SCIENCE EDUCATION IN PRIMARY SCHOOLS

FINAL REPORT

December 2003

ACKNOWLEDGEMENT

The Mauritius Research Council (MRC) would like to thank the Ministry of Education and Scientific Research and Bureau d'Education Catholique for providing the permission to visit the schools for the survey.

The MRC wishes to express its sincere gratitude to all the Head Teachers, Teachers and Students of the Primary Schools where the survey was carried out during the months of September and October 2003.

The MRC also wishes to thank all the respondents for their help in providing useful information and insight in to the teaching and learning of science in the primary schools, without which the study would not be possible.

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LIST OF ACRONYMS

BEC	Bureau d'Education Catholique
CPE	Certificate of Primary Education
EVS	Environmental Sciences
CA	Continuous Assessment
GP	General Purpose Teacher
GS	Government School
HT	Head Teacher
HSC	Higher School Certificate
ICT	Information and Communication Technology
MCA	Mauritius College of the Air
MES	Mauritius Examination Syndicate
MIE	Mauritius Institute of Education
MRC	Mauritius Research Council
NCCRD	National Centre For Curriculum Research and Development
PTA	Parent Teacher Association
RCA	Roman Catholic Aided
SC	School Certificate
ZEP	Zone d'Education Prioritaire

SCIENCE EDUCATION IN PRIMARY SCHOOLS

EXECUTIVE SUMMARY

The Ministry of Education and Scientific Research has mandated the Mauritius Research Council (MRC) to chair a Steering Committee and two Task Forces, on primary and secondary education respectively, in order to review the teaching and learning of science at both primary and secondary levels. This action was taken following a number of studies commissioned by the Mauritius Research Council, the findings of which called for concern - increasingly fewer students are opting for science subjects, these being perceived as difficult and irrelevant.

In order to better understand the reasons why students were not attracted to science subjects, the MRC conducted a survey of a representative sample of 15 state, private and confessional primary schools in the different educational zones during the months of September and October 2003, to carry out an audit on the teaching and learning of science at primary schools.

Focused group discussions were conducted with the head teachers, teachers and students of lower primary and upper primary to collect qualitative and quantitative data on teaching and learning of science. Views of primary school inspectors were also gathered through a pre-designed questionnaire.

THE KEY FINDING OF THE SURVEY ARE CONCLUDED AS FOLLOWS:

- Almost 66% teachers and head teachers said that science should be introduced in Standard I because the teaching and learning of science starts at home at a very early age, when the child starts reasoning with the parents.
- Most students in primary schools prefer EVS/ science more than the languages (French and English)
- 10% of the General Purpose teachers had never studied science in secondary school
- Only 44% teachers of lower primary and 56% teacher of upper primary had studied science up to Form V
- Only 53% teachers had attended refresher trainings for teaching of science, however, they did not found the training useful as the trainers (Inspectors) themselves did not have a science background
- Creole and French are used along with English by all the teachers to explain the scientific concepts to students
- 77% of the lower primary students prefer French to English as they have a limited English language vocabulary
- 53% of the upper primary students prefer writing technical science terms in English and learning in French and Creole

- Continuous Assessment, that is, assessing the child at each term rather than one end of the year final exam, is preferred by 86% of the teachers and head teachers
- All upper primary students take private tuitions to learn more and to get good marks
- 60% teachers feel that private tuitions are necessary to complete the syllabus
- All teachers felt that EVS and science curriculum should be made more interesting and relevant with topics related to daily life and taught through games and experiments
- All teacher and head teachers felt that mini science laboratory/ science room/ demonstration room OR proper science kits should be provided to each school to facilitate them in making teaching and learning of science more fun and attractive
- All teachers and head teachers felt that science should be taught by a subject specialist teacher with at least science qualification up to Form V
- All the teachers' felt the need for a teachers guide to help them in problem solving

RECOMMENDATIONS MADE BY HEAD TEACHERS AND TEACHERS OF PRIMARY SCHOOLS

- EVS/ Science curriculum to be reviewed and revised to make it more fun and interesting by adding games and experiments to facilitate students to learn the complex scientific concepts easily.
- Organization of Inter-School and Intra-School science exhibitions regularly
- Provision of Teaching aids/ science kits/ mini science laboratory to carry out experiments
- Introduction of science practical involving hands on experience (***la main a la pate: LAMAP***) and low cost equipment
- Resource persons from different fields should visit the school and talk about their experiences with the children
- Association of Science teachers should help the primary teachers in problem solving
- Introduction of 'Subject Specialist Teachers' to teach Mathematics, Science and ICT
- Combination of Creole/French/English for teaching and learning the scientific concept.
- Introduction of Continuous Assessment: Weight age to be given to the grades for each term paper as this will be a better reflection of the child's ability than the existing one-time final examination
- Pupils should be assessed on their understanding of the scientific concepts and not on their language skill
- Mode of assessment to be extended from paper & pencil to practical work as this would be beneficial for pupils having language problem and for those who are manually skilled.
- An ideal teacher student ratio should be maintained in the schools for meaningful interaction between the teacher and the students

- Introduction of a Teachers' guide to help the teachers in problem solving
- Qualified MIE lecturers instead of school inspectors should organize the regular refresher trainings in Science in each term for the science teachers
- Involvement of private sector for their commitment to the educational institutions and to the future workforce of the country: by providing incentives such as tax relief
- Private tuitions should be completely banned in the primary schools to reduce the pressure from the children.

