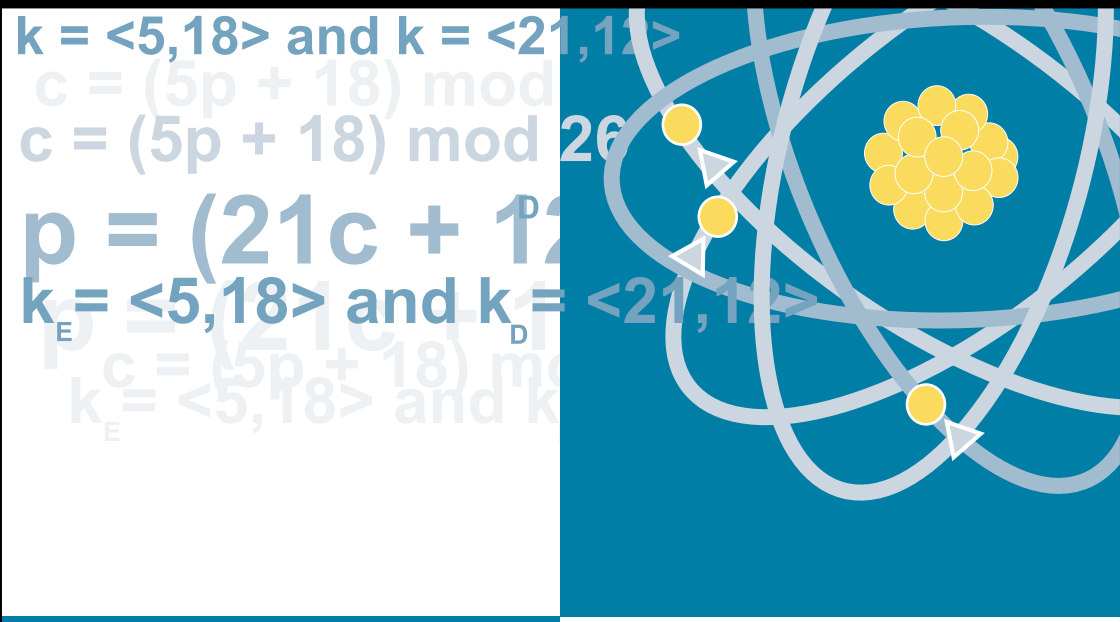
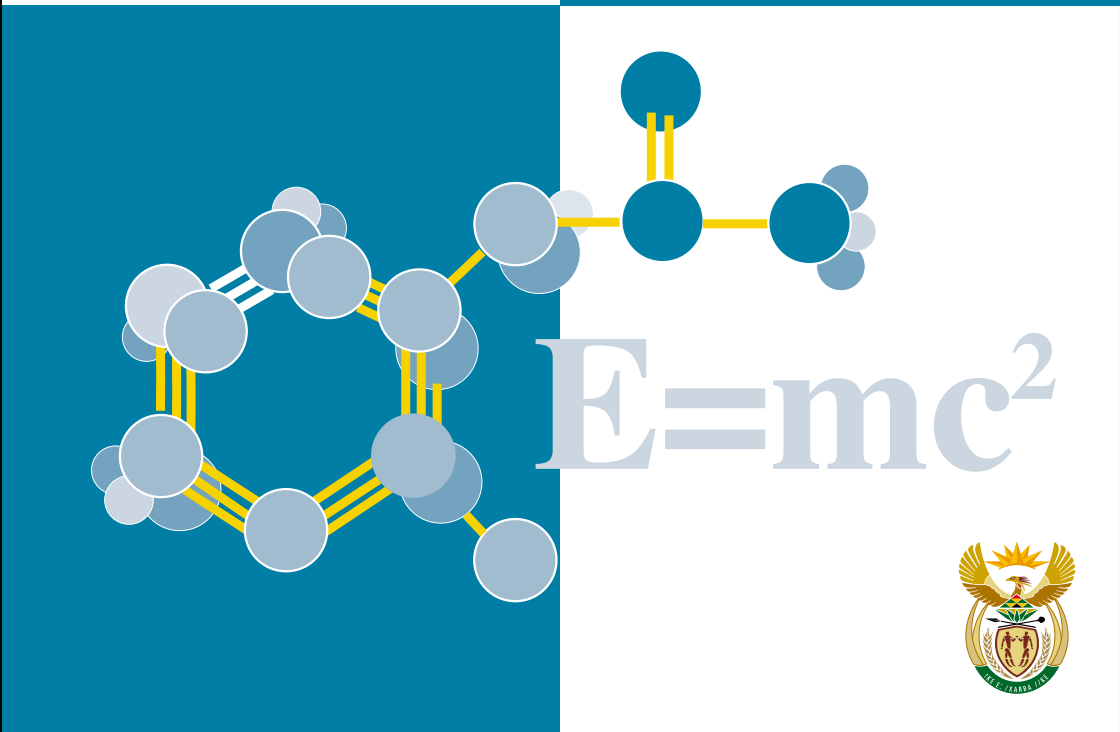
National Strategy for

MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

in General and Further Education and Training





NATIONAL STRATEGY FOR MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION IN GENERAL AND FURTHER EDUCATION AND TRAINING

DEPARTMENT OF EDUCATION

June 2001

'Special attention will need to be given to the compelling evidence that the country has a critical shortage of mathematics, science and language teachers, and to the demands of the new information and communication technologies.' (President Thabo Mbeki - 2000)

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FOREWORD

It must be acknowledged that besides languages, history, the arts and music, three areas have come to dominate expectations regarding what counts as successful schooling and a preparation for socio-economic life and further study. These are mathematics, science and technology education. The legacy of inequality persists in these key fields of study and limits both participation and the release of talent potential. The Department of Education, in collaboration with the Departments of Arts Culture, Science and Technology and of Communications, now seeks to address these structural problems that retard provision of a high-quality education experience in mathematics, science and technology education.

In the learning and teaching of these areas and fields of study, particular attention will be given to the South African Qualification Authority's critical and developmental outcomes for the development and application of mathematics, science and technology. Attention to these learning areas and fields will impact on the quality of delivery of other learning areas and fields. All learning areas and fields of study in the curriculum will be delivered with care, commitment and vigour.

This Strategy is an outcome of a long process of wide consultation that culminated in a consultative conference held in Midrand, Johannesburg, from 11 to 13 September 2000. Addressed by the Minister of Education, Professor Kader Asmal, MP, and the Minister of Arts, Culture, Science and Technology, Dr Ben Ngubane, respectively, the conference resolved to focus the Strategy for Science, Mathematics and Technology Education on three thrusts, viz. (a) raise the participation and performance of historically disadvantaged learners in Senior Certificate science and mathematics; (b) provide high-quality science, mathematics and technology education to all learners taking the first FETC and GETC; and (c) increase and improve human resource capacity to deliver quality science, mathematics and technology education.

The purpose of this Strategy is to present a short-term to medium-term programme of action and mobilise our limited and scarce resources to address the problem at hand. This marshalling of resources involves coordinating those resources that are already being deployed in the system, as well as obtaining additional ones.

One might argue that strategies should be developed separately for the three 'discipline' areas. However, there are other arguments to be made for seeing commonality across the three areas. Not only do the three disciplines inform one another, but curriculum integration also demands that we try to see the totality. There is commonality in the public mind, as well as commonality regarding the problems that each area experiences in terms of its implementation and resources. More often than not, the same staff members teach these learning areas/fields of study in schools.

Now is the time for a concerted effort to improve the quality, participation and performance of South African learners in mathematics, science and technology education. This action strategy must see the beginning of our collective effort.

Through this Strategy, I call upon our social partners within the education system, the private sector, non-governmental organisations and donor agencies to join hands to address one of the critical elements of our human resource strategy.

Mosibudi Mangena
Deputy Minister of Education

1. INTRODUCTION

In the main, education and training under apartheid were characterised by the underdevelopment of human potential; particularly that of blacks1. Vast disparities existed between blacks and whites in accessing educational opportunities. The extent of exclusion was much greater in the learning and teaching of mathematics and science.

The Reconstruction and Development Programme of the first democratic government identified the development of our country's human resources as key and central to the growth and reconstruction of society. In pursuit of this objective, government has adopted a Human Resource Development Strategy: A Nation at Work for a Better Life for All. The Strategy is aimed at improving the foundation of human development and the improvement of the supply of high-quality skills, especially scares skills, which are more responsive to social and economic needs. The Strategy further argues that improvement in the foundation for human development will require, amongst others, improvement of results in mathematics and science.

President Thabo Mbeki, in his State of the Nation addresses during the opening of Parliament in 2000 and 2001, emphasised the centrality of mathematics and science as part of our human resource development strategy.

Globally, in the last two decades, we have experienced an information technology revolution that is pervasive throughout the whole realm of human activity. Technological innovation and its social application will determine the capacity of nations to transform themselves. In recognition of this, government has committed itself to invest in the development of information communication technology infrastructure and the human capacity to mediate these technologies.

The ability of all learners to succeed in today's technically orientated work environment is increasingly dependent on their understanding of mathematical and computational sciences and their application in practical situations. In fact, these sciences have become essential for all learners, including those preparing to become technicians, engineers, educators, leaders in business and government, and more generally, for developing scientifically, mathematically and technologically literate citizens.

