students’ performance (why)
   b) Students’ understanding (why)
   c) Attitudes (why)
   d) Students motivation (why)
   e) Collaboration (why)
2. What do you think about mathematics education in general?
3. How do you plan your lessons?
4. What is the most important in mathematics lesson?
5. How do you ensure that you achieved your goals?
6. How do you teach mathematics?
   a) Introduction of the lesson
   b) Presentation
   c) Conclusion
7. How do you assist students who are struggling, (if there are any)
   a) What method do you use?
   b) What material do you use?
8. How do you ensure that higher performers and low performers all learn something during you lessons?
9. How do you measure learning outcomes
   a) performance
   b) understanding
   c) attitudes
10. What are the assessment methods
Appendix B

Dear respondent

Kindly be informed that the purpose of this questionnaire is to investigate the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The information obtained from these questionnaires will be used to compile a research report. However, your identity remains confidential; conclusions will be drawn unanimously. The information you will provide does not serve any other purpose besides this research project. At parts where you do not understand the question, feel free to ask for clarification. Please answer the questions as honest as possible.

Please provide your initials below to indicate that you voluntarily agreed to partake in this research.

Signature ……………………

Date …………………………

Simson Fuma
University of Eastern Finland
simsonf@uef.fi
1. Draw a picture of you in a mathematics lesson.

2. Why did you draw the picture in that way? Please describe.

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3. Draw a picture showing how you would want your learners to look like in your class, if you were a mathematics teacher.

4. Explain why you want your learners to look the way you drew in the picture.

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5. Do you think mathematics is needed in your life, (yes / no)? Explain your opinions.
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6. Do you think mathematics content include things from your environment that you already know (yes or no)? Explain your answer.
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7. Do you use the skills you learn in mathematics in your everyday life (yes or no)? Explain your answer.
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8. Do you enjoy mathematics exercises such as classwork and homework (yes or no)? Explain your reasons.
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9. Explain what happens when you get a wrong answer in an exercise?
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10. Explain what you do if you do not understand a topic, in mathematics.

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11. In your opinion, does the teacher give you enough help to understand topics? Explain why.

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12. Does mathematics remind you of information you learned in other grades or at home? If yes, please explain how it reminds you.

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13. When you learn new mathematics skills, do you also learn how to use it in real life? If yes, explain how you can use it.

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Appendix C

Dear respondent

Kindly be informed that the purpose of this observations is to investigate the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The information obtained from the observations will be used to compile a research report. However, your identity and of all classroom stakeholders remains confidential; conclusions will be drawn unanimously. The information, which will be gathered, does not serve any other purpose besides this research project. Please present your lesson freely.

Please sign below to indicate that you voluntarily agreed to host me as a non-participant researcher in your classroom.

Signature …………………

Date ………………………

Simson Fuma
University of Eastern Finland
simsonf@uef.fi
(Adapted from Archer & Hughes, 2011)

1. Begin lessons with a clear statement of the lesson’s goals and their expectations.

2. Review prior skills and knowledge before beginning instruction.


4. Use clear and concise language.

5. Provide an adequate range of examples and non-examples.

6. Break down complex skills and strategies into smaller instructional units.

7. Provide guided and supported practice, through clues and prompts.


10. Provide immediate affirmative and corrective feedback.

11. Reteach when necessary.

12. Deliver the lesson at a brisk (energetic) pace.

13. Help students organise knowledge.

14. Provide distributed and cumulative practice (providing distributed practice by including practice opportunities that address both previously and newly acquired skills)

15. Students practice until skills are automatic (They become fluent).

16. Students get a chance to practice independently.
17. Discuss how the knowledge is applicable in really life.

18. Focus instruction on critical content

19. Sequence skills logically
Appendix D

Dear respondent

Kindly be informed that the purpose of this questionnaire is to investigate the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The information obtained from these questionnaires will be used to compile a research report. However, your identity remains confidential; conclusions will be drawn unanimously. The information you will provide does not serve any other purpose besides this research project. At parts where you do not understand the question, feel free to ask for clarification. Please answer the questions as honest as possible.

Please provide your initials below to indicate that you voluntarily agreed to partake in this research.

Signature ……………………

Date …………………………

Simson Fuma
University of Eastern Finland
simsonf@uef.fi
Ondodo .............................................

Eedula doye ...........................................

1. Faneka efano loye uli mongulu yo mwaalu.

2. Shanga chokololo kuty oshike welifanekela momukalo oo.

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3. Ngeno owali omulongi womwaalu, Faneka efano tali ulike eshi wahala ovalongwa voye vakale veli motundi yoye vomwaalu.