SCIENCE EDUCATION IN PRIMARY SCHOOLS

FINAL REPORT

1. INTRODUCTION

The Ministry of Education and Scientific Research has mandated the Mauritius Research Council to chair a Steering Committee and two Task Forces, on primary and secondary education respectively, in order to review the teaching and learning of science at both primary and secondary levels. This action was taken following a number of studies commissioned by the Mauritius Research Council, the findings of which called for concern - increasingly fewer students were opting for science subjects, these being perceived as difficult and irrelevant.

In order to better understand the reasons why students are not attracted to science subjects, the MRC conducted a survey of a representative sample of state, private and confessional primary schools in the different educational zones during the months of September and October 2003, to discuss issues relating to science education with students and teachers.

2. OBJECTIVE OF THE STUDY

To carry out an audit on the teaching and learning of science at primary schools

3. METHODOLOGY

SAMPLE SELECTION

There are a total of 277 primary schools in Mauritius. Therefore, to select an appropriate sample for the survey, a list of all the primary schools and their Certificate of Primary Education (CPE) pass percentage for the academic year 2002 was obtained from the Ministry of Education and Scientific Research and Mauritius Examination Syndicate, respectively.

From each zone around 40 high achieving, medium achieving and low achieving government (GS), private aided and private unaided primary schools were selected and contacted for the visit. As only 15 schools responded, therefore, the visits to 15 primary schools were scheduled in consultation with the head teacher on the date and time suitable to them.

ABOUT THE SAMPLE

- A total of 15 primary schools (*Table 1, Annex 1*) were visited in the month of September and October 2003 to carry out an audit on the teaching and learning of science at primary schools

Table 1 - Zone wise distribution of sample schools visited

		Rural	Urban	Total
Zone 1	GS RCA Private	1 0 0	1 0 0	**2**
Zone 2	GS RCA Private	2 1 1	1 1 0	**6**
Zone 3	GS RCA Private	1 1 0	1 1 0	**4**
Zone 4	GS RCA Private	1 0 0	1 1 0	**3**
		8	**7**	**15**

- The sample included 9 government, 5 Roman Catholic Aided (RCA) and 1 un aided schools in the four zones. Out of which 8 schools were located in rural areas and 7 schools in urban areas.
- Zone wise distribution of sample included 2 schools in zone 1, 6 schools in zone 2, 4 schools in zone 3 and 3 schools in zone 4.
- Out of 15 primary schools, 7 schools having low CPE pass percentage, 3 schools having medium pass percentage and 5 schools having high pass percentage were visited

DATA COLLECTION

- Focused group discussions were conducted with head teachers, teachers and students of lower primary and upper primary to collect qualitative and quantitative data on teaching and learning of science through a pre-designed questionnaire. The questionnaires are attached as Annexes 2 and 3.
- The questionnaires were administered in groups to teachers of lower primary and upper primary and for students of lower primary (Standard I – III) and upper primary (Standard IV-VI).

- 10 School Inspectors were also contacted during the LAMAP workshop at MIE in October 2003 to gather their views on teaching and learning of science in general and refresher trainings programmes conducted by them in particular (The questionnaire and their views on science education in primary schools are presented in a separate report entitled "***Primary School Inspectors Survey Report***").

4. MAIN FINDINGS

4.1 Introduction of Science in Primary Schools

Almost 66% teachers and head teachers said that ***science should be introduced in Standard I because the teaching and learning of science starts at home at a very early age***, when the child starts reasoning with the parents. The formal science teaching can even start at pre-primary. If science is introduced at an early age, it would be easier for students to understand not only scientific concepts but also processes of science better. This would result is students' developing interest and confidence in science which would further help them in coping well in science at the secondary level.

However, 20% respondents felt that science should be introduced at Standard IV because the students are very young in Standard I to understand scientific concepts due of the language problem.

The remaining 13% respondent said that teaching and learning of science should continue as it is in the current context, that is, science to be taught from Standard I but in the form of EVS.

4.2 Curriculum

4.2.1 Environmental Science (EVS) Curriculum

Focused group discussions with a total of 274 lower primary students and 39 lower primary teachers were held for their views on the EVS curriculum.

*The **Teachers** had the following views –*

- The EVS curriculum has bulky words and long sentences
- The students of lower primary do not have enough English language vocabulary to understand difficult words in EVS

- The level of English in EVS is even higher than the English curriculum itself
- No space for nature corner in the class room
- The EVS book does not explain how to conduct a practical.

*The following **suggestions** were given by the teachers on how to make EVS teaching and learning fun and attractive –*

- EVS curriculum to be made more interesting and relevant with simple words and short sentences
- The curriculum should be transacted in schools using games and practical work
- More topics related to daily life should be included
- Use of Creole to explain the difficult words

The discussions with the **lower primary students** studying in Standards I, II and III was done in Creole and/or French. They were asked to raise their hands in response to the question, indicating their preferences for a particular subject or language etc. For some questions they were asked to respond individually and their responses were noted down.

In general, it was observed that the lower primary students prefer EVS to languages, French and English.

