

PROJECT

Primary Science

2007-2009

Content

Project Summary	3
Project Justification	4
Sustainability	5
Project Description	6
Aims & Objectives	7
Methodology	8
Team Members	10
Time Frame	10
Project Milestones	11
Budget	12

Developing critical thinking among pupils of primary school in learning science using ICT coupled with an interactive pedagogy.

(Engaging in Thinking)

Project Summary

It not a surprise for anyone that science learning in our primary schools is dull and not interesting. On one hand, pupils learn science by rote and this causes hindrance to developing an inquisitive mind and becoming independent learners. On the other hand, capable pupils are not able to express their science ideas freely whether verbal or written. The teaching is so dull that pupils start developing a negative attitude towards learning of science.

The project which is in line with government policy on quality education aims at engaging pupils of primary schools to develop a critical mind with a view to becoming independent problem solvers using ICT and an interactive pedagogy.

The three-year project target 9 primary schools in the four zones and cuts across three levels - low achieving, average achieving and high achieving. The project intends to bring a paradigm shift in teaching and learning of science with emphasis on the medium of instruction. It is expected that the outcomes will be beneficial to all the stakeholders.

Project Justification

The National Curriculum framework lays emphasis on the development of a complete child and for this to happen, the child should have developed competencies in the following areas: personality, knowledge, skills and attitude. It also stresses the fact that science should be accessible to all and that science should be an active process which pupils will acquire 'by doing' rather than by memorizing facts as is the case presently.

This project which is in line with government policy to improve teaching and learning at primary level of education is designed to engage the pupils in constructing knowledge of events based on an interactive pedagogy. Pupils will be involved in continuous cognitive dissonance, necessary for developing purposeful cognitive structures in their mind.

The outcomes from this project will be beneficial to the:

- (i) Pupils as they will develop sound understanding of concepts,
The interactive pedagogy will enable learners to construct knowledge by enabling them to gradually develop cognitive structures in their minds,
- (ii) Teachers as they will adopt a pragmatic approach to teaching,
Teachers will have the opportunity to develop teaching styles which are directly related to learning. The constructivist approach will enable teachers to be facilitators rather than transmitters of knowledge. Notes giving will be phased out.
- (iii) Parents as they will be full fledged partners in the education of their child as they will be involved in follow up activities at home,
Parents will be offered the opportunity to be partners in the process of knowledge construction by their children.
- (iv) MIE as the approach will be integrated in our programmes,
Our courses at primary (and possibly pre-primary) will incorporate elements of activity-based learning.

- (v) Ministry of Education and Human Resources in its pursuit for a world class quality education.

Our aim is to help the Ministry to improve teaching and learning of science in our primary schools. This project provides the basis for extending the findings to other subjects.

Sustainability

The outcomes of this study will be communicated to the Ministry of Education and Human Resources so that this new paradigm in teaching and learning is fully adopted in all schools. It is also expected that curriculum writers will align their approach along this dimension.

The resources that will be developed will be uploaded on the MIE website to enable all primary school teachers to have access to them.

Moreover, it is expected that in the first instance, various stakeholders (hotels, banks, etc) will be contacted to sponsor more schools to adopt this new pedagogy. These stakeholders will be encouraged to work in partnership with the target schools which will be grouped in different clusters.

Project Description

Introduction

We are living in a dynamic world where we can no longer afford not to be scientifically literate as all new developments have in one way or the other a direct relation to scientific discoveries. Our Mauritian society is embarked on a journey towards the building of a competent workforce for the welfare of each and everyone.

Teachers, being one of the stakeholders, have a very important role to play in enabling pupils to develop conceptual understanding of lessons. The task of the educator is not to produce elites or high flyers only, but to produce critical thinkers so that the complete child, when grown up will be able to operate effectively and efficiently at whatever social or economic milieu he or she is.

A comprehensive analysis of CPE Examinations for the past five years (2002-2006) shows that the rate of failure in science is quite alarming. Many factors have been attributed to the poor performance, such as lack of understanding, inability to develop understanding of scientific processes, lack of motivation and interest amongst others. In 2006, the number of candidates scoring an 'A' has decreased by almost 10% as compared to the year 2005, while the number of candidates scoring a 'U' grade has increased at an alarming rate. The reports make reference to a number of areas that pupils need to pay particular emphasis, namely, language, problem solving and observational skills amongst others. The reports clearly emphasize on a more pragmatic approach to teaching and learning whereby pupils are involved in *hands on* activities. However, due to poor language skills, a significant number of pupils are unable to communicate properly their knowledge and understanding of concepts properly. Statistics from a number of years clearly emphasize on significant disparity on passes among boys and girls. Girls usually score higher grades than boys who are mainly penalized when it comes to expressing and communicating their ideas in English.

Children have unlimited curiosity and vivid imagination which teachers should tap and sustain as well as ensure that such qualities are not suppressed by the teacher centered approach and endless examinations. We should not forget that our children of today will surely be facing the inevitable problems of global warming, energy production and distribution, sustainable living, AIDS, bird flu or other epidemics¹. Our children need to be involved in cognitive tasks to enable them develop a critical mind so that they can take up the new world challenges that are constantly emerging.

