Moses Kotane Institute
INNOVATION. THE FUTURE

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CONCEPT FRAMEWORK
MOSES KOTANE
STEM INNOVATION
FUND

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INTRODUCTION

South Africa's economy is currently in dire need for Science, Technology and Engineering skills. This could be partly attributed to inadequate outputs of such talent pipeline by the education system at various levels. If South Africa does not produce adequate science, technology and engineering skills, the country may be forced to rely on other countries, and furthermore, this may render South Africa unable to compete globally in the areas Science, Technology and Engineering. The South Africa's education system output in Science, Technology and Engineering does not match the demand and thus the system is unable deal with high local demand Science, Technology and Engineering skills. On the other hand, government has planned and ambitious, trillion rand infrastructure for the next decade

In the past 10 years the number of students enrolled in Science, Technology and Engineering higher learning increased dramatically and this could be attributable to increased government financial support through NFSAS. However, of over 511 564 students enrolled from 1998 to 2010, only 14 % graduated. Consequently, SA still ranked 111th out of 142 countries for its availability of scientist and engineers, and is also ranked as one of the weaker nations for its ability to produce professionally skilled engineers. The 2012 survey conducted by Engineering Council of SA reported that SA has one engineer per 3000 of the population

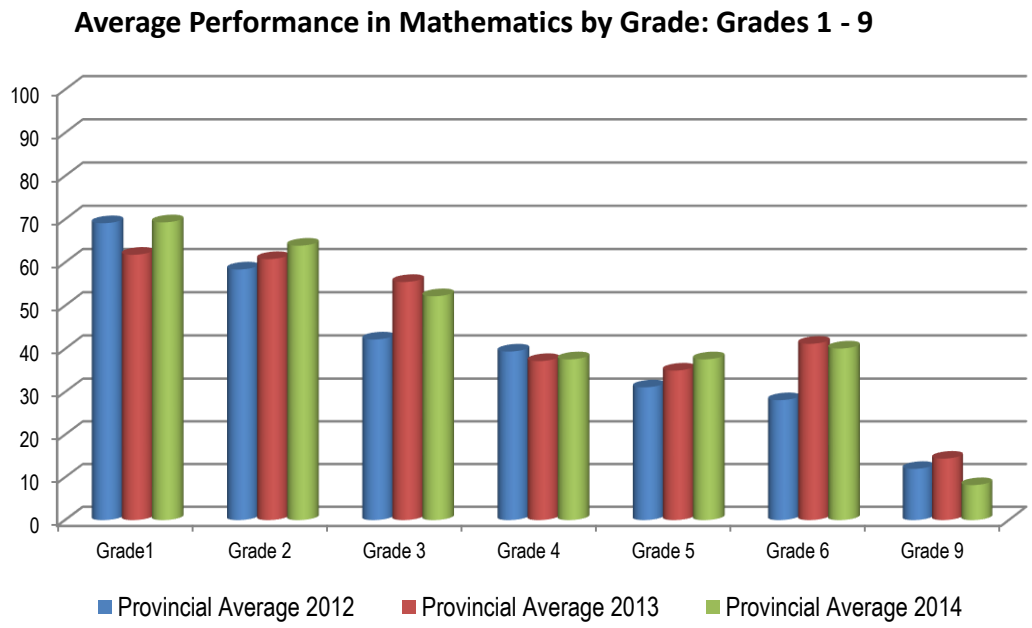
BACKGROUND

Moses Kotane Institute (MKI) was established with a mandate to implement South Africa' STEM Strategy, including the Maths, Science and Technology (MST) plan of the KZN Education Department. The goal of MKI is to contribute to economic development through leveraging an interventionist type strategy in the provision Science, Technology and Engineering. This area remains amongst the critical strategic challenges facing our government in realizing an acceptable level of radical economic transformation, and egalitarianism and sustainable development.