Box 1: Subjects Preferred by Lower Primary Students

In order of preference –

- Information and Communication Technology (ICT, Computers)
- Environmental Studies (EVS)
- Mathematics
- French
- English
- ✓ Creative Art, Physical Education and Computer were liked by all students

The Students liked EVS because:

- They enjoyed doing experiments
- They liked the illustrations in the book
- They liked the demonstrations carried out by the teacher and
- They learnt about the environment, animals, plants, water, air, etc.

4.2.2 Science Curriculum

To get the views of teacher and students of upper primary on science curriculum, focused group discussion were held with 365 upper primary students and 50 upper primary teachers.

*The views of **upper primary teachers** on **science curriculum** were as follows:*

- The curriculum was loaded (topics on water and air are too bulky)
- Abstract topics should be removed
- Time allocated for teaching of science was not enough (only 75 minutes per week)
- Absence of a teaching guide
- Not all teachers had a science background
- Irrelevant and Insufficient on-the-job trainings for the teachers for teaching of science.

*The teachers gave the following **suggestions** on making science teaching fun and attractive:*

- Science curriculum should be reviewed to be made more interesting by adding more experiments
- Teaching aids/ science kits/ mini science laboratory to carry out experiments
- Inter-school and intra-school science exhibition
- Resource persons from different fields should visit the school and talk about their experiences with the children
- Association of Science Teachers should help the primary teachers in problem solving

Even though the teachers faced a number of problems in teaching of science, such as, lack of science background, insufficient trainings etc. on the other hand, the students of upper primary, that is, standards IV, V and VI found Science as their **most favourite** subject.

Box 2: Subjects Preferred by Upper Primary Students

In order of preference –

- Science
- Mathematics
- Computers (ICT)
- History and Geography
- French
- English
- ✓ Creative Art, Physical Education and Computers are liked by all students

The Students found science as their most favourite subject because -

- They found it very interesting
- They learnt a lot of new things in science - living things, environment, energy, water, air pollution, body parts, light and sound etc.
- They liked doing experiments
- They discovered new things

Almost all students interviewed agreed that science was needed in everyday life, in school, outside school and at home and they were able to give relevant examples for the same.

Only 30% of the upper primary students found science interesting because of the teacher, while almost 70% students found it interesting because of the subject matter and especially because of the science experiments, which were demonstrated by teacher in the classroom, and some children like to repeat some of the possible experiments at home.

Box 3: Scientific Ambitions of the Upper Primary Students

When asked what would they like to become when they grew up? In one school, about 5% students of upper primary – both boys and girls said that they wanted to become a '**scientist**'. On further probing the students said that they wanted to do research, experiments, explorations and inventions on dodo, marine life, planets, volcano, medicine, and extraterrestrials.

Another 55% students interviewed indicated their preference to take up other scientific jobs. They wanted to become Doctors, Engineers, Astronaut, Veterinary Doctor, Dentist, Nurse, Ecologist, Archeologist, etc. when they grew up.

4.2.3 Information and Communication Technology (ICT) Curriculum

In both the lower primary and upper primary classes **computers was being taught as a theoretical subject** because most of the schools visited had only one or two computers and each student got only 1-10 minutes per week to work on the computer during the ICT class.

Besides students, nine computer teachers were also met during the survey for their views on the ICT curriculum and suggestion if any.

*The main **problems faced by the ICT teachers** were*:

- Only some teachers had been provided with the ICT curriculum
- The ICT curriculum had mostly practical exercises but in the absence of computer, it was not possible to have frequent practical classes.
- There was no book on ICT for the primary schools.
- Lack of supporting materials such as educational CD Rom etc. However, some teachers brought their personal CD Rom to show to the children.
- Due to the language problem, it was difficult to introduce the "key words", such as mouse, keyboard etc in English especially to the lower primary students

*The ICT teachers gave following **suggestions** to improve the teaching and learning of ICT in primary schools:*

- ICT should be introduced at upper primary level when students have developed English language vocabulary
- ICT books should be provided to the teachers.
- ICT teachers should be provided with educational CD Rom to make teaching and learning of ICT more fun and interesting as the students find CD Rom very interesting
- Teachers guide/syllabus to be made available to the ICT teachers.
- Refresher training programmes should be organised every six months
- Each school should be provided with an E-mail and internet connection.

STUDENTS' VIEWS ON ICT CURRICULUM

At **lower primary level** the students preferred computers more than other subject (see Box 1). This was because of the novelty of the subject although they had language problem in understanding and learning the technical words, such as, mouse, monitor, keyboard etc**.** The students of standard I, who had very limited English vocabulary were confused with words such as mouse as they knew mouse as "*le rat*", an animal. However, they enjoyed making design on the computer.

At lower primary level, students knew how to type words (their name etc.), and draw design, handling of mouse, drag and drop, use of pointer. The students who had computers at home were also aware about the other uses of the computer like playing games, watching a film and listening to music on the computer. Some of them were also aware about Internet and E-mail – they had seen their parents or elder siblings sending emails to friends and relatives within Mauritius and abroad.

The **Upper Primary** students also liked computers but it was the **third** preferred subject after science and mathematics (see Box 2). The reason being that they get very little time to work on the computer. In one school the students said that they get only one minute in each period to work on computers and they would like to work more as they find it very interesting.

However, the upper primary students knew how to turn on the computer, create folder, open/close a file, print a file, word processing, functions of a computer, parts of computer, drag & drop, selection, double click etc.

