



casme

CENTRE FOR THE ADVANCEMENT OF SCIENCE AND MATHEMATICS EDUCATION



UNIVERSITY OF
KWAZULU-NATAL™
INYUVESI
YAKWAZULU-NATALI

PROJECT PROPOSAL: YOUNG SCIENTISTS INCUBATION PROJECT (Y-SiP)

INTRODUCTION

CASME (Centre for the Advancement of Science and Mathematics Education), Eskom EXPO for Young Scientists (EXPO) and the University of KwaZulu-Natal's Science and Technology Education Centre (STEC@UKZN) share common visions for the improvement of Science, Technology, Engineering, Mathematics and Innovation (STEMI) in South Africa. CASME, EXPO and STEC@UKZN will collaborate in a joint undertaking, the *Young Scientists Incubation Project (Y-SiP)*, to enable the realization of some of these common visions. Through the *Young Scientists Incubation Project* CASME, EXPO and STEC@UKZN aim to improve science learning outcomes for a group of black learners from township and per-urban schools, through developing their investigative and problem solving skills.

It is hypothesised that when learners are given opportunities to engage in basic school practical work and practice investigative and problem solving exercises, the probability of producing novel research work would increase. The ultimate goal of this Project is to produce internationally competitive science projects, especially in the categories of Engineering and Innovation.

DISCUSSION

EXPO engages young people in project work in Science, Technology, Engineering, Mathematics and Innovation areas. It is well positioned to develop the inquiring mind of the youth using research to ignite passion around the sciences. EXPO also attempts to encourage interest in the fields of science and technology, with the ultimate objective of urging young people into science careers and postgraduate studies. The EXPO organisation arranges 35 regional science expos across the country, managed by volunteers, and one International Science Fair (ISF), where learners exhibit their research or investigative work. EXPO prioritises previously disadvantaged schools and schools that have not previously been involved in EXPO through training and support. EXPO has developed teacher training material which is accredited by the South African Council for Educators (SACE), which adds value to the continuous professional development of our educators. The vision of EXPO is to inspire young scientists and researchers through developing their problem solving and analytical skills, so they are able to find solutions and communicate these effectively.

CASME is a non-profit organization whose vision is to change the lives of learners through quality and innovative mathematics and science education programs. To realise this vision, CASME with MAHLE BEHR SA has initiated the Science2Go program. Science2Go aims to provide quality, school-based practical science lessons in township, rural and under-resourced schools to educate and spark the interest of science, maths and engineering amongst the leaders of tomorrow. The Science2Go program augments other science education initiatives driven by CASME. The centre has also partnered with *Design Squad Global* to promote design and engineering thinking through a 6 to 12 week club-based programme. In Design Squad Global clubs, learners explore engineering through fun-packed, high energy, hands-on activities.

STEC@UKZN aims to stimulate and encourage high school learners with enquiring minds to pursue careers in agriculture, engineering and science. The science centre facilitates numerous interactive displays, posters and presentations for learners and provides a bridge between schools and scientist researchers within the College of Agriculture, Engineering and Science at the University of KwaZulu-Natal. It offers exciting science shows which highlight and explain everyday phenomena. The Science Centre outreach program Science4U conducts science workshops for learners that allow children to try 'hands-on' science to stimulate questioning and kinesthetic learning as requested in the National Curriculum and beyond.

EXPO, CASME and STEC@UKZN, sharing a similar vision for the youth of South Africa in terms of STEMI education, have identified school practical work as one of the areas that can improve science learning outcomes, especially investigative skills of learners.

The Young Scientist Incubation Program (Y-SiP) is a combination of the following initiatives, driven by the identified partners:

- Practical work lessons that focus on the prescribed practicals for Physical Sciences
- The establishment of school science clubs where interested and well performing learners undergo further support
- Learner workshops on scientific investigations and problem solving
- Learner workshops on how to apply their knowledge of investigative and problem solving skills to craft an EXPO project
- Learner participation in the "Design Squad Global" program with the intention of producing Engineering-specific projects
- The mentoring of the learners by scientists and researchers from the various fields
- The upgrading of the EXPO projects for national and international participation

PURPOSE

The broad purpose of the Young Scientists Incubation program is to:

- Establish a model for sustainable, cluster based, extra-curricula science clubs as a permanent incubator of science talent
- Connect science clubs with a resource network to improve the quantity and quality of young scientists
- Increase the pool of black learners from township and rural schools to pursue science as a subject at the Grade 10 to 12 level and beyond.
- Increase the number of black learners participating in the Expo for Young Scientists

OUTCOMES

By establishing a model that combines learner self-directed activities, support for teacher champions working in geographical clusters and connecting extra-curricula science clubs with a network of professional scientists and education resources, Y-SiP will enable teachers to more effectively support learners to apply their scientific knowledge to produce internationally competitive scientific projects.

In its pilot phase a minimum of 4 internationally competitive EXPO projects will be achieved. In the implementation phase this should increase to 10.

APPROACH

The project is implemented in two phases, taking into account the current year timelines for submission of EXPO projects. The first phase will pilot and refine a model for the establishment and support of a cluster-based science club. The second phase will roll out the refined model to 3 or 4 clusters.

The project approach is for a cluster of schools to establish a science club with the aim of supporting the above objectives and drive participation in project activities.

The project partners have identified 3 potential areas in which schools will be clustered namely Clermont, KwaDabeka, Molweni. This is based on the presence of existing resources and opportunities to leverage existing relationships with schools.

ACTIVITIES

1. Identify and support a champion teacher and champion learner
2. Establish Science Clubs at cluster level
3. Monitor and Support the Science Clubs through specialist workshops, facilitated through CASME's Science2Go, STEC@UKZN's Science4U and other partner institutions
4. Workshop selected learners (Grade 8/9) on the scientific investigative method and problem solving skills
5. Train learners on how to do a scientific project
6. Identify the relevant scientists and researchers to mentor and guide learners to

initiate novel research investigations

The activities, individual outcomes, performance indicators, responsible persons and time-frames will be discussed and agreed upon by the various partners. This work plan will form an Addendum to this Project Proposal.

FUNDING MODEL

The project is to be externally funded with funding divided across two areas:

1. Project Co-ordination

CASME will drive the project coordination by maintaining contact with project champions, facilitating workshops, coordinating the development of support resources and science research mentors.

2. Club and Expo Entry Support

Clubs will receive a small kickstarter operating grant to cover meeting costs and incidentals. In addition each club is eligible to enter its projects into a competitive application process for project grants. The project grant funding will cover the costs associated with finalizing learners' projects for entry into the Regional Expo. They will be required to present a motivation and budget.

Costs covered by the project funding are:

- Materials Development
- Printing materials
- Consumables for practicals and workshops
- Transport costs for facilitators and learners
- Project coordination
- Project Grants
- Incentives

RISK FACTORS

- Lack of support from Champion teacher
- Lack of learner participation
- Learner dropout

KEY DATES

Eskom Expo Regionals (Central Region): 17 to 19 August

Applications close end of June/July

National Science Week: 2nd week of August

Eskom Expo Nationals: 3 to 6 October

Additional Notes:

Each club establish a Peer Review Process where proposed Expo Projects are presented in order to:

- Encourage competition
- Promote joint problem solving
- Foster Collaboration

Each club should have at least 10 members but not more than 15.

Krishnie Naidoo

Eskom Expo for Young Scientists

Henre Benson

CASME

Tanja Reinhards

STEC