1 Black is used in its historical sense to include Africans, Coloureds and Indians

2. CURRENT PERFORMANCE OF THE EDUCATION SYSTEM

In developing the Strategy, one must give attention to the question of capacity and agency, to resources and the ability to accept and mediate change, and to the reality at systemic and institutional levels. For the Strategy to make sense, one requires an understanding of the tacit and material conditions, as well as constraints to action. This Strategy must be located in this reality and seek to transform it into a desired set of future outcomes.

2.1 POOR OUTPUT OF MATHEMATICS AND SCIENCE GRADUATES IN GRADE 12

The number of learners who participate and successfully pass mathematics and science in Grade 12 is very low (see table 1 below). Those who take these subjects in the Higher Grade are very few.

Table 1: Pass % in physical science and mathematics Higher Grade and Standard Grade, 1997 - 2000. Source: Department of Education (1999b, 2000)

Total number of candidates (x1000)	Grade	1997 559.0	1998 552.0	1999 511.0	2000 489.9
Mathematics	HG	Wrote Pass % 68.5 22.8 4.1	Wrote Pass % 60.3 20.3 3.7	Wrote Pass % 50.1 19.9 3.9	Wrote Pass % 38.5 19.3 3.9
Mathematics	SG	184.2 66.9 12	219.4 68.6 12.4	231.2 72.2 14.1	254.5 79.6 16.2
Physical Science	HG	76.1 27.0 4.8	73.3 26.7 4.8	66.5 24.2 4.7	55.7 23.3 4.7
Physical Science	SG	65.2 35.2 6.3	83.8 43.2 7.8	93.5 44.0 8.6	125.1 55 11.2

The number of learners enrolling for the Senior Certificate has been decreasing in the last four years. Figure 1 below shows this decrease diagrammatically. Figures 2, 3, 4 and 5 show the diagrammatic representation of both enrolments (participation) and achievements (performance) at both Higher and Standard Grade levels.

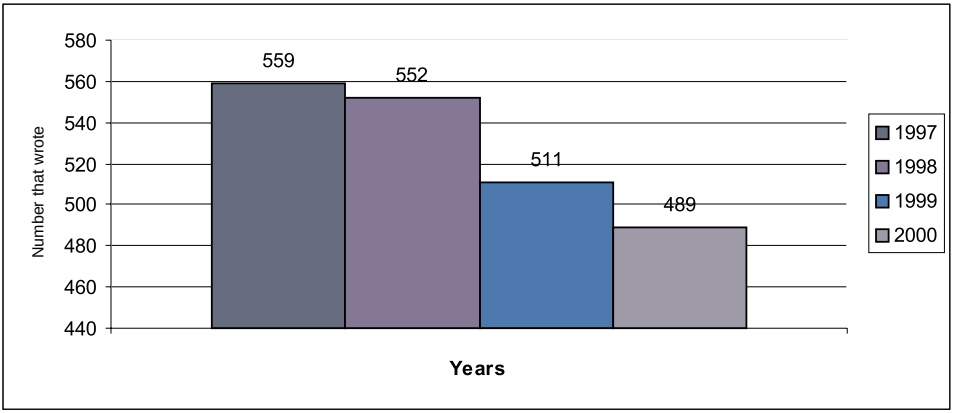

Figure 1: Senior Certificate enrolments for the period 1997-2000

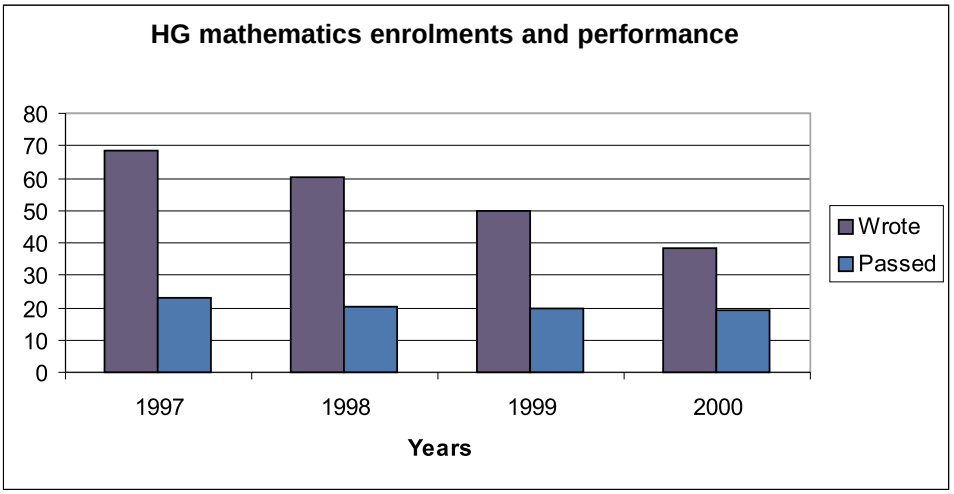

Figure 2: Higher Grade Senior Certificate mathematics participation and performance

