PERFORMANCE OF LEARNERS IN MATHEMATICS AT UPPER PRIMARY PHASE IN OKAHANDJA DISTRICT: EXAMINING REASONS FOR LOW PERFORMANCES

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September 2009

Report No: 1
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EXECUTIVE SUMMARY

1. Introduction and background

Namibia as other countries in the world exhorts strong emphasis on Mathematics and Science. This is evident through efforts that the government and other partners in education committed in training Mathematics and science through projects such as MASTEP and the defunct INSTANT Project which was there during early year of the reform. In addition, there are palpable emphasis on Mathematics and science from politicians, bureaucrats and academics on the importance of the two subjects (GRN, 1999). To date, more learners are encouraged to opt and specialise in the two subjects. Despite acknowledging the quintessence of the two subjects and the government determination to improve the performance in the subjects as well as investment aimed at boosting the development of the subjects, the low performance in the two subjects and particularly, Mathematics as this study intended to find out, is apparent (Makuwa, 2004 and Voigts, 2003). Hence the following quote: “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. These marks do not only reflect on the grade 7 teachers, but on all the mathematics teachers from Grade 1 to Grade 7” (DNEA, 2007:7).

2. The aim of the study

The aim of this study was to find out the performance of learners in Mathematics in Grades 5-7 in 2007. More specifically, the study intended to explore reasons for low performance in Mathematics.

3. Research questions

a) What are the Mathematics examination results of Grades 5, 6 and 7 learners in 2007 in Okahandja schools?

b) What is the perception of Grades 5, 6 and 7 (Upper Primary) learners in Okahandja schools towards mathematics?

c) Do Grades 5, 6 and 7 (Upper Primary) learners in Okahandja schools experience problems in learning mathematic concepts and skills?

4. Research and sampling designs

Apart from examining the performance of Grades 5, 6 and 7 (upper primary) learners in Okahandja schools in mathematics, the study intents to evaluate the mathematics syllabus implementation of these grades in 2007. Holistic approach was found suitable to conduct this study. Triangulation technich was applied in the senses that achievement tests were conducted, questionnaire for learners and teachers were administered and later interviewed. In order to determine how learners performed in respective schools, promotion schedules and continuous assessment record sheets were analysed.

The study was conducted in Grades 6, 7 and 8 learners of 2008 assuming that these learners were in Grades 5, 6 and 7 in 2007. Forty learners from each school were randomly selected using random sampling tables. The expected total sample of learners in all schools was 200 and the achieved sample was 116 (58%).
5. Methods

Three local primary schools that had Grades 6 and 7 in 2007 were sampled and one secondary school which had grade 8 in the same year, stratified by area (town vs. location) within Okahandja. Forty learners from each school were randomly selected using random sampling tables. The expected total sample of learners in all schools was 200 and the achieved sample was 116. All teachers teaching Grades 5, 6 and 7 were asked to complete the questionnaires based on the specific grade syllabus. There was no sub-sampling of both learners and teachers within a school or in the study as a whole.

5.1. Data collection and administration

To be able to determine the actual performance of learners in the Upper Primary Phase in mathematics, the promotion schedules from the sampled schools were collected from the schools and analysed. The data demonstrated the extent to which learners in these grades performed in mathematics in 2007. Furthermore, the continuous assessment mark for Mathematics for Grade 7 were collected in each school in order to analyse the performance of Grade 7 learners in the External Examination and compared the actual performance in absence of the continuous assessment marks. The analysis of learners’ performances in Grade 7 in Paper 1 and Paper 2 was done in order to examine the differences in learners’ performances in the two Papers. This was inevitable for distinguishing the differences between the continuous assessment outcomes versus the actual performance in the Grade 7 External Examination.

The researchers administered achievement tests in Grade 6, 7 and 8 in 2008 in each school. The aim of these tests was to determine the level of performance of these learners in these grades in 2007 and compared them with other studies specifically SACMEQ. The tests also aimed at identifying competencies that were difficult attaining and shed light to curriculum developers, examiners and teacher trainers on how to affect the outcomes.

Teachers teaching Grades 5, 6 and 7 were given a questionnaire in order to collect views about curriculum implementation and possibly identifying areas within the syllabus that learners encounter difficulties in learning. Likewise, learners completed a questionnaire aimed at collecting (their) views about the curriculum contents and possibly identify areas within the syllabus that were difficult.

6. Data analysis

Data collected from the promotion schedules were statistically computed using SPSS data processing and excel spreadsheet programmes. Furthermore, the results of grade 7 external examination were extracted from the continuous assessment marks and computed in order to find out differences in the performance of learners in Paper 1 and 2. The t-test was computed for Paper 1 and 2 to find out whether the performance of learners in Paper 1 and 2 were significantly different. Further computation of percentage was done. The results were then compared to determine the differences between learners who performed well from those who performed poorly. Qualitative data from teachers and learners’ interviews were content analysed in order to categorise the information derived from the learner’s interviews (Patton, 1990).

7. Presentation of the key findings

7.1 The performance in Mathematics in Grade 5, 6 and 7 by schools in 2007

The performance of learners in Okahandja primary schools was satisfactorily. The results in all grades are concentrated at ‘C’ and ‘D’ symbols. A small number of learners in all grades scored ‘B’ symbol with
Grade 6 (9%) outperformed Grade 5 (7%) and Grade 7 the lowest (2%). Generally Grade 5 performance was striking comparing to grade 6 and 7 especially if we consider the total percentage of ‘C’ and ‘D’ symbols (85%) with only 11% at ‘E’ symbol. The results further indicated a slight decline in performance in Grade 6 and 7. Hypothetically the cause of this trend was due to spiral mode of the curriculum because the contents and competencies become more complex in Grade 6 and 7. Grade 6 is a mid-point of the Upper Primary Phase and improvement or decline in performance at this level predict the type of output one could anticipate at the exit point of the Primary Phase.

When the performance of the four selected schools in Grade 5 in Okahandja were plotted together, it was evident that Okahandja Primary School produced significant performance specifically when results at ‘B’, ‘C’ and ‘D’ symbols were added together making it 90% with only 11% at ‘E’ symbol compared to other schools. More impressing still was that, out of 72 learners in Okahandja Primary School, 50% obtained ‘C’ symbol and 33% obtained ‘D’ symbol. This was an outstanding achievement without judging the standard of the examination and modes of assessment. It was interesting to note the distribution of scores at Eden Primary School. As low as 4% of the learners at Eden Primary School obtained ‘A’ symbol, 28% obtained ‘B’, 21% ‘C’ and 25% ‘D’ symbols. The attainment of ‘A’ and ‘B’ symbols at this school outperformed the other schools. Aurora and Nau-Aib scored high in ‘C’ and ‘D’ symbols. 23% of learners in each of the two schools got ‘E’ symbol signifying a considerable number of failure comparing to Okahandja and Eden. In general, the scores in all four schools were concentrated at ‘C’ and ‘D’ symbols but more at ‘D’ symbol than ‘C’. About three quarter (78%) of the learners at Eden Primary School obtained ‘A’, ‘B’, ‘C’, and ‘D’ symbols implying that more than half of the learners passed Mathematics on that year.

The performance of Grade 6 learners per schools in Okahandja showed Aurora Primary School demonstrated remarkable results for the year 2007 compared to other schools. This was apparent by the ‘B’ (14%), ‘C’ (39%) and ‘D’ (35%) symbols that learners in this school had obtained. Furthermore, only 12% of learners got ‘E’ symbol indicating that they had low percentage of failures in that year.

The performance of Okahandja Primary School is equally impressive with 9% of the learners obtaining ‘B’ symbol, 35% ‘C’ and 42% ‘D’ symbols. A small number (14%) obtained ‘E’ symbol. Of the four schools under study, Eden Primary School produced unimpressive results. About a third (31%) of the 71 learners obtained ‘E’ symbol compared to the low performance, in percentages, in the other three schools.

7.2 Analysis of the Grade 7 performance and external examination results

Grade 7 is an exit point to junior secondary education. Learners sit for the Grade 7 External Examinations at this level. In practice, the Grade 7 External Examination is not a benchmark for entry to junior secondary school but could give an indication of the learners’ abilities to excel in different subject areas at Junior and Senior Secondary Phases.

The results show the accumulation of scores at ‘D’ symbol and ‘E’ in all schools compared to ‘A’, ‘B’ and ‘C’ symbols. The scores at ‘A’ and ‘B’ were lower compared to ‘C’ and more significantly at ‘D’ and ‘E’. The results inferred a significant decline in performance.

The results of the Grade 7 External examinations were used to compare the schools’ performances because of the set common standard of the examination, the marking scheme and the strict conditions set and controlled by the Directorate of National Examination and Assessment (DNEA).

The External Grade 7 Examination results showed that learners’ scores denoted an asymmetrical curve, negatively skewed. The results were considerably different from those derived from the continuous assessment. The symbols were accumulated on ‘D’ and ‘E’ and more on ‘E’ symbol. The performance was low when a standard examination was administered. It showed the extent to which the continuous assessment marks overshadowed the actual learners’ performances.
7.3 Differences in performance between Paper 1 and 2

Following the distributions of scores between Paper 1 and 2, learners performed better in Paper 1 compared to Paper 2 in 2007 in grade 7 external Mathematics Examinations. Furthermore, there was significant difference between the scores of Paper 1 and 2 ($t=3.4; \text{df }=350; p=.001$). These differences raised serious concerns on what teachers emphasised during lessons, the mode of assessment, the contents of trimester mathematics examination papers and perhaps more significantly the coverage of competencies within the Mathematics syllabus.

7.4 Topics and competencies learners face difficulties in learning in Grade 5 syllabuses

The learners’ questionnaire intended to collect information on topics and specific competencies within the syllabus that learners experienced difficulties.

**Whole Number: competency 5:** More than a third of the learners (37%) experienced difficulties in Whole Number competency 5.

**Whole Number: competency 10:** Half of the learners (55%) indicated having problems in whole Number competency 10 that dealt with terminologies regarding the four operations.

**Common Fractions: competency 2:** Learners indicated facing difficulties in fractions. These responses corresponded to questionnaire outcomes. There were noticeable difficulties on how to order Decimal Numbers using the relationship signs ($>;<;\leq$)? The majority (61%) of learners indicated they cannot order Decimal Numbers using relationship signs ($>;<;\leq$) while only 37% of the learners indicated they were competent in carrying out the task.

**Measurement: Length, Mass and Capacity: competency 1:** The majority (60%) of the learners did not know the SI symbol for Length, Mass and Capacity compared to those who indicated that they know the symbol of IS in Length, Mass and Capacity (37%). This result had two implications. First, there was either no emphasis on comprehending mathematical abbreviations or the second learners did not take the learning of symbols seriously to infer to the holistic understanding of mathematical concept.

**Measurement: Length, Mass and Capacity: competence 3:** Out of 156 learners, 49% indicated that they cannot apply the four operations to Length, Mass and Capacities and 47% indicate they can pursue the operations.

**Geometry:** More than half of the learners (53%) indicated they cannot distinguish between different kinds of triangles and quadrilaterals and 46% indicated they can. This implied that learners faced difficulties in Geometry and competencies attached to this topic.

7.5 Topics and competencies that learner faces difficulties in learning in the Grade 6 syllabus

The following findings represent the difficult topics in Grade 6 as identified by the learners from the questionnaire.

**Decimal Fraction: Competency 4:** Although the learners start with Decimal Fractions in Grade 5, most of them found it difficult to apply Decimal Fraction in Measurement (Length, Mass and Capacity). This was evident when three quarter of the learners (71%) indicated that they cannot express and order SI units in decimal. Less than a third (24%) indicated that they can express and order SI units in decimal. This inferred to a lack of proficiency on this competence.
**Measurement: Length, Mass and Capacity: competency 2:** On this competency, 51% of the learners indicated that they could not estimate measures to an acceptable accuracy, compared to 41% who affirmed. This augured well with what they had indicated on Decimal Fraction because all of these items involved SI units. It was therefore correct to assume that many learners find it difficult to understand SI units.

### 7.6 Topics and competencies that learners faced difficulties in learning in the Grade 7 syllabus

The complexity of the competencies, the introduction of the new topics and most likely the loss of interest on the subject could have caused many learners finding Mathematics difficult, challenging and or not interesting. This was apparent due to the increasing number of competencies within the topics that learners faced difficulties in learning in Grade 7 compared to Grade 5 and 6.

**Data Handling: competency 2**

Two basic competencies were asked under Data Handling of which learners found the second competence more difficult where 59% indicated they did not know how to interpret mean of a small set of discrete data and make deduction compared to 37% of the learners who affirmed.

**Whole Numbers: competency 5**

In competency 5 out of the total of 6 competencies asked, 53% responded ‘NO’ compared to 42% who responded ‘YES’.

**Common Fraction: competencies 2 & 3**

More than a half of the learners 62% responded ‘no’ under competence 2 which learners were asked if they could determine what fraction a quantity was of another quantity. On competency 3 they were asked if they could solve three-step word problems involving Common Fraction. Slightly more than a half (53%) indicated that they could not pursue the task.

**Decimal Fraction: competencies 3, 4 & 5**

Out of these 5 competencies, competencies 3, 4 and 5 were noted to be difficult. These involved understanding of the four operations with decimal fraction, express one quantity as a fraction of another quantity (72% ‘NO’) and solve word problems in the context of physical quantities and money (51% ‘NO’)

**Percentage: competence 2**

Learners were asked two basic competencies under percentage. Competence 1 asked the learners if they were competent on converting fractions to percentage. Half (53%) of the learners responded ‘NO’. Results that were different from the achievement test outcomes.

**Measurement: length, mass, capacity and time**

Learners indicated difficulties in Capacity, Mass, Length, especially with the abbreviations that goes along with these competencies. Learners could not understand the abbreviation ‘SI’ in the questionnaire. Teachers during interview confirmed about this difficulty and the difficulty of reading ‘time’. They assumed the problem of mixing time was caused by thinking first in Afrikaans which read, e.g. 07:30 in different order and transform the thinking in English.

**Competence 1:** Learners were asked if they could solve problems involving conversion between units using Whole Numbers, Common Fractions, Decimal Fractions and Percentage. About 53% of the learners responded ‘no’.

**Competency 3:** Learners were asked if they could apply the SI units for Length, Mass and Capacity involving conversion of units. Learners could not understand symbol ‘SI’. This was evident in
the achievement test where learners were tasked to convert the units. The majority (68%) responded ‘NO’.

7.8 Teachers’ identification of learners’ areas of difficulties in learning mathematics

Teachers identified the following topics as difficulty to most of the learners:
1. decimal numbers;
2. common and decimal fractions;
3. geometry;
4. four basic operation;
5. conversion of time;
6. problem solving.

7.9 Reasons for poor performance

It was found that the poor performance was caused by:

1. Poor Mathematics foundation laid at lower primary. Therefore the poor learners’ performance at upper primary phase was not eccentric.
2. The link between the of lower primary and upper primary phase curriculum;
3. The subject content versus pedagogic knowledge of the teachers
4. Association of learning competencies;
5. The linear nature of the Mathematics syllabus.
6. Lack of parental involvement and support;
7. Lack of Mathematics equipment
8. Difficult topics and competencies;
9. Medium of instruction.

8. Conclusion and policy proposition

In conclusion, most schools in the study scored at ‘D’ and ‘E’ with few of them at ‘C’ symbol. We can further conclude from these results that the low performance was not as high as it was anticipated. On the other hand, the higher performance was lower compared to the average performance. This was alarming because there were indications of declining of performance as learners’ progressed into higher Grades. From learners’ interviews we could glean that learners had difficulties in certain competencies as they preceded into next the grade.

Policy Proposition (1). School management and inspectors to impose effective teaching by monitoring and evaluating teaching and learning process in schools
Policy Propositions (2). Improve the assessment technique in teacher training program. School managers and inspectors should monitor the assessment processes and output. Standardise the examination of papers in schools, clusters, circuits to improve the performance. Monitor the paper 2 contents in all schools since learners performed poor in this paper
Policy Proposition (3). The regional advisory teachers for Mathematics as well as the Mathematics education officers at NIED should see to it that the Mathematics teachers receive proper training on how to use the assessment information in the syllabus to set up the assessment activities at school, cluster and at the national level. Inspectors and the school management should ensure that examination papers are moderated and assessment is done according to the set guidelines.
Policy Propositions (4). Teachers should improve the teaching of the topics and competencies that learners experience difficulties, assess reasons for difficulties and improve the assessment modes. The curriculum developers should review and modify competencies under the difficult topics. Teacher trainers should improve the teaching of these competencies and maintain a balance between content and pedagogical knowledge. The inspectors should ensure that the school management consistently assesses the teaching and learning process. School managers should monitor and evaluate teaching and learning processes regularly. NIED’s Curriculum Development Division to review the identified difficult competencies; intensify the training of teachers on these competencies; CPD subdivision with curriculum divisions at NIED should promote continuous professional development of teachers in the field.

Policy Propositions (5). NIED and Colleges of Education should train teachers in content and methodologies of teaching difficult Mathematics areas. Advisory teachers should play a role in advising teachers on subject related matters and visit schools frequently to share their expertise. Cluster school system should be used effectively in providing platforms for exchange of views and sharing of filed experiences among the mathematics teachers.

Policy Propositions (6). NIED curriculum division should ensure that there is smooth link and transition between the lower and upper primary Mathematics syllabuses. The Colleges of Education should ensure that teachers receive a balance input between methods and subject content. The school management and advisory teacher should monitor the teaching of Mathematics.

Policy Propositions (7). Schools should implement compensatory teaching policy to help learners to excell in the subject. NIED should train teachers on compensatory teaching to enable all teachers to help learners with learning difficulties to excel well in the subject.

Policy Propositions (8). School management should strengthen the link between the school and home where learners reside. The colleges should ensure that a module covering home versus school dynamics is developed and students teacher are well trained on these dynamics. NIED should provide training as part of Continuous Professional Development on dialectical relationship between the school and the home.

Policy Propositions (9). Examination (DNEA) and inspectorate directorates should review the assessment and evaluation of learners. Colleges should have an in-depth content teaching in teacher training program. Inspectors, school management, should ensure that learners are assessed according to the assessment guidelines and that examination Papers carry a balance of knowledge and application as enshrined in the syllabuses. Teachers should put more emphasis on teaching high level competencies. NIED should take responsibility in reviewing the contents and competencies where learners failed to achieve. CPD at NIED should strengthen and provide refresher courses to long service teachers.

Policy Propositions (10). The ministry of education should build more schools and classrooms; avail all needed equipment and materials; improve the working conditions of teachers especially in the remote areas; and continuous professional development should be intensified. Advisory Teachers should render the necessary support.
CHAPTER 1

AN OVERVIEW OF THE STUDY

1.1 Introduction and background

The high demands for technical and scientific expertise in many countries including Namibia made governments to emphasise the effective teaching of Mathematics and Science in schools to enable learners to excel in these subjects. The promotion of quality and effective Mathematics and Science education in schools is essential for attaining, particularly the technical, scientific and economic goals and transform the society into a knowledge-based economy as enshrined in national development goals such as Vision 2030 and NDP3. This view is equally emphasised in The Presidential Commission on Education, Culture and Training (1999:112) stating “Many teachers feel inadequate in Mathematics…[Y]et Mathematics is essential for success in scientific and technical education. Unless the foundations are secured, it will be extremely difficult to build Mathematical and scientific success at secondary level”.

Plausibly, the shortage of scientists and technical staff in Namibia, as in other developing nations, seems to be caused by many learners who do not opt for subjects that lead to these professions. Teachers on the other hand, face a number of challenges in teaching of Mathematics and Science. It is reasonable and perhaps inevitable questioning the crux of the status quo. More importantly, the question remains on why the situation has not changed significantly despite the material, financial and human inputs that the nation has engaged in since independence.

It is also sensible to accept the fact that learners require a high level of cognition to understand the concepts and skills required to solve Mathematics problems. These challenges, in addition to general misconceptions which learners have towards Mathematics, make it difficult for some learners to excel in the subject.

This study thus aims at finding out the reasons for learners’ low performances in Mathematics. Where does the problem lie? What is crucial to address the problem? Is it ‘policy’, ‘curriculum contents’, ‘pre and in-service teacher training’, ‘teachers as implementers of the curriculum’, ‘learners as recipients of the curriculum’ or subject content knowledge?

1.2 Basic assumptions and empirical findings

This study is prompted by the following assumptions and empirical findings:

a) Many learners in Namibian schools performed poorly in Mathematics examination (SACMEQ, 2004; MASTEP, 2002; Clegg, 2007 and 2008).

b) Learners experienced difficulties in learning Mathematics contents and skills (Shiel and Kelly, 1999).

c) Learners who have negative misconception towards Mathematics tend to perform poorly in the overall assessment in the subject (Shiel and Kelly, 1999).

d) Teachers teaching Mathematics are not equipped with adequate subject-content knowledge (MASTEP, 2002; Clegg, 2007).

e) Teachers bear negative views towards Mathematics teaching.

f) Gender and cultural beliefs affect choices and performance in Mathematics.

g) Learners’ learning styles and interest in Mathematics seem to be largely ignored by the teachers.
1.3 Research questions

d) What are the Mathematics examination results at Upper Primary Phase in 2007 in Okahandja schools?

e) What is the perception of Grade 5, 6 and 7 learners towards Mathematics?

f) Do Grade 5, 6 and 7 learners experience problems in learning Mathematics concepts and skills?

g) Do Grade 5, 6 and 7 teachers have sufficient teaching materials and media to affect Mathematics teaching?

h) What is the Grade 5, 6 and 7 teachers’ perception towards teaching Mathematics?

i) What influences of culture and traditional beliefs have on Mathematics’ performance?

j) Do Grade 5, 6 and 7 learners demonstrate any individual learning styles that help them to perform better in Mathematics?