Subjects responsible for the low pass rate in KZN

No.	Subject Description	Number Wrote	Achieved	Pass Rate	Failed
1.	*Mathematics	71 634	29 188	**40.75%**	**42 446**
2.	*Physical Sciences	45 143	25 177	**55.77%**	**19 966**
6.	*Life Sciences	74 496	54 184	**72.73%**	**20 312**
7.	*Mathematical Literacy	70 070	53 154	**75.86%**	**16 916**
9.	*Agricultural Sciences	18 837	14 701	**78.04%**	**4 136**

*Extract from KZN grade 12 examination analysis report on 2014-15



The table above is a snapshot of the KwaZulu-Natal's performance in Mathematics, in the ANA from 2012 through to 2014

The above table and diagram indicates the reality in mathematics learners' performance by grade over the last three years, some of whom will complete grade 12 with mathematics literacy. In pursuit of this mandate, the Institute focuses, among others on the following objectives

- Provision of Science, Technology, Engineering and Mathematical skills for economic development and service delivery to the members of our society through a range of recognised school intervention programmes, further and higher education and training career paths to facilitate migration into areas of economic potential;
- Facilitate access to Science, Technology, Engineering and Mathematics careers at higher education institutions through comprehensive graduate development programmes, to enhance participation in the mainstream economy;
- Enhancing the knowledge and skills of educators, leadership and governance capacity and capabilities for government business, municipalities and traditional authorities to enhance service delivery and rapid economic transforming and development; and

Provision of continuous strategic political education underpinned UBUNTU, good governance, developmental state approach and embedding a historical perspective of poverty, lack of knowledge, lack of skills and associated underdevelopment

PURPOSE

The purpose of the Fund is to promote Science, Technology and Engineering education and skills development among the historically disadvantaged learners, youth and communities. It is hoped that the KZN Economic Development, Tourism and Environmental Affairs (EDTEA), in collaboration with corporate partners will work together to establish this fund with the sole strategic purpose to contribute towards funding strategic projects aimed at promoting access to Science and Engineering opportunities, addressing the inadequacies to provision of Science, Technology and Engineering education interventions to disadvantaged learners and youth to assist them to seize economic development opportunities

OBJECTIVES

Various research endeavors indicate that less and less learners choose mathematics as a preferred subject, and those who do so will rather do mathematics literacy. These decisions are having negative implications on the country's future talent supply pipeline in Science, Technology, Engineering and Mathematics.

It is for this reason that the objectives of the STEM Innovation Fund have to articulate to the country's strategy in Maths, Science and Technology Strategy of the KZN Education and the Institute five-year strategy. Therefore the objectives are:

- Promote Science, Technology and Engineering programmes and careers among historically disadvantaged learners and youth in order to improve uptake in these disciplines and careers
- Provide educational and academic and skills development interventions aimed at improving the quality of learning and performance of Maths, Science and Technology Educators so they can help learners and youth realise their potentials in these disciplines.
- Provide financial support to deserving learners, students and graduates from rural communities to enhance access to opportunity to study STEM disciplines both at FET and Higher Education levels.
- Resourcing of deserving Mathematics, Science and Technology rural community schools to enhance the quality of learning and learners' performance in these subjects

OPERATIONAL SCOPE OF THE FUND

The scope of the STEM Fund will first and foremost to respond strategic pillars five and six Programme of the NSLA Framework. Strategic Pillar five and six focuses on **Mathematics, Science and Technology and Educator**

Development respectively. The limitations in funding impacts negatively on the implementation of MKI interventions where such interventions are most needed, i.e. rural schools especially within the Nine (9) identified underperforming education districts. The proposed Science, Technology, and Engineering interventions to be funded out of the Fund are:

1. Promotion of Science, Technology Engineering and Mathematics through innovative technology and engineering school competitions, science shows and festival, career guidance and research and innovation project at tertiary levels;
2. Mathematics, Science and Technology (MST) Educator Professional Development;
3. Promoting access (partnering with Universities to fund bridging programme) into tertiary studies in Sciences, Technology and Engineering related disciplines, undergraduate development, post graduate research and development and ACCESS apprenticeships, graduate internship opportunities

MANAGEMENT OF THE FUND

In July 2011, the government and business signed a National Skills Accord where firstly, (i) the government committed to ensuring a more active training mandate for State Owned Enterprises; secondly, (b) the business committed to increase training beyond the current 1% training levy; and thirdly, (c) companies committed to consider a stretch target of between 3% to 5%. The strategic collaboration on the establishment of the STEM Fund between EDTEA and private sector is critical, as it will ensure the fund is sustainable and therefore enables the Institute to expand its reach and footprint where its interventions are most required. It is against this context that the Institute has decided to establish STEM INNOVATION FUND.