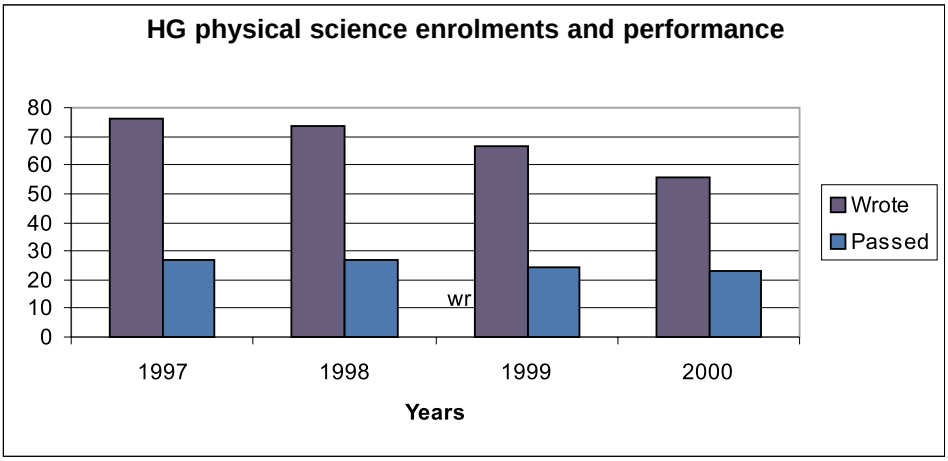

Figure 3: Higher Grade Senior Certificate physical science participation and performance

There are two important conclusions that may be drawn from the above data. Firstly, the numbers enrolling for Higher Grade mathematics and physical science have, like the Senior Certificate enrolments, been decreasing in the last four years. But the number of learners obtaining Higher Grade passes in both mathematics and physical science over the last four years has been fairly steady (see Figures 2 and 3 above). In percentage terms, there has not been an increase in Higher Grade passes in either mathematics or physical science.

Secondly, the numbers moving into Standard Grade mathematics and physical science are increasing (see Figures 4 and 5 below). Overall, the take up in these gateway subjects is increasing. However, the performance still remains unsatisfactory.

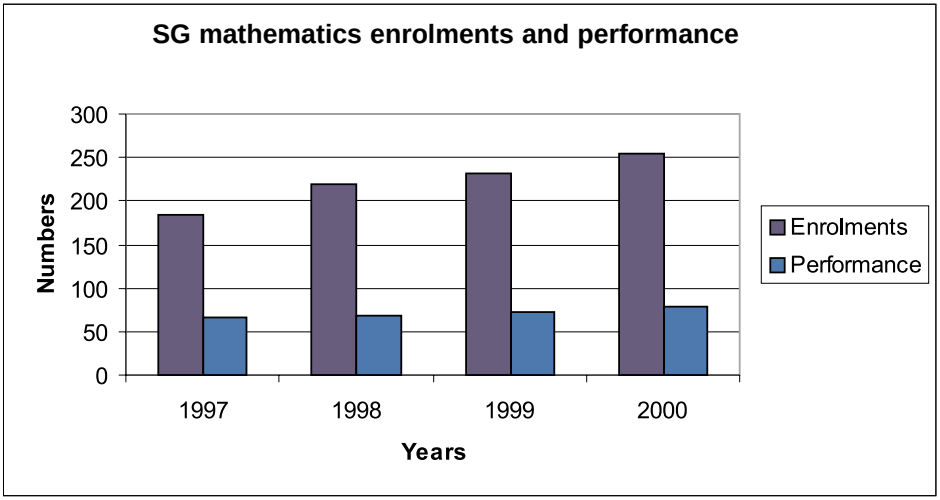

Figure 4: Standard Grade Senior Certificate mathematics participation and performance

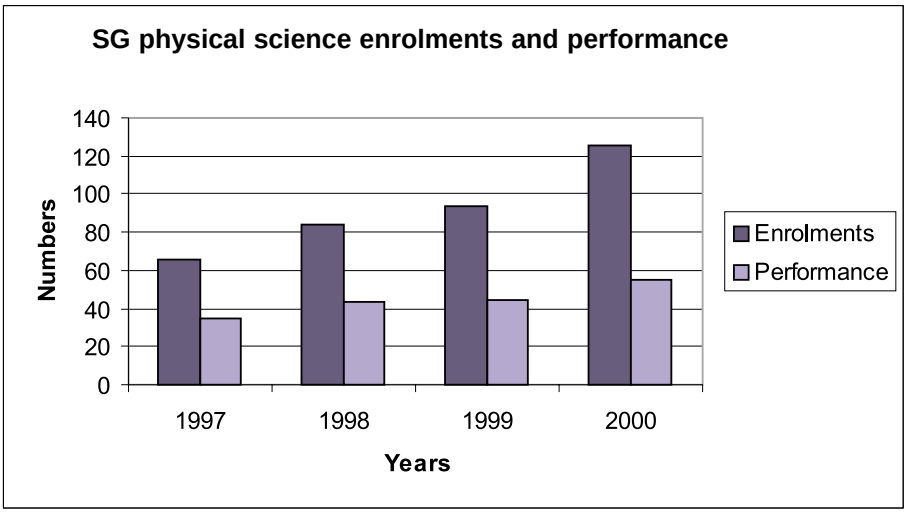

Figure 5: Standard Grade Senior Certificate physical science participation and performance