1.4 Justification of the study

A number of studies and reports cite low performance and possible reasons for poor performances in Mathematics (NIED, 2004; DNEA, 2004; SACMEQ, 2004; MASTEP, 2002; Shiel and Kelly, 1999). Reasons for poor Mathematics performance as confirmed by these studies and reports are: teachers’ competencies in mastering the curriculum content, miss allocation of subjects to teachers in the phases as a result of shortage of Mathematics teachers, availability of teaching materials, methods of presentation, learning environment, lesson preparation, gender, and motivation to learn.

These studies showed that learners at Upper Primary level perform poorly in basic Mathematics skills. SACMEQ II (2004) reported the low performance of the Namibian learners and teachers in Mathematics comparing to the performance of the same group of learners and teachers in the Southern African countries. This study contributed significantly to changes in policy directives, modifications in curriculum and teacher training programme. SACMEQ II report advanced a number of suggestions addressing the Mathematics problems Namibia is experiencing:

1. to teach Mathematics at Upper Primary phase in educational regions;
2. subject specialist from NIED and advisory teachers should arrange training workshops for Mathematics teachers in these regions to address the problem;
3. Mathematics teacher trainers in teacher training colleges and teacher in-service training course providers should emphasise the teaching of higher competencies.

The Okahandja town study precedes the national study. The national study is prompted by SACMEQ (2004:147&155) policy suggestions stating: Policy suggestion 42: There is a need for NIED to make further investigations to identify the competencies that might be lacking in the school reading and Mathematics curriculum, in teacher training curriculum and/or in the teachers’ teaching practices.

Policy suggestion 44: Subject specialists from NIED and advisory teachers should arrange training workshops for Mathematics teachers in these regions to address the problem. Mathematics teachers in teacher training colleges and teacher in-service courses providers should emphasise the teaching of higher competencies.

This study intends to go beyond the findings of the above studies by pointing out specific areas of the curriculum contents and competencies that learners experience difficulties in learning Mathematics. By doing so the study specifically suggests what: education authorities should audit, the EMIS should verify, areas of curriculum that require adjustment, teacher trainers and subject advisors should focus, specifically, on what and how teachers should teach to elevate the Mathematics performance. Due to the triangulation approach used in the study, the researchers are convinced that the multifactor findings will enable the examiners to construct relevant achievement test in the subject.
CHAPTER 2

AN OVERVIEW OF PERFORMANCE IN MATHEMATICS

2.1 Introduction

There is an outcry among the public about current status of our education system. The performance of learners in Mathematics and Science has raised a strong sense of concern both locally and internationally. The low performance is evident in other subject areas such as English. SACMEQ II (2004) ranked Namibia below other Southern and Eastern African countries in terms of Grade 6 teachers’ and learners’ competencies in Mathematics. The report further showed that, Namibian learners scored the least (430) in Mathematics comparing to other Southern and Eastern African countries while the teachers’ scores were 710 a bit higher than six Southern and Eastern African countries. These findings call for concerted efforts in addressing the challenges facing Mathematics teaching and learning.

The learners’ performance in Mathematics within the country is not impressive. The JSC results in Mathematics for 2004 and 2006 show that just a fraction of the learners scored between very well, that is ‘A’ to average that is ‘C’. In both years the scores were loaded between ‘D’ and ‘U’ (un-graded) and more on ‘U’ (un-graded) than the other scores.

2.2 Emphasis on Mathematics

Within the framework of Vision 2030, and the Second National Development Plan (NDP2), the Government of the Republic of Namibia (GRN), supported by Namibia’s Development Cooperating Partners (NDCPs) adopted a 15-year strategic plan, Education and Training Sector Improvement Program (ETSIP\(^1\)). The aim of ETSIP is to improve the education sector so that it contributes to the attainment of national development goals as pronounced in NDP3 and Vision 2030. Furthermore, ETSIP’s objective is to facilitate the nation’s vision of attaining the knowledge-based economy by 2030. Within this framework Mathematics and Science feature prominently as subjects that could contribute largely to socio-economical, scientific and technical fields.

2.3 Current problems in Mathematics performance

There are currently few studies, reports and documents in Namibia that cite the current problems in Mathematics performance. The Upper Primary Mathematics Facilitators’ Training Workshop, (NIED, 2006) listed twenty four factors attributing to low performance in Mathematics of which the following are important to mention:

1. Lack of the teacher’s subject-content knowledge;

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\(^1\) ETSIP is a comprehensive sector-wide programme that covers: (i) early childhood development and pre-primary education, (ii) general education, (iii) vocational education and training, (iv) tertiary education and training, (v) knowledge and innovation, and (vi) culture and lifelong learning. The programme has phased into three five-year cycles; the first cycle started 2006/07 to 2010/11.
2. Lack of pre- and in-service teacher training;
3. Lack of support from subject advisors;
4. Learners’ in-ability to read, understand and interpret the Mathematics concepts;
5. Lack of parental involvement in education;
6. Teachers not aware of the content and skills covered at the preceding grades;
7. Poor background foundation or knowledge on Mathematics among learners;
8. Misconception of the Mathematics as a subject.

Each of the issues cited in the report could serve as areas of investigation. However, it is apparent that the reports did not identify specific areas of the syllabus and competencies that are difficult or easy to teach from the point of view of the teachers and difficult or easy to learn from the point of view of the learners. Shiel and Kelly (1999) in a study carried in Britain, highlight reasons for poor Mathematics performance from the principals’ point of views:

1. Lack of learning support;
2. ‘Principal teachers’ dissatisfaction with the in-career training of teachers in Mathematics’;
3. ‘Perceived shortage of instructional resources for teaching Mathematics;
4. ‘Learners taught by teachers who have not participated in career professional development’;
5. Mathematics contents were not fully covered. Emphasis is placed on few areas that involve numbers.

Interesting findings from Shiel and Kelly (1999) study are that learners perform well on areas that deal with numbers and data analysis than on areas that deal with measurements, shapes and space. The findings of such a study shed light on the performance of learners in various areas of the Mathematics and further propose to the curriculum developers, teacher trainers and policy-makers on how to improve Mathematics teaching in order to affect the learners’ performance in the subject. These findings have common assumptions. These facts create an opportunity for conceptualising the actual situation in the Namibian context by looking at the following critical factors:

**Teachers’ opportunities for professional development**

A number of institutions offer professional development opportunities to teachers. These are Institute for Open Learning (IOL), University of Namibia (UNAM), University of South Africa (UNISA), colleges of education and many others. How many teachers utilise these possibilities? And how many specialised in Mathematics teaching? In fact, the extent and possibly the accessibility to continuous professional developments are not well known. One of the factors that affect the accessibility to these institutions is the costs involved and availability of bursary or grants.

The need for uplifting teachers’ competencies in teaching different subjects was raised in the SACMEQ report (1998:3) stating that, “Teacher-training levels are exceptionally low in many schools. The upgrading of teacher has been identified by the Ministry as a priority. The dilemma the Ministry is faced with is that teachers expect improved remuneration if they undergo extensive training, resulting in salary expenditures that the government cannot afford without implementing major cost-recovery and austerity measures”. However, this complication does not deter the emphasis the government places on continuous professional development. The uplifting of teachers’ qualifications continues to be a major objective to ensure the positive growth and attainment of high education standard, thus, raising the quality of the education system.

**Availability of teaching material and other resources**

The government is the provider of teaching resources. Bearing the number of schools and learners in Namibia and the financial constraints at hand, it is logical to state that not all needs of resources in schools are met. Schools are encouraged to use School Development Fund (SDF) to support the government in provision of teaching materials to all learners in schools. Schools with little means of
raising development funds due to socio-economic status of the communities where they are located are supported by Education Development Fund (EDF) (Education Act, 2001). This does not guarantee the availability of sufficient teaching materials in schools. Many, if not all, schools especially in peripheral areas, are crying foul of shortage of teaching materials. The shortage of teaching resources is more in subjects such as Mathematics and Sciences that require the use of sophisticated equipments.

Shiel and Kelly (1999) report close to 100% of learners having adequate learning materials about 87% resources and materials for teaching are shared among teachers. It makes sense to conclude that the availability of teaching resources has an impact on Mathematics performance. Would this be the case in developing countries including Namibia?

**Understanding the curriculum content**

Curriculum is dynamic. It changes with time. Any changes in the curriculum imply changes in subject policy directives, teacher training, teaching approaches, assessment, teaching materials and research. Not much is known in the Namibian context on curriculum dynamism. One can conceptualise the situation as follows:

1. Trends of progress globally in various curriculum areas, specifically in Mathematics, exert global changes in the curriculum contents that affect competencies enshrined in the national curriculum and subject syllabuses. These changes are inevitable for synchronising global developments and allow the smooth exchange of technology. The sharing of new knowledge through training involves a number of agencies such as policy-makers, curriculum development agencies, examiners, teacher trainers, teachers, parents and learners.
2. Policies are made through various mechanisms. Policy formulation observes new trends and progress. This is also applicable in Mathematics teaching and policy formulation - requesting changes to take effect in the curriculum content and learning outcomes.
3. The curriculum developers adapt changes in the curriculum and advise institutions responsible for professional development to design training programmes responsive to the new changes and reflect on the teaching and learning of the new competencies.
4. Teachers receive the training in content areas and how to impart the required competencies to learners.
5. Learners become the recipients of the curriculum reforms and thus improve performance in the subject.
Below is a model conceptualising this process.

![Diagram](image)

**Figure 1:** Dynamics in curriculum changes and adaptations: exploring influences

**Learners’ perceptions towards Mathematics**

Learners’ perceptions towards learning are influenced by many factors. Studies on Mathematics performance show among many other factors, that low performance influenced misconception of the subject as difficult, perception of the subject as designed for certain group of people based on gender or intelligence because of the line of professions it leads into, home background, undesirable teaching approaches and availability of teaching materials and child-centred problems.
CHAPTER 3

RESEARCH DESIGN

3.1 Introduction

A pilot study was conducted in four schools in Okahandja town. The pilot study was done for the purpose of testing and refining the instruments before carrying out the national study. However, the pilot exercise that involved data collection, analysis and interpretation was extensive and intensive enough to produce a status quo Mathematics performance report on Okahandja schools.

Apart from examining the performance of learners on Mathematics, the study evaluated the Mathematics syllabus implementation at Upper Primary phase in 2007. The pilot study was conducted in schools with Upper Primary phase which includes Grades 5, 6, and 7. The Grade 8 learners in junior secondary schools were included in the study because they were in Grade 7 in 2007.

3.2 Population and sampling

The aim of the Okahandja study was to find out the performance of learners on Mathematics at Upper Primary phase and evaluate the Mathematics syllabus implementation at this level. The findings of this study will advance policy proposals in curriculum development and teacher training programme so as to affect the Mathematics teaching and outcomes in the district.

The selection of schools

As mentioned before, the Okahandja study targeted learners who were in Grade 5, 6, and 7 in 2007. These learners were in Grade 6, 7, and 8 in 2008. It was therefore necessary to consider the combined schools and omit the primary schools that did not have Grade 7 learners of 2007.

Target population

Learners

Learners in each of the three grades in the Upper Primary phase were included in the study. A systematic random sampling method was used to select forty learners (N=40) in each grade level to participate in the study. First, the class lists were collected. Learners were chosen from the class list using random numbering tables. This implies that the expected total sample of learners in all schools was (N=480). However, due to some selected learners being absent on the day of testing, the achieved sample was (N=427) of which 156 were in Grade 6 for (Grade 5), 155 Grade 7 for (Grade 6) and 116 Grade 8 for (Grade 7).

Teachers

The sample of teachers teaching Mathematics varied from school to school. This was the case where a school had more than one stream in a grade. The researchers drew all Mathematics teachers at the Upper
Primary level per school. The sample for Mathematics teachers was (N=7). Due to some questionnaires not being returned in time before processing the data, only four (N=4) teachers were finally included in the study.

3.3 Data collection and administration

To be able to determine the actual performance of learners in the Upper Primary phase in Mathematics, the promotion schedules from the sampled schools were collected. The data from the schedules demonstrated the extent to which learners in these grades performed in Mathematics in 2007. Furthermore, the continuous assessment mark for Mathematics were collected in each school in order to analyse the performance of learners in Grade 7 the external examination and later analyse the learners’ performance in Paper 1 and Paper 2. This was inevitable for distinguishing the differences between the continuous assessment outcomes versus the actual performance in the Grade 7 external examination.

The researchers administered the achievement tests in Grades 6, 7 and 8 in 2008 in each school. As previously mentioned, these learners were in Grade 5, 6 and 7 in 2007. The aim of the test was to determine the level of performance of the learners in these Grades and compared them with other study findings specifically SACMEQ. The test also aimed at identifying competencies that were difficult to attain and shed light to curriculum developers, examiners and teacher trainers on how to affect the outcomes.

Teachers were given a questionnaire in order to collect their views on the Mathematics curriculum implementation and possibly identify areas within the Mathematics syllabus that learners encounter difficulties in learning. Likewise, learners’ questionnaire intended to find out areas and competencies within the Mathematics syllabus that learners experience difficulties. Group interviews were conducted with Mathematics teachers and learners in each school in order to compliment the quantitative data collected from the survey questionnaires.

3.4 Equilibrium approach on methods and data analysis

Data collected from the promotion schedules were statistically computed using SPSS data processing programme. Furthermore, the results of Grade 7 external examinations were extracted from the continuous assessment marks and computed in order to find out differences in the performance of learners in Paper 1 and 2. The t-test was computed for Paper 1 and 2 to find out whether Paper 1 and 2 results were significantly different. The correlation coefficient (r) was computed to assess the correlation of learners’ performance in Paper 1 and 2 in the Grade 7 external examination outcomes.

Data from the achievement test for Grades 6, 7 and 8 in 2008 that were in Grades 5, 6 and 7 in 2007 were analysed to find out areas within the Mathematics syllabus where learners experience difficulties. The wrong answers were separated from the correct answers and t-test was computed to determine differences between the wrong and the correct answers.

Further computation of mean, standard deviation and standard error of the mean of the results from the learner’s and teacher’s questionnaires were in-cooperated to determine the extent to which the sampled estimates that is mean or percentage of a population, differ from the actual scores of the population. The results were then compared to determine the differences between learners who performed well to those who performed poorly.

Qualitative data was first synthesised since learners were asked the same questions across the phase. The data derived from the synthesis analysis was later content analysed in order to categorise the information derived from learner’s interview guide. The aim of content analysis was to categorise the information into
themes. Direct quotes from group interview with learners regarding their feelings towards Mathematics and teachers’ views on the learners’ performance in Mathematics were presented in order to complement the results of Mathematics performance derived from promotion schedules, performance in Paper 1 and 2 in the Grade 7 external examinations and more explicit the achievement test outcomes.

Data from the teachers’ and learners’ questionnaires were quantified. Frequencies, percentages and mean of teachers’ and learners’ responses on on mathematics syllabus contents and competencies are presented in tables and figures in the presentation of the findings from chapter four.

The interactive approach of methods, data analysis and interpretation is presented in figure 2.

Figure 2: Equilibrium model of methods and data analysis on Mathematics performance

3.5 Description of the instruments

Mathematics Achievement Test

In absence of a localised achievement test, the researchers developed the achievement tests in order to measure the attainment of curriculum content and detect competencies that were difficult to attain. Nevertheless, the BES III achievement test device, specifically the format, was communicated and used in developing localised achievement test that was used in testing learners’ performance in this study.

Setting up of the Mathematics achievement tests

Mathematics achievement tests were compiled in order to test how the learners had achieved the basic competencies of the Grade 5, 6, and 7 in 2007. Three tests were developed to test the basic competencies acquired in the Grades 5, 6 and 7 in 2007. The achievement tests were compiled by using the current Upper Primary Mathematics syllabus. Each Paper within the grade consisted of 30 multiple choice items.
In order to test the ability of the learners in computing and selecting the correct answers, the Mathematical misconceptions and common errors were used as distracters in compiling the questions. These distracters were taken from the Mathematical terminologies like carrying over when adding, borrowing as well as the arranging numbers or fraction in order. The learners were also requested to read and write numbers in words and vice versa.

In order to come up with the specific number of questions which represent the theme, the basic competencies in each theme were counted and numbered. The total of basic competencies in each theme was later added in order to get the total number of basic competencies in each grade. The total number of basic competencies per theme (Total teaching Competencies) was then divided by the number of competencies in a grade (Total Grade Competencies) and multiplied by 30 which was the required number of questions in the achievement test. The following formula was used to calculate the number of questions in a topic.

\[
PNQ = \frac{TTC}{TGC} \times 30
\]

TTC = Total Teaching Competencies per theme  
TGC = Total Grade Competencies  
PNQ = The proportion number of questions per theme

The items were developed after the calculation of the item representations. The items focused more on the knowledge with understanding as well as the application of Mathematical knowledge and skills. Figures 6, 7 and 8 provide the detailed information on the representations of the competencies within the topics in the achievement tests for Grade 5, 6 and 7. The proportions of questions in each grade were later converted into percentages.

Figure 3: Item representations in Grade 5 Mathematics achievement test
Figure 3 illustrates items representations in the achievement test for Grade 5. Most of the questions (30%) came from the Whole Numbers followed by Geometry (19%) and Mensuration (13%). The number of competencies within the topics had an influence on the number of questions. The differences on the percentage representation of the items of the remaining topics in the achievement test were not significant.

![Pie chart of Grade 5 Mathematics achievement test](image)

**Figure 4: Item representations in Grade 6 Mathematics achievement test**

The picture portrayed in figure 4 is interesting. Although more questions come from the Whole Numbers (25%), there were minor variations between Measurement: Time (16%) and Geometry (14%). Furthermore, there was a balance on the representation between Measurement: Length, Mass and Capacity (10%) and Decimal Fractions (10%).
In Grade 7, as shown in figure 5, the Whole Numbers represents 34% of the achievement test questions followed by Geometry (20%) and Mensuration (13%). Decimal Fractions (10%), Common Fractions (7%) and Percentages (7%) constituted a much bigger proportion of questions comparing to the remaining topics. The bigger representation of Whole Numbers in the achievement test Papers in all grades was not surprising because it has more basic competencies compared to other topics.

**Interview Guide/Group interview**

This instrument aimed at exploring learners’ and teachers’ perceptions towards Mathematics. The researchers understood that the perception of Mathematics differs among learners. The instrument therefore captured qualitative information about the learners’ attitudes towards Mathematics as well as the type of difficulties they are experienced in learning Mathematics concepts and skills. Due to the large number of learners in the schools, group interview was conducted in all the sampled schools and grades.

**Questionnaire for teachers**

The aim of this instrument was to collect information from teachers about the difficulties they are encountered in teaching Mathematics. In addition, the instrument was intended to identify the type of professional input that the teachers would require to enable them to teach Mathematics more effectively.

**Questionnaire for learners**

The learners’ questionnaire was based on the basic competencies in the Grade 5, 6 and 7 syllabuses. All basic competencies in each grade were turned into questions. Learners were asked to opt by ticking ‘YES’ or ‘NO’ on what they were capable of doing or not.
CHAPTER 4

PRESENTATION OF THE RESEARCH FINDINGS

4.1 Organization of the research findings

The findings of this study are presented in seven sections. Each section forms a chapter. Each chapter contains an in-depth analysis and interpretation of the findings, the basic assumption that presumes the existence of the problem, summary of the findings namely ‘research evidence’ and propositions for stakeholders are presented in bolded text boxes. The chapters are outlined as follows:

1. Chapter 4 is a presentation of each school’s Mathematics performance; the aim of this presentation is to find out which grade level within the school demonstrated higher performance; the analysis of the Mathematics performance by school in order to find out which school produced better results in the same year; and the third is the analysis of the Grade 7 external examinations’ results for the same schools in 2007. The aim of this presentation is to substantiate the results from the schools and compare the schools’ Grade 7 performance by looking at Mathematics external examinations results;
2. Chapter 5 is the analysis of the identified areas of difficulties from the point of view of the learners in Grade 5, 6 and 7 syllabuses;
3. Chapter 6 is the analysis of the learners’ achievement test results for Grade 6, 7 and 8 who were in Grade 5, 6 and 7 in 2007; and the comparison of learners’ performance according to the SACMEQ levels of competencies.
4. Chapter 7 is the teachers’ and learners responses on curriculum and teaching.
5. Chapter 8 the summary of the findings and concluding remarks.

4.2 Learners’ performance in Mathematics at Aurora Primary School

Figure 6 below presents the findings in Aurora Primary School. It was clear that performance of learners in Mathematics in all grades was low at ‘A’ and ‘B’ symbols on which only 1% of the Grade 5 learners in the final mark obtained ‘A’ symbol. Slight progress is evident where 14% of learners in Grade 6; 5% in Grade 5 and 1% in Grade 7 obtained ‘B’ symbols. This indicated that many learners in Grade 7 had difficulties in attaining basic Mathematics competencies. Thus, the higher the grade the difficult the contents and so were the expected competencies.
This fact was further validated by low percentage of Grade 7 learners who got ‘C’ symbol (14%) and high percentage (53%) of learners who got ‘D’ symbol. In all the grades, learners scored ‘C’ symbols interpreted as average and ‘D’ symbols which is satisfactory. Following the trends of performance specifically in Grades 7 and 6, one could not expect the Grade 7 external examination results to be different.

4.3 Learners’ performance in Mathematics at Nau-Aib Primary School

Taking into account the number of learners in this school, the performance of learners in Mathematics was less impressive with higher scores lying at ‘D’ symbol that was, 43% in Grade 5, 44% in Grade 6 and 54% in Grade 7 and ‘E’ symbol that was, 23% in Grade 5, 14% in Grade 6 and 43% in Grade 7.
Grade 6 scores, though not evenly distributed, were spread in all symbols assuming that at least most of the learners were able to acquire basic competencies at this level. Substantively, 14% out of the 161 got ‘E’ symbol. This authenticates the fact that the performance was satisfactory compared to other Grades. Grade 7 results were low with only 4% of the learners obtained ‘C’ symbol and none of the 134 learners scored ‘A’ and ‘B’ symbols. There were clear indications that the performance had declined in this Grade level comparing to other grades. It was logical to envisage low performance in the external examinations where standard examinations are administered and marking system is standardised.

