

Education: A vital ingredient in scientific programmes

A southern African story

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Abstract- The first discovery of a coelacanth off the coast of South Africa in 1938 created a scientific furore and excited both the national and international scientific communities.

The second discovery off the east coast of South Africa in 2000 invoked more excitement amongst the scientific community world wide.

The Coelacanth Programme is a flagship scientific endeavour for the southern and east African region aimed at developing excellence in science and using the excitement of ships, submarines and under water exploration to encourage youth to enter the sciences. In Africa, entry into science and retention of scientists is poor, hence this need to use the multidisciplinary programme to inspire the youth. Indeed, several governments in the region are promoting science. The environmental education programme, together with the public awareness programme, is taking science to the people to:

- Promote ocean exploration as possible career choices,
- Collaborate with governmental educational programmes and produce educational resources that are in line with the national curriculum in each country,
- Provide opportunities for educators to build their knowledge base with regard to the marine and coastal environments, extending them to ocean exploration and
- Develop opportunities for the involvement of the youth in the programme, with the objective to share and disseminate the excitement and information.

This paper describes the planning and processes that have taken place during the development of the programme, how they have been implemented and received by the education community. It also evaluates the process to ensure that a product of high quality is being produced and maintained. The paper also highlights the importance of including the people in scientific programmes through the medium of education. It also indicates the future objectives of the Programme, having learnt from this process.

I. INTRODUCTION

In 1938 the scientific and media worlds had their interests peaked with the discovery of a coelacanth by Marjorie Courtenay Latimer, of the East London Museum, South Africa. The public were intrigued, but not included in all the excitement [1]. The recent discovery of a colony of coelacanths living off the South African coast in the Greater St Lucia Wetland Park, created an even bigger scientific and media stir [2]. However, the scientists and the South African Government saw this discovery as an opportunity to further knowledge of the coelacanth and deep oceans, and to excite the public about the wonders involved in ocean exploration. Furthermore it was seen as

an opportunity to contribute towards the development of educational resources centred on the discoveries from the expeditions.

Another need was identified when scientists and educators involved in ocean research were called together to plan the programme. It became evident that African governments are deeply concerned about the lack of interest in science in schools and even a fear of science, the poor recruitment into science, lack of scientists, the inability to retain scientists. Therefore the Programme saw the need to include public awareness and capacity building initiatives into their core functions, developing an excellence in science and using the excitement of ships, submarines and underwater exploration to encourage the youth to enter the science, engineering and technological fields.

The 2000 discovery of live coelacanths led to the formulation of a multidisciplinary regional flagship programme with one of its core objectives to share the discoveries with the youth, public and young scientists. This also met the realisation that there was the potential to bring two clear benefits to countries. Firstly the communities would take ownership and develop their understanding of the environment, leading to sustainable utilization and development of their resources (contributing to and promoting education for sustainable development) and secondly inspire the youth to seek careers in areas of the sciences they may not have known about and therefore increasing the number of excellent scientists and developing a critical mass.

At the launch of the Coelacanth Programme in April 12, 2002 [3], the South African Minister of Science and Technology, Dr Ben Ngubane, clearly supported and encouraged the Programmes objectives to:

- Promote ocean exploration as possible career choices,
- Collaborate with governmental educational programmes and produce educational resources that are in line with the national curriculum in each country,
- Provide opportunities for educators to build their knowledge base with regard to the marine and coastal environments, extending them to ocean exploration and
- Develop opportunities for the involvement of the youth in the programme, with the objective to

share and disseminate the excitement and information.

In summary the programme aims to capture the imagination of the youth inspiring them to value and conserve their marine and coastal environment, to seek careers in science, engineering and technology and to empower the public to make informed decisions about their environment. It provides educators with new educational resources and encourages best teaching practise.

II. ENVIRONMENTAL EDUCATION & PUBLIC AWARENESS

Through initiative taken by the Coelacanth Programme the imagination of the child is fuelled and the educator inspired. It can allow for young and old to re-live adventure and be part of “living” history in an exciting chapter of southern African science.

The icon of the coelacanth weaves itself into the resources produced and training presented. It is used to the attention of the audience, while promoting the coastal and marine environment. The focus is therefore not only on the coelacanth, but includes its deep ocean habitat, interactions with other organisms, mapping of the seafloor, management and conservation strategies and the technology involved in ocean exploration, to name but a few focus areas.

In its infancy the Programme initiated the environmental programme by calling all marine educators to work together to take ocean sciences to the communities. From the outset individuals offered up their time voluntarily. In the first year, these dedicated people developed a cartoon booklet that introduces the reader to the Programme, the science objectives and known facts of the coelacanth, the booklet can be used as a stand alone product or with the classroom resources developed for the foundation, intermediate and senior school phases of the South African school system. Activities were developed in consultation with official governmental environmental



Fig. 1 Representation of educational resources

education body and the national education framework. Together with these resources an educational poster for use

in classrooms or at public presentations was produced (fig 1).



Fig. 2. Marine educator workshop 17-19 July 2003

These educational resources were introduced to 50 marine educators at a two day training session, each trainee in turn has been tasked to train a further 50 educators in their area (fig 2), leaving with sufficient resources to share with the educators they trained.