Of these low numbers, the number of African candidates who participate and succeed is disturbingly low. An analysis of the 2000 Senior Certificate results indicates that out of a total population of over 400 000 candidates, only 20 243 African candidates wrote mathematics in the Higher Grade. Of these candidates, 3 128 passed (see table 2 below).

Table 2: Performance of African candidates in mathematics and physical science in 2000

Province	Mathematics HG		Physical Science HG		Mathematics SG		Physical Science SG	
	Candidates	Pass	Candidates	Pass	Candidates	Pass	Candidates	Pass
WC	78	21	93	45	3889	662	2204	1100
NC	12	9	24	4	671	218	333	178
FS	471	115	2098	619	12066	2454	5146	2639
EC	362	113	1060	136	36736	11101	21435	8548
KZN	5772	746	7108	1221	40367	10309	16109	7062
MP	1381	159	3567	264	16451	3235	7048	2730
NP	7780	1041	12902	1621	36884	5683	10499	3897
Gauteng	812	329	1566	471	20497	5478	11495	5286
NW	3575	595	5239	755	12644	2200	3411	1434
Totals	20243	3128	33657	5136	180202	41540	77680	32874

There is a striking variation in uptake and performance across provinces, which is partly linked to provincial policy regarding candidates' entry for matriculation endorsement and variations in the quality of curricula.

2.2 UNDERQUALIFIED AND UNQUALIFIED MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATORS

The low level of output, particularly in mathematics Higher Grade, has a direct impact on the capacity of the system to produce qualified educators in mathematics and science. Those that have obtained a good pass find it less attractive to choose teaching as a career and therefore opt to study in the science-related fields. As a result, few learners enter teacher training programmes in mathematics and science.

A report published by EduSource in 1997 found that most mathematics and science educators were not qualified to teach these subjects. Although 85% of mathematics educators were professionally qualified as educators, only 50% had specialised in mathematics in their training. Similarly, while 84% of science educators were professionally qualified, only 42% were qualified in science. An estimated 8 000 mathematics and 8 200 science educators needed to be targeted for in-service training to address the lack of subject knowledge.

In addition, educators in these subjects generally had a low level of teaching experience. More than a third of mathematics educators, over 45% of general science educators and almost 40% of physical science educators had less than two years' experience teaching their subjects. (Reference: South African Institute of Race Relations, 1997/1998)

2.3 A VICIOUS CYCLE OF UNDERSUPPLY OF QUALIFIED MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATORS

The resultant effect of few learners graduating in mathematics and science and choosing teaching in these subjects as a career, is a vicious cycle of undersupply of educators in these fields of study. As a result, most secondary schools do not offer mathematics and science. In most cases those that offer these subjects have educators who are underqualified and unqualified.

2.4 LACK OF FINANCIAL SUPPORT FOR GRADE 12 GRADUATES TO TRAIN AS EDUCATORS MAJORING IN MATHEMATICS, SCIENCE AND TECHNOLOGY

In most cases, those who have an interest to train as mathematics, science and technology educators find that they lack the necessary financial support to study at higher education institutions. This Strategy will seek to find resources to support those who wish to be qualified mathematics, science and technology educators. Other incentives will also be sought to attract more graduates to the teaching of mathematics, science and technology.

2.5 LACK OF AND INADEQUATE FACILITIES AND RESOURCES TO ENHANCE EFFECTIVE LEARNING AND TEACHING

The majority of schools that offer mathematics and science have a serious problem with regard to facilities such as laboratories and equipment to promote effective learning and teaching. The teaching of science remains at a theoretical level without any experiments to enhance understanding and application of knowledge.

3. VISION STATEMENT

Our vision is that of a scientifically literate, technologically fluent and numerically/mathematically literate society that empowers individuals to participate in the emerging knowledge-based economy and supports sustainable development.

4. MISSION STATEMENT

Our mission is to strengthen the teaching and learning of science, mathematics and technology in General and Further Education and Training, using appropriate curricula, teaching methodologies and learning support materials.