4.4 Learners’ performance in Mathematics at Okahandja Primary Schools

Figure 8 presents performance of learners in Okahandja Primary School. The results in all grades were concentrated at ‘C’ and ‘D’ symbols. A small number of learners in all grades scored ‘B’ symbol with Grade 6 (9%) out performing Grade 5 (7%) and Grade 7 the lowest (2%).

![Figure 8: Learners’ performance in Mathematics at Okahandja Primary School in 2007](image)

Grade 5 performance was striking comparing to Grade 6 and 7 especially if we consider the total percentage of ‘C’ and ‘D’ symbols (83%) with only 11% at ‘E’ symbol. The results further indicate a slight decline in performance in Grade 6 and 7. It might be logical to hypothesise the cause to this trend as due to spiral mode of curriculum because the contents and competencies become more complex in Grades 6 and 7.

4.5 Learners’ performance in Mathematics at Eden Primary School

Figure 9 presents the performance of learners in Mathematics in Eden primary school. The results indicate a relatively impressive performance at Grade 5 where 4% of the learners obtained ‘A’ symbol, 28% obtained ‘B’ symbol and 21% scored ‘C’ symbol.
The results for Grade 6 and 7 were highly concentrated in ‘D’ symbol (43% for Grade 6 and 52% for Grade 7) and ‘E’ (31% for Grade 6 and 28% for Grade 7) were not surprising because the declining of performance seems to be consistence specifically when learners progress to the higher grade.

4.6 The Performance in Mathematics in Grade 5 by school

In order to compare the performance of the four selected schools in Grade 5 in Okahandja, the results from the 4 selected schools were plotted together. It was evident that Okahandja Primary School produced significant performance specifically by looking at the results at ‘B’, ‘C’ and ‘D’ symbols making a total of 90% with only 11% at ‘E’ symbol compared to other schools.
More impressing still was that, out of 72 learners in Okahandja Primary School, 50% obtained ‘C’ symbol and 33% obtained ‘D’ symbol. This was an outstanding achievement without judging the standard of the examination and modes of assessment. It was interesting to note the distribution of scores at Eden Primary School. 4% of the learners at Eden Primary School obtained ‘A’ symbol, 28% obtained ‘B’, 21% ‘C’ and 25% ‘D’ symbols. The attainment of ‘A’ and ‘B’ symbols at this school outperformed the other schools.

Aurora and Nau-Aib scored high in ‘C’ and ‘D’ symbols. 23% of learners in each of the two schools got ‘E’ symbol signifying a considerable number of failure compared to Okahandja and Eden. In general, the scores in all the four schools were concentrated at ‘C’ and ‘D’ symbols but more at ‘D’ symbol than ‘C’. 78% of the learners at Eden obtained ‘A’, ‘B’, ‘C’, and ‘D’ symbols implied that more than half of the learners passed Mathematics that year.

The general impression of the public in making judgments on the school or learners’ performances is determined by the number of ‘As’ or ‘Bs’ symbols before resorting to ‘Cs’. Scores that were concentrated at ‘C’ and more ‘D’ symbols implied a satisfactory performance. This outcome may hoist great concerns to stakeholders assuming, as it had been the case, the blame to be falling on the teaching rather than other factors that are micro, meso or macro in nature.

4.7 Performance in Mathematics in Grade 6 by school

Grade 6 is a midpoint of the upper primary phase. Improvement or decline in performance at this level could predict the type of output one could anticipate at the exit point of the primary phase. Figure 11 below presents the Grade 6 results in the four schools.

![Figure 11: The performance in Mathematics in Grade 6 in four primary schools in Okahandja – 2007](image)

Aurora Primary School demonstrated remarkable results for the year 2007 comparing to other schools. This was apparent due to ‘B’ (14%), ‘C’ (39%) and ‘D’ (35%) symbols that learners in this school had obtained. Furthermore, only 12% got ‘E’ symbol indicated that they had low percentage of failures on that year.
The performance of Okahandja Primary School was equally impressing with 9% of the learners obtained ‘B’ symbol, 35% ‘C’, and 42% ‘D’ symbols. A small number of learners (14%) obtained ‘E’ symbol. At Nau Aib Primary School, 4% of the learners obtained ‘A’ symbol. The performance of learners at this school concentrated highly on ‘D’ symbol with 44%. Of the four schools, Eden Primary School produced unimpressive results because 31% out of the 71 learners obtained ‘E’ symbol compared to the low performance, in percentages, in the other three schools.

The results in figure 12 validate the proposition and so the evidences from the single school’s analysis that most of the scores were accumulated at ‘C’ and ‘D’ symbols. Thus, on the one hand, we could conclude from these results that the low performance was not as high as it was anticipated. On the other hand, the higher performance was lower compared to the average performance. This was alarming because there were indications of declining of performance as the learners’ progresses to higher grades.

4.8 The performance in Mathematics in Grade 7 by school

Grade 7 is an exit point to junior secondary education. Learners sit for the grade 7 external examinations at this level. In practice, the grade 7 external examination was not a benchmark for entry to junior secondary school but could gave an indication of the learners’ abilities to excel well in different subject areas at junior and senior secondary levels.

The results in figure 12 show a considerable accumulation of scores at ‘D’ symbol (50% and above) and ‘E’ (20-43%) in all schools comparing to ‘A’, ‘B’ and ‘C’ symbols). The scores at ‘A’ and ‘B’ were lower compared to ‘C’ and more significantly at ‘D’ and ‘E’. The results infer a significant decline in performance at Grade 7 comparing to the other grades. It was logical cogitating that, this trend of progress was attributed to various factors such as the complexity in the Mathematics contents and competencies at this level, less of interest in the subject from the learners as the contents become more difficult, teaching, learning culture and learning style, poor methods of teaching, changing of teachers, teacher subject qualification, and lack of support at home among many. This situation calls for imperative intervention at all implementation levels in order to alleviate the problems leading to low performance and thus improve the performance in Mathematics at this level.
Basic Assumption: Learners in upper primary phase in Namibian schools perform poorly in Mathematics examination
Research Evidence: Learners’ performances in all phases are low specifically in Grade 7. The score are more accumulated in symbol ‘C’ and more higher in symbol ‘D’
Policy Propositions: School management and inspectors to impose effective teaching by monitoring and evaluating teaching and learning

4.9 Analysis of the Grade 7 external examination results

The results of the final Grade 7 examinations are relevant for comparing the schools’ performance because of the set or rather common standard of the examinations, the marking scheme and the strict conditions set and controlled by the Directorate of National Examination and Assessment (DNEA).

Figure 13: External Grade 7 examination results in the four primary schools - 2007

Figure 13 illustrates the examination results in the four primary schools. It is surprising to note that the learners’ scores denote an asymmetrical curve, negatively skewed. More shockingly, the results are considerably different from that of figure 13 in the previous section. Although the symbols obtained by learners in all schools in figure 13 are accumulated between ‘C’ and ‘E’ but more on ‘D’ and less between ‘A’ and ‘C’ symbols, the score in figure 14 shows the contrary. The symbols were accumulated on ‘D’ and ‘E’ and more on ‘E’ symbol. This surmises significantly low performance when a standard examination was administered. It also showed the extent to which the continuous assessment marks shade the actual learners’ performances.

These results question the validity and reliability of the mode of assessment and the teachers’ assessment skills. One would expect minor variation between the continuous assessment marks that combines the external examination marks and the actual external examination marks if teachers were equipped with required assessment skills and conduct assessment according to the set requirements.

Furthermore, it might be relevant to question the learners’ literacy and numeric competencies specifically, on one hand, the extents on which learners were able to read the mathematical instructions without the ‘usual’ assistances from the teachers, and tackle the mathematical problems. On the other hand, the
teachers’ abilities to teach all topics and competencies were questionable, leave alone their literacy and numeracy proficiency.

### Table 1: Mean of Paper 1 and 2 in Grade 7 external examination in 2007

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper 1</td>
<td>351</td>
<td>12.4</td>
<td>5.9</td>
<td>.32</td>
</tr>
<tr>
<td>Paper 2</td>
<td>351</td>
<td>11.5</td>
<td>8.8</td>
<td>.47</td>
</tr>
</tbody>
</table>

Table 1 presents the mean, standard deviation and standard error of the mean for Paper 1 and 2 in the external examination. Following the distributions of scores between Paper 1 and 2, learners performed better in Paper 1 compared to Paper 2 in 2007 Grade 7 Mathematics external examinations. In other words, Paper 2 results deviated more significantly from the mean comparing to Paper 1. Furthermore, there was significant difference between the scores of Paper 1 and 2. It was therefore not surprising, that the results of the two papers highly correlate ($r = .79; p = .000$). The high correlation between Paper 1 and 2 outcomes creates doubts about the contents of the two papers, thus calling for more tests to validate the differences.

### Table 2: Paired samples t-test of Paper 1 and 2 in Grade 7 in 2007

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std Error Mean</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper 1 &amp; Paper 2</td>
<td>.98</td>
<td>5.4</td>
<td>.29</td>
<td>3.4</td>
<td>350</td>
<td>.001</td>
</tr>
</tbody>
</table>

In order to validate the mean differences, the t-test analysis was conducted to compare the mean of the two Papers. This comparison was done by looking at the $p$ value. The $p$ value indicates whether the mean values of Paper 1 and 2 were significantly different. The results in table 2 show significant differences on the performance of learners’ in Paper 1 and 2 ($t = 3.4; df = 350; p = .001$) at $p \leq 0.01$ critical value where learners performed better in Paper 1 compared to Paper 2. These differences raise serious concerns on what teachers emphasise during lessons, the mode of assessment, the contents of trimester Mathematics examination Papers and perhaps more significantly the coverage of competencies within the Mathematics syllabus.

2. Basic Assumption: The learners’ continuous assessment mark in Mathematics in Grade 7 will differ from the external Grade 7 examination mark.

   Research Evidence: Learners’ performance in Mathematics in the Grade 7 external examinations is low comparing to the continuous examination mark where the external examinations are included. The external examinations depict the learners’ actual performance while the continuous assessment covers the actual performance. Evident poor performance was noticed in Paper 2.

   Policy Propositions: Improve the assessment technique in teacher training programme. School managers and inspectors to monitor the assessment process and output. Standardise the examination of papers to improve the performance. Monitor the Paper 2 contents in all schools since learners perform poor in this Paper.

4.10 The analysis of the trimester examination paper from selected schools

At the end of Upper Primary phase, the learners are required to write the Mathematics national examination. This examination was set nationally for all the Namibian schools. In this examination, Paper 1 and 2 are set in the ratio of 2:3 and written separately. Paper 1 consisting of short questions was aimed at covering the following assessment objectives in the Namibian Mathematics syllabus:
Table 3: Upper Primary Mathematics assessment objectives

<table>
<thead>
<tr>
<th>No.</th>
<th>Assessment objectives</th>
<th>Paper 1</th>
<th>Paper 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Recall facts, terms notations, conventions and results</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Use mathematical and other instruments to measure and draw to an acceptable degree of accuracy</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>3.</td>
<td>Perform calculations by suitable methods</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>4.</td>
<td>Understand system of measurement in everyday use and make use of them in the solution of problems</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>5.</td>
<td>Use estimation and approximation when appropriate</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>6.</td>
<td>Apply and interpret mathematical knowledge in the context of everyday situations</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>7.</td>
<td>Recognise patterns and structures in a variety of situations, and form generalisations</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>8.</td>
<td>Analyse a problem, select a suitable strategy and apply an appropriate technique to obtain its solutions</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>9.</td>
<td>Recognise and use spatial relationships in two and three dimensions</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>10.</td>
<td>Set out mathematical work, including the solution of the problems, in a logical and clear form using appropriate symbols and terminology</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>11.</td>
<td>Organise, interpret and present information accurately in written, tabular, graphical and diagrammatic forms</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

The table above has a mapping of the Upper Primary Mathematics assessment objectives as well as their representations in Papers 1 and 2. According to the Namibian Upper Primary syllabus; “Paper 1 ensured the syllabus coverage and it is allowed the testing of knowledge, understanding and manipulative skills”. Paper 2 is more structured than Paper 1 and it is aiming at asking questions with greater emphasis on application to the process of problem solving in context.

The school based examination
The schools set their own examinations based on the specific grades. All four schools that participated in the study submitted the August end of term test in which the learners wrote in 2007. In summary, the tests which were given to the Grade 5, 6 were school based while the Grade 7 in all the schools wrote a common cluster based examination. There is not much difference between the Grade 7 end of term test and the school based end of term tests for Grade 5 and 6. Most of the papers were in a booklet format and learners were not encouraged to show their work before they write the answer to the specific questions especially in Paper 1.

For example: 400 + 73 – 73 = __________________ (1 mark)

The mode of questioning in Paper 2 encourages learners to write the answers only without showing the calculations. This could have contributed to the failure because the learners were not encouraged to tackle the problem step by step to be able to conceptualise the mathematical steps leading to correct answer. It was also noted that there was a close relations between questions in Paper 1 and 2. There was thus an obvious repetition of some contents in the two Papers. It was clearly evident that the assessment objectives enshrined in the subject syllabus were not considered during the setting of the school based end of term tests. The same might have occurred in the setting of the major tests, projects and investigations which the learners have to complete for continuous assessment purposes.

Basic Assumption: The August examinations are not in line with the assessment objectives that are enshrined in the Upper Primary Mathematics syllabus.

Research Evidence: There was no much difference between the questions set for Papers 1 and 2 in the school based examinations. Learners were not encouraged to show their work when completing the booklet.

Policy Preposition: The regional advisory teachers for Mathematics as well as the Mathematics education officers at NIED should see to it that the Mathematics teachers receive proper training on how to use the assessment information in the syllabus to set up the assessment activities at school, cluster and at the national level. Inspectors and the school management should ensure that examination Papers are moderated and assessment is done according to the set guidelines.
CHAPTER 5
THEMES AND COMPETENCIES THAT LEARNERS FACE DIFFICULTIES IN LEARNING

5.1 Themes and competencies learners face difficulties in learning in Grade 5 syllabuses

The content of the Mathematics syllabus for Upper Primary is spirally distributed across the grades. This means the themes run across all three grades with additional competencies to the contents as learners proceed from one grade to the next. It is therefore logical to concur that the contents and competencies becomes complex as learners proceed to the higher grade. The crux of the matter is that learners are expected to use their previous knowledge to learn and understand the new knowledge.

The learner’s questionnaire intended to collect information on themes and specific competencies within the syllabus that learners experience difficulties. It made sense assuming that there were common themes and competencies within the syllabus that learners experience difficulties. In order to interpret the outcome more precisely the observation of percentages of 1, denoting ‘Yes’ and 2 denoting ‘No’ were taken as benchmarks for identifying specific difficult competencies within the syllabus.

Table 4: Identified difficult competencies in Grade 5 syllabus.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Val case</th>
<th>N</th>
<th>Missing</th>
<th>%</th>
<th>Mean</th>
<th>Std. Err of mean</th>
<th>Std. dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHNUM5: Round off numbers to the nearest power of 10</td>
<td>Yes</td>
<td>156</td>
<td>1</td>
<td>4</td>
<td>37</td>
<td>1.8</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHNUM10: Identify and use the different terminology with regard to the four operation signs</td>
<td>Yes</td>
<td>156</td>
<td>2</td>
<td>8</td>
<td>39</td>
<td>2.0</td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFRAC2: Ordering decimal number using the relationship signs (&gt;;&lt;;=)</td>
<td>Yes</td>
<td>156</td>
<td>0</td>
<td>0</td>
<td>37</td>
<td>1.8</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MESLMC1: Knowing the SI symbol for length, mass and capacity</td>
<td>Yes</td>
<td>156</td>
<td>1</td>
<td>1</td>
<td>39</td>
<td>1.7</td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MESLMC3: Apply the four basic operations to lengths, masses and capacities</td>
<td>Yes</td>
<td>156</td>
<td>1</td>
<td>4</td>
<td>47</td>
<td>1.7</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEO: Distinguish between different kinds of triangles and quadrilaterals</td>
<td>Yes</td>
<td>156</td>
<td>1</td>
<td>1</td>
<td>46</td>
<td>1.6</td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents five areas within the syllabus on which learners face difficulties in Grade 5:

Whole Numbers: competency 5
Round off skills were concisely introduced at the beginning of Upper Primary phase in order to enable learners to configure and comprehend the number concepts. Learners were asked the following competency based question: ‘Do you know how to round off numbers to the nearest power of 10?’ 60% of the learners responded ‘No’ compared to 37% who affirmed. This indicated that many learners faced difficulties to round off.

Whole Numbers: competency 10
Mathematical terminologies were essential for understanding the mathematical skills and concepts; The lack of language to understand the terminologies would obviously have an impact on Mathematics performance. Learners were asked the following question: ‘Can you identify and use the different terminology with regard to the four operation signs?’ 55% of the learners responded ‘No’ and 39% of the learners affirmed. These results implied that the use of terminology regarding the operational signs was difficult. Furthermore, understanding mathematical terminologies require extensive literacy skills since it
was a language based competency. Not being competent on language skills casts doubts regarding the emphasis on language across the curriculum as enshrined in the National Curriculum for Basic Education and equally echoed in the Mathematics syllabuses.

**Common Fractions: competency 2**
During the interviews, many learners indicated that they faced problems in fractions. It was not therefore surprising that learners’ responses on the questionnaire corresponded to this notion. Learners were asked the following competency based question: ‘Do you know how to order Decimal Fractions using the relationship signs (>; <; =)?’ The majority (61%) of learners indicated they could not order Decimal Fractions using relationship signs (>;<;=) while only 37% of the learners indicated that they were competent in carrying out the task. This inferred that Common Fractions were a problem to many learners in Grade 5.

**Measurement: Length, Mass and Capacity: competency 1**
Mathematical abbreviations caused problems to the learners. This was confirmed during the administration of the achievement test when many learners asked the meaning of SI. Under this competency, learners were asked if they know the SI symbol for length, mass and capacity. The majority (60%) of the learners did not know the SI symbol for Length, Mass and Capacity compared to those who indicated that they knew the SI symbol of length, mass and capacity (37%). This result has two implications. First, there was either no emphasis on comprehending mathematical abbreviations or learners did not take learning of symbols seriously to infer to the holistic understanding of mathematical concepts.

**Measurement: Length, Mass and Capacity: competency 3**
The four basic operations are taught at the beginning of school. Learners were expected to be able to use these operations in different situations as they proceed through grades. It was surprising to find that learners faced problems in manipulating the four operations. This was evident especially in responding to the following competency based question: ‘Can you apply the four basic operations to Lengths, Mass and Capacity?’ Out of 156 learners, 49% indicated that they could not apply the four basic operations to Length, Mass and Capacity and 47% indicate they could pursue the operations.

**Geometry**
According to the learners’ responses to the competency based question: ‘Can you distinguish between different kinds of triangles and quadrilaterals?’ 53% indicated they could not distinguish between different kinds of triangles and quadrilaterals and 46% indicated they could. This implies that learners face difficulties in Geometry and competencies attached to this topic.

**5.2 Themes and competencies that learners’ face difficulties in learning in the Grade 6 syllabus**

Table 5 illustrates the difficult topics in Grade 6 as identified by the learners from the questionnaire. In order to interpret the outcome more precisely the observation of percentages of 1, denoting ‘Yes’ and 2, denoting ‘No’, are taken as benchmarks for categorising specific difficult topics and competencies within the syllabus. Learners indicated two topics and competencies within the Grade 6 syllabus that they find difficulties in learning. These topics are discussed below.
Table 5: Difficult competencies in Grade 6 syllabus

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Valid cases</th>
<th>N</th>
<th>Missing</th>
<th>%</th>
<th>Mean</th>
<th>Std. Error of mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFRAC4:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowing how to express and order SI units in decimals</td>
<td>Yes</td>
<td>157</td>
<td>7</td>
<td>23.6</td>
<td>2.08</td>
<td>.13</td>
<td>1.57</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td>70.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MESLMC2:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimating measurers to an acceptable accuracy</td>
<td>Yes</td>
<td>157</td>
<td>11</td>
<td>40.8</td>
<td>2.08</td>
<td>.15</td>
<td>1.98</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td>51.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decimal Fractions: Competency 4

The concept of Decimal Fractions starts at the beginning of Upper Primary phase. Slight additions to the Grade 5 basic competencies pertaining to conversions, multiplications and division and the multiples of ten were effected in Grade 6. Decimal Fractions was a pre-requisite topic for Measurement and Money and Finance because it is used concurrently in the application and computation of the above mentioned topics. Learners were expected to know Decimal Fractions to be able to understand Money and Finance.

In order to test the competency in these skills, learners were asked the following competency based question: Do you know how to express and order SI units in decimals? Although the learners started learning Decimal Fractions in Grade 5, most of them faced difficulties to applying Decimal Fractions in Measurement: Length, Mass and Capacity. This was evident when many Grade 6 learners (70.7%) indicated that they could not express and order SI units in Decimals. The rest (23.6%) indicated that they could express and order SI units in Decimals. This inferred a lack of proficiency on this competency.

Measurement: Length, Mass and Capacity: competency 2

Estimation skills are essential for solving basic problems in the absence of the equipment used to measure Length, Mass and Capacity. The learners were required to look at the distance and estimate its Length without taking the measurements. In testing this competency, learners were asked the following question: "Can you estimate measurers to an acceptable accuracy?" On this competency, 51% of the learners indicated that they could not estimate measures to an acceptable accuracy, compared to 40.8% who affirmed. This augured well with what they had indicated on Decimal Fractions above because all of these items involved SI units. It was therefore correct assuming that many learners found it difficult to understand SI units.