Fig. 3. Essay winners on their way to the research vessel for their on board experience

No opportunity went to waste, programme staff included and invited schools to participate in the launch of the programme and those situated in and around the Greater St Lucia Wetland Park, received visits from trained environmental educators. At these visits they were introduced to the coelacanth and the Programmes objectives. Resources were developed to illustrate the coelacanth. Furthermore learners were invited to enter an essay writing competition, winning contributors (fig 3) had the opportunity to visit the research vessel during the Programmes Research and Training expedition run mid year 2002. For many this was the first time they had seen a research vessel let alone experience a few days at sea. In each port during this cruise learners and educators were

invited on board, given a tour and an opportunity to interact with the crew and researchers, in 2002, 400 visitors boarded the ship at various ports (fig 4) [3,4].

During each expedition the public are invited to attend public presentations by the researchers and regular updates on scientific finds are posted near the research site. Promotional videos are aired and the media is well informed so as to share the excitement and discoveries. Making the coelacanth and ocean exploration a household name.

Since the first year funding has been obtained for an Environmental Education Coordinator facilitating the combined efforts of the voluntary personnel.

III. CAPACITY BUILDING



Fig. 4. Educators from Richards Bay, South Africa on board *FRS Algoa* during a port visit

Alarmingly it was realised from the first planning workshop of the Programme, that there is a dire need to encourage more people to take up careers in the sciences. Furthermore funding and institutional infrastructure needs to be developed to retain them. This would then build a pool of scientists to conduct high quality research in their own regions

In 2002, twenty eight trainees joined the ship and of those 28, 22 were young woman (fig 5). For 2003 an estimated 20 trainees will be trained on board the expedition [4].

Within all projects or initiatives the programme endeavours to include trainees or students, offering mini bites of in-service training. This has been achieved through including journalism, film and public relations students during development or for the production of posters, films or media presentations e.g. university journalism students produced the posters for the Programme to present at the 2003 World Summit for Sustainable Development conference.



Fig. 5. Mozambique students sorting and identifying fish

IV. PROMOTION OF QUALITY

A Programme of this magnitude needs to continuously assess the impact and relevance of its contribution to environmental education, public awareness and capacity building. Since the official start of the Programme in March 2002 it has grown from a national (South African) to a regional (South Africa, Mozambique, Tanzania, Comoros, Madagascar) Programme, contributing to the African NEPAD initiative. Faced with this rapid growth quality assurance is imperative to honestly fulfil its mandate.

Due to the rapid start of the Programme initial quality assessment strategies were aimed at specific products produced or training initiatives. This was obtained from user feedback (questionnaires and interviews) and the Environmental Education Steering Committee evaluating each proposal and outcome. Feedback on the educational resources where gained from the governmental environmental education body, the first 50 marine educators introduced to the products, educators using the products and learner response. From this it has been ascertained that the resources are user friendly, provide valuable information on ocean exploration, allows for creativity by the educator and can be adapted to different situations or contexts, do need to be broken down into lesson plans per grade and will have to incorporate the recent changes made to the South African Curriculum Standards. Furthermore there is potential to further develop resources and to grow.

Those who visited the research vessel in each port found the experience to be invaluable, adding value to their classroom presentations. The experience enabled them to present content more enthusiastically and with confidence that inspired learners. They would welcome a second opportunity to attend. We have learnt from this that we must maintain this opportunity and build upon it.

The capacity building initiative was a huge success on many levels, the content covered and work experience supported the students' university modules and enriched their knowledge base. However the ports within South Africa are close together only giving trainees a few days on board. Those who boarded in Mozambique spent two weeks on board and had more opportunity to become familiar with and participate in the research, adapt to ship

board life and receive a more comprehensive lecture series [4]. Feedback from the trainees indicated that the experience was invaluable. The overall positive response from trainees, researchers and tertiary institutions has led to strong recommendations that training expeditions should become an annual event to build capacity. However, to facilitate a comprehensive and more valuable learning experience, fewer trainees would be selected and they would remain on the ship for about two weeks. Expeditions would be extended to Tanzania, Comoros and Madagascar. In future trainees would be from the different participating countries, allowing for cultural exchange to take place, enriching the experience further.

Public awareness initiatives have been hard to quantify and have been evaluated primarily on the response of those that attended public lectures, discussion forums or displays and the number who attend. It has been estimated that in South Africa over several thousand people attended the various initiatives.

V. FUTURE

The success of the Programmes environmental education, public awareness and capacity building initiatives in its first year, the inspiration and dedication shown by the voluntary personnel encourages the continuation of them and development of new ones. With the appointment of the environmental education co-ordinator the Programme has a positive future. The Programme has formalised its objectives, developed management strategies and business plans in line with them and is entrenching quality assurance throughout. The resources are contributing to what is taught at school, it is inspiring the youth, educator and community and is developing young scientists and is poised to grow into a major southern and East Africa initiative. In support of the United Nations Decade of Education for Sustainable Development (2005-2014) [5], the Coelacanth Programme and others like it must include educational initiatives; it is the right of everyone to have access to information and the responsibility of research programmes to share it in a user friendly and accessibly manner.

This Programme will continue to

- produce high quality resources,
- encourage wide distribution of them,
- provide or support inspirational training initiatives and
- public information sessions.

However, to do this the Programme must at all times “belong” to the people, have the support of the respective governments, form strong partnerships with non governmental organisations and businesses and work in harmony with other national and international programmes to develop financial and infrastructural capacity, to continue this inclusive, multidisciplinary and vital work.

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