5. THRUSTS OF THE STRATEGY

The National Strategy for Mathematics, Science and Technology Education revolves around three thrusts:

(a) To raise participation and performance by historically disadvantaged learners in Senior Certificate mathematics and physical science;

(b) to provide high-quality mathematics, science and technology education for all learners taking the first General Education and Training Certificate and Further Education and Training Certificate; and

(c) to increase and enhance the human resource capacity to deliver quality mathematics, science and technology education.

5.1 RAISING PARTICIPATION AND PERFORMANCE IN SENIOR CERTIFICATE MATHEMATICS AND PHYSICAL SCIENCE

5.1.1 Dedicated mathematics and science schools

The policy of specialisation in mathematic and science is crucial to address the current low levels of achievement and output of especially historically disadvantaged learners in the system. In the main, policy is driven by the following reasons:

- Firstly, good mathematics and science teaching is expensive and the necessary resources (qualified and competent educators, well-resourced laboratories and libraries) are scarce;
- secondly, an adequate supply of Grade 12 graduates with mathematics and science is needed to enter higher education. This could be better assured by focusing on mathematics and science learners with potential in dedicated schools, rather than through a dilution of effort across the whole schooling system;
- thirdly, dedicated schools may have policies to increase the participation of disadvantaged learners in science and technology-based education; and
- fourthly, these schools will promote innovative learning and teaching strategies for mathematics and science that are usually not found in mainstream schools.

The policy of dedicated schools is therefore the most cost-effective way of deploying scarce resources in the teaching of these subjects. In the context of competing priorities and limited resources, it is better to, at least in the short term, provide sufficient and adequate learning and teaching facilities to fewer schools with the aim of going full scale over a longer period of time. Secondly, this policy will respond better to a range of abilities and interests that learner display. It will allow those with the most ability to study intensively and learner preference in mathematics and science to be catered for. However, such a policy should not exclude other learners from studying basic mathematics, science and technology.

In pursuit of this policy, the Council of Education Ministers (CEM) has approved the establishment of a hundred dedicated high schools for mathematics and science. These schools will be distributed pro rata across the nine provinces and will be clustered mainly in districts for easy co-ordination, connectivity and sharing.

The dedicated schools will be chosen from: (a) underresourced, well-performing schools; and (b) those with potential to improve participation and performance in mathematics and science.

The underresourced and well-performing schools should be chosen from those that:

- Already offer mathematics and science in the Higher Grade and have satisfactory class sizes of a minimum of 20 learners;
- are situated in Presidential nodal areas - i.e. those targeted for urban renewal and rural development;
- have competent educators in both mathematics and science; and
- display basic levels of functionality.

The schools that have the potential to improve participation and performance should be chosen from those that:

- Already offer mathematics and science at least at Standard Grade level and have satisfactory class sizes of a minimum of 20 learners;
- are situated in Presidential nodal areas - i.e. those targeted for urban renewal and rural development;
- have or need competent teachers in both mathematics and science;
- display basic levels of functionality;
- have the potential to improve both participation and performance in Senior Certificate mathematics and physical science; and
- are clustered around a focus or specialised school - i.e. well-performing schools.

Once the schools are chosen, provinces will introduce a programme to progressively provide facilities and equipment for the effective teaching of mathematics and science. Resources given to well-performing schools should be accompanied by commitment on their part to serve their communities by developing other schools, learners and/or educotors in their areas. In addition, a fast-tracked programme should be initiated to introduce information and communication technologies as fields of study and to support learning and teaching. In addition to academic achievement, these schools should also be given cross-curricular support and should be encouraged to excel in extramural activities.

5.1.2 Language of learning and teaching

Language policy matters are important in the learning and teaching of mathematics and science. Post the Foundation Phase (Grades R - 3), mathematics and science are usually taught through a medium of instruction that is different from the mother tongue or home language. Although language problems reflect insufficient conceptual understanding, difficulties associated with the learning and teaching of

mathematics and science are also associated with lack of proficiency in the medium of instruction. It is therefore important to strengthen the teaching of English second language.

5.1.3 Learning support materials

There is a well-established connection between learner achievement and the availability of quality learning support materials (LSMs). The Strategy will support the Tirisano programme on LSM procurement, delivery and retrieval to ensure the following:

- Availability of quality and relevant learning and teaching materials;
- the existence of a range of learning materials, from textbooks to internet-based sources and information;
- a reliable system that ensures procurement and distribution of appropriate materials in cost-effective ways; and
- the cost of learning material is at a level that ensures access by historically disadvantaged learners.

5.1.4 Increased participation and performance by girls

The participation and achievement of girls in mathematics are very low. In order to improve the retention of and participation and performance by girls, the Strategy will consider the following:

- A quota system, especially in the dedicated/specialised schools;
- the establishment of girls' schools specialising in mathematics and science;
- special incentives for girls to study mathematics and science; and
- preferential access to dedicated/specialised schools.