5.3 Themes and competencies that learners face difficulties in learning in the Grade 7 syllabus

Table 6 illustrates the difficult topics in Grade 7. The complexity of the competencies, the introduction of the new topics and most likely the loss of interest on the subject could have been caused of many learners finding Mathematics difficult, challenging and or not interesting. This was apparent due to the increasing number of competencies within the topics that learners faced difficulties in learning in Grade 7 compared to Grade 5 and 6.
Table 6: Difficult competencies in Grade 7 syllabus

<table>
<thead>
<tr>
<th>Variable name</th>
<th>V/ cases</th>
<th>N</th>
<th>Missing</th>
<th>%</th>
<th>Mean</th>
<th>Std.Err of mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHAND2: Calculate and interpret the mean of a small set of discrete data and make deductions</td>
<td>Yes</td>
<td>116</td>
<td>5</td>
<td>37.1</td>
<td>1.93</td>
<td>.147</td>
<td>1.58</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHNUM5: Rounding off a sum to its nearest million</td>
<td>Yes</td>
<td>116</td>
<td>5</td>
<td>42.2</td>
<td>.148</td>
<td>.148</td>
<td>1.59</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFRAC2: Determining what fraction a quantity is of another quantity</td>
<td>Yes</td>
<td>116</td>
<td>3</td>
<td>35.3</td>
<td>1.83</td>
<td>.12</td>
<td>1.27</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFRAC3: Solving three-step word problems involving common fraction</td>
<td>Yes</td>
<td>116</td>
<td>3</td>
<td>44.0</td>
<td>1.74</td>
<td>.12</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFRAC3: Knowing and understanding how to perform the four operations with decimal fraction</td>
<td>Yes</td>
<td>116</td>
<td>1</td>
<td>40.5</td>
<td>1.66</td>
<td>.08</td>
<td>.85</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFRAC4: Expressing one quantity as a fraction of another quantity</td>
<td>Yes</td>
<td>116</td>
<td>2</td>
<td>46.6</td>
<td>1.66</td>
<td>.10</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFRAC5: Solving word problems in the context of physical quantities and money</td>
<td>Yes</td>
<td>116</td>
<td>1</td>
<td>47.4</td>
<td>1.59</td>
<td>.08</td>
<td>.86</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERC2: knowing how to convert fractions to percentages</td>
<td>Yes</td>
<td>116</td>
<td>2</td>
<td>44.8</td>
<td>1.67</td>
<td>.10</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MESLMC1: Solving problems which involve conversion between units using Whole Numbers, Common Fractions, Decimal Fractions and Percentages</td>
<td>Yes</td>
<td>116</td>
<td>3</td>
<td>44.0</td>
<td>1.82</td>
<td>.14</td>
<td>1.55</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MESLMC3: knowing how to convert fractions to percentage</td>
<td>Yes</td>
<td>116</td>
<td>3</td>
<td>29.3</td>
<td>1.89</td>
<td>.12</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MENS2: Calculating the perimeter</td>
<td>Yes</td>
<td>116</td>
<td>2</td>
<td>46.6</td>
<td>1.66</td>
<td>.10</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data Handling: competency 2

Data Handling involves extraction of information from charts, tables and figures. This skill requires a competent knowledge of associating, matching and visualising illustrations with figures. Two basic competencies were asked under this topic. These were: 1) “Can you read and interpret data accurately from bar graphs and charts, including the pie chart and pictograms? And 2) “Can you calculate and interpret the mean of a small set of discrete data and make deductions?” For these two competencies, learners found the second competency more difficult where 58.6% of them indicated they did not know how to interpret mean of a small set of discrete data and make deduction compared to 37.1% of the learners who affirmed. This shows that many learners faced difficulties in this competency.

Whole Numbers: competency 5

Round off skills and recognising the value of a digit in a number form an essential part of teaching in Grade 7. Out of the total of 6 competencies that were asked under this theme, learners indicated that they were competent in all competencies except competency 5 stated in a question form as follows: “Can you round off a sum to its nearest million?” learners who responded ‘No’ were more (53.4%) as compared to those who responded ‘Yes’ (42.2%). This indicates that learners experienced difficulties in mastering this competency.

Common Fractions: competencies 2 & 3

Of the 4 competencies based questions under the Common Fractions, 35.3% of learners responded ‘Yes’ compared to 62.1% who responded ‘No’ under competency 2 which was asked: “Can you determine what fraction a quantity is of another quantity?” Competency no. 3: “Can you solve three-step word problems involving Common Fractions?” was also poorly responded to which 44.0% of learners responded in affirmative compared to 53.4% who responded ’No’.
**Decimal Fractions: competencies 3, 4 & 5**

Learners were asked 5 competencies under this theme. Out of these 5 competencies, competencies 3, 4 and 5 were opted negatively. Competency 3 asked: “Do you know and understand how to perform the four operations with Decimal Fractions?” 40.5% of learners responded ‘Yes’ where 58.6% responded ‘No’. Of competency 4 “Can you express one quantity as a fraction of another quantity?” 71.6% responded they could not express such a quantity where only 27.6% could. This infers that learners experienced problems on Decimal Fractions specifically on competencies that they indicated not being competent. It would have been interesting to note how this competence was achieved in the achievement test.

The question for competency 5 was posed as follows: “Can you solve word problems in the context of physical quantities and money?” Learners responded negatively with only 47.4% of the learners who responded that they could solve such a problem, whereas 51.7% of the learners said they could not perform the operation. The differences might not be significant as might be observed. Surprisingly, both the teachers’ and learners’ during the interviews expressed strongly that learners faced ‘severe’ problems on ‘word problems and fractions’ particularly Decimal Fractions. Therefore, the 51.7% of the learners who responded ‘No’ would not appear to be insignificant should we consider the teachers’ and learners’ opinions.

**Percentages: competency 2**

Percentage is very important in daily use. It is commonly used in classrooms to express learners’ marks in the tests, examinations or classroom exercises. Learners were introduced to percentage at the exit of the upper primary phase as a foundation for junior and secondary phase. Percentage appeared to be one of the difficult areas in Mathematics. Learners were asked two basic competencies under this topic. Competency 1 asked the learners “Do you know how to convert fractions to percentages?” Only 44.8% of learners responded ‘Yes’ out of 116. A large proportion (53.4%) of learners responded “No” to this competency. Question 3 in the achievement test that deals with Percentages, learners scored 31.6% representing a significant surprise when this was triangulated with their responses to the questionnaires (see item 17, 18, and 19 in the figure 19).

**Measurement: Length, Mass, Capacity and Time**

During the fieldwork, many learners indicated that they had difficulties in Length, Mass, Capacity and Time, especially with the abbreviations that go along with these competencies. For instance, learners struggled to come to terms with the abbreviation ‘SI’ in the questionnaire. Teachers in the interview confirmed about this difficulty and as well as the difficulty of reading ‘time’. They assumed the problem of mixing time was caused by thinking first in Afrikaans which read, e.g. 07:30 in different order and translate the thinking in English. Three competencies were asked under this topic.

**Competency 1:** Learners were asked the following competency based question: “Can you solve problems which involve conversion between units using Whole Numbers, Common Fractions, Decimal Fractions and Percentages?” Out of 116 learners, 44.0% responded ‘Yes’, and 52.6% responded ‘No’. This was not surprising by noting the composition of the questions which includes Common Fractions, Decimal Fractions and Percentages which were noted in the previous sections as difficult topics. Generally, this competency appeared also difficult to teach when both teachers and learners were asked in the interviews.

**Competency 3:** The following competency based question was asked. "Can you apply the SI units for Length, Mass, Capacity and Time involving conversion of units?" The symbol ‘SI’ was problematic for learners in the questionnaires. This was evident in the achievement test where learners were tasked to convert the units. It is therefore not surprising that only 29.3% out of the 116 learners responded ‘Yes’ to this question comparing to the 68% who responded ‘No’.
Mensuration
Learners were asked the following questions “Can you calculate the perimeter of squares and rectangles using formula and give answers to perimeters in correct units?” Out of 116 learners 36.9% responded ‘No’ comparing to 61.8% who affirmed on the question: “Can you calculate the volume of cuboids and cubes using the formulae and give answer to volume in correct cubic units?” Fewer learners 46.6% affirmed compared to 51.7% who disaffirmed, thus concluding the fact that learners faced problems on Mensuration.

The specific Mathematics problem learning areas
Learning is a process. Though the learning process might be the same, the ability to understand what is taught might not necessarily be the same. Learners differ on their ability to learn different concepts and skills as well on the ability to transform what they have learned into knowledge. It is difficult to find a uniform trend of learning and differences on learning of specific learning areas among learners. The problems learners faced in learning Mathematics were very diverse, ranging from counting numbers that go above a million, decimal fractions, BODMAS, long division, approximation, multiplication tables and word problem. These views were vividly expressed by learners:

“Counting is very confusing especially when it is above million” (a Grade 5 learner).
“Decimal fraction is confusing and I also fail to understand numbers” (a Grade 7 learner)

Apart from specific areas of difficulties learners faced in learning Mathematics, the problem in reading and understanding the questions seemed to be prominent. Problem solving questions where learners were required to read the question thoroughly and solve the mathematical problem posed challenges to learners. In addition, learners could not read instructions well to be able to know the task they were required to pursue. There were strong connections between numeral and literacy. Perhaps it would have been beneficial if a mathematics lesson would have been embedded with literacy and language teaching thus fully implementing the concept of language across the curriculum as embedded in the National Curriculum for Basic Education:

“It is difficult for me to read and understand Mathematics instructions” (a Grade 6 learner).

It was to account teachers for the problems facing learners in specific mathematical learning areas. For example, lack of clarity on what they teach and mixing concepts and skills from different content areas while teaching and the inconsistence on methods and applications when solving Mathematics problems hindered the learning process:

“Sometimes you cannot read and understand the question” (a Grade 6 learner).
“Other topics are fractions. Sometime the teacher put together the mixed numbers and improper fractions, now you cannot know the mixed numbers and improper fractions” (a Grade 6 learner).
“Teachers must specify by writing the topics on the chalkboard to make the work easier” (a Grade 5 learners).

It was understandable through learners’ responses that some teachers did not adhere to the principles of teaching. Topics should be written on the chalkboard so that learners become aware of what is taught. Learners with specific learning problems find it difficult to specify and understand what is taught if teachers did not specifically write the topic on the chalkboard. Failing among learners to specify and name areas where they face difficulties learning, was an indication of the fact that principles of teaching and learning are not fully adhered, thus causing confusions among learners. It is not a surprise that learners thought that teachers mixed the topics. Teachers were blamed for not explaining clearly to learners for them to understand, thus adding up to the problems they were facing in learning Mathematics. Expressing this concern one learner lamented:
According to the learners’ responses, the most difficult themes were: Decimal Fractions, Common Fractions, equivalent fractions, long division divisions, word problems, BODMAS, multiplication, Geometry, and rounding off. It was interesting noting that despite of the confusions on the topics as expressed, learners could mention the themes very well thus indicating that in some instances teachers introduced the topics.

4. Basic Assumption: Learners experience difficulties in learning specific Mathematics contents and competencies
Research Evidence: Learners experienced problems in Decimal Fractions, BODMAS, difficulties in comprehending the contents and competencies increase as learners proceed to the higher grades. Learners face slight difficulties in grade 5 perhaps due to transition from lower to higher phase, lesser difficulty in grade 6, and more in grade 7 perhaps due introduction of more complex topics and competencies in solving, Whole Numbers, long division, multiplication tables, Decimal and Common Fractions and language.
Policy Propositions: Teachers should improve the teaching of the above topics and competencies, assess reasons for difficulties and improve the assessment modes. The curriculum developers should review and modify competencies under these topics. Teacher trainers should improve the teaching of these competencies and maintain a balance between content and pedagogical knowledge. The inspectors should ensure that the school management consistently assesses the teaching and learning process. School managers should monitor and evaluate teaching and learning processes regularly.

The teachers’ views on the difficulties learners faced when learning Mathematics
Mathematics teachers especially the long practising ones were dependable in providing relevant information about topics and perhaps specific competencies within the syllabus that learners experienced difficulties in learning. According to the teachers, the problems learners faced were:

“The four operations, fractions, including Decimal Fractions, ordering numbers both in ascending or descending order, Geometry in Grade 7, telling/reading time, and measuring capacity or length” (a Grade 5, 6 and 7 Mathematics teacher).

The problem in telling time comes from the confusion in word order when learners think first in Afrikaans or vernacular and saying this in English. In fact there were differences among languages when telling time. A question asked in English on time would be translated differently by a learner who has a predominant first language (L1) background that was different from the testing language.

“Learners always have a problem telling time in English when the time involves half past an hour because the order of saying in Afrikaans is not as the same like in English” (a Grade 5,6 and 7 Mathematics teacher).

Word problems was another problem for learners at this stage, and this was due to “poor” language proficiency among learners at this phase as learners are not taught correctly in the mother tongue in lower primary phase. There were doubts about the mother tongue and the English proficiency among teachers. The lack of language proficiency among teachers in one or both languages might had a grim effect on the teaching of the second language.

Skills on the four operations start at lower primary phase, actually at the beginning of schooling. It was hard understanding why learners at upper primary level fail to transform the skills on four operations into knowledge. Learners confuse that multiplication gives a product and not a sum. A typical example of this was ‘multiplication becomes a summed number instead of a product number’ which is completely wrong:
“In some serious cases, Grade 6 or 7, still cannot ‘add or subtract’ reasonably well, and they confuse the “+ or x” operating signs, e.g., to them: 5x6 = 11 and not 30” (a Grade 5, 6 and 7 Mathematics teacher).

5.
**Basic Assumption:** Learner in upper primary phase experience different difficulties in Mathematics
**Research Evidence:** Learners found difficulties in learning Decimal and Common Fractions, additional and subtractions, Geometry, four operations, conversion of time and language
**Policy Propositions:** NIED should review the contents and competencies within these themes and topics. NIED and colleges of education should train teachers in content and methodologies of teaching these areas. Advisory teachers should play a role in advising teachers on subject related matters and visit schools frequently to share their expertise. Cluster school system should be used effectively in providing platforms for exchange of views and sharing of field experiences among the Mathematics teachers.

**The teachers’ views on the difficult themes to teach in the syllabus**
Teachers maintained that fractions, including Decimal Fractions, word problem, Percentages, volume and multiplication were most difficult topics to teach. Teachers spent more of time “drilling” on these themes and topics and this could have led to teachers not completing their syllabus within a specified period. Competencies with the topics mentioned above and in addition percentage, Geometry in Grade 7 and Measurement: Time (especially Length, Mass, and Capacity) were difficult to teach and achieved.

“Difficult topics for Grade 6 and 7 are Common and Decimal Fractions. One spends a lot of time repeat teaching but in the end some learners fail to understand well”. Multiplication and long division are also difficult topics”. One principal recommends; “we have to go back to the basics where multiplication table was taught by memorising” (a Grade 5, 6 and 7 Mathematics teacher).

6.
**Basic Assumption:** Teachers experience difficulties in teaching specific topics.
**Research Evidence:** Teachers found some topics in the syllabus difficult to teach.
**Policy Propositions:** Teachers should be given the opportunity to continuously improve their professional skills.
6.1 Mathematics achievement test outcomes in Grade 5

The Mathematics achievement test was conducted for the purpose of testing learners’ mastery of mathematics competencies within the syllabus. Figure 14 presents the results of learners’ performance on each question. It further presents the percentage of learners who got correct and wrong answers from the thirty tested mathematical areas.

The results of the Mathematics achievement test are indicated a higher percent of learners who got wrong answers on each tested question compared to those who got correct answers. Remarkably are 100% wrong responses to questions M15, M24 and M25 where all learners got wrong answers. This infers that many learners face difficulties in many competencies within the syllabus. These results were contrary to the outcome on the learners’ questionnaire where they were asked to respond on their competencies on different mathematical competencies by ticking on ‘Yes’ or ‘No’. Learners noted only six topics and seven competencies to which they experienced difficulties (see table 4 in section 8.2).

Further analysis of these results using t-test shows significant differences (t=-4.48;df 29;p=.000) between learners who got wrong answers with mean equal to 66.03 to those who got correct answers with mean equal to 33.56 (see table 7 below).
Table 7: Paired samples t-test results of learners who got correct and wrong answers in achievement test in Grade 5 in 2007

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct ans - Wrong ans</td>
<td>-33.56</td>
<td>40.99</td>
<td>7.48554</td>
<td>-48.87 -18.25</td>
<td>-4.48</td>
<td>29</td>
<td>.000</td>
</tr>
</tbody>
</table>

Thus rejecting the fact that ‘Learners who are taught the same Mathematics contents and competencies will not differ on performance on the Mathematics achievement test’ should the null hypothesis (Ho) been taken as point of departure.

6.2 Mathematics achievement test in Grade 6

Figure 15 illustrates the results of the Grade 6 achievement test outcomes on each question. The figure shows the percentages of the learners who obtained the correct and wrong answers in the specific items. The results for Grade 6 learners’ performance were not impressive because learners who got the wrong responses exceeded those who got the correct responses on more than three quarters of the tested questions.

Figure 15: Mathematics achievement test outcomes for Grade 6

Learners scored well only on M08 where 95.5% of the learners got correct answers. The worst performed items were M13, M16, M20, M26 and M27, ranging from 78.6% to 85.2% wrong responses, meaning only a handful of learners got the items correct. The same outcome was observed on the remaining competencies. Generally, more than 60% of the learners did not do well in the majority of the questions thus inferred that they experienced severe problems in these competencies.
Table 8: Samples t-test results of learners who got correct and wrong answers in achievement test in Grade 6 in 2007

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std dev</th>
<th>Std Error</th>
<th>t</th>
<th>df</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct answers</td>
<td>23</td>
<td>24.54</td>
<td>19.44</td>
<td>4.05</td>
<td>16.14</td>
<td>22</td>
<td>.000</td>
</tr>
<tr>
<td>Wrong answers</td>
<td>23</td>
<td>65.38</td>
<td>19.31</td>
<td>4.02</td>
<td>16.23</td>
<td>22</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 8 illustrates the sampled t test results of the learners who got the correct and wrong responses. It was apparent that the mean of 65.38 on the wrong answers was high compared to 24.54 on the correct answers. These results inferred that many learners performed poorly in the achievement test. The t-test was further performed to find if there were differences on scores between the correct and wrong responses. The results of the t-test showed significant differences in scores between the correct (t=16.14; df 22; \( p = .000 \)) and wrong answers (t=16.23;df22;\( p = .000 \)). The results further inferred that learners scored poorly in the achievement test. This created doubts on the attainment and mastering of the competencies taught during the year.

6.3 Mathematics achievement test outcomes in Grade 7

Figure 16 presents the results of learners’ performance on each question reflecting the percentage of correct and wrong answers from the thirty tested Mathematical areas. Item M 19 was taken off from the rest of the items as the correct answer from the list of the 4 given options was missing. Hence, the total number of items was finally 29.

The summary of the findings which are of interest for this study are the wrong answer. The wrong answers demonstrate the areas and competencies that learner face difficulties. The wrong answers would provide clues to curriculum developers on what makes the syllabus contents and the accompanied competencies complicated. Following this case and further analyse achievement test outcomes in figure 16 we can observe that four items were scored wrongly between 50–59%, four 60-69%, seven between 70-79%, seven between 80-89% and two between 98-100 indicating a considerable high failure and thus low performance in the achievement test at grade 7.

This implied that the skills imparted during the year’s course had not been transformed into knowledge and thus learners failed to demonstrate skills in pursuing the tested competencies. These results were slightly contrary to their responses on what they are capable of doing in the learners’ questionnaire. Learners noted 11 topics and competencies to which they experienced difficulties (see table 5 in section 9.2 above).
The nine items that were poorly performed, whereby 80% to 100% of the learners got wrong answers as shown in figure 16 were M07, M13, M20, M22 and M28. Only four items had more learners getting correct responses as compared to those who got wrong responses: M01, M02, M29 and M30. The results on M29 matched well with the learners’ responses in the questionnaire where about 61.8% of the learners responded positively. The results of the achievement test on M30 contradicted learners’ responses in the questionnaire where 51.7% of the learners indicated experiencing problems in “Mensuration”.

Table 9: Paired sampled t-test results of learners who got correct and wrong answers in achievement test in Grade 7 in 2007

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct_answers</td>
<td>10.21</td>
<td>28</td>
<td>.000</td>
<td>31.77</td>
</tr>
<tr>
<td>Wrong_answers</td>
<td>20.98</td>
<td>28</td>
<td>.000</td>
<td>65.10</td>
</tr>
</tbody>
</table>

Further analysis of these results using t-test showed significant differences (correct answers $t=10.21; \text{df}=28; p=.000$ and wrong answers $t=20.98; \text{df}=28; p=.000$). This was evident since $p$ value of 10.21 and 20.98 were higher than the critical value 2.76 at $p \leq 0.01$. Furthermore, the mean 65.10 of learners who got wrong answers was higher compared to those who got the correct answers the (mean 31.77) see table 9 above. These results further construed the fact that more than half of the set questions were wrongly answered and that the low performance in the achievement test was an indication that learners did not master the competencies in the syllabus in 2007.

6.4 Reasons for low performance in the achievement test

This section presents an analysis of the learners’ performances in the achievement test for each Grade (5, 6 and 7) and exploring reasons for low performance in Mathematics. The figures were divided into three sections representing the topics, what learners could do and not do in the achievement test. It was crucial
to mention that many of the items used in the achievement test were based on the Mathematical misconceptions and common errors done by learners and these were used as distracters. Most of the distracters which appeared misleading, including terminologies, carrying over when adding, borrowing as well as the arranging numbers or fractions in order, were used in test item construction.

6.4 Reasons for low performance in the achievement test

This section presents an analysis of the learners’ performances in the achievement test for each grade (5, 6 and 7) and exploring reasons for low performance in mathematics. The figures were divided into three sections representing the topics, what learners could do and not do in the achievement test. It was crucial to mentioning that many of the items used in the achievement test were based on the mathematical misconceptions and common errors done by learners were used as distracters. Most of the distracters which appeared misleading included terminologies, carrying over when adding, borrowing as well as the arranging numbers or fractions in order were used in test item construction.