They also knew about Microsoft word, Excel, Power point, Bytes & Bits, Design, Painting, Hardware, Chatting, Games, listen to music, watch films, send E-mail, calculation etc.

4.3 Science Practical

4.3.1 Importance of Science Practical, Use of Multimedia, Low Cost Equipment, Field Visits etc.

All the respondents strongly felt that practical work, use of multimedia, low cost equipment, field visits are very important for learning and teaching of EVS and science. In fact, it was found that the students like EVS and science because of the practical work, field visit etc. They learnt more by doing (or seeing!! in case of science experiments demonstrated in the classroom). All the teachers felt the need for -

A ***mini science lab, or a science room or a demonstration room*** to demonstrate science practical to students, especially on the topics like water and fire, which cannot be carried out in the classroom due to security reasons; **OR** at least a proper ***science kit*** to facilitate teachers in demonstrating experiments in the classroom.

Almost 80% of the surveyed teachers and upper primary students found the video films produced by MCA interesting. However, there were no educational video films for students of lower primary. The schools did not have educational CD Rom also.

All schools organize at least **one** field visit in a year. It was observed that good schools (*the star schools*) organized field visits more frequently than the ZEP schools and low performing schools. Students from the low performing schools and ZEPs were not able to pay for the frequent trips as they generally came from poor families.

4.3.2 Problems faced during EVS/ Science Practical

Even though all the respondents included in the survey unanimously felt the need for practical work in making science teaching and learning fun and interesting, still they were not carrying out science practical in classrooms due to the following reasons.

LACK OF SPACE

Classroom space was reported as a major drawback to carryout group work or to do an experiment individually. The teachers found difficulty in making small groups for hands on experience, as there was not enough space for students to even sit comfortably in most of the schools.

LACK OF TIME

There were only three periods of 25 minutes each, that is, 75 minutes per week allocated for teaching of science. In this limited time, the teachers were more concerned about completing the syllabus somehow rather than giving time to the students to carry out experiments on their own.

LACK OF MATERIAL/ EQUIPMENTS/ TEACHING AIDS

The teachers felt that due to lack of materials and teaching aids in school and lack of training in preparing low cost material and teaching aids, teachers were not able to conduct experiments in classroom.

4.3.3 Problems Faced during use of Low Cost Equipment

A pilot project on "Low Cost Equipment" has been launched by the Bureau d'Education Catholic (BEC) in some RCA schools. The teachers involved in this pilot project were asked to give their views on the low cost equipment booklet.

Although, all teachers felt that the use of low cost equipment was very useful in teaching and learning of science in primary school, still, they came across a number of problems in carrying out experiments from the low cost equipment booklet. Some of the problems were as follows –

LACK OF MATERIAL – As the low cost equipment was not readily available in schools, teachers had to bring the waste material themselves if they plan to carry out an experiment or they had to ask children to bring it from their home.

LACK OF TIME AND SPACE to organize exercises from the low cost booklet - In one school, the research team observed the teacher conducting a science practical on "light" from the low cost equipment booklet. The whole process of demonstration, making children repeat the exercise in groups took almost 45 minutes while the science class was for 25 minutes duration only

THE EXPERIMENTS IN THE LOW COST EQUIPMENT BOOKLET WERE NOT THE SAME AS THE SYLLABUS

The exercises in the low cost equipment booklet were different from the exercises mentioned in the science syllabus for standards IV and V. Therefore, the teachers did not carry out the experiments, as they were more concerned on following the syllabus and completing it before the exams.

OUTDATED EXERCISES

A few teachers felt that some exercises given in the booklet were outdated and the children were not able to relate to them. For example, the exercise on sound - the use of tin cans as telephone was very outdated when every household uses mobile phones nowadays.

4.3.4 Problems Faced during use of Multi Media

The teachers and head teachers faced a number of problems in using the multi media, some of which were stated as below:

- The audio-visual (AV) room had been converted into multi-purpose room (ICT/ AV room/ library/ Staff room) therefore, it was difficult to show video film to students during the science class as the AV room might be used for another purpose by another class
- Some schools lacked funds to buy new video cassettes from MCA.
- As the schools had to get video films themselves from the MCA, sometimes it was not possible for them to buy films due to lack of time or because they were not aware about the availability of new videos
- Some schools felt that maintenance of the Audio-Visual equipment was a problem due to lack of funds
- In some schools, in the absence of the AV room, the audio-visual equipment had to be transported to each classroom whenever required, which took at least 10-15 minutes out of the 25 minute period scheduled for teaching science on that particular day
- Some teachers felt that the video films were outdated and new videos should be introduced from time to time.

4.3.5 Problems faced during Field Visits

COST

The schools charged around Rs. 50/- per fieldtrip from each student. The schools reported that many children from poor families especially when such families have 3 or 4 school going children found it difficult to pay Rs. 50/- or more per trip per child.

SECURITY

The head teacher and the teachers were responsible for the security of students during the field visit. Therefore they did not feel motivated to take students out for the field visits very frequently.

PERMISSION/ CONSENT FOR THE FIELD VISIT

The teacher have to take consent from the head teacher, Ministry of Education, Parents and the place where they have to take students for the visit. The whole process was so time consuming that by the time they got the permission from all concerned parties, the topic was already covered in the classroom. .

