

PREPARING LEARNERS FOR A MATHEMATICAL LITERACY OLYMPIAD

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In 2006, Mathematical Literacy was introduced as a fundamental subject in the Further Education and Training Curriculum in South Africa. This subject was directed at learners who, in the past, would stop studying mathematics after grade 9. This situation perpetuated high levels of innumeracy in our population. The inclusion of this subject in the curriculum “will ensure that our citizens of the future are highly numerate consumers of mathematics”. The orientation training programme for grades 11/12 teachers was scheduled for July 2006. Due to unforeseen circumstances, the training had to be postponed. The PE District eventually conducted its training in November 2006. The GMSA Foundation was asked to present a 2 hour slot on “The use of Multimedia Mathematical Literacy classroom”. The Mathematical Literacy teachers were enthusiastic and actively involved throughout the training. They also found the Multimedia slot very interesting and informative. This prompted the GMSA Foundation to meet with the writer of this paper and come up with a firm proposal to enhance the status of Mathematical Literacy as a subject in our schools.

This paper traces the progress made thus far:

INTRODUCTION

Mathematics Olympiads or competitions usually target learners with “higher-order” problem solving abilities. Currently, there are a number of Mathematics Olympiads in which learners from various grades participate.

The competitions organized by the NMMU Mathematics Department together with AMESA (PE) set competitions for grades 3; 5; 7; 9 and 11. This is undertaken on a massive scale and comprises 2 rounds. In round 1, learners write at their respective schools and in round 2 selected learners write the papers at central venues. This venture has proved to be very popular. It is exciting to see parents with their children flocking to the prize-giving ceremony in large numbers.

Mathematical Literacy is a new subject in the FET band in South African school curriculum. It is accorded the same “status” as Mathematics. Each learner, in the FET band, must have either Mathematics or Mathematical Literacy as a compulsory subject. However, the feelings of teachers and learners at some schools are that Mathematical Literacy is inferior to Mathematics. Thus, we have learners who should be doing Mathematical Literacy doing Mathematics. Their teachers say that they are not coping with Mathematics. However, they “refuse” to do Mathematical Literacy because it is an

“inferior” subject.

The GMSA Foundation Mathematical Literacy Olympiad is intended to change this view of Mathematical Literacy and raise its profile at our schools. Mathematical Literacy learners are being given an opportunity to participate in their own Olympiad and interest in this project from teachers and learners in the Nelson Mandela Bay area (incorporating Port Elizabeth, Uitenhage and Despatch) has been phenomenal.

The aim of the Mathematical Literacy Olympiad (MLO) is to work hand-in-hand with educators to develop the numeracy skills of Mathematical Literacy learners in the Nelson Mandela Bay area. This project is being undertaken in a partnership with officials from the local education district offices.

A key problem plaguing many learners in Mathematical Literacy (according to reports from teachers) is a lack of basic numeracy skills. The Mathematical Literacy Olympiad (MLO) project aims to motivate educators and learners to focus on mastering the four basic operations in mathematics – addition, subtraction, multiplication and division. This will be done by means of the support materials given to assist learners to prepare for the Olympiad in the 3rd term.

The GM South Africa Foundation (initially called Delta Foundation) was established by the Delta Motor Corporation (now called GM South Africa) in 1994 as an independent development agency. Since inception, the GM South Africa Foundation has pioneered a unique approach to corporate social investment - **Corporate Social Action (CSA)**. This involves the management of innovative pilot projects and the making use of all lessons learnt to produce new developmental models. These models – which are really sets of implementation guidelines - are structured so that the lessons learnt can be shared throughout South Africa and so that findings can also be used to assist the various authorities in the formulation of policies and programmes.

MATHEMATICAL LITERACY VERSUS MATHEMATICS

Mathematical Literacy as a subject is defined in the South African Curriculum as follows:

Mathematical Literacy provides learners with an awareness and understanding of the role that Mathematics plays in the modern world. Mathematical Literacy is a subject driven by life-related applications of mathematics. It enables learners to develop the ability and confidence to think numerical and spatially in order to interpret and critically analyse everyday situations and to solve problems (DoE 2003a: 9).