<table>
<thead>
<tr>
<th>Item description</th>
<th>What the learners can do</th>
<th>What learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GRADE 5</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number concepts</td>
<td>48.4% average of learners could recognise the basic numbers</td>
<td>47.1% of the learners in average could not recognise the basic numbers</td>
</tr>
<tr>
<td></td>
<td>31% of the grade 5 learners had problems in knowing the mathematical terms</td>
<td>67.1% of the grade 5 learners faced problems in knowing the mathematical terms</td>
</tr>
<tr>
<td></td>
<td>83.9% of learners could perform single operation in whole numbers.</td>
<td>48.4% Could not do expanded notations in whole numbers.</td>
</tr>
<tr>
<td></td>
<td>70.3% of the learners could do word problems that involved sharing of objects or items</td>
<td>29.1% of the learners could not do word problems that involve sharing of objects or items</td>
</tr>
<tr>
<td></td>
<td>11.0% of them could perform the order of operations</td>
<td>87.2% of them could not perform the order of operations</td>
</tr>
<tr>
<td></td>
<td>42.6% of the learners could compare and order whole numbers.</td>
<td>55.5% of the learners faced problems in comparing and ordering whole numbers.</td>
</tr>
<tr>
<td><strong>General comment and observations:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The result of the achievement test indicated that 47.9% of the learners who participated in the study did well in number concepts compared to 55.7% of the participants who could not do well in this area. These results showed the high numbers of the learners who could not do well in the number concepts. This could have been caused by the lack of skills in performing calculation which required them to use the mathematical formulas such as the order of operation (BODMAS). It was also noted that learners had difficulties in comparing and ordering numbers. This could be caused by the lack of knowledge in place value of numbers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractions</td>
<td>47.1% of the learners could recognise the simple fraction</td>
<td>51.6% of the grade 5 learners could not recognise the simple fraction</td>
</tr>
<tr>
<td></td>
<td>23.9% of the learners managed to find the equivalent fractions.</td>
<td>72.3% of the learners failed to find the equivalent fractions</td>
</tr>
<tr>
<td></td>
<td>35.5% of the learners could convert the mixed numbers to decimal fraction.</td>
<td>62.6% of the learners could not convert the mixed numbers to decimal fraction</td>
</tr>
<tr>
<td></td>
<td>24.5% of the learners had no problem in ordering common fractions.</td>
<td>72.2% faced problems in ordering common fractions</td>
</tr>
<tr>
<td></td>
<td>20.6% of the learners had no problem in multiplying the decimal numbers with the power of ten.</td>
<td>77.4% of the learners experienced problems in multiplying the decimal numbers with the power of ten.</td>
</tr>
<tr>
<td><strong>General comments and observations:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The figure above shows that 67.2% of the grade 5 learners encountered difficulties in performing the basic competencies in the fractions compared to 30.3% of the learners who could perform these basic competencies. Most of the learners find it difficult to work out the equivalent fractions. Learners also faced difficulties to multiply the decimal numbers with the whole numbers especially in power of ten. This concurrently corresponded with the lack of knowledge in placing values as identified in number concepts. The result also indicated that fractions were difficult because learners performed poorly in all questions pertaining to fractions in the achievement test. Teachers need to find ways in teaching the concept of fraction to remedy the situation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurements</td>
<td>61.3% of the learners were competent in doing simple</td>
<td>38.1% of the learners could not do simple</td>
</tr>
<tr>
<td>Item description</td>
<td>What the learners can do</td>
<td>What learners cannot do</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>word problems in measurement which involves estimations. 34.8% of the learners could add numbers in different units of mass. They could do conversion from kg to grams as well. 11.6% of the learners were able to convert between the units of lengths</td>
<td>word problems in measurement which involves estimations. 62.6% of the learners could not add numbers in different units of mass they cannot do conversion from kg to grams as well. 87.1% of the learners were not able to converting between the units of lengths</td>
</tr>
</tbody>
</table>

**General comment and observations:**

Out of the learners, 27.8% on average could perform questions related to geometry compared to the 71.9% who could not. This simply meant that properties of the quadrilateral and the application of the mathematical forms should be learned first for one to be able to do well in this area.

| Money            | 44.5% of the learners could do word problems in money and finance, 44.5% of the learners could do simple subtraction which involved money 13.5% of the learners could divide money with the power of ten, the activity which involved the changing of the digit position. | 54.8% of the learners could not do word problems in money and finance, 55.5% of learners were not able to do simple subtraction which involves money 85.1% of the learners could not divide money with the power of ten, the activity which involves the changing of the digit position. |

**General comment and observations:**

Only 35.9% of the learners did well in the questions which were set for testing measurements compared to 62.6% who performed poorly. Although word problems were regarded as difficult in general, the learners did not experience problems in items which required them to do word problems in measurements. It might be that they were taught how to estimate the length of the items which they worked with in everyday life. The problem in conversion was caused by the lack of understanding of basic calculation such as multiplication and division skills. Hence teachers need to pay more attention in teaching these skills in order to solve the problem.

| Time             | 24.5% of the learners were able to write given time in words 31.6% of the learners could read tables and television schedules | 75.5% of the learners could not write given time in words 67.7% of the learners could not read tables and television schedules |

**General comment and observations:**

Time was one of the topics in the syllabus where learners experienced problems in calculating. The achievement outcomes showed that 28.1%, in average score of the learners got the questions correctly compared to 71.6% in average score of the learners who experienced problems in calculating question under time. It was surprising to note that 75.5% in average score of the sampled learners could not convert time from 24 hours to 12 hours. The same applied to the reading and interpreting time schedules. This problem was caused by the lack of addition and subtraction skills which learners did not have. The subtraction and addition problems were caused by the lack of knowledge in whole number concept.

| Geometry         | 21.3% of the learners could recognise the simple quadrilaterals 17.7% of the learners could recognise the properties of the quadrilaterals 44.5% of learners could calculate the perimeter of the polygons | 78.1% of the learners were not able to recognise the quadrilaterals such as trapezium 82.6% of the learners could not recognise the properties of the quadrilaterals 54.9% of the learners did not know how to calculate the perimeter of the polygons |

**General comment and observations:**

The average percentages of the learners who could read and interpret the charts were lower than those who could not read and interpret the charts. A number of learners could not use the information presented in charts to do simple calculations such as addition. Looking at the above mentioned areas of mathematical content, one could notice that most of the learners performed poorly in most of the items. The result also indicated that many learners could do single operations such as addition and subtraction where the single operation was involved. They also mastered the competencies for measurement, where they were required to estimate the length of the items which they use everyday such as books. Learners faced challenges in applying mathematics in real life situation, and this might be caused by the lack of practice as well as the lack of language skills in general. The problem on the use of mathematical formulas in solving problems was noticeable in most of the content area of the grade 5 syllabus.
GRADE 6

<table>
<thead>
<tr>
<th>Item description</th>
<th>What the grade 6 learners can do</th>
<th>What the grade 6 learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number concepts</td>
<td>22.3% of the learners had no problems with the expanded notation. 37.6 of the learners could write the numbers on words. 33.8% of the learners could do the word problem items which required them to use common sense.</td>
<td>66.9% of the learners had problems with the expanded notation. 58.6% of the learners could not write the numbers on words. 63.1% of learners could not do the word problem items which required them to use common sense.</td>
</tr>
</tbody>
</table>

**General comments and observations:**
Learners’ performances in grade 6 achievement test were not impressive. There were few questions where learners obtained scored highly. The average score of 31.2% indicated that learners could perform simple calculations in few competencies compared to the average score of 66.8% which they could not perform. In some questions for example M11 which had to do with the basic terminology for addition, there was the same number of learners who got the item correctly to those who got the item wrong. It was obvious that many of the learners confused the addition and division terminologies. BODMAS or the orders of operation were problematic to the learners because they did not know the sequence of operation when more than two operations were involved in expression. It was also noticed that the learners had problem in applying mathematics to real life situation.

| Fractions | 48.4% of the learners could arrange fraction in order. 15.3% of the learners could convert simple common fraction with the denominator 5 to a decimal number. 15.3% of the learners could add fractions. 14.6% of the learners could multiplication of decimal by the whole number was a problem to the grade 6 learners | 45.3% of the learners could not arrange fraction in order. 75.2% of the learners could not convert simple common fraction with the denominator 5 to a decimal number. 79% of the learners could not perform addition of fraction. 67.5% of the learners could not multiplication of decimal by the whole number was a problem to the grade 6 learners. |

**General Comments and observations:**
Applicable to the results in grade 5, Grade 6, learners encounter problems with the application of operation such as multiplication of decimal numbers with the whole numbers. The average score of 23.4% of learners who did well in arranging fractions, conversion of simple fractions to decimal fractions as well as the multiplication of decimal fraction with the whole numbers and 66.8% of the of the learners who encountered problems with fractions clearly indicated more teaching input was required in this topic and the competencies within. Learners failed to use the formula for adding the fractions. A common mistake observed was that most of the learners added the numerators apart and the denominators to get the sum of the two fractions.

| Measurements | 74.5% of the learners could calculate the perimeter of a triangle when sides are given | 30% of the learners could not calculate the perimeter of a triangle when sides are given |

**General comments and observations:**
Although some learners encountered problems with the calculation of expressions which involved mathematical formulas, 74.5% of the learners could calculate the perimeter of the triangle compared to 30% of the learners who could not. This was one of the topics where many of the learners scored impressively. They might have been trained well to calculate the perimeter or the formula which was used to find the answer. There were clear indications that adding numbers in different units was problematic to most of the learners. It was evident and logical to assume that they do add the numbers without converting them to the same unit first – thus the problem.

| Time | 21.7% of the learners could interpret time 19.1% of the learners did not have problem in writing time in 12 hours and also in 24 hours 39.5% of the learners could divide time which the whole numbers was also not a problem. | 72% of the learners find the language of interpreting time was difficult. 77.7% of the learners experienced problems in writing time in 12 hours and also in 24 hours 48.9% Dividing time which the whole numbers was a problem. |

**General Comments and observation:**
On the average, 39.5% of the learners could convert time to the specified time format. They could interpret time and divide time with whole numbers compared to 66.2% who could not perform the basic competencies which were set for the test. The reason might be the lack of understanding of the language in mathematics, lack of division skills as it was realised in the whole numbers and the insufficient knowledge in place value of the numbers.

| Mass | 28% of the learners did not experience problems in converting the units of mass. | 67.5% of the learners experienced problems in converting the units of mass. |

**General Comments and observation:**
The conversion of unit involves the multiplication and division of the units with the power of ten. In this basic competency, only 28% of the learners performed well compared to 67.5% of who could not convert units of mass. This implied that learners could neither multiply nor know how many grams were there in a kilogram.

| Geometry | 17.8% of the learners were competent in properties of quadrilaterals. Learners could use these properties to answer the questions | 79% of the learners were not competent in properties of quadrilaterals. Learners could not use these properties to answer the questions |
### GRADE 6

<table>
<thead>
<tr>
<th>Item description</th>
<th>What the grade 6 learners can do</th>
<th>What the grade 6 learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.8% Learners knew the lines of symmetry or they could recall the number of symmetry on quadrilaterals.</td>
<td>78.4% Learners did not know the lines of symmetry or they could not recall the number of symmetry on quadrilaterals.</td>
<td></td>
</tr>
<tr>
<td>36.9% Learners could identify the name of a polygon when sides were given to them.</td>
<td>58.7% Learners faced problem in identifying the name of a polygon when sides were given to them.</td>
<td></td>
</tr>
</tbody>
</table>

**General comments and observations:**

On average, only 33.1% of the learners knew the use of the properties of the quadrilaterals to answer the questions. The learners could also recall the line of symmetry as well as identifying the names of polygons compared to an average of 88% of the learners who experienced problem in the above mentioned competencies. This might have been caused by the lack of content knowledge.

<table>
<thead>
<tr>
<th>Data Handling</th>
<th>What the grade 6 learners can do</th>
<th>What the grade 6 learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>94.6% Most of the grade 6 learners could read and interpret bar charts</td>
<td>3.8% of the learners could not read and interpret bar charts</td>
<td></td>
</tr>
<tr>
<td>52.9% of the learners could interpreting the bar charts and apply the basic operation to solve the problem</td>
<td>47.4% of the learners could not interpreting the bar charts and apply the basic operation to solve the problem</td>
<td></td>
</tr>
</tbody>
</table>

**General comment and observations:**

On average, 73.8% of the learners were able to read and interpret the mathematical information presented in graphs compared to 46.5% who could not. The lack of reading and mental arithmetic skills affect a fraction of learners who failed.

### GRADE 7

<table>
<thead>
<tr>
<th>Item description</th>
<th>What grade 7 learners can do</th>
<th>What grade 7 learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number concepts</td>
<td>20.3% of the learners could round off three digit numbers to the nearest ten.</td>
<td>75.4% of the learners were not competent in rounding off three digit numbers to the nearest ten.</td>
</tr>
<tr>
<td></td>
<td>68.6% of the learners were competent in writing an eight digit number in words.</td>
<td>29.6% of the learners could not write an eight digit number in words.</td>
</tr>
<tr>
<td></td>
<td>34.7% of the learners were able to arrange numbers in order.</td>
<td>61% of the learners faced challenges in arranging numbers in order.</td>
</tr>
<tr>
<td></td>
<td>44.1% of the learners were competent in multiplication terms: product.</td>
<td>49.9% of the learners were not competent in multiplication terms such as ‘product’.</td>
</tr>
<tr>
<td></td>
<td>30.5% of the learners could do a two step word problems involving addition and subtraction.</td>
<td>66.1% of the learners did not know the two step word problems involving addition and subtraction.</td>
</tr>
<tr>
<td></td>
<td>22% of the learners knew the order of operation and that (BODMAS) was not a problem to some of the learners.</td>
<td>75.4% of the learners did not know the order of operation (BODMAS) is a problem to most of the learners.</td>
</tr>
</tbody>
</table>

**General comments and observations:**

The achievement test outcomes revealed that an average of 59.6% of learners in the sampled schools had problems in applying the four mathematical basic operations compared to 36.7% who were competent in this topic and competencies within. Many of learners failed to get the correct answer in items which required them to borrow when subtracting; carrying over when adding whole numbers as well as common and decimal fractions. These problems might be caused by the lack of knowledge of place values of digits in a numbers. Learners could not do multiples well. They could not write the eight digit numbers in words. As it was noticed in previous grades, the order of operation (BODMAS) was a problem to most of the learners in grade 7 because they did not know the sequence of operation when more than two operations were involved in the expression.

<table>
<thead>
<tr>
<th>Fractions</th>
<th>What grade 7 learners can do</th>
<th>What grade 7 learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.2% of the learners mastered division and subtraction of fraction.</td>
<td>66% of the learners encountered problems in division and subtraction of fraction.</td>
<td></td>
</tr>
<tr>
<td>14.4% of the learners were competent on understanding the value of the digit in decimal numbers.</td>
<td>83.8% of the learners faced challenges on understanding the value of the digit in decimal numbers.</td>
<td></td>
</tr>
<tr>
<td>11.9% of the learners mastered the basic operation with fractions.</td>
<td>86.5% of the learners were competent in basic operation with fractions.</td>
<td></td>
</tr>
<tr>
<td>20.3% of the learners could rounding off of decimal fractions to the specified value.</td>
<td>75.4% of the learners had problems in rounding off of decimal fractions to the specified value.</td>
<td></td>
</tr>
</tbody>
</table>

**General comments and observations**

On average, the 19.7% of the learners were able to perform the basic operations on fraction, compared to the average of 77.9% of the learners who could not do well in the tested competencies. This entailed that three quarter of the learners experienced serious problems in performing the basic competencies.

<table>
<thead>
<tr>
<th>Measurements</th>
<th>What grade 7 learners can do</th>
<th>What grade 7 learners cannot do</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.3% of the learners were competent in conversion of units.</td>
<td>82.2% of the learners faced challenges in conversion of units.</td>
<td></td>
</tr>
<tr>
<td>(65.3%) of the learners did well in items where they were requested to calculate the area of two dimensional figures by counting squares.</td>
<td>(33.1%) of the learners could not calculate the area of two dimensional figures by counting squares.</td>
<td></td>
</tr>
<tr>
<td>5.9% of the learners could calculate the perimeter.</td>
<td>92.3% of the learners could not calculate the perimeter.</td>
<td></td>
</tr>
</tbody>
</table>
when the shape is not mentioned or drawn. perimeter when the shape is not mentioned or
drawn.

**General comments and observations**

On average, 28.6% of the learners scored well in the questions set for measurement compared to 69.2% who did not do well in this topic. Many of the learners experienced problems in calculating the expressions involving the mathematics formula such as finding the perimeter of the diagram where most of the learners (92.3%) failed to get the correct answer. In some cases, the learners confused the formula i.e. using the wrong formula to find the answer. The lack of understanding of mathematical terms might have contributed to the failure. It might also be possible that learners could do well if shapes were illustrated to enable them to use the general information for solving problems.

<table>
<thead>
<tr>
<th>Money</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.7% of the learners could do problem solving in money</td>
</tr>
<tr>
<td>13.6% of the learners understood percentages in money and finance</td>
</tr>
<tr>
<td>72.1% of the learners faced challenges in understanding problem solving in money</td>
</tr>
<tr>
<td>82.2% of the learners were not competent in percentages in money and finance</td>
</tr>
</tbody>
</table>

**General comments and observations**

On average, 28% of the learners could naming angles 39% of the learners understood the properties of a circle 43.2% of the learners knew the properties of a quadrilaterals 50.5% of the learners knew the lines of symmetry in two dimensional shapes 17.8% of the learners understood properties of quadrilaterals 69.5% of the learners faced challenges in understand Naming angles 58.6% of the learners did not understand the properties of a circle 67.4% of the learners did not understand the properties of a quadrilaterals 70.8% did not know lines of symmetry in two dimensional shapes 90.6% did not understand the properties of quadrilaterals

**Data Handling**

<table>
<thead>
<tr>
<th>Data Handling</th>
</tr>
</thead>
<tbody>
<tr>
<td>61.9% of the learners could calculate the mean</td>
</tr>
<tr>
<td>34.8% of the learners could not calculate the mean</td>
</tr>
</tbody>
</table>

**General comments and observations:**

On average, 23.7% of the learners could do problem solving in money compared to 77.2% who could not. This implied that that many learners could not apply mathematics in their real life. It might have meant that the learners were not involved in purchasing or entrepreneurial activities at schools which could have train them to do the simple calculation of the amount spent on goods or the calculation of change after purchasing the goods although these activities were happening almost every day.

**Geometry**

28% of the learners could naming angles 39% of the learners understood the properties of a circle 43.2% of the learners knew the properties of a quadrilaterals 50.5% of the learners knew the lines of symmetry in two dimensional shapes 17.8% of the learners understood properties of quadrilaterals

**General comments and observations:**

On average, 31.7% of the learners performed impressively in questions related to geometry compared to 66% who faced challenges in this topic. The results indicated that the learners had problems in recalling the properties of the geometrical shapes, hence the poor performance.

**6.4.1 The perceptions, views and importance of mathematics**

**Perception of mathematics**

According to the interviews outcomes with teachers and learners, learners had different views, perceptions and opinions pertaining to mathematics. Learners were asked to express opinions on how they perceived mathematics. The responses ranged from those finding mathematics difficult, easy, and to those who were not sure: “Sometimes easy but sometimes difficult because sometimes a teacher may explain well other times not” (a grade 7 learner).

“Sometimes difficulty especially when it comes to different topics” (a grade 6 leaner).

It was apparent that learners encountered difficulties in some topics. More evident was the way teachers presented different topics. The difficulties faced learners in different topics could be attributed to, among many things, the way topics were presented, teacher’s competencies, learner’s interest on the subject, frame of the competencies and the availability of teaching materials and equipment.

Though there were indications of liking the subject, the general impression as observed was that mathematics was not liked and that learners did not enjoy the subject. This was evident especially when they were asked on how they performed in the final examination and the choice of subjects. The responses were prompt and a handful got ‘A’, ‘B’ or ‘C’ compared to who indicated got ‘D’ and ‘E’.
Learners had negative perceptions on mathematics as a subject. Supporting this fact was a clear testimony from learners bearing negative perception on the subject:

“I don’t like mathematics because it is too difficult” (a grade 6 learner).
“I don’t like mathematics because there is no one to help me” (a grade 6 learner).

Views toward mathematics
Learners’ negative views toward mathematics were shared by mathematics teachers. According to the teachers, mathematics had not been a popular subject among learners. Learners were compelled to take the subject because it was compulsory at primary and junior secondary phases. However, few learners took it seriously. According to the teachers, there were learners who liked mathematics and those disliked the subject. Learners who disliked mathematics had the opinion that mathematics was difficult while those who liked it saw it as an easy and interesting subject. More interesting disposition according to the teachers’ was the fact that some learners feel the subject was for learners who were gifted. Otherwise, learners who had had no option were forced to take it because it was a compulsory subject in the curriculum:

“There are some learners who feel the subject should be optional to give them (learners) a choice to choose it” (a grade 5, 6, 7 mathematics teacher).

It was clear through the teachers’ responses that the likes and dislikes of mathematics among learners were not innate. They develop with time and especially when learners were exposed to circumstances within the learning environment that triggered the disliking or liking of the subject. Taking this further, the positive perception of the subject could be attained when proper grounds and foundation were laid with strong supporting system in terms of resources, strong teaching and learning process, well trained teachers, friendly learning environment at all levels especially at the foundation stage:

“With a good mathematics teacher and enough resources like enough textbooks, stationery and reasonable teacher-learner ratio, this kind of negative perception could be ‘minimised’ to a certain extent and proper attitude could be in cultivated into the learners. The lower primary foundation must be properly laid at this stage so that learners master the basic competencies which they suppose to achieve at this level” (a grade 5, 6, 7 mathematics teacher).

The teacher to learner ratio, sufficient textbooks and stationary and trained mathematics teachers continues being a challenge despite the importance placed on the subject. The sharing of mathematics textbooks was widespread in all four schools. This situation frustrated learners especially when they were given homework and had had to use textbooks after school; a situation that contributed tremendously to negative attitude towards the subject.