4.4 Infrastructure

4.4.1 Infrastructure for Teaching and Learning of Science

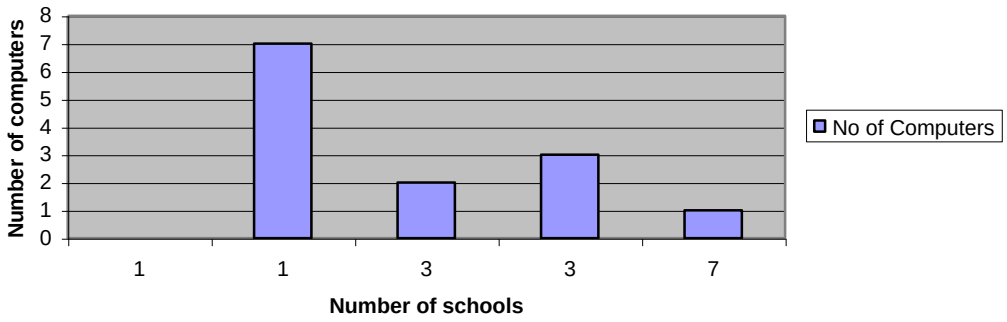
Out of 15 schools visited only one school, **Espitalier Noel in Curepipe**, had a **Science Room**, where one classroom was converted into a science exhibition-cum-demonstration room with the initiative of the head teacher. The science exhibition-cum-demonstration room had exhibits and models related to the EVS and science syllabus. The Parents Teachers Association (PTA) had contributed in making all the exhibits out of waste materials and low cost equipments.

Only two schools had **science kits**, however they were outdated (the thermometer was already broken etc.) and were not used anymore, and only four schools had science corners in the classroom.

4.4.2 Infrastructure for Teaching and Learning of Computers

Only 4 schools had a computer room with one computer each and 6 schools had multi-purpose rooms, which were being used as library/ multimedia room/ computer room/ staff room.

Figure - 2 Number of Computers in Primary Schools



As for the number of computers in each school, only one ZEP school had 7 computers, which were donated by a private company as part of the ZEP scheme. Out of 15 schools visited seven schools had only one computer each to cater for around 400 students in the school. Three schools had 2 computers each and remaining three schools had 3 computers each for around 800 students each.

Box 4: Private Sector Sponsorship

During the survey the research team came across a school, which was sponsored by the neighbouring hotel. The hotel had donated computers to the school and helped them by providing curtains, upgrading of the toilets etc. The head teacher of the school was asked to give the requirements to the hotel administrators and they were being provided with the services. In return, the hotel had put a "plaque" outside the school indicating their affiliation with the school.

The hotel did not had an annual budget for the school and the funding was not regular. The hotel was providing with the services required by the school on as and when required basis.

Similar efforts of involving the private sector by providing incentives such as tax relief should be promoted by the Government in a more organized manner.

4.4.3 Classroom Space

A majority of schools, including the Star Schools, had insufficient space in classrooms for group activity, such as, la main a la pate (LAMAP) etc. The students had just enough space to sit on their seats along with the huge school bag. In some schools it was noticed that the students were sitting just one-meter away from the blackboard.

In some schools, classroom space was not a major problem, as they had very few students in the school because parents did not want to send their children to such schools due to various factors such as location, environment and reputation of the school as a poor performing school.

4.5 Teachers/ Teaching Quality

Small group discussions were organized with 89 General Purpose Teachers (39 teachers from lower primary – 3 males and 36 females; and 50 teachers from the upper primary – 30 males and 20 females) in 15 schools to get their views on teaching of EVS and science, their workload, student teacher ratio, refresher trainings etc.

4.5.1 Teachers Workload

Almost all 87% of the General Purpose (GP) teachers were teaching "all subjects" except computers (ICT) and Asian languages for which there were specialist teachers.

Only 2 schools had a specialist teacher for Physical Education & Health, however the "*Health*" part of the Physical Education & Health was also taught by the GP teachers.

All teachers felt that the GP teachers were considered as "*Jack of All*" - they were supposed to be an expert in teaching all the subjects. Due to their heavy workload, the GP teachers had no time to prepare the lessons and to be more creative in teaching EVS and science. As a result, all GP teachers felt frustrated de-motivated and exhibited no passion for teaching.

4.5.2 Teacher Student Ratio

The teacher student ratio was another deterrent factor to the **meaningful interaction in the classroom** as majority of the classrooms were overcrowded with 40-45 young hyperactive students.

All good schools having high and medium CPE pass percentage had a student teacher ratio of around 1:40-45. On the other hand schools having low CPE pass percentage had a student teacher ratio of 1:20-25 with an exception of a few.

A wide disparity in the student teacher ratio from school to school was found. Therefore, it would not be right to quote the national average student teacher ratio of 1:25 for decision-making by the policy makers.

4.5.3 Teachers Science Qualification

"***Out of 31 General Purpose teachers in a Star School, only 4 teachers had studied science up to HSC***", said the head teacher. The findings of the survey also reflect similar results regarding the science qualifications of the lower primary and upper primary teachers.

Amongst the GP teachers at the lower primary level, 10% teachers had **never** studied science in school, and 46% teachers had studied science up to Form III level only. Out of the remaining, 23% teachers had studied science up to Form V and 21% up to Form VI (Refer figure 3). Teachers having science qualifications up to Form VI were new / young teachers.