Aims & Objectives of the Project

It is high time that remedial actions be taken with a view to addressing the nearly 40% failure at CPE. This project, though centered at science, is also targeted at developing the communication skills of learners. Communication skills are at the core of scientific process skills. In this perspective, the project will also target English language as a medium of instruction during communication.

The project aims at introducing the learner centered approach to teaching and learning coupled with ICT.

The **objectives** of the project are to:

- (i) design *hands on* and *minds on* activities in science at Primary level,
- (ii) embed ICT in thought provoking activities in science,
- (iii) train primary school teachers in adopting learner centered pedagogy in their teaching,
- (iv) enable teachers to apply the learner centered pedagogy to teaching and learning of science.

¹ Hart-Davis, A. (2006) "Science must be the most useful tool for everyday life", *Primary Science Review* 95. The Association for Science Education, UK

Methodology

This project has been designed following preliminary groundwork undertaken by the research team to probe into the problems that Head Teachers, Deputy Head Teachers, Teachers and Pupils are facing in the teaching and learning of Primary Science.

The methodology adopted will be based on four phases.

The project will target 9 primary schools across the island. Two schools per zone will be selected after discussions with the Ministry of Education and Human Resources. One additional school will be chosen in the zone which has a large number of schools. The selected schools will form part of three categories, namely, low ability (ZEP Schools), Average ability and High ability.

Phase I

A comprehensive analysis of the Science and English curricula will be undertaken with a view to identifying key concepts within and across the subjects as well as areas of overlap. This will enable the research team to design appropriate instruments to develop the interactive pedagogy and also to integrate concepts within and across subject areas.

It has to be noted that in 2006, a sample of five primary schools were surveyed by our team and based on the data collected, this project has been conceptualised.

Phase II

Learning packs which include *minds on* and *hands on* activities will be designed. The activities will enable pupils to:

- (i) give importance to prior knowledge which is a pre-requirement for understanding new concepts,
- (ii) be engaged in critical thinking which involves logical thinking and reasoning including skills such as comparison, classification, sequencing, patterning, webbing, deductive and inductive

- reasoning (cause/effect), forecasting, planning, hypothesizing, and critiquing,
- (iii) continuously challenge their pre existing notion of concepts,
 - (iv) develop core constructs² that are essential for developing purposeful knowledge structures.

Most of the activities will have to be carried out in groups using ICT. The emphasis is to embrace both areas - collaboration and ICT - and work towards developing pupils' full collaborative potential. It is expected that pupils communication skills in English, if properly sustained, will be enhanced.

Pupils will have the opportunity to collect data using PDA (Personal Digital Assistant or Pocket PC) as well as carry out a number of analysing tasks. The data can also be uploaded on a PC for more analysis.

The PDA will be kept under custody at the MIE and will be made available to schools on the day when they will be used and they will be collected back in the afternoon. In this way, all the pupils (working in groups) will have the opportunity to have access to the PDA. This approach will ensure that the element of security of the PDA is taken care of.

Schools will have the opportunity to use the mobile projection unit during the teaching of the concepts. Pupils will therefore have the opportunity to interact with latest technology, backed with a learner centered pedagogy.

Comprehensive worksheets will also be designed by the research team to enable pupils to carry out specific tasks related to the concepts (together with the idea of curriculum integration) with a view to enabling them construct purposeful knowledge structures.

² Parmessur, V K P, Ramma, Y, Bessoondyal, H, Ramdinny, A (2004) "Investigating the common core constructs in students' acquisition of logico-mathematical concepts in physics at HSC level" Project funded by the Mauritius Research Council, 2001.

Phase III

Teachers will be called to the MIE for training. The project will be launched during the school vacation and initial training will start during that time. More training will be offered to teachers after school hours on specific days, following discussions with the Ministry of Education and Human Resources.

Phase IV

The research team will carry out regular visits to schools to further help and sustain the project. Any shortcomings identified will be addressed and fed back into the project.

The Team Members

Dr Y Ramma Initiator & Team Leader
Academics in other Departments will be identified.

Time frame

2 years

The project is targeted to start in June 2007.

Project Milestones

		J07	F07	M07	A07	M07	J07	J07	A07	S07	O07	N07	D07	J08	F08	M08	A08	M08	J08	J08	A08	S08	O08	N08	D08	J09	F09	M09	A09	M09
Phase I	Comprehensive Analysis -Eng & Science																													
	Identifying regions of integration																													
	Developing instruments																													
	Developing pedagogy																													
Phase II	Developing learning packs																													
	Piloting																													
Phase III	Training of Teachers																													
Phase IV	Implementation of the Project																													
	Sustaining the project - regular visits																													
	Improving the project based on feedback																													
	Workshop																													
	Writing up																													

Budget (Capital & Recurrent)

Details requirements	Rs
4 PDA & Sensors The above include the following: PDA	
Materials	
Salary (Research Assistant) & Transport	
Documentation	
Consumable	
Training & Evaluation	
Total	
Contingency (10%)	
Grand total	616,000.000

It is most probable that a mobile projection unit will be made available to MIE by Microsoft free of charge. This device also will be included in the project.

Dr Y Ramma