5.2 PROVIDING HIGH-QUALITY CURRICULA FOR THOSE TAKING THE FIRST GETC AND FETC

Basic numeracy, mathematical, scientific and technological skills are critical for further learning and the world of work. Learners who are competent in these skills are able to engage in effective learning across a wide range of learning fields. The teaching of mathematics, science and technology across the General Education and Training Band must receive priority. All learners who graduate with a General Education and Training Certificate in Grade 9 must be competent in mathematics, science and technology.

The National Curriculum Statement for Grades R - 9 provide a more specific curriculum framework that includes a national set of learning outcomes and assessment standards for mathematics, science and technology. The latter are benchmarked grade by grade. To ensure the laying of a solid foundation for the sciences and technology, literacy and numeracy programmes are allocated 70% of learning time in the Foundation Phase (i.e. the first three years of schooling). In the Intermediate and Senior Phases, these three learning areas and languages take up more or less 60% of the curriculum time. In other words, adequate time has been allocated to mathematics, science and technology in the General Education and Training Band.

The assessment standards being developed for these three learning areas will ensure an integration of concepts, skills and values. Unlike in the old, content-based curricula, these learning areas have assessment standards focusing on the development of process skills. Allocation of time has ensured space for the development of these skills. Physical resources will have to be mobilised to support this innovation in the National Curriculum Statement for the General Education and Training Band.

The development of the National Curriculum Statement has ensured that learners across the education and training system will consistently receive challenging learning programmes that will capture their interest and prepare them for lifelong learning. These, if implemented accordingly, will equip learners with knowledge and skills that will help them to compete in a global economy and allow them to lead lives of satisfaction and integrity, both as individuals and as citizens.

The revision and upgrading of the Further Education and Training curriculum must ensure the development of rigorous standards and assessment, with a new emphasis on helping disadvantaged learners to attain the challenging academic standards expected of all learners. This will build on the National Curriculum Statement for the General Education and Training Band.

5.3 INCREASING AND ENHANCING HUMAN RESOURCE CAPACITY

5.3.1 Adequate supply of qualified and competent mathematics and science educators

Many studies suggest that more qualified and experienced mathematics and science educators are associated with higher levels of learner achievement in these fields of learning. Attracting and retaining sufficient numbers of mathematics and science graduates into the teaching profession is a serious problem confronting many countries across the world where these graduates are in demand and are better paid in the private sector and in other occupations. South Africa is no exception when it comes to the problem of undersupply of qualified mathematics and science educators.

The improvement of learner achievement is largely dependent on a competent teaching corps of mathematics and science educators. This Strategy addresses both the ongoing professional development of educators already in the classroom and the preparations of new educators.

There is a need to develop strategies for attracting, recruiting and selecting learners that have obtained good marks in mathematics and science to train as educators at higher education institutions. Incentives should be sought to direct those that have obtained a Higher Grade pass towards a teaching degree majoring in mathematics, science and technology. Those that have obtained a pass in the Standard Grade should be directed towards a National Teaching Diploma.

Programmes that can equip educators with competences to teach at all levels of the schooling system will be appreciated. Higher education institutions (with assistance from the non-governmental community) will have to play a far more active role in improving the knowledge and skills of educators currently in the system, as well as those of future trainees. They should develop rigorous new programmes for educator preparation, strengthening both subject matter expertise and pedagogical mastery. The quality and relevance of the training programmes should be reviewed to ensure that when trainees complete, they are competent in both subject content knowledge and teaching skills and strategies (pedagogic content knowledge) - that is, knowing how to teach specific scientific, mathematical and technological concepts and principles to young people at different stages of development. The training programmes should reflect a strong ‘discipline’ component balanced with a good understanding of what they are teaching, as well as how to teach.

Mastery of content knowledge and good classroom practice would enhance confidence of educators.

5.3.2 Upgrading of underqualified and unqualified educators

Currently, there are talented and dedicated educators who are teaching mathematics, science and technology in our schools. Some of these educators are either underqualified or unqualified. In order to ensure that every classroom has a competent and qualified educator, the Strategy must first and foremost upgrade the knowledge, competences and skills of underqualified and unqualified educators already in the system. An upgrading programme that focuses on both subject content knowledge and teaching skills will be introduced as a matter of urgency.

5.3.3 Incentives for attracting students to train as educators in mathematics, science and technology

One way of attracting learners to train as mathematics, science and technology educators, is to provide them with bursaries to enter higher education. A contractual agreement would be entered into between government and prospective trainees on matters such as where to teach after graduation and for how many years.

There are good mathematics, science and technology educators who have either retired or have taken a voluntary severance package. A concerted effort will be made to persuade them to return to teaching and to be deployed in areas of need.

Recruiting mathematics, science and technology educator trainers from other countries can also complement the current teaching corps. These trainers could be used to:

- Build and strengthen educator training and support capacity at district office level;
- share expertise and knowledge through team teaching;
- act as subject advisors to a group of educators in a district; and
- stand in as substitutes when local educators go for in-service training.