As for the GP teachers at the upper primary level, only 18% had studied science up to Form VI and 38% up to Form V. The remaining 44% had studied science up to Form III only (Refer figure 4).

The teachers said that most of the time they had to learn science themselves and than teach as they had no knowledge about the science topics covered in Standard IV onwards. Sometimes they had difficulty in finding answers to the student's questions or they had doubts about their answers as they had limited knowledge about science. *Therefore, teachers were continuously learning science and teaching at the same time.*

It was, therefore, suggested that the teachers should be provided with a "teacher's guide" to help them in problem solving.

4.5.4 Refresher Training for Teacher

"*Teachers Training at MIE should be reviewed, the teachers are taught in a abstract manner without the realities in schools*", said a primary school teacher.

Only 53% of teachers included in the survey had attended refresher training for teaching of science, however, they did not find the trainings useful because the trainers (***Inspectors***[1]) just read the whole book. They did not provide examples of good lesson planning, strategies to teach different topics in science and failed to build their confidence. It was mainly because the trainers themselves did not have any science background and lacked experience of teaching science at primary level.

The refresher training programmes, generally, involved teaching four subjects in a day by the same trainers and mostly it was a repetition of the earlier trainings. "*It was not a training session but only a briefing session when a new book was introduced",* said a primary school teacher.

The refresher training was organised during holidays, therefore, teachers were not motivated to attend the training. "*Anyway it was the same training every time and it was boredom as same things were taught every time".*

It was proposed that qualified MIE lecturers instead of school inspectors should organize the refresher trainings in science in each term.

[1]*To probe further in this matter, Primary School Inspectors, who were attending the LAMAP workshop at MIE in October 2003, were given a questionnaire to get their views on teaching and learning of science in general and refresher training of general-purpose teachers in science in particular. Their views and suggestions have been compiled separately and are presented in the report entitled "Primary School Inspectors Survey Report".*

Figure - 3 Science Qualification of Lower Primary Teachers

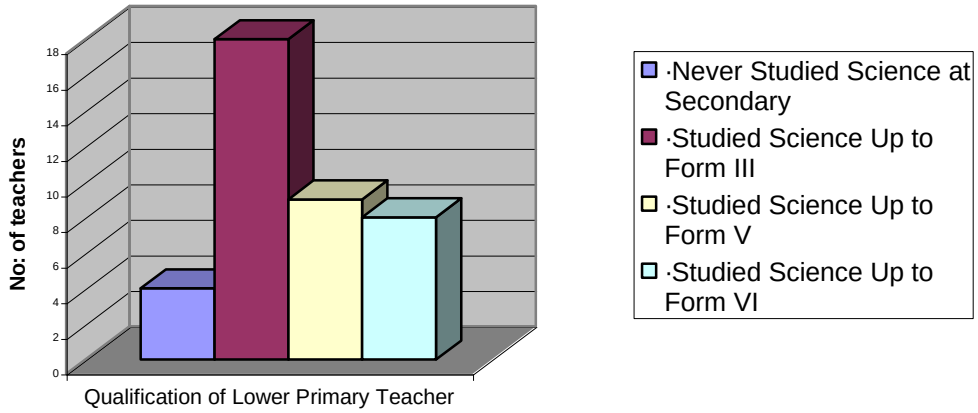
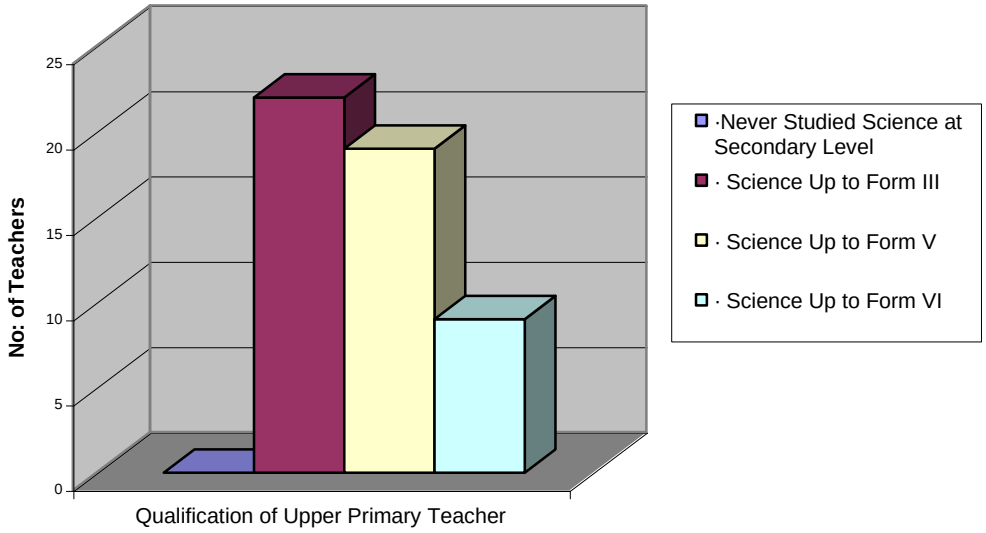


Figure - 4 Science Qualification of Upper Primary Teachers



4.5.5 Specialist Science Teacher

All teachers and head teachers were of the view that ***science should be taught by a subject specialist teacher with at least science qualification up to Form V*** at the upper primary level. As for the lower primary level however, the GP teachers could continue teaching EVS.

