DISCUSSION DOCUMENT

SOUTH AFRICAN MATHEMATICS FOUNDATION
SAMF

coordinated by the

Association for Mathematics Education of South Africa (AMESA)
and the
South African Mathematical Society (SAMS)

1. Background and Rationale

Our country faces many challenges, the main focus being that of economic development. An accelerated economic development should be spearheaded by appropriate technological innovations and advancement. For this to happen there is general consensus that the quality of teaching and learning mathematics is central to any curriculum.

Conscious that the future prosperity of South Africa depends on increased numbers of mathematically qualified personnel, the two professional societies for mathematics in the country, the South African Mathematical Society (SAMS) and the Association for Mathematics Education of South Africa (AMESA), together representing the entire mathematics community in South Africa, acknowledge that there are common areas of operation in terms of mathematics development and education in this country and hence the need to pool the resources of the two organisations to meet the challenges.

In respect of mathematics the issues such as equity, redress, transformation and access will be one of the main focus areas of the Foundation in the short term. Furthermore in the light of the current demand for job creation and the challenge to be globally competitive the Foundation will strive to create an environment that will promote cutting edge technological competitiveness. The Foundation has identified areas of focus and challenges:

- Few learners do mathematics at FET level.
- The need for mathematical literacy.
- Poor public image of the state of mathematics.
- Shortage of appropriately equipped teachers of mathematics.
- Lack of appreciation and acknowledgement of mathematics as the basis for scientific and technological advancement.
- The concern of stakeholders of the competency level of our learners in mathematics

Both these two societies have so far been run by mathematicians or mathematics educators in their spare time; university and other tertiary educators as well as secondary and primary school educators doing this job for the love of it. With these limited resources the two societies have so far been remarkably successful in their efforts, but it has now become clear that both these societies have reached a point where no further significant contribution towards a solution to the problem can be made in their current capacity.

2. THE SOUTH AFRICAN MATHEMATICS FOUNDATION

For an efficient coordination and administration of the listed activities an administrative support structure is needed. These professional societies need a permanent office with full-time executive and administrative staff. This will ensure that the combined skills, know-how and professional capabilities of the members of these two societies can be utilised in a professional manner.

Through a national office for mathematics in the country, it will be possible to exploit the infrastructure and know-how of both AMESA and SAMS and incorporate and extend a number of existing programmes. Examples are listed in the Appendix.

Participation in extramural activities will provide educators with the experience and confidence to approach curriculum changes with a positive attitude. It is likely that enrichment material will in turn develop into topics suitable for inclusion in school syllabuses.

The central target market will be the mathematics educators and users of mathematics of tomorrow.

The autonomy of each organisation SAMS and AMESA is acknowledged and respected. The aim is to provide administrative and other logistical support where needed and to further develop the activities in which both organisations are involved.

3. Aims and Objectives

1. To create a mathematically enabling environment which provides opportunities for all learners to develop to their fullest potential.
2. To inculcate a culture of mathematics.
3. To appreciate and acknowledge the critical role of mathematics in the technological environment.
4. To create a broad base for mathematics participation by all stakeholders specifically including the learners and mathematics educators.
5. To create opportunities for global interaction and competitiveness..
6. To popularise mathematics among all South Africans and to assist in improving the public image of mathematics in South Africa, acknowledging the critical role of mathematics in the technological environment.
7. To develop programmes that will contribute to the mathematical development of all South Africans.
8. To impact positively on the standard of mathematics teaching and learning.
9. To promote research in mathematics and mathematics Education.
10. To enable educators to participate in co-curricular programmes in order to provide them with the necessary skills and confidence to meet the challenges of curriculum changes.
11. To provide administrative and logistical support to AMESA and SAMS and to develop a central focus for the societies.
12. To liase with organisations and stakeholders with similar aims and objectives.

4. POSSIBLE ACTIVITIES

Projects of the Foundation could include all existing projects that have until now had participation in them by both member societies, some of which are listed in the Appendix. Apart from these activities, the Foundation could assist in the following possible projects.