4. Shanga ehokololo kombinga yefano eli wafaneka pombada. Oshike wahala ovahongwa voye wakale momukalo ouwafaneka?

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9. Hokolola oshilanduli ngeenge wadopa oshinyangadalwa shomwaalu.
10. Hokolola kutya ohoningi ngahelipi ngeenge kuuditeko oshikalimo shomwaalu.
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11. Eshi watala ovalongi ohavekupe evatelo lawana opo wuudeko oshikalimo shomwaalu?
Shanga moule.
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12. Omwaalu womongudu omu uli ohaikudimbulukifa eshi walongwa keendodo dopeduu?
Ngeenge ohaukudimbulukifa, hokolola kutya ohaukudimbulukifa ngahelipi.
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13. Ngeenge tolongwa ounongo upe momwaalu, oholongwa yonghee todulu okuulongifa
monghalomwenyo yefiku keshe? Osho ile hasho? Shanga moule.
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Appendix E

Simson Fuma
Masters of Arts Student
University of Eastern Finland
Cell: +358 449 520184
Email: simsonf@uef.fi
simfuma@gmail.com

May 23, 2018

The Director
Khomas Education directorate
Private bag 13236
Windhoek

Dear Sir.

Request for permission to collect data in Khomas Region

I am hereby to submit my request for permission to conduct a research in Khomas region, specifically at …and…

I am a final year student in Masters of Arts (education) degree program at the University of Eastern Finland and currently working on my master’s thesis. My study focus on “Explicit and systematic pedagogy in mathematics education in four Namibian primary schools”. Despite the prominent status, that mathematics enjoys over other subjects in the Namibian context, challenges as exists. Learners’ mathematics knowledge and competencies lack behind the anticipated level and they do not like mathematics, as it is non-meaningful. Therefore, the study investigates the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The nature of the study requires me to seek permission from your good office to research on this topic.

As part of my data collection tools, I will conduct interviews, observations and give questionnaires. I plan to spend 2-3 days with one senior primary (grade 4-7) mathematics teacher at each of these schools. I will conduct the study from the end of May to early June. I will use the data for the thesis project only. The participants’ identity will remain entirely confidential and anonymous.

I hope your good office will permit me to conduct this project within the region and I am pleased to answer questions or concerns regarding my research.

Sincerely,
Simson Fuma
simsonf@uef.fi
The Director
Ohangwena regional Council
Directorate of Education Arts and Culture
Private bag 88005
Eenhana

Dear Sir.

Request for permission to collect data in Ohangwena Region

I am hereby to submit my request for permission to conduct a research in Ohangwena region, specifically at … and…

I am a final year student in Masters of Arts (education) degree program at the University of Eastern Finland and currently working on my master’s thesis. My study focus on “Explicit and systematic pedagogy in mathematics education in four Namibian primary schools”. Despite the prominent status, that mathematics enjoys over other subjects in the Namibian context, challenges as exists. Learners’ mathematics knowledge and competencies lack behind the anticipated level and they do not like mathematics, as it is non-meaningful. Therefore, the study investigates the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The nature of the study requires me to request permission from your good office to research on this topic.

As part of my data collection tools, I will conduct interviews, observations and questionnaires. I plan to spend 2-3 days with one senior primary (grade 4-7) mathematics teacher at each of these schools. I will conduct the study in June and I will utilise the data for the thesis project only. The participants’ identity will remain entirely confidential and anonymous.

I hope your good office will permit me to conduct this project within the region and I am pleased to answer questions or concerns regarding my research.

Sincerely,
Simson Fuma
simsonf@uef.fi
Appendix F

Simson Fuma
Masters of Arts Student
University of Eastern Finland
Cell: +358 449 520184
Email: simsonf@uef.fi
simfuma@gmail.com

May 23, 2018

Dear Principal

Request for permission to collect data at ….

I am hereby to submit my request for permission to conduct a research at …

I am a master’s degree student in primary education at the University of Eastern Finland. I have a research project focusing on ‘explicit and systematic pedagogy’ in mathematics education. The purpose of the study is to investigate the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. As part of my data collection tools, I will conduct interviews, observations and give questionnaires. I plan to spend 2-3 days with one senior primary (grade 4-7) mathematics teacher at your school. I will conduct the study at the beginning June. The participant’s identity will remain entirely confidential and anonymous. And the data gathered is for this thesis project only.

I hope your good office will permit me to conduct this project within your school and I am pleased to answer questions or concerns regarding my research.

Yours faithfully,
Simson Fuma
simsonf@uef.fi
Dear parent

Kindly be informed that your child ……………. (Initials) is chosen to take part in a research about explicit and systematic pedagogy in mathematics education in Namibian primary schools. The purpose of this study is to investigate the presence of explicit and systematic pedagogy features during mathematics lesson planning and learning situations. The information obtained from the questionnaire will be used to compile a research report. However, the child’s identity remains confidential; conclusions will be drawn unanimously. The information she/he will provide does not serve any other purpose besides this research project. Since the learner is a minor and cannot make informed decisions, I would like to ask for your permission to allow the learner to partake in this research.

Please sign below to indicate that you agreed to the content of this letter.

Signature …………………

Date ………………………
Appendix H

To Whom It May Concern

Namibian teachers, who are participating in Master’s Degree Programme in Primary Education as a part of their studies, are conducting dissertation research. These studies consist of three different parts: a) planning seminar, b) working seminar and c) research report. To be able to complete the dissertation, they have to conduct empirical data collection, which is recommended to be carried out in Namibia. As a supervisor of their master’s thesis, I ask for Your kind support for their data collection under all necessary ethical requirements.

In Joensuu, 15th November, 2017

Sari Havu-Nuutinen
Professor
Academic head of the Master’s Degree Programme in Primary Education
Supervisor of Thesis