Importance of mathematics
The responses on the importance of mathematics were influenced, on the one hand, by the direction in life and career that learners wanted to lead and the successful role models portrayed by members within the family or the community on the other hand. At the same time there were learners who merely liked the subject without a notion on what career they would have wanted to take in the future.

Learners conceived mathematic as an important subject in life when associating it with banking. Perhaps thinking that, those working in the bank earned more money than those working elsewhere. Many perceived banking as a good career and that mathematics would have helped them achieving that aspiration. These insights were strongly expressed:

“I like mathematics because it is part of life important subject. Mathematics will give you a better job when you grow up especially if you learn it in a correct way” (a Grade 6 learner).
“Mathematics is a god subject that will help you to work in the bank” (a Grade 7 learner).
You need mathematics if you want to start your own business” (a Grade 7 learner).
According to teachers’ views, Mathematics not mentioning other important subject such as Science was a subject of discussions in schools, media, and other means of communication. One tends to presuppose that learners at Upper Primary Phase should at least have a notion on the importance and the role Mathematics plays in shaping the future career. Surprisingly, according to the teacher’s observation, learners did not know the importance of Mathematics as a subject and could not link this to their future careers:

“Very few of them know its importance because when asked they would tell you they use the subject to calculate their money, and there some who would tell you “mathematics” is the subject which could prepare them to become a doctor or a pilot” (a Grade 5, 6, 7 mathematics teacher).

Parents support adds value to the school efforts. A dialectical relationship between parents and teachers enhances the academic and social upbringing of the learners. It was logical to conclude that parents who interacted effectively with teachers at school on assisting the children, carryover these practices at home. Learners coming from such homes discusses with their parents about the choice of subjects and career prospects:

“Her mother wants her to become an accountant and to become this, she has to be good in mathematics and she is really good at mathematics” (a Grade 5, 6, 7 mathematics teacher).

The lack of knowledge about the type of profession that various subjects may lead was hindered by the lack of Career Guidance teachers in schools. Teachers felt that Career Guidance should be strengthened in schools in order to inform learners the importance of different subjects. The present status of Career Guidance or more correctly Life Skills teachers should be reinstated and Life Skills periods allocated in the timetable be fully used for the purpose. Schools on the other hand should use community role models to inspire learners through motivation speeches:

“For learners to know the importance of a subject career guidance in schools should be strengthened and influential people in the community should give inspirational talks to learners so that they could attach some importance to subjects”. At present, career guidance receives’ poor attention’ and its periods allocation are used by teachers to teach other subjects”. (A Grade 5, 6, 7 mathematics teacher).

Learners varied a lot in responding to whether they would choose Mathematics among other subjects. Some indicated that they would not choose mathematics while some mentioned they would opt for the subject thus indicated that they like mathematics.

Those disliking Mathematics centred their blames on the teachers. Teachers come to the classroom with different moods. They shouted to learners or got angry to the learners without apparent reasons. Obviously learners develop fear and negative attitude towards the teacher and the subject. This feeling interfered with learning and thus affected learners’ performance on the subject. The way teachers present different topics frustrated learners adding up to negative attitude towards the subject. Learners bearded the impression that the subject was not taught correctly. Why paying attention to such a subject?

“Teachers are angry and shout to us to us that is why some learners dislike the subject” (a Grade 6 learner).

“Teacher should be happy while teaching” (a Grade 5 learner).

“The reason why I like mathematics is that I learn more about number and multiplications tables. In the future if my children don’t go to school I will be able to teach them mathematics. The reason why I dislike mathematics is that teaches don’t teach in a correctly way I won’t know what do” (a Grade 6 learner).

Learner’s decision to choose Mathematics when given a choice to do so was connected to the expected career prospects and life expectations. On the other hand the nature of the subject being good and interesting influenced the choices:
“I will choose mathematics because if you don’t know how to count how will you know your own children in the house when you grow up? Again mathematics is important to me because without it you will not be able to learn” (a Grade 6 learner).

However, when asked who should take Mathematics between girls and boys; both girls and boys maintained that boys and girls should take Mathematics because they were equal. This implied that issues pertaining to equality between girls and boys were well articulated in the schools and at all levels of the society. It was therefore not a surprise that learners at school were well informed about gender equality:

“All people are equal when it comes to intelligence. Both sexes perform equally in the subject” (a grade 6 learner).

These responses were clear testimony of the fact that gender equality was clearly addressed in schools. Subjects that were male dominant in the past were made open to girls. Girls did not feel inferior anymore and boys did not regard girls as their subordinates.

7.
Basic Assumption: According to the teachers’ views, not all learners knows the importance of mathematics or why they should study the do well in mathematics
Research Evidence: Some learners know and some do not know the importance of mathematics. Many learners connect mathematics with money. Few parents discuss with their children about their future career and the subject choices. Learners demonstrated different opinions and views towards mathematics. Some learners feel that the subject should be optional. Teachers believe that provision of sufficient equipment and material with well trained teachers will have a positive impact on the learners’ attitude towards mathematics
Policy Propositions: Carrier guidance and life skills should be strengthened in schools and give learners possibilities to discuss about their future plans, career perspective and subject choices. Parents should discuss with their children about career choices and importance of various subject. Teachers should motivate learners who are negative towards mathematics by making the subject more interesting. NIED and Colleges of Education should train mathematics teachers through the existing training programs. NIED should provide opportunities for continuous professional development

The comparison of work across the grades in the phase
Learners were asked to state if there were any differences between grade 4 and 5, 5 and 6 and 6 and 7 work. Slight differences in responses were noted. Learners who had insight on mathematics contents indicated that they found the contents to be difficult in Grade 5 and easy in Grade 4. Differences were also observed in grade 5 to those in Grade 6, Grade 6 to those in Grade 7 and Grade 7 to those in grade 8. It was obvious that one should expect changes in mathematics content because of the spiral nature of the curriculum and different phases, leave alone differences that might have existed between grades. The changes in competencies were obvious and these differed from one grade level to the other. New topics were introduced at the entry to the upper primary phase. Learners having good perceptions of the differences between grades and most probably insight and interest on the subject expressed that:

“It is difficult. In Grade 4 teachers give simple questions but in grade 5 they give you difficult questions” (a Grade 5 leaner).

“It is different because the new topics we get in Grade 5, but mathematics is simple in grade 4” (a Grade 5 learner).

“More difficult in present grade than last year” (a Grade 7 learner)
8. 
**Basic Assumption:** Mathematics tasks differ from one grade to another.
**Research Evidence:** Learners found mathematics tasks different and more complex as they proceed to higher grades.
**Policy Propositions:** Teachers should link the previous learned knowledge with the current learning tasks.

Teacher’s way of teaching mathematics
Learners indicated that teachers helped them when they needed assistance. On the contrary learners were not pleased by the way teachers taught them. They indicated that teachers did not value them. This was obvious, especially when they shouted to them, got angry easily, used bad language, humiliated and hit them. In addition learners’ expressed their dissatisfaction on how teachers taught the subject. They would like teachers to teach them slowly, provide more home work and demonstrate positive mood. These sentiments were obvious:

“Teachers should be happy while teaching us” (a Grade 7 learner).
“Teacher should teach us slowly so that we understand. They should not rush” (a Grade 6 leaner).
“Teachers should teach us in a better way. For example, he must give us homework every day so that we can understand better mathematics” (a Grade 5 learner).
“Tasks should be harder than before” (a Grade 7 learner).

Learners held the opinion that teachers did not pay attention to their needs. They operated haphazardly. They sometimes marked their work, but sometimes did not. They carried the opinion that teachers should be blamed for their failure:

“I will give the blame to the teacher because they don’t help. They don’t give us attention we need that is why we don’t understand the questions. We just answer the questions when they give us work to do they don’t do corrections. Sometimes they don’t teach they are just busy. That’s why we fail” (a Grade 6 learner).
“When you don’t understand the teacher say you can do it yourself and write nonsense on the Paper” (a Grade 6 learner).

The situation become more serious when teacher included topics they did not teach thoroughly in the examination. It was thus not surprising that learners enunciated this issue vehemently:

“Teacher put the topics we have not learned in the examination” (a grade 6 learner).

Learners raised the issues of teachers’ skills and ability to teach, specifically, when they emphasised the fact they would like to be taught correctly. This concern comes from learners with keen interest on Mathematics. The learners demanded to given correct explanations of mathematics concepts and skills from teachers. They also wanted more attention given to their needs:

“I would like him/her to explain correctly from one step to another so that we understand. So that everyone can follow the steps and how to do it correctly” (a Grade 6 learner).
“By helping us in correct way by giving us examples and attention to understand all the things they are teaching us. Sometimes they really don’t help us that is why we don’t do things correctly (a Grade 6 learner).
Changes in learners' responses did not come as a surprise because male learners tend to think and assigning themselves to difficult tasks (masculine) and that anything that was easy should be handled by girls (feminine). The cruxes of these responses denote that mathematics, hard as it was perceived, was not for girls.

Learners were asked to choose between a male and female teacher. Responses were quite mixed. The common feeling among the learners was that male teachers were better than female. The main reason behind this choice was that male teachers provided better explanations than their female counterparts. In addition male teachers were strict than female.

"Male teacher because female teacher if you ask them a question they always say they are tired" (a Grade 5 learner).

"Male teacher because female teachers when you ask a question they will beat you and tell you why did not you listen when I was teaching?" (a Grade 6 learner).
Obvious the perception differed because they were those who opted for female teachers because they were humble, caring and kind compared to male teachers:

“I will choose a female teacher because male teachers beat us” (a Grade 6 learner).
“I will choose a female teacher because she approaches learners kindly” (a Grade 5 learner).

<table>
<thead>
<tr>
<th>11.</th>
<th>Basic Assumption: Many learners are negative towards mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research Evidence: Teachers’ attitude towards teaching mathematics negatively impact on learners’ choices of the subject. Gender does not have an influence on learners’ choices of mathematics. There is no gender difference on gender preference of teachers between girls and boys</td>
</tr>
<tr>
<td></td>
<td>Policy Propositions: Teachers should maintain positive attitude when teaching mathematics and encourage learners to learn and like mathematics</td>
</tr>
</tbody>
</table>

The assistance from home in learning mathematics

Learners indicated that they received assistance from other siblings, parents and other relatives at home. Those coming from families with low education and socio-economic background received no assistance. This was not a surprise because such families were normally engaged with finding ways and means of feeding the family thus detached from supporting their children’s education.

The covering the teaching topics

It is common practice within the teaching profession that teachers finish a topic fully before proceeding to another one. This was not the case in all classrooms and schools. These differences were very evident in learners’ responses. There was a tendency of teachers paging through the textbooks skipping some portions of the topics. This was expressed in schools that learners had access to the text books. The motives for skipping some topics or portion varied:

“When they do some part of the topic they tell us to leave other part for tomorrow” (a Grade 5 learner).

The problem of learners not understanding the content of the lesson and most probably the presence of those with difficulties in mathematics hindered the pace of teaching and thus coverage of the topics within the prescribed time. This issue was well articulated:

“No because some of the learners say they did not understand and teachers cannot go to the next stage because they want everyone to understand that is why we do not finish the topic” (a Grade 6 learner).

Apart from teaching, teachers were also assigned to carry other tasks. As a rule these tasks should not interfere with teaching. In practise, teachers specialises different subjects in a phase. Due to shortage of subject specialist within a phase, school management utilised subject specialist from other phases to teach in high or lower phases. This practice was evident in schools:

“No because teachers have some other work to do especially teaching grade eight they start early preparing for the examinations and sometimes have meetings to attend. Some because of coming late they try to cover all chapters but fail” (a grade 7 learner).

Differences on how teachers covered the topic were evident. It became obvious according to learner’s responses that some schools covered all the topics. This implies that the syllabus had been fully implemented. Other schools did not cover all the topics. There were obvious different practices between schools. For example, grade 7 learners who were interviewed were in Grade 8 in 2008. One easily notices the differences through their varied responses on the coverage of topics. The researcher asked learners coming from the present school in (2007 to raise their hands. A large number of learners raised their hands up and some did not thus indicating that the remaining come from other schools. It was thus apparent, school operates differently with some covering all topics while some not. These variations affected the standard of input and thus output in Mathematics performance nationally:
“Some of them do but some not ending up asking the part they have not covered in the examination” (a Grade 7 learner).

The learners’ incongruous views were contributed by the fact that teachers’ did not know what was expected to be covered. The differences between the topics in the textbooks and the competencies stipulated in the syllabus were not known. As a result, learners encountered difficulties in tackling questions in the external examinations. It was obvious that learners were exasperated by this situation:

“They don’t teach us all the topics. When you write the examination you find some topics that were not taught” (a Grade 7 learner).

12. Basic Assumption: Teacher covers the mathematics syllabus in a year
Research Evidence: Some teachers don’t teach all topics in the syllabus but include them in the examination. The presence of learners with learning difficulties makes it difficult for teachers to cover the syllabus. Some teachers cover the mathematics syllabus in a year
Policy Propositions: Inspectors and the school management should ensure that teachers cover the syllabus in a prescribed year. The school management should moderate the trimester examinations

The availability of Mathematical equipment and teaching materials
Mathematics equipment and materials enhances teaching. Teachers faced problems in demonstrating lessons that required the use of specific equipment and materials. Learners equally failed to learn well topics that required the use of specific equipment and materials. The limited material and equipment available at school were shared between two learners or more. In some situations there was no equipment. The teaching material such as textbooks, exercise books, ruler, pencils were not adequate. Learners had to buy some learning materials. This was a bit cumbersome especially to learners whose parents were unemployed, orphans and other vulnerable children. The lack of textbooks caused difficulties to learners especially when they were given assignments or home work.

Learners had had necessary but inadequate textbooks to do their work. Things like pencils, some mathematical equipment were provided by parents. It was difficult for parents who were economically disadvantaged to provide for their children. Children from such families tend to beg from other children a situation that was not inspiring as it demoralised and embarrassed learners from disadvantaged families. The sharing of text books among learners was evident in all schools. Sharing of textbooks caused a lot of difficulties to learners. Learners were forced to make efforts to get the books after school hours when they were given home work. One learner reiterated this sentiment:

“It is a problem to share the text book especially if you are given a home work and sharing the same text book. If the other goes home with the book and you want it. If you go where she stays and you don’t find her/him you won’t be able to do your homework. If you go to school without the homework, you are punished and sent out” (a Grade 6 learner).

13. Basic Assumption: Schools have enough equipment and teaching materials to affect the mathematics teaching
Research Evidence: There were shortages of equipment and text books in schools to affect the teaching of mathematics. Learners share mathematics text books. This makes it difficult for learners do their homework and revision
Policy Propositions: Text books should be distributed in quotas. The school inspectors should ensure that schools entitled for Education Development Fund are provided with funds to purchase mathematics equipment. Principals and school board should make sure School Development Fund is used effectively

The mathematics home work
Teachers gave home work to learners consistently in some schools and sporadically in some. The practice in all schools was to let learners exchange books and teachers went through the correction with learners.
Peer marking was mostly practiced. Learners marked partner’s books and assigned marks. It was rational to doubt the reliability of this practice since teachers signed the home workbook without carefully checking the marking. Not much was known about the accuracy of learners marking and whether they look at the method leading to the correct answer or just the answer. It was therefore not a surprising that learners wanted teachers to mark the work:

“They are not marked. Often teachers tell us to exchange books and mark them. We want them to mark the books themselves” (a Grade 6 learner).

14. Basic Assumption: Teachers seldom give and mark learners’ mathematics homework
Research Evidence: Teachers differed on the way they gave home work to learners. Peer marking was in practice in schools
Policy Propositions: Teachers should provide homework and mark the books consistently. The principal and the head of department should make sure that teachers give homework and mark learners’ books

6.5 Teachers views on why learners perform poorly in Mathematics

The foundation of mathematics in the lower primary phase
Teachers attributed learners’ difficulties in learning mathematics as due to a “poorly” laid foundation in the lower primary phase. They conceived that foundation in this phase was not laid properly because:

“The learners in grade 5 or 6 fear big numbers when asked to add or subtract a number like 100 +203 or 993-624. One could hear among themselves remarking these are big numbers to handle!” (Grade 5, 6, 7 Mathematics teacher).

Teachers at Upper Primary Phase did not have a clue about the Lower Primary Phase syllabus, whether it limits or prescribes teachers in this phase to teach learners sums between 0-100 or up to 1000. But, if it was not the case, teachers should have introduced learners to ‘big’ numbers which they dealt with earlier. Learners at this phase still got confused with multiplication and addition as indicated above. Instead of using multiplication they would add, e.g. 6x6, they would get = 12, instead of 36:

“we have to go down to grade 1 or 3 to see really how learners are taught in mathematics for the system to complement one another” (Grade 5, 6, 7 Mathematics teacher).

15. Basic Assumption: Poor mathematics foundation at the lower primary affects the performance of learners in mathematics at upper primary
Research Evidence: Teachers conceived that mathematics foundation at the lower primary was not laid properly and this affected the learners’ performance in mathematics at upper primary
Policy Propositions: NIED curriculum division should ensure that there is smooth link and transition between the lower and upper primary mathematics syllabuses. The Colleges of Education should ensure that teachers receive a balance input between methods and subject content. The school management and advisory teacher should monitor the teaching of mathematics

The Ministry’s and stakeholders efforts on improving learners’ mathematics performance (teachers’ views)
Teachers’ views on the ministries efforts in improving teaching skills were astonishing; indicating not much took place in improving their skills in teaching. This was reflected in the comments on stakeholders’ efforts on improving learners’ mathematics performance:

• The Ministry of Education should provide more in-service training for the mathematics’ teachers. At present they feel that they do not receive any in-service training even after syllabuses reforms.
• Mentoring courses for a beginner teachers coming from colleges is also not systematically provided in schools.
Other platforms like conferences are important to develop teachers professionally and this could be arranged on a yearly basis.

Teachers should come together and share some information and approaches about topics that both teachers and learners find difficulties achieving.

Teachers insisted on close co-operation between mathematics teachers and its subject advisory service at all levels and strongly felt that Ministry should foster such a relationship.

The Ministry should provide teaching and learning materials including textbooks to enable a favourable teaching and learning environment.

Generally in-service training is highly appreciated among incumbent teachers because this helps them to take an “inward look” into their teaching practice as one teacher summed up.

Advisory teachers responsible for Mathematics were crucial in improving teaching in schools. The extent to which subject Advisory Teachers gave input in improving teaching of specific subjects including Mathematics in schools was not well known. Teacher felt that the link between schools and Advisory Teachers was weak. This concern was hand in hand with the cooperation with other stakeholders in education. Teachers anticipated more visits from Advisory Teachers and other experts in Mathematics in order to affect teaching and learning of Mathematics:

“Subject advisors should do continuous class visits and render constructive advice and support. In-service training and workshops should be organised termly even if this takes place during teachers’ school vacation” (Grade 5, 6, 7 Mathematics teacher).

Experts from other stakeholders, e.g., UNAM, could visit schools to render help or give a talk to motivate teachers and learners to study and explain to them the importance of mathematics in life” (Grade 5, 6, 7 Mathematics teacher).

“NIED staff, as they are now currently doing with their fieldwork, should have contacts with principals and inform them on the conferences on mathematics, e.g. the one organised annually in Swakopmund (Grade 5, 6, 7 Mathematics teacher).

Primary phase teachers should receive continuous professional training to bring them at par with the new trends in education, including the principles of learner-centred teaching approach. They also proposed the provision of textbooks, teacher’s manuals and other teaching learning materials like teaching aids:

One teacher suggests, “The Ministry of Education should put more effort on providing workshops to teachers. Teachers should be encouraged to attend conferences on mathematics, and competitions on mathematics amongst schools could be arranged where both teachers and learners’ interest in mathematics could be realised” (Grade 5, 6, 7 Mathematics teacher).

Teachers noted that there were needs for establishing a networking among local schools that could save as a platform for developing collective subject lesson preparation and sharing of information about new educational developments. They proposed workshops that would foster a close co-operation among school teachers in the same cluster. More importantly, schools should organise workshops with mentors or heads of department where they could assist new and senior teachers on issues of curriculum.

“Mentoring helps a lot. I remember a situation where my head of department helped me a lot on how to introduce my topic/lesson to the learners and how to assess them. Mentoring is not common in our schools and this should be encouraged to take place. Where it exists, it is not uniformly and systematically organised and this is where mentors need to get training in” (Grade 5, 6, 7 Mathematics teacher).
16.

**Basic Assumption:** The Ministry's and other expertise support to teachers in improving mathematics teaching is insufficient

**Research Evidence:** It was evident that the ministry was not providing enough support to teachers or providing enabling conditions for improving mathematics teaching and learners' performance

**Policy Propositions:** NIED should provide efficient and accessible continuous professional development programs. The school inspectors should promote and monitor the functions of the cluster schools systems and use them as platforms for exchange of expertise among mathematics teachers. The ministry should formalise the mentoring teacher duties in schools. The regional education offices should ensure that teaching material, equipment, and textbooks are evenly distributed in schools

The Learners' ability to achieve competencies in the syllabus

Teachers maintained that not all learners can achieve all the competencies set in the syllabus because:

Learners come in mixed abilities, as there slow and fast learners. The slow learners could have problem achieving all competencies in the syllabus (Grade 5, 6, 7 Mathematics teacher).

The background at the lower primary phase where they come from varies as some learners were properly taught where others not (Grade 5, 6, 7 Mathematics teacher).

There were of course fast learners who achieved all competencies within a specified time but because of the slow group, teachers always slowed the pace to include all learners. On the contrary teachers believed that all learners could have achieved all competencies as set in the syllabus if proper teaching took place in the class. This would have been attained if classes were provided with sufficient textbooks, teaching and learning materials. Teachers felt that principals should have strict management skills on essential classroom management such as controlling lesson plans, scheme of work, syllabus implementation, and assessment, moderate the quality of examination and conducted regular class visits.

17.