4.1 Mathematics Olympiads (these existing olympiad projects are described in the Appendix)

- South African Mathematics Olympiad
- I M O
- P A M O
- I P M O
- Olympiad Coaching Camps

4.2 Mathematics Development Programmes

A Mathematics Teacher Development Programme

A key challenge in the teaching and learning of school mathematics in South Africa is the deepening and re-orienting of the teachers' mathematical knowledge and their pedagogical mathematical knowledge (i.e. how mathematics is learnt and taught). Thus an in-service mathematics teacher development programme

focusing on developing the mathematical abilities of educators at primary and secondary school level is crucial. While there are several mathematics teacher development programmes in the country conducted by NGOs, most of these focus more on methods of teaching rather than on the developing the mathematical ability of the teachers. The envisaged programme should focus on mathematical development of the current teaching corps in South Africa.

A Mathematics Learner Development Programme

Objectives include

- To develop relevant and meaningful programmes in mathematics for learners.
- To initiate programmes for learners that will contribute to the development of mathematics.

4.3 A National Centre for Mathematical Excellence

A number of local, regional and national mathematical activities are already established. Meetings are organised for secondary school pupils in which their interest in mathematics is further stimulated with lectures on a variety of topics and other activities. Mathematics competitions are run in several parts of the country. These activities are on the whole run by university mathematicians, as few high school educators feel themselves mathematically equipped to organise activities of this nature and often do not have access to administrative structures. High school teachers often also do not have the time to organise activities such as competitions. However, mathematics competitions enjoy considerable support from mathematics teachers, and indeed could not take place without the cooperation of the many teachers who are currently involved. These activities are largely confined to urban areas. A mathematics Centre that houses all our journals, resource materials; enrichment materials is envisaged that serves as

- a resource centre for learners
- a venue for coaching camps
- a resource centre for educators

Rationale for the centre:

- to support national enrichment activities in mathematics
- to support and develop both researchers and educators to run these activities
- to produce and make available booklets, pamphlets, magazines and other resource materials in mathematics
- to act as a resource centre for all relevant mathematical materials, including enrichment materials
- to organise conferences; workshops, seminars, refresher courses and mathematical camps aimed at stimulating imaginative approaches to mathematics teaching and learning
- to serve as a venue for research work, orientation courses and in-service courses
- to act as a resource centre.

This centre shall serve the interests of all stakeholders in Mathematics.

4.4 Publications and Conferences

The administrative infrastructure of the Foundation can be utilised to assist with the publication of existing journals and other publications of both societies and to assist in the organisation of the existing annual conferences of the two societies. Joint conferences by the two societies can be organised by the Foundation. A joint biennial conference could alternate with the individual association conferences. The Foundation can also publish monographs, mathematics workbooks and teachers' guidebooks.

4.5 The Popularisation of Mathematics

By promoting mathematical activities that are seen to be intellectually rewarding and fun, the public image of mathematics will be considerably enhanced. The SAMF will develop a promotional programme, including the design and distribution of mathematical posters and the publication of magazines and a range of inexpensive booklets and magazines on a variety of interesting mathematical topics. Special

attention must be given to gaining coverage of the activities of the SAMF in the press and on radio and television.

5. STRUCTURE

The SAMF is a Public Benefit Organization with a permanent office, a full time Chief Executive Officer, called the director and administrative staff. the following offices whose activities are coordinated and supervised by a director:

- Public Awareness Office
- National Centre for Mathematical Excellence
- SAMO/IMO Office
- AMESA/SAMS Office

5.1 Advisory Board

The affairs of the Foundation shall be administered by the advisory board. The Principal members of the board shall be SAMS and AMESA. Each organisation shall be entitled to two representatives. Their term of office shall be 3 years. The Board will also comprise representatives from National Research Foundation, Department of National Education and major sponsors. The Board is responsible for

- Ensuring that the aims and objectives of the Foundation are achieved
- Initiating, maintaining and supervising the projects of the Foundation
- Appointing and determining the terms of office for the project managers of Foundation projects
- Establishing guidelines and objectives for projects of the Foundation and evaluating the success of these projects in terms of the objectives of the Foundation.