On the other hand Mathematics is defined as:

Mathematics enables creative and logical reasoning about problems in the physical and social world and in the context of Mathematics itself. It is a distinctly human activity practised by all cultures. Knowledge in the mathematical sciences is constructed through the establishment of descriptive, numerical and symbolic relationships. Mathematics is based on observing patterns; with rigorous logical thinking, this leads theories of abstract relations. Mathematical problem solving enables us to understand the world and make use of that understanding in our daily lives. Mathematics is developed and contested over time through both language and symbols by social interaction and is thus open to change (DoE 2003b:9)

From these definitions, we see that there are both similarities and differences between Mathematics and Mathematical Literacy

Similarities:

Role of mathematics in the world and the applications of mathematics

Numerical and spatial thinking

Solve problems

Differences:

In Mathematics there is observation of patterns leading to theories of abstract relations; this is not a feature of Mathematical Literacy. This is one of the key differences between Mathematical Literacy and Mathematics.

However, looking at the similarities between Mathematical Literacy and Mathematics, it becomes apparent **one** of the foci of Mathematics and/or Mathematical Literacy Olympiads should be:

The solving of problems involving the applications of mathematics in real-life situations; this involves numerical and spatial thinking.

In Mathematical Literacy this may be the only focus.

MEETING WITH TEACHERS

Teachers were invited to a meeting called by GMSA Foundation to explain the purposes of the Mathematical Literacy Olympiad. The writer of this paper discussed the following issues with teachers:

- What an Olympiad is

- The purpose of the first ever Mathematical Literacy Olympiad
- Procedures involved in the Olympiad: Benchmark test; Learner Support; structure of the Olympiad

The teachers were also free to raise any issues regarding the Olympiad. About 40 teachers attended this initial meeting. However, 65 high schools participated in the Benchmark tests comprising approximately 1755 learners.

5 tutors (2 retired Mathematics Teachers and three University students) were appointed by GMSA Foundation to assist in this project. These tutors were trained and given certain roles: These roles included:

- Delivering material to schools
- Marking benchmark (baseline assessment) tests
- Supporting selected learners over a 10 week period (9 weeks in term 2 and one week in term 3)

BENCHMARK TEST

The benchmark test consisted of 15 questions. This comprised the following:

The first 5 questions were on basic arithmetic involving the four operations (no calculator usage for these questions);

Question 6 was converting a decimal to a mixed number;

Question 7 was on number patterns;

Question 8 involved recognizing a 90° angle;

Question 9 was on metric conversions;

Questions 10 – 13 were word problems; and

Questions 14 and 15 were on interpretation of graphs

A quick analysis of the test revealed the following:

Learners had difficulty with the basic operations; they had difficulty with the word problems with language being a major factor; they had difficulty in highlighting key points from a given problem. However, they were able to interpret graphs reasonably well.

An analysis of the performance in the benchmark tests revealed that the majority of learners needed support. Thus, a series of learner support activities were developed by this writer. Learners would complete these tasks throughout the second term and early in the third term. These support activities were developed partly from the benchmark test analysis and partly from selected assessment standards for grades 10/11 Mathematical Literacy subject statements. This was done so that learners would see that their completion of the support activities would help them prepare for the Mathematical Literacy Olympiad as well as assist them with their daily Mathematical Literacy class tasks. Learners were required to use calculators when working through the support activities.

The five tutors were allocated to support 25 schools.(Due to budget constraints only those schools that indicated they needed support were allocated tutors). This support would involve tutors meeting with selected groups of learners in the afternoons and assisting them with the tasks given in the support materials.

THE MATHEMATICAL LITERACY OLYMPIAD

The support activities in the 2nd and early in the 3rd term served as preparation for the Olympiad which will consist of 2 rounds.

Round 1:

To be written at their schools in August 2007: All learners who wrote the benchmark tests will participate in round 1. The round 1 paper will be on basic knowledge and routine applications

Final Round

From the learners who write round 1, 500 will be invited to participate in the final round. This will be based mainly on performance in round 1. However, to ensure inclusivity a minimum of 2 learners per school will be invited to the final round. The final round paper would include more advanced applications.

The prize-giving ceremony will be in October 2007. A detailed analysis of the learners' results will be presented at the 2008 AMESA Congress in Port Elizabeth.

REFERENCES

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