**Basic Assumption:** Learners demonstrate limited ability in achieving all competencies in the syllabus

**Research Evidence:** The classes were comprised of fast and slow learners. Not all learners have the ability to achieve all competencies in the syllabus

**Policy Propositions:** Schools should implement compensatory teaching policy to help learners excelling well in the subject. NIED should train teachers on compensatory teaching to enable all teachers to help learners with learning difficulties to excel well in the subject

Simplification of the basic competencies

Teachers opinions differed about the present basic competencies as stipulated in the syllabus. There were those who believed that the competencies in the syllabus were already in their simplest form and do not need simplification:

“Subject teachers should adjust their teaching to the class environment. This takes ‘experience and maturity’ of the teacher” (Grade 5, 6, 7 mathematics teacher).

However, other teachers contended that the language in the syllabus was too difficult. Obviously this notion has little to do with the learners since teachers were expected to deduct the content from the syllabus and compile the scheme of work thereof. The language used in the textbooks and syllabuses goes hand in hand with the vocabulary that learner were expected to master at this phase:

“Language used in both textbooks and syllabuses of mathematics across the grades is much advanced and should be simplified. Words like, ‘identify, evaluate’, are difficult to learners in Okahandja schools to grasp and the syllabus committee tasked with its development should think about advancing some changes to it. Every ‘word’ from the syllabus the teacher ‘says’ is ‘new’ to the learners and as such,
learners are ‘left’ puzzled in the process. Examples given in the syllabus at times are ambiguous and are quantified in a very small space” (Grade 5, 6, 7 Mathematics teacher).

18. Basic Assumption: The competencies set in the mathematics syllabuses at upper primary are simplified enough for learners to understand and learn the skills required to master mathematics at this phase.
Research Evidence: The terms used in the syllabus and the language was difficult and thus required to be simplified.
Policy Propositions: NIED should review the syllabus especially the terms and the language. The panels should expand the glossary list and ensure that all new terms are included. NIED with the Colleges should review the Teachers’ Training Programs to ensure that the terms used in the syllabus are clearly understood by teachers.

The anticipated family and community support
Teachers indicated lack of parental involvement in their children education as one of the biggest problem. Very few parents helped their children with school tasks, or even few cooperated with the schools to find out how their children were progressing with their work:

‘Parents of our local schools are faceless: they are nowhere to be found in their children’s schooling. They do not come to inspect their children’s work when we need them to come to see their children’s work. They do not make time for this. The main reason is the lack of interest in their children’s work” (Grade 5, 6, 7 Mathematics teacher).

The lack of education hampered the parents’ involvement in their children’s education. Although not all parents with low education do value schooling and that children’s education meant little to them, most of them do. Children coming from such families lacked support and assistance:

Another reason could be, a lot of parents are not so educated to understand the value of schooling or even assisting their children where they suppose to help” (Grade 5, 6, 7 Mathematics teacher).

Teachers’ views on this subject were substantiated by learners’ responses to the question “Is there any one at home who is interested in knowing what you are learning at school e.g. request mathematics demonstration, ask questions about your mathematics progress or homework of check your work?”

“Very few of our parents assist us with our school work. Not all parents are interested in knowing what we are doing at school or even asking us to demonstrate what we did at school” (Grade 5, 6 and 7 Mathematics teacher).

Teachers viewed parent positions in the education of young people as important. By participating actively they would help teachers to attain teaching and learning objective and improve the pass rate in the schools. According to teachers’ views, learners who came from families with low education and socio-economic background do not get support from parents. These learners form the majority of the school population. The reason why parents of these children find difficulties supporting them at the school could be; they spend much time in finding ways and means to support the family than supporting the school in their children’s education.

19. Basic Assumption: The community and the family are not involved or support the children in school work
Research Evidence: There was a lack of parental involvement in children’s education. Low level of education among many parents hampered their involvement in children’s education
Policy Propositions: School management should strengthen the link between the school and home where learners reside. The Colleges should ensure that a module covering home versus school dynamics is developed and students teacher are well trained on these dynamics. NIED should provide training as part of continuous professional development on dialectical relationship between the school and the home.
Syllabus covering and assessment
Teachers find difficult to cover the syllabus especially in the first term because of routine school activities, e.g. sports (athletics, which is mostly arrange during this term). In grade 5 which was the entry point to Upper Primary Phase, teachers mostly drilled on some topics that learners were supposed to have mastered at the Lower Primary Phase. The presence of learners with Mathematics learning difficulties slowed down the pace of teaching and learning in the classroom. This made it difficult for teachers to cover the syllabus within the required time frame. It is most likely reasonable conclude that if teaching would have been done according to the specified period in the scheme of work, it would have entailed a rushing over through the topics without learning:

“It must be left the subject teacher to arrange his/her teaching to the needs of the class that he/she knows”, summed up the teacher (Grade 5, 6, 7 Mathematics teacher).

Teachers assessed the learners through many techniques like “testing, topic tasks, investigation, class work (class exercise), homework or writing examination. The assessment of Mathematics was done in accordance to the Broad Curriculum assessment guidelines.

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<tr>
<td><strong>Basic Assumption:</strong> Teachers do not cover the syllabus in a prescribe time to be able to assess learners in all competencies</td>
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<td><strong>Research Evidence:</strong> Routine school activities interfered with teaching. The existence of learners with disabilities slowed down the teaching pace. The assessment of learners was done according to the assessment policy</td>
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<td><strong>Policy Propositions:</strong> School management should review the prerequisite of routine activities and the tent to which they interfere with teaching and learning. The principals should ensure that all learners are given compensatory teaching. The inspectors and advisory teachers should ensure that the assessment policy is fully and correctly understood and implemented</td>
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6.6 Comparing levels of performance in mathematics at Upper Primary Phase

To be able to determine the levels of performance of learners in this phase and possibly compare the outcome with other countries, the right responses were gauged against the set standards of performance in mathematics in the SADC countries. The mathematics level specified in SACMEQ (2004) study was used to categorise the questions set for the achievement tests. The competencies were categorised in figure 18 in the following manner: **high level competencies** (level 7 & 8), **the medium level competencies** (levels 4, 5 & 6) and the **low level competencies** (levels 1, 2 & 3).

Figure 18 below illustrates the allocation of questions that were scored above 50% in the achievement test against the levels of competencies.
Analysis and comparison of performance of grade 5
In this study, it was found that the learners performed well on the questions set at lower than the medium and high level questions. It was important noting that none of the grade 5 learners performed well in the questions covering the low level basic competencies (questions 1, 5, 6 and 19), a number of them also performed well in one high level competency question (level 8).

Analysis and comparison of performance of grade 6
Most of the questions where the grade 6 learners performed very well were low competence level questions. Only questions 9 and 29 at the middle competency level did learners performed very well. This indicated that most of the learners did not do well in the middle level competencies questions. There were only two questions of high level competencies set in the test. None of the learners performed well on these questions.

Analysis and comparison of performance of grade 7
The performance in grade 7 was a bit different from the grade 5 and 6. The results indicated that there were high performances in the questions categorised at lower level competencies. Learners experienced difficulties in all the tested middle level competency content areas. There were 5 questions set at the high level competencies 7 and 8. Out of these questions, only in one question did 65.3% of the learners performed well. The rest of the questions had lower marks.
Basic Assumption: Many learners in upper primary phase perform poorly in mathematic examination

Research Evidence: Learners performed very poorly in the achievement test about 80 - 90% failed the test in grade 5, 6 and 7. The aggregated wrong answers inferred the lack of teaching of high competencies in schools thus the failure of learners in attaining these competencies. Significant differences between the wrong and the right answers were evident in all grades indicating that learners scored wrongly in most of the questions in the achievement test in all grades (5, 6 and 7). Although most of questions tested the lower and middle level competencies, learners performed poorly in the test indicating that they did not achieve the required competencies. The few tested higher level competencies were poorly attempted giving an impression that the test results would have been worse if the high competencies would have been dominant in the test. These results were comparable to the SACMEQ findings.

Policy Propositions: Examination (DNEA) and inspectorate directorates to review the assessment and evaluation of learners. Colleges should have an in-depth content teaching in teacher training program. Inspectors, school management, should ensure that learners are assessed according to the assessment guidelines and that examination Papers carry a balance of knowledge and application as enshrined in the syllabuses. Teachers should put more emphasis on teaching high level competencies. NIED should take responsibility in reviewing the contents and competencies where learners failed to achieve. CPD at NIED should strengthen and provide refresher courses to long service teachers
CHAPTER 7

TEACHERS’ RESPONSES ON MATHEMATICS CURRICULUM AND TEACHING

7.1 Introduction
This section presents teachers’ responses on the following areas: approach in teaching mathematics, learners’ performance in various skill areas, areas that require emphasis, the use of equipment in mathematics, topics that were difficult to learners, reasons for poor performance in mathematics, teachers’ assistance to learners in learning mathematics, challenges facing mathematics teachers and competencies that learners faced difficulties in learning. Teachers were asked to rate 1 which indicated to a less extent and 5 to large extent and 3 denoting the middle or neutral point. 2 denoted closer to less extent and 4 denoted closer to large extent on the items under each of the above mentioned areas.

The results are presented in figures denoting the percentages under each of the five points scale. These statistics are fundamental for interpreting the findings. It should be noted that the higher the mean the lower the standard deviation and the standard error of the mean. Similarly, note that, the lower the mean the higher the standard deviation and the standard error of the mean. Note that only items which have mean score of 3.5 and above were used to select items and construct the figures and later interpretation of the findings. The mean of above 3.5 showed the emphasis on the problem, importance of the approaches, and the strength of opinions and views expressed by teachers.

Furthermore, under each grades, the number of teachers was limited to N=4, this was not accidental because there was one teacher teaching mathematics in the phase in each school. Adding to this, the interviews and questionnaires targeted mathematics teachers in the upper primary phase only. The researchers were aware of the fact that the risks of sampling errors were higher when the sampled population is lower.
7.2 Teachers’ responses on curriculum and teaching

Approaches used when teaching Mathematics

Figure 17: Approaches used when teaching Mathematics (N=4)

Figure 18 presents approaches used when teaching Mathematics. Teachers applied varying teaching approaches for enhancing the teaching of Mathematics and consequently improve learners’ performance. As shown in figure 18 when teachers were asked what approach do they use when teaching Mathematics, in total of 75% of them with a mean average of 4.2 indicated that they used “activity based approach, Use of text-book, class discussions before individual work”, and “explain the new work and later individual work”.

22.
Basic assumption: There are various approaches used to teach Grade 5, 6 and 7 Mathematics. Some of the approaches are more popular than others; and some are more effective than others.
Research evidence: It was evident that 75% of the teachers in this study indicated that they use approaches such as: activity based approach; text-books, class discussions before individual work; and explain the new work and later individual work.
Policy Propositions: Specialists from NIED and Advisory Teachers should make teachers realise the advantage of using varying teaching approaches especially in mixed ability and overcrowded classrooms because this makes the concepts of differentiation and individualisation possible.
Performance of learners in the Mathematics skill areas

With good teaching and enough materials and resources, all learners are expected to excel in Mathematics. The findings presented in figure 19 show uncertainties on teachers’ responses on how learners performed in various skill areas. Most of the teachers’ responses fell on the middle point scale while a fraction of their responses fell on the agreeing side of the scale. We can conclude from this that learners experienced problems in all mentioned Mathematics skill areas.

**Figure 18: Performance of learners in the Mathematics skill areas (N=4)**

With good teaching and enough materials and resources, all learners are expected to excel in Mathematics. The findings presented in figure 19 show uncertainties on teachers’ responses on how learners performed in various skill areas. Most of the teachers’ responses fell on the middle point scale while a fraction of their responses fell on the agreeing side of the scale. We can conclude from this that learners experienced problems in all mentioned Mathematics skill areas.

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**23. Basic Assumption:** Learners in Namibian primary schools perform poorly in many mathematical skill areas. Reasons leading to this vary.

**Research Evidence:** In this study only a quarter of the teachers agreed that learners possessed the selected mathematical skill areas, the majority of the teachers remained neutral.

**Policy Propositions:** Teachers should ensure that they help learners to master skill areas when teaching and assessing learners as these skills form the cornerstone of mathematical knowledge. They might also be a need for the Advisory Teachers to empower the teachers in the said skills, especially for assessment purposes. NIED should review the skill areas and develop training programmes as part of Continuous Professional Development for teachers.

**Emphasis needed for improving performance in Mathematics**

For learners to do well in Mathematics, emphasis should be placed on certain key areas perceived as more demanding or difficult. These areas should be rehearsed and attention should be given on to how learners are continuously improving.
The results on teachers’ responses presented in figure 20 show that more emphasis should be placed on understanding problem solving and interpreting graphs. The results in figure 20 show that more emphasis should be placed understanding problem solving and interpreting results. Skill areas that were scores below the midpoint of the scale were not included. This implied that no emphasis on teaching was needed on these areas.

Basic assumption: Some Mathematics topics are more demanding and hence, require more emphasis to ensure improved performance.

Research evidence: The findings show that 50% of teachers indicated that emphasis should be placed on understanding problem solving and interpreting graphs.

Policy Propositions: NIED should analyse the contents in these topics and ensure that they are comparatively in line with what is taught across the regions. The Advisory Teachers should help teachers pay attention and if possible advise them to allot more time to such topics when planning, mainly the schemes of work.

Specific Mathematics content areas require extensive use of equipment and materials
Teachers were asked to rate mathematical areas that required intensive use of equipment and teaching materials. It was obvious that certain Mathematics content areas require the extensive use of equipment and materials than others if effective teaching has to take place. The results in figure 21 show that Shape and Space, Problem Solving, Measurements, Geometry and Fractions required the most extensive use of equipment and materials. One wonders to why problem solving was scored as needing equipment.
25. **Basic Assumption**: Certain Mathematics content areas require the extensive use of equipment and materials than others and most of the schools are not well equipped.

**Research Evidence**: Teachers identified Geometry, Measurement, Problem Solving and Fractions as content areas that require extensive use of equipment and materials.

**Policy Propositions**: The Ministry of Education should equip all schools with necessary equipment and materials; especially for use in Geometry, Measurement and Fractions as identified.

Topics learners find difficult in learning

It was ironic to note that when teachers were asked, ‘what are the themes/topics learners find difficult to learn?’ The majority of their responses lied on ‘depend’ denoting that learners had had either difficulties or not difficulties in the mentioned themes. These peculiar findings are presented in figure 22. It was not amusing that teachers noted specific competency areas which learners faced difficulties. According to the teachers’ responses these competency areas were most challenging.
Figure 21: Topics learners find difficult in learning (N=4)

Basic Assumption: Learners find most of the Mathematics themes and topics difficult to learn due to ineffective and inappropriate teaching approaches.

Research Evidence: Teachers indicated mental arithmetic, multiplication and division, comparing and ordering decimal, scales in decimal fractions, introduction to decimal fraction as challenging. Topics that teachers felt were less challenging are: multiplying and dividing by 10 and 100 in Decimal Fraction

Policy Propositions: Subject specialists from NIED and Advisory Teachers should conduct training workshops to enable teachers teach the identified topics effectively and introduce them to different teaching approaches.

Figure 23 presents reasons that make learners perform poorly in Mathematics. The results show that teachers strongly felt that shifting from teaching in mother-tongue to English contribute to poor performance in Mathematics in this phase. Researchers observed that schools with English as medium of instruction from Grade 1 could express themselves well during the learners’ interviews than those which shifted from mother-tongue to English in the upper primary phase.
Lack of language to learn the Mathematics concepts and skills was noted as a hindrance to learners’ performance in Mathematics. This view should be taken in close relation to the ‘lack of interest in Mathematics’ and lack of motivation towards Mathematics with teachers’ responses fell at 4.0 and 4.5 respectively. Other issues of concern were transfer of learners without achieving basic competencies, overcrowded classrooms, lack of individual assistance to those facing problems in Mathematics, and the lack of parental involvement.

27. Basic assumption: Many learners in Namibian schools perform poorly because they have a negative attitude towards the subject. Research evidence: There were a number of reasons why learners in Namibian schools perform poorly: shifting from teaching in mother tongue to English; lack of language to learn the Mathematics concepts and skills, lack of interest in Mathematics, lack of motivation towards Mathematics, transfer before learners mastered Mathematics competencies in a respective grade, learners with mathematical problems receive little or no assistance in the overcrowded classrooms, lack of individual assistance to those facing problems learning Mathematics, lack of teaching materials to foster understanding of concepts and skills and lack of parental involvement.

Policy Propositions: Educational planners; policy makers and curriculum developers should revisit the language in education policy (mother tongue instruction vs. ‘straight to English mode’), and evaluate the effectiveness of promotion guidelines specifically on transfer. The Ministry of Education should equip schools and improve the infrastructure (build more classrooms) of the schools to allow differentiation and individualisation. Teachers to motivate learners to learn Mathematics; specifically helping them realise the benefits of learning Mathematics as well as revisiting existing channels between the schools and the parents; involving them more in the education of their children; parents should also be made to see the value of learning Mathematics.
Effective methods of assisting learners to improve Mathematics performance

It can be observed in figure 24 that apart from ‘giving learners assignments, projects and homework regularly,’ were areas to which teachers’ responses were evenly distributed within the five point scale. The ratingS of the rest of the areas were high with average mean score of 4.1. Impressively, according to the teachers’ responses, motivating learners, exposing learners to various methods of teaching and teaching learners’ basic Mathematics principles received higher rating. Although these three areas were discrete, they may have great impact into learners’ performance when well integrated and implemented during teaching.

28. **Basic assumption:** There are effective methods/ ways of assisting learners improve their performance in Mathematics.

**Research evidence:** The following methods were noted to be effective in improving the performance of the learners in Mathematics: motivating, exposing learners to various methods of teaching and teaching learners basic Mathematics principles.

**Policy Propositions:** Subject specialists from NIED and the Advisory Teachers should conduct workshops on: ways of motivating and changing the perception of learners, introducing teachers to various methods and demonstrate some of them. Basic Mathematics principles should be known by all Grade 5, 6 and 7 teachers in the Namibian schools.
Challenges facing Mathematics teachers at Upper Primary level

Teachers obviously face a lot of challenges in Upper Primary when teaching Mathematics. The most critical challenge teachers identified were the over-crowded classes and the shortage of teaching materials and equipment. As the practice in many schools among teachers, teachers depended on textbooks activities. The harsh conditions in rural areas were obvious and equally challenging. It was logical to conclude that harsh conditions of teaching in rural areas posed challenges to teachers and shun away those with high potential in teaching Mathematics. Teachers saw misplacement of teachers by the management as a challenging issue. While, the possibilities of continuous professional development and the need for support from the Ministry officials were very important.

**Figure 24: Challenges facing Mathematics teachers at Upper Primary level (N=4)**

Teachers obviously face a lot of challenges in Upper Primary when teaching Mathematics. The most critical challenge teachers identified were the over-crowded classes and the shortage of teaching materials and equipment. As the practice in many schools among teachers, teachers depended on textbooks activities. The harsh conditions in rural areas were obvious and equally challenging. It was logical to conclude that harsh conditions of teaching in rural areas posed challenges to teachers and shun away those with high potential in teaching Mathematics. Teachers saw misplacement of teachers by the management as a challenging issue. While, the possibilities of continuous professional development and the need for support from the Ministry officials were very important.

**Basic assumption:** Teachers at upper primary level face some challenges that hinder their effectiveness.

**Research evidence:** Teachers in this study faced a number of challenges: 100% (mean of 5.0) identified overcrowded classrooms; 75% found shortage of equipment and materials; and dependency on textbooks activities as challenges; 50% identified harsh teaching conditions especially in remote areas; misplacement of teachers by management; and lack of support from advisory teachers. 25% found the possibility of continuous professional development as a challenge.

**Policy Propositions:** The Ministry of Education should build more schools and classrooms; avail all needed equipment and materials; improve the working conditions of teachers especially in the remote areas; and continuous professional development should be intensified. Advisory teachers should render the necessary support.
7.3 Difficult competencies in Grade 5 Mathematics syllabus

**Data Handling**

Teachers’ ratings on how learners performed in Data Handling and the competencies within showed that learners faced minimal problems in the topic. The result in figure 26 shows few competencies under five topics that learners experienced difficulties and these were: estimating answers to calculations with reasonable accuracy, rearrange random numbers in given sequence according to their values in ascending or descending order, identifying the difference in a subtraction task, indicating and identifying the product of a multiplication task, recalling multiplication tables up to 12x12, multiply up to a three-digit number by a two-digit number with answers less than or equal to 10,000, applying any paper and pencil algorithm/mental arithmetic to multiplication and division, and solving two-step word problems. It make sense to conclude that a combination of these competencies few as they are might make this topic and competencies hard achieving.

![Figure 25: Difficult competencies in Data Handling (N=4)](image)

**Common Fractions**

During the interviews, both teachers and learners indicated that Common Fractions were perceived as a difficult topic. Results presented in figure 27 shows that treating denominators of fractions as divisors e.g. a/b as a ÷ b where by b represents the whole number of parts into which a whole number is to be divided and compare and order mixed numbers and improper fractions in practical situations as challenging to learners. Similarly, recognising equivalent fractions and calculating fractional parts of quantities as difficult to learners. Though not apparent, comparing and order fractions with different denominators including finding a common denominator, e.g. 1/3, ¼ and 1/5 is difficult since 50% of the teachers with a mean of 3.5 indicated that learners had problems in pursuing this competency.
Figure 26: Difficult competencies in Common Fractions (N=4)

Decimal Fractions
Figure 28 presents the teachers’ responses on identified difficult competencies within Decimal Fractions. The results show that certain competencies within fractions were difficult specifically converting between proper fractions and mixed numbers with denominators consisting of multiples of 10 and 100 to decimal fractions up to hundredths and correctly multiplying and dividing decimal fractions up to the second decimal place by 10 and 100, where 75% of the teachers with a mean of 3.7 responded that learners faced challenges on competencies under introducing Decimal Fractions and multiplying and dividing by 10 and 100. Equally, arranging decimal fractions in ascending and descending order was difficult to learners though only a quarter of the teachers had indicated so.