It is proposed that a special committee be established to take responsibility for the management of the fund. The proposed committee will be report to the Institute's Board sub-committee on finance, and shall have clear terms of reference, which among others will include but not limited to

1. Fundraising and raising the profile of the institute and its strategic projects to potential funders and donors
2. Defining the scope and funding plan and the distribution of funds
3. Establishing strategic partnership with various institutions of learning to among other enhance STEM access and allocation of STEM graduate funding
4. Collaborate with the Institute sub-committee on STEM education, academic and skills development to identify funding priorities, monitor the utilisation of the FUND and report to Finance committee

FINANCING, IMPLEMENTING AND MONITORING AND EVALUATION

It is proposed that the following process should be followed in implementing, financing and monitoring and evaluating the impact of the STEM Fund

FINANCING PROCESS

It is envisaged that the Economic Development, Tourism and Environmental Affairs will initiate the first seed fund into the STEM fund as part of the launch. Further potential contributions are expected from state departments and such as Basic Education both national and KZN provincial department, Departments Science and Technology, Higher Education and Training through National Skills Fund, the Sector Education and Training Authorities (SETAs) in Science, Technology, and Engineering economic sectors private business and donors locally and internationally as well as state Entities like SANRAL, SITA, TRANSNET and others.

Potential funders and donor will be approach individually through the Institute Business Development unit to fund various interventions, which will among others include

1. School Mobile Science Laboratory,
2. Science and Engineering promotion,
3. STEM educator development,
4. Undergraduate and post graduate scholarship
5. Provision of internship and apprenticeships opportunities

IMPLEMENTING PROCESS

The Science and Engineering promotion competition herein referred to as “I am an Engineer” School Competition” targeting 20 schools per district which will be the first intervention to be implemented during the second quarter of this financial year. This event should also be used to launch the Institute’s STEM Fund. This project will be facilitated in partnership with non-governmental organisations operating in the space of Science and Engineering.

During this phase various donors and funders will be consulted and invited to make contribution to the fund in the areas of their interests as covered in the scope of the STEM Fund. It is preferred that funding be ring-fenced around the three (3) year Memorandum of Agreement with KZN Department of Education. The MoA broadly covers the following strategic interventions, which the Institute is unable to fund due to budget constraints:

1. Educator Development- resourcing of the STEM Laboratory to conduct practical training for grade 8 to 12 educators
2. Purchase and supply of the Mobile Science Laboratory for identified STEM schools in the Nine underperforming education districts
3. Science Curriculum Delivery Innovation- Purchase and supply of Cyber-class resources and equipment for identified STEM schools as part of science curricula delivery innovation intervention and related training of the educators on the use of equipment

MONITORING AND EVALUATION PROCESS

In order to ensure effective utilisation of the fund, an annual performance plan will be put in place, with clearly defined interventions, performance outcomes and indicators, including the budget plan. Each funded project or intervention will be evaluated following the formative and summative evaluation process to determine its impact against set process outcomes. In addition to monitoring and evaluation report, proper financial reporting in accordance with the Institute’s expenditure reporting budget and expenditure

reporting policy framework will be produced and communicated to various donors and funding partners

CONCLUSION AND RECOMMENDATION

The establishment of the STEM Innovation Fund is critical if the Institute service delivery footprint is to reach the majority of the disadvantaged leaners, youth and rural communities. The Institute also needs to build strategic service delivery collaborations with specialist organisation in order to increase its STEM Fund impact. Effective fund distribution and governance of needs to be the foundation of the management of the fund.