6. MOBILISING COMMUNITY SUPPORT

It is critical to mobilise broader society (parents, educators, business leaders, volunteers and concerned citizens) around the need and urgency to improve participation and performance by historically disadvantaged learners in Senior Certificate mathematics and science.

One part of community mobilisation will include a campaign to persuade alumni of schools that were performing well in the eighties, seventies and sixties to engage in support programmes for their former schools. Today, most of these learners occupy key positions in government and in the private sector. Their involvement could include:

- Serving as role models to learners;
- providing motivation and encouragement to learners; and
- making financial contributions, where possible.

Professional organizations have played a critical role in supporting educators to improve learner achievement. The support and participation of mathematical, scientific and technical communities will continue to be crucial in the realisation of our objectives.

In the past, the private sector has demonstrated a willingness to support the improvement of learner participation and performance in mathematics and science. Private sector contributions have come in the form of bursaries and the supply of learning support materials (including equipment). This support must be encouraged and channeled towards targeted institutions that can demonstrate success.

In addition, we will encourage visible national and local activities such as 'Science Week' to engage and arouse public interest in mathematics and science.

Through this Strategy, we hope to bring together the public and private sector and professional organisations to develop a strong network of local partnerships aimed at improving learner attainment.

7. RESEARCH

There are a number of areas that require further research in order to support the Strategy. These include, amongst others:

- An analysis and diagnosis of the reasons for the underparticipation and underperformance of female learners in mathematics, science and technology.
- The use and application of Indigenous Knowledge Systems in the learning and teaching of mathematics, science and technology.
- Policy informing research on science, mathematics and technology education change projects.
- Further research on disadvantaged schools that do well in mathematics and science, their links with higher education institutions and the extent to which they are widespread.
- General research on barriers to curriculum change in science, mathematics and technology education, including the role of language, gender, race, school ecology and curriculum models.
- Longitudinal study of about five to ten years that track the success of interventions implemented as a result of this Strategy.

2001		2002	
ACTIVITIES	**TIME FRAME**	**ACTIVITIES**	**TIME FRAME**
• Launch	25 June	• Institutional development and support (100 schools)	January ongoing
• School profiles	8 June		
• Selection of dedicated mathematics and science schools	30 July	• Introduction of ICT to support learning and teaching	February
• National list of mathematics and science educators and their qualifications	31 July	• Monitoring of the implementation plan	February ongoing
		• Community support programmes to motivate learners in focus schools	February ongoing
• Initial discussions with embassies	May/June		
• Institutional assessment	July	• National curriculum statements (NCS) for GET ready and used to develop LSMs and train mathematics, science and technology educators	February ongoing
• Development of provincial plans	August		
• Development of plans for each school	August/Sept		
• Development of a research design on the participation and performance of girls in mathematics and science	August	• Preparation of pilot for NCS	February ongoing
		• Development of appropriate training programmes for educators	March
• Advocacy (mobilising community support)	September		
• Appointment of a project team	October	• Development of teacher support materials	March
• Consultation with universities and technikons science teachers	April ongoing	• Infrastructure and equipment put into specialised schools	April
• Recruitment strategies for mathematics and science learners	November	• Launch of process to develop FET National Curriculum Statements	April - June
• Strategies to upgrade the qualifications of mathematics science educators	November	• Strategic plan to increase HG enrolments of African mathematics and science learners, specifically female learner participants	April - June
		• Development of high quality of learning	April ongoing
		• National bursary policy for educator development and upgrading	May
		• Implementation of post provisioning and measures to employ more mathematics, science and technology educators and subject advisors in vacant posts	June/July
		• Recruitment of Grade 12 mathematics and science graduates to study teaching in the area of mathematics and science	July
		• Plan to monitor and evaluate piloting and implementation of the mathematics, science and technology learning area statements	November

9. CONCLUSION

This Strategy to improve access to and participation and performance in mathematics, science and technology education represents a priority goal of our education and training system. The time is ripe for a concerted effort to improve participation and performance in mathematics, science and technology education. This Strategy represents the beginning of a national effort aimed at mobilising resources and our social partners to support this initiative.

New investment in the learning and teaching of these fields and areas of study will, in the long term, undoubtedly improve the learning outcomes of all learners, particularly those from disadvantaged communities. The success of this Strategy will contribute significantly to the human resource development needs of our country. To make the Strategy work, the Department of Education will enter into partnerships with relevant stakeholders and role-players. The necessary resources (human, fiscal and physical) need to be put in place in order to meet the new demands placed on the post-apartheid system.

As our efforts to address these areas of great concern get underway, cross-disciplinary curriculum models will be developed. In this way we will ensure the success of a quality and balanced post-apartheid curriculum.

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