Subject specialist teachers were required to teach the upper primary level (Standards IV-VI), firstly, because it was not possible for one person to be an expert in teaching all subjects. The teachers tend to concentrate more on the subject in which they were more comfortable. For other subjects they just try to complete the syllabus so that the child could manage to pass in the exams.

Secondly, if it is proposed to make science compulsory up to Form V, it is very important that there should be good science teacher at the upper primary level so that the students are well prepared to study science at the secondary level.

4.5.6 Information and Communication Technology (ICT) Teacher

During the visit to 15 primary schools, 9 computer teachers (4 males and 5 females) were also interviewed for their views on introduction of ICT in primary schools, their workload, their qualification and suggestion if any.

All ICT teachers were fresh pass outs, without any science background, but all of them had undergone induction training at MIE. Most of them had done a computer course with just basic skills to teach computers, but had no knowledge at all about computer hardware.

The ICT teachers were teaching **only ICT** to all classes from Standard I to VI. Some ICT teachers were also teaching in two schools at a time. In some schools with student population around 800 or more (with four sections/ streams) there were two ICT teachers.

Following problems were being faced by ICT teachers: -

- There were only one or two computers in each school (refer figure 2)
- Most of the schools did not have a computer room. Therefore one computer was being transported to all classrooms during ICT period resulting in wastage of time
- Due to limited number of computers in schools, each student got just 1-10 minutes only per week to work on the computer
- There was lack of technical support for maintenance of computers. A technician had to be called every time any problem was faced.

4.6 Medium of Instruction

The medium of instruction was found to be one of the **major concerns** by students, teachers and head teachers in primary schools for teaching and learning of science. ***"The root cause of the problem in teaching and learning of science was the language"***, said a primary school teacher.

4.6.1 Students Views on Medium of Instruction

LOWER PRIMARY STUDENTS

A majority (77%) of the lower primary students prefer French as a medium of instruction, followed by English (15%) and Creole (8%). (Refer figure 5). The students prefer French because they were exposed to French and Creole at home and in the pre-primary schools. It was also found that even though students preferred Creole for learning of EVS, but very few students (8%) mentioned the preference for Creole due to peer pressure and social mindset that, ***Creole should not be used in school.***

The lower primary students, especially Standard I and II pupils, found the technical words in EVS very difficult to pronounce and sentences too complex to understand because they did not have adequate English language vocabulary.

Fig -5 Medium of Instruction Preferred by Lower Primary Students

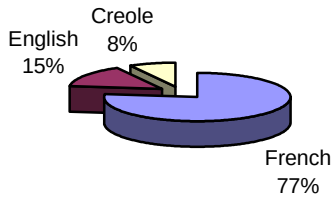
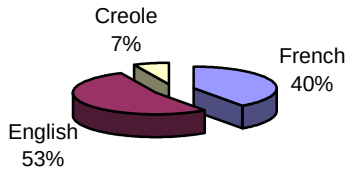


Fig - 6 Medium of Instruction Preferred by Upper Primary Students



UPPER PRIMARY STUDENTS

Fifty three percent of the upper primary students preferred English as a medium of instruction followed by French (40%) and Creole (7%) (Refer figure 6). Preference for English meant that they preferred writing scientific terms and answers in English than in French, although for explanation of the scientific concepts they preferred French and Creole.

One student rightly said, "***We think in Creole, learn in French and write in English".***

4.6.2 Head Teachers and Teachers Views on Medium of Instruction

During the focused group discussions with head teachers and teachers, two ***opposing views*** emerged, one for Creole and French as the medium of instruction in the primary schools and the other for English. The two viewpoints were as follows:

CREOLE AND FRENCH AS MEDIUM OF INSTRUCTION

"*Mother tongue should be used at all levels for better understanding of the scientific concepts and knowledge rather than English*", said a head teacher. Although English was the official language, the teachers preferred French (27%) and Creole (13%) for teaching EVS and science, as they felt that the students did not have adequate knowledge of English language.

The teachers also realized that students would have problems adapting in secondary schools if French was used as medium of instruction but they felt that students would **like** the subject more when taught in Creole and French.

"Creole was the ideal language to be used in primary schools", said another teacher. Creole should be used to introduce science topics and gradually scientific concepts should be introduced in English. For slow learners, learning and writing in English was very difficult since, they preferred Creole.

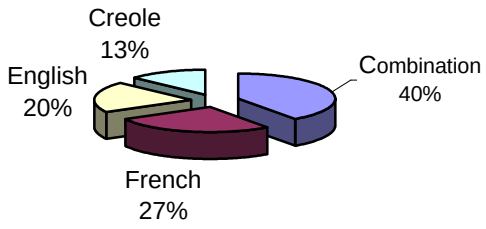
Teaching EVS in English was very difficult especially for lower primary students who were still learning the English language. At home and in pre-primary schools children were exposed to Creole, French and their mother tongue and not to the English language. Therefore, in Standards I & II where ***students cannot read or write in English they should have only oral exams and should be allowed to reply in French/Creole.*** Written exams should be introduced from Standard III onwards.