Figure 27: Difficult competencies in decimal fraction (N=4)
The teaching of Measurement: Length, Mass and Capacity has the same importance like any other themes in the syllabus. Learners are taught the four basic operations at the beginning of school. They are expected to be able to use these operations in different situations as they proceed through grades. The results of interest in figure 29 were: using and interpreting correctly terms such as distance, thickness, length, height, and perimeter, sides and opposite sides under vocabulary, multiply and divide lengths, masses and capacities by whole numbers and under four basic operations.

![Figure 28: Difficult competencies in Measurement: Length, Mass, and Capacity and Time, Geometry and Mensuration (N=4)](image)

The results in figure 29 show that learners experienced fewer problems in Measurement: Time. This might be due to the fact that learners use time almost in all aspects of life. This includes simply telling time from a clock, converting between years and months, months and days, and the use and correct interpretation of terms like previous, current and future events in proper relation and with appropriate terms. The findings in figure 29 further demonstrate that learners had problems on reading clocks, timetables and calendars, specifically on reading time accurately from clocks and watches (having either hands or digital display). In the achievement test, learners indicated they had problems in Geometry when it comes to distinguishing different kinds of triangles and quadrilaterals. The achievement test results showed that they cannot measure lengths of sides. The results on figure 29 show the contrary. Teachers
indicated that learners experienced difficulties in three dimensional shapes specifically under creating, designing and building three-dimensional figures. However, there was no outcome on Geometry.

30. **Basic assumption:** Learners face difficulties with the competencies in the Grade 5 Mathematics syllabus. **Research evidence:** The findings showed that Grade 5 learners experienced difficulties on fewer competencies, but significant, compared to those competencies that they found easier. It is equally evident that those competencies dealing with money and coin; and measuring time are the easiest. One can infer this to the fact that these competencies are experienced on a daily basis by the learners. **Policy Propositions:** NIED curriculum development division to review the identified difficult competencies; intensify the training of teachers on these competencies; promote continuous professional development of teachers. NIED Curriculum development division should seek a wide consultation with teachers and advisory teachers when developing the syllabuses.

### 7.4 Difficult competencies in Grade 6 Mathematics syllabus

#### Data Handling

![Bar Chart](chart.png)

Figure 29: Difficult competencies in Data Handling in % (N=4)

The Mathematics syllabuses, like all other syllabuses, list competencies that learners should be achieve at the end of each lesson. Some of the competencies are easy while others are difficult for learners. Teachers were asked to indicate difficult competencies in ‘Data Handling.’ As shown in figure 30, the average mean of 3.5 and percentage ranging from 25% to 50% suggests that all listed competencies were difficult. Competencies of representing data with bar graphs and pictograms and reading and interpreting data from bar graphs and pictogram were singled out by the majority of the teachers as difficult at a mean of 4.0 of which 50% respectively agreed of the difficulties that learners were faced in achieving these
competencies. These results suggested that teachers need to pay particular attention to the representation, reading and interpretation of bar graphs and pictograms.

**Whole numbers**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Strongly agree</th>
<th>Partially agree</th>
<th>Depend</th>
<th>Partially disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve step two world problems in context</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognize multiples of numbers up to 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognize and use odd and even numbers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrange random numbers up to 100,000 in order of size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply the relationship signs $&lt;$; $&gt;$; $=$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Express a five digit numeral in expanded notation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use appropriate vocabulary to count up to 100,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 30: Difficult competencies in whole numbers (N=4)**

The outcomes on the topics falling under Whole Numbers were different compared to Data Handling. On Data Handling, the teachers’ responses varied. Figure 31 shows that the following competencies under the displayed topics were noted to be difficult to learners: using appropriate vocabulary to count up to 100,000, expressing a five digit numeral in expanded notation, applying the relationship signs $<$; $>$; $=$, arranging random numbers up to 100,000 in order of size, recognizing and using odd and even numbers, recognizing multiples of numbers up to 12 and solving step two world problems in context. The mean of the remaining competencies were 3.0 or below denoting that, according to teachers’ perspectives, learners found them easy and achievable.
Common and Decimal Fractions

The results in figure 32 show that teachers indicated that adding and subtracting fractions with the same and different denominator restricted to three terms/fractions under the sub-topic additional and subtraction mixed numbers, converting fractions as difficult. This tied with their responses on identifying difficult topics, as this was found to be difficult under common fractions too. Equally difficult is solving two-step problem involving addition (restricted to three terms) and subtraction with common fraction. Under decimal fractions, Adding and subtracting Decimal Fractions with not more than three decimal places and converting common fraction with denominators that are factor of 10,000 and 1000 to decimal fraction are difficult to learners.

<table>
<thead>
<tr>
<th>Competency</th>
<th>Percentage Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convert fraction to equivalents</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Add and subtract fractions with the same and different denominator</td>
<td>Partially disagree</td>
</tr>
<tr>
<td>Solve two-step problems involving addition (restricted to three terms)</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>Convert common fraction with denominators that are factors of 10,000 and 1000 to decimal fraction</td>
<td>Partially agree</td>
</tr>
</tbody>
</table>

**Figure 31: Difficult competencies in common and decimal fraction (N=4)**

The results in figure 32 show that teachers indicated that adding and subtracting fractions with the same and different denominator restricted to three terms/fractions under the sub-topic additional and subtraction mixed numbers, converting fractions as difficult. This tied with their responses on identifying difficult topics, as this was found to be difficult under common fractions too. Equally difficult is solving two-step problem involving addition (restricted to three terms) and subtraction with common fraction. Under decimal fractions, Adding and subtracting Decimal Fractions with not more than three decimal places and converting common fraction with denominators that are factor of 10,000 and 1000 to decimal fraction are difficult to learners.
It was clear from the responses of the teachers as shown in figure 33 that both competencies on money and finance were difficult to learners. The situation changed on the topic measurement, length, mass and capacity; where learners seemed not to face problems in conversion and ordering specifically on converting between SI units using decimal notation. On this competency, 25% of the teachers disagree while 50% seemed not to be sure of the problems learners experienced.
Figure 33: Difficult competencies in Measurement: Time, Geometry and Mensuration (N=4)

Figure 34 presents difficult competencies in measuring time. The results show that all the competencies on the topics of notation and conversion (50% partially agree and 25% strongly agree); and reading and recording were noted to be difficult and learners faced difficulties in these competencies whereby 50% of the teachers strongly and partially agree respectively that learners face problems in these competencies.

Geometry and Mensuration
The outcome of the teachers’ responses in figure 34 shows that teachers indicated the following competencies as being difficult: drawing lines of symmetry in two dimensional shapes under the topic line of symmetry seems to be top on the list as 75% of the teachers’ responses with a mean score of 3.7 indicated it difficult to learners, using a set of square to draw perpendicular lines’, identifying and naming acute, right, obtuse and straight angles’, using different notations for the same angles, e.g. LABC; BÂC;Â’ and identifying and drawing lines of symmetry in regular polygons’. The average 50% teachers’ responses and mean score of 3.5 denoted that learners find these competencies difficult achieving. Furthermore, learners experienced problems on how to calculate the perimeters of regular two dimensional shapes and find an unknown side if the perimeter was given.

31.
Basic Assumption: Learners have difficulties with the competencies in the Mathematics Grade 6 syllabus because competencies become complex with the next Grade or no proper foundation laid in the previous Grade
Research Evidence: This research has shown that Grade 6 learners experienced difficulties on more competencies compared to Grade 5 learners. This research has also revealed that competencies for Mensuration were the easiest.
Policy Propositions: The curriculum development division at NIED should review the identified competencies; intensify the training of teachers on these competencies; promote continuous professional development of teachers
7.5 Difficult competencies in Grade 7 Mathematics syllabus

Data Handling

Figure 34: Difficult competencies in Data Handling (N=4)

Figure 35 presents teachers’ opinions on competencies within Data Handling that learners experience difficulties. The results clearly indicated that learners experience problems in collecting, organizing, recording and presenting data. Although these difficulties were evident under all competencies, they are more vivid under read and interpret data from bar graphs and pictograms (50% of the teachers agree and strongly agree respectively). Furthermore, learners experience difficulties in calculating and interpreting the mean of the small set of discrete data and make deductions (50% in total of the teachers agree). There were obvious difficulties in reading and interpreting data accurately from bar graphs, pie charts and pictograms (50% of the teachers agree and strongly agree respectively). These findings inferred, therefore, that Data Handling as whole was difficult to most learners.
Figure 36 portrays difficult competencies under whole numbers. This was in accordance to the question ‘what competencies in the following Mathematical contents do learners face difficulties?’ Apart from competencies pertaining to determining the factor of number up to 100 and recognizing pattern in factors of numbers, which respectively have the mean of 2.8, denoting minimal but equally significant difficulties facing learners in these competencies, the rest of the competencies according to teacher responses are difficult to learners. More significantly, were the four operations (75 of the teachers in total agree), approximation and estimations (50% of the teachers in total agree), Comparing and ordering of numbers and properties of operations (75% of the teachers in total agree). These findings are congruent to the learners’ responses in the interviews where they indicated facing problems in BODMAS.
Common and Decimal Fractions

During the interviews learners indicated that they had experienced problems in decimal and common fractions. Learners’ responses during the interview corresponded to teachers’ responses to the question ‘what competencies in the following Mathematics contents do learners face difficulties in learning?’ According to teachers’ responses as presented in figure 37, learners faced severe problems in conversion, four operations approximation, estimations and word problems.
Percentages, Money and Finance, Measurement: Length, Mass, Capacity and Time

Figure 37: Difficult competencies on Percentages, Money and Finance, Measurement: Length, Mass, Capacity and Time (N=4)

The findings shown in figure 38 presents difficulty competencies on percentage, money and finance, measurement, length, mass capacity and time. It was evident according to the teachers’ responses that learners experienced difficulties in conversion of percentage and word problem.

**Geometry and Mensuration**

Figure 39 demonstrates the difficulty competencies in Geometry and Mensuration. It can be seen according to the teachers’ responses learners faced problems with calculating the three competencies under perimeter. Under volume they faced problems in calculating unknown dimension of cuboids and cubes. There were obvious difficulties in Geometry specifically in identifying name and use proper notations of angles, points and line, triangles and quadrilaterals.
Figure 38: Difficult competencies in Geometry and Mensuration (N=4)

32. Basic Assumption: Not all the topics and competencies within the syllabuses are difficulty for learners to achieve.

Research Evidence: Teachers indicated that learners face difficulties in the following topics and competencies within the syllabus: all competencies under Mensuration were difficult to achieve, competencies Geometry posses problem where learners faced difficulties in seven out of nine competencies, there were slight difficulties in money and finances, learners experienced problems in competencies under percentages, learners experience severe problems in competencies under decimal and common fractions, apart from the competency dealing with classification of number under the whole number the rest of the competencies under whole number were difficult to achieve.

Policy Propositions: NIED should review the syllabus. The officials responsible for Mathematics in conjunction with professional development subdivision should be engaged in developing teachers’ capacities to teach these competencies and topics effectively.
The purpose of this study was to find out reasons for the poor performance of learners in Mathematics in Okahandja schools. The study was conducted in four primary schools. The findings of the study demonstrated clearly that there were poor performances in Mathematics and reasons leading to poor performance in Mathematics.

The schools’ performance in Mathematics
This section summarises the performance of the four schools in Okahandja District on Mathematics. The findings from the promotion schedules indicated that learners in the four schools obtained lower symbols compared to the high symbols in the external examination results and continuous assessment marks. Most of the learners scored C symbol and below and very few learners obtained A and B symbols. In some schools, none of the learners in Grade 7 obtained A or B. It is evident that learners in Grade 7 experienced difficulties in Mathematics than in the lower grades. From these findings, one can conclude that the competencies become harder and complex as learners proceed to higher grades.

Hence, teachers needed support to upgrade their strategies and approaches of teaching Mathematics in higher grades. Equally important, the Advisory Teachers should render consistent support to subject teachers and the school managers. The role of Inspectors of Education should be re-defined. The inspectors should monitor and evaluate teaching and learning instead of shouldering these obligations to the Cluster Centre Principals. It is equally, and perhaps more crucial for NIED, specifically the subdivision Curriculum Development and Research and Continuous Professional Development to review the Mathematics syllabus for Upper Primary, design and offer intensive CPD training programmes to teachers.

The achievements of educational goals require joint efforts. The schools and the community should work together to strengthen the link between schools and home in order to enhance teaching and promote a holistic child growth. The school management needs to monitor teaching and learning process consistently especially the assessment of learners. The school inspectors should ensure that the National Standards for Schools are implemented and maintained in their respective schools.

The comparison of the Mathematics performance by school
The four schools in this study were compared in terms of performance in Mathematics per grade. The scores for the Grade 5 learners in all four schools are concentrated at C and D symbols, but more at D symbol. In Grade 6, the results accumulated at C and D symbols with few learners attained E symbols. The situation in Grade 7 was different from the above mentioned grades. The results were more accumulated at D symbol in all four schools. No school obtained A symbol, and only one school had learners who obtained B symbol. Overall, the majority of Grade 7 learners’ performance obtained D and E symbols compared to the lower grades. This indicated a decline in the performance of Grade 7. Although the aim of this study was not explore the standard of examination and assessment in schools, differences between the continuous assessment outcomes and the examination marks casts doubts on the mode and standard of tools of assessment specifically the trimester examinations and the continuous assessment marks.

Looking at the result, the higher concentration of learners who obtained D and E symbols indicated un impressively low performance of learners at Upper Primary Phase in Mathematics in the four schools.
This trend of performance would negatively influence the performance of the learners as they go further in grades.

**The Grade 7 external examinations results in 2007**
The schools’ performance in Grade 7 external examination was by far less impressive. The highest concentration for all schools was at E symbol. These findings inferred that many learners performed below average in a standard national examination. The marks gained from the continuous assessment deceivably elevated the learners’ marks and gives a wrong impression of the satisfactory or good performance. The researchers acknowledge the essence of continuous assessment but discourage the dependence on its outcomes for judging the performance specifically when used for determining the national performance. It should be noted that comparison of learners’ performance with other nations in a standardised test looks at the actual performance independent from continuous assessment mark.

The regions should strengthen the cluster system and use them as benchmarks for developing of standardised achievement tests. The Directorate of National Examination and Assessment (DNEA) through examination officials should set mechanism for moderating the cluster tests before administering them in the cluster schools. It is recommended that judgments on the performance should be barely based on the outcome of the cluster, external or other standard examinations.

Following this deposition, it was increasingly not surprising noting that more learners performed well in Paper 1 than 2. The reason could be that Paper 1 tests the low level competencies. Meanwhile, Paper 2 seems to be complex as it required the learners to apply knowledge and skills. On the contrary, the questions in school based examination did not show much difference between Papers 1 and 2. The differences in contents between the external examination and the school based examination raises a strong concern on what was taught and tested specifically in schools.

It was clear that learners were not taught all competencies and were tested and got used to few competencies that were taught and tested during teaching. It was therefore not surprising that many learners find the external examination different in content. Learners claimed that they were not taught ‘that is why they fail’. This situation needs a strong and consistent monitoring of teaching and learning. Inspectors of Education, Advisory Teachers and school management should work together to ensure that learners are taught and assessed according to the set guidelines and national standards.

**Difficult topics and the actual performance of the learners**
The learners in all grades identified difficult themes. However, learners in Grade 5 identified fewer themes compared to the Grade 6 and 7. It was evident that the difficulties increased as learners proceeded to higher grades. In was evident the themes and competencies became more complex in Grade 7. Learners were not objective in identifying some topics and competencies that they faced difficulties in learning because these results differed from their performance in the achievement test. The fact that learners, especially in Grade 5, identified less difficult topics should be correlated with their performance in the achievement test. The opposite was perceptible because the outcome of the achievement test was poor compare to Grade 7 who identified more difficult topics.

It was surprising to note that the learners in this study did not perform well because most of the questions in the test were categorised as low in accordance to the SACMEQ II study competence levels. It was thus obvious that, the performance would have been much lower if the achievement test would have included higher level competency questions. Bearing the number of topics and competencies identified as difficult by Grade 7 learners, and looking at the poor performance, it would have been sensible to conclude that the learners in Grade 7 would face difficulties in the final examination.

It is worth recommending that colleges of education should have in-depth subject content knowledge teaching in pre- and in-service teacher training programmes to enable teachers to teach higher level competencies with understanding. Teachers should also put more emphasis on the teaching and testing of higher level competencies.
The learners’ perceptions on Mathematics

This section gives a summary of how the learners in the four studied schools perceived the subject. It was not surprising to note the differences on the perceptions of Mathematics between those who perceived it difficult and not difficult, because learners differed in their ability to learn different subjects. Those who perceived Mathematics as difficult indicated that they did not like Mathematics and the opposite was apparent. Despite the differences on opinions on how they perceive Mathematics, many learners identified the number of content knowledge areas which posed problems to them such as: BODMAS, decimal fractions, common fractions, problem solving, whole numbers, long division, and multiplication tables. They also found the Mathematics language difficult to understand. Learners indicated that the contents and competencies become more complex as they proceeded to higher grades.

The teaching of Mathematics was not desirable as some teachers showed little interest on the well being of the learners. This situation impaired learning and promoted negative attitude towards the subject. It was thus apparent that though some learners knew the importance of the subject, they rejected opting, or putting efforts in the subject and blaming the teachers for not teaching them in a way that would enable them to understand the contents. Drastic and coherent measures by all partners in education are urgently needed to rectify this situation.

The shortage of textbooks and mathematical equipments made it difficult for the learners to do homework and revision. The learners also lamented that teachers gave homework but they did not mark them. The peer marking was practiced in all schools. The disparities between schools were so obvious to the extent that one wonders if there was any proper system used for example in distributing textbooks in schools. How were resources being distributed? Was it “first come first served” or was it the well known and radical school managers and schools getting priority and benefit? The fact that some schools were well equipped, while some had nothing, was difficult to understand and unacceptable. This situation imposed frustration to learners and teachers and had a direct impact on their performance.

Learners did not know the content of the syllabus. This was not strange because in practice, syllabus is a tool for teaching. Learners with textbooks were able to follow what was taught. Those who received information from the teachers that some topics were left because they were not prescribed in the syllabus had clues on whether the syllabus was completed or not. It was evident in the findings that some learners did not know whether all topics were covered or not, because they did not have textbooks to follow what was being taught and teachers did not discuss with them the contents of the syllabus. Based on this authentication, it was not surprising that learners believed that teachers did not teach all topics in the syllabus although they included them in the examinations. Teachers should discuss with the learners the content of the syllabus so that they are aware of what was taught and why some topics in the textbooks are skipped. Not finishing the prescribed topics and including them in the assessment is unfair to learners and would obviously lead to poor performance.

The finding revealed that continuous professional development was not practiced. In addition, there was lack of support to teachers in subject content and pedagogic approaches. It was obvious that teachers needed support for them to be conversant with the content they were teaching. The management also needed to monitor the day to day classroom activities to ensure that the teaching and learning was done effectively.

The teachers’ perceptions on the learner’s Mathematics performances

According to the teachers, the learners demonstrated different opinions and attitudes towards Mathematics. Some learners liked the subject while some not. This was probably caused by lack of motivation both at school and home. The lack of dialectical relationship between the school and home cut down the input that the school could put into the growth of the learners and choices of the subjects. Teachers conceived that parents were not involved in the education of their children perhaps due to low level of education among many. Very few parents discussed the future career and subject choices with their children. Due to this, parents failed to motivate and encourage their children who believed that Mathematics is a difficult subject and it should be optional to change their attitude towards the subject.
It was palpable that teachers blamed the Ministry for not providing enough support to teachers to enable them to teach Mathematics well. There is a need for looking to the extent and type of refresher courses offered in the regions. While the role of Advisory Teachers was finely documented, the practice needed refinement if they have to render effective and efficient assistance to teachers in their respective work areas. NIED, likewise, specifically the Sub-division Curriculum Studies and Research and Continuous Professional Development, should play a major role in training teachers in curriculum, subject-content knowledge and pedagogical approaches.

On the implementation and the perception of the Mathematics syllabuses, teachers found the language and terms used in national documents such as the syllabuses and textbooks difficult and that hampered the learning of the content knowledge. In some instances, they were forced to drag through the syllabuses slowly. Other factors that delayed teaching and affected the full implementation of the syllabus were: routine school activities and the existence of learners with learning difficulties in the classrooms.

When teachers were asked to identify the topics that were difficult to the learners, they came up with the following: Decimal Fractions, Common Fractions, Geometry, four basic operations, conversion of time and problem solving. It was apparent according to teachers’ views that learners performed poorly because there was no proper foundation laid at Lower Primary phase. Therefore, the poor learners’ performance at Upper Primary phase was not eccentric. The two highlighted factors namely: difficult topics and poor foundation laid at Lower Primary were crucial. To what extent was Mathematics syllabuses of Lower Primary and Upper Primary phase linked? Does the link allow learners to transfer knowledge from the Lower Primary to the Upper Primary Phase? What type or level of subject content versus pedagogic knowledge did teachers at the Lower Primary have to enable them to teach specific subjects like Mathematics? NIED and the teacher training institutions should critically look at these burning issues.

There were doubts whether the concept of learning style was known or understood by teachers. The mere fact that teachers acknowledged that they did not capitalise on, or teach according to the individual learners’ learning style strengthens the core of this argument and provides a clear testimony of the status quo. The teacher training institutions in collaboration with NIED should review its pre- and in-service programmes to ensure that teachers are equipped with this approach and promptly apply it in the classroom to enhance teaching and learning of Mathematics.

Teachers’ perceptions such as lack of parental involvement, support, equipment, difficult topics, and problems posed by the medium of instruction posed a threat to the teaching and learning of Mathematics at Upper Primary phase if not well attended. The Ministry of Education, specifically the Regional Education Offices, should provide support to schools and plan a consistent Continuous Professional Development programmes in collaboration with NIED and teacher training institutions.
15. REFERENCES


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Performance of Learners in Mathematics at Upper Primary Phase in Okahandja District: Examining reasons for low performances. Research Unit, Division Professional Development and Research, NIED Okahandja

ISBN Number:978-99945-2-020-6
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