5.2 Director

- The chief executive officer of the Foundation will be the Director of the Foundation who should preferably be a mathematician or mathematics educator. The role of the director includes
- the execution of the work of the Foundation as defined by its projects, that is providing logistical and administrative support to Foundation projects.
- ensuring that the member associations become more efficient in their participation on various bodies and in public comment on curriculum documents etc.
- staying abreast of developments and co-ordinate efficient and timely participation by the member associations.
- oversee the finances of the Foundation and to forward appropriate reports to the Advisory Board.
- arrange teacher development seminars at various points in the country.
- arrange for the publication and dissemination of problem solving material.
- develop a database containing information of
    - members of the societies
    - projects
    - competitions.
- acquire sponsorships and funding for Foundation projects.

The Director should be a full-time position remunerated at an agreed basis and should be contracted for a period of three years.

5.3 Secretariat

The secretariat will comprise one or more full-time secretaries and *ad hoc* administrative assistants. The secretariat will work under the direction of the Director who in turn will be instructed by the Advisory Board of the Foundation.

5.4 Committees for the different projects

Committees, consisting of mathematicians and mathematics educators from all tiers will be constituted to

take care of the main projects.

6. Finance

Some of the existing projects that will be taken over by the Foundation have their own budgets and these will make provision for some of the running expenses incurred by the Foundation activities

It is anticipated that in time the director will source financial support for all activities of the Foundation. However, to get the Foundation off the ground as a running enterprise, seed funding will be required for about three years.

7. Dissolution

This has to be addressed.

APPENDIX: OLYMPIAD ACTIVITIES OF THE FOUNDATION

1. South African Mathematics Olympiad (SAMO)

The South African Mathematics Olympiad (SAMO), a sponsored event, is the national mathematics competition of the country. It is a three round competition with interesting questions and nice prizes and currently about 30000 learners participate annually in SAMO.

SAMO is a premier mathematics competition in the country and is aimed at developing mathematical talent and a positive image of mathematics amongst the youth of South Africa and to develop the mathematics teaching corps in doing so.

This is achieved by:

- stimulating an interest in mathematics and problem solving through the nature of the questions;
- identifying talented students and engaging them in enrichment programmes;
- involving the teaching community at all levels in the Olympiad
- ensuring broad-based participation;
- using the results (statistics) of the competitions to identify areas of need and implement intervention programmes; and
- developing the required skills amongst teachers so that they may use the Olympiad as a teaching source, that they will encourage their students to participate, and that they will be able to provide for the needs of the mathematically talented.

SAMO will be organised by the SAMF in collaboration with other stakeholders.

2. The SAMO Development Project

This project, a sponsored event, will be organised by SAMF. Training camps for educators are organized to provide them with the know-how to establish Maths Clubs in their schools or run local mathematics challenges. One of the most important objectives of this project is to develop capacity among mathematics educators in problem solving. This project will hopefully redress past imbalances in terms of access to problem solving.

3. The International Mathematical Olympiad (IMO) and IMO Talent Search

This project entails the selection, preparation and actual participation of a national team to take part in the annual International Mathematics Olympiad. Currently the South African Committee for the International Mathematical Olympiad, consisting of SAMS and AMESA members runs this project. The project is also a sponsored event.

Selection and preparation of the teams is based on a nationwide Talent Search and a programme of mathematical Camps. Special programmes have been set up countrywide to identify potential IMO team members.

The IMO programme is a functioning and successful activity that can readily be incorporated into the SAMF initiative. It will provide a standard of high achievement to be striven for by pupils and educators. Just as sport serves society by providing vivid examples of excellence and role models for the youth of the country, so the opportunity offered to a pupil to represent his or her school in an inter-school mathematical competition, or the region in a regional mathematical competition, or the country at the International Mathematical Olympiad, will be a major stimulus to the attainment of mathematical excellence.

4. The Interprovincial Mathematics Olympiad

The annual interprovincial mathematics olympiad is another sponsored event running successfully since 1990. It was organised by individuals on an ad hoc basis but is currently a formal SAMS project. It consists of two competitions, one for senior learners (gr 10-12) and one for juniors (gr 8-9) and a similar

model could be developed for lower levels.

3. The Pan-African Mathematics Olympiad (PAMO)

The Pan-African Mathematics Olympiad is an annual mathematics competition for African countries. This event is linked to the Talent Search.