ENGLISH AS MEDIUM OF INSTRUCTION

Some teachers (20%) were of the view that Creole or French could be used to explain scientific concepts but ***English should be used as the medium of instruction***. English language could be introduced by using simple and short sentences and simple question answers for good understanding, as the exam paper would always be in English. Long structured question and answers should be avoided. The students should have more exposure to the English language in school to increase their vocabulary. "*English as a medium of instruction has successfully been used forever in schools but there is a lack of exposure as even the media promotes French language and not English"*, said a primary school teacher.

A majority (40%) of the teachers interviewed felt that ***a combination of the three languages, Creole, French and English, is ideal for teaching and learning of science.***

Figure - 7 Medium of Instruction Preferred By the Teachers



The language problem is also linked with examination; some teachers' felt that questions papers should be both in English and French. As the students did not have adequate skills to answer exam papers in English. ***The students should be tested for understanding the scientific concept and not for the English language skills.*** Therefore, if they used Creole or French in the exam, they should not be penalized.

4.7 Assessment and Examination

In primary schools, students have two term papers followed by a final exam in November. But the final assessment of a student was based only on the final examination since the marks for the term paper were not counted.

Box 5: Examination Facts For Primary Schools

- Term papers and final exam papers for Standard I-III were prepared and examined at school
- Term papers for Standard IV – VI were prepared and examined at school
- Final exam papers for Standard IV and V were prepared at the Ministry of Education and Scientific Research and examined at the schools
- Final exam papers for Standard VI (CPE) are prepared and examined at Mauritius Examination Syndicate (MES)

Eighty Six percent of head teachers and teachers preferred continuous assessment (CA) for assessing primary school students to end of the year exam. *"The students tend to forget everything by the end of the year and it was unfair to assess them on just one exam"*, said a teacher.

Remaining 13% of teachers and head teachers did not prefer continuous assessment because they felt that the system did not have faith on the teachers and there would be a risk of favoritism in the assessment procedure. Some felt that because the examination and assessment were not standardized at the primary school level, it would be unfair for students to be assessed by different teachers using different assessment criteria all over the island.

However, some form of continuous assessment was being practiced in the RCA schools, but the state schools did not carry continuous assessment. The reasons given were - it was difficult to carry out continuous assessment due to large number of students in a class.

As per a circular from the Ministry of Education, primary school teachers were asked to carry out continuous assessment every week after each topic. The Teachers Union, however, refused to carry out continuous assessment on a weekly basis. They did not have problem assessing students every term.

Therefore, it was proposed that continuous assessment should be introduced, that is, weightage should be given to the grades for each term paper, as this would be a better reflection of the child's ability than the existing one-time final examination.

TEACHERS' VIEWS ON EXAMINATION AND ASSESSMENT

- The teachers also felt that examination and assessment system in the country was just to catch the students (and the teachers) and not to actually examine childrens' capabilities.
- The automatic promotion for the students of Standards I – V was not a good idea as it was not beneficial for the academic growth of a child. As a result a large number of slow learners were not able to pass the CPE examination, because they had not yet developed the reading and writing skills properly.
- A majority of the teachers felt that streaming was better to separate low achievers from the high achievers.
- The literacy and numeracy programme introduced by the Ministry should only cater for the low achievers and specialist teachers should be appointed to cater for the low achievers and students with special needs.

- The high achievers did not appreciate the literacy and numeracy programme as they found it too easy.
- The teachers also felt that there was a lack of coordination between MES, MIE and NCCRD resulting in blaming teachers for poor performances in schools.

4.8 Private Tuition

Almost **all** the students of upper primary, that is, standards IV - VI take private tuition from their class teacher in the school premises at least three times in a week for **all subjects**. But private tuition for the students of lower primary, that is, Standard I-III, was banned with a few exceptions.

4.8.1 Teachers Views on Private Tuition

Two opposing views on private tuition emerged from the head teachers and the teachers of the primary schools. Around 60% teachers believed that private tuition were required for a number of reasons given below. On the other hand, around 40% teachers and head teachers felt that the private tuition should be completely banned for the students of primary schools.

*"If the teachers do not give tuitions than they were **not** considered as good teachers",* said all the teachers. The teachers also gave the following reasons, for giving tuitions to the students of upper primary -

- Completion of the syllabus
- Competition
- Pressure from the parents
- Monetary reasons

COMPLETION OF THE SYLLABUS

The teachers felt that there was a need for the students to take private tuition in all the subjects as the syllabus was too bulky and they were not able to complete it in the school time. So they had to spend extra time to complete the syllabus and for revision purpose.

COMPETITION

Tuition was also important due to the current examination-oriented system of education. Although ranking had been abolished but it had been replaced by grading, which was ranking in a disguised form. Therefore, the competition among the students (*and the parents!!*) to get good grades and to get admission in good secondary colleges (*Star College!!)* in their region continued, and thus the need for private tuitions also continued.

PRESSURE FROM THE PARENTS

As both the parents were working nowadays, they had no time to teach their children; also they preferred that the children continued to stay in the school till five in the evening until they returned from work. Furthermore, the existing nuclear family system does not have a support system to take care of the children and guide them, therefore, this arrangement suited the parents as they felt that their children were in good hands in their absence. As a result parents approached (*imposed*) and pressurized (*forced*) the teachers in the beginning of the year for private tuition.

Some parents cannot teach their children, as they themselves were not educated, therefore, they wanted the children to take tuition so that their children could do well in studies.

MONETARY REASONS

Very few teachers mentioned that they gave tuition due to monetary reason, as their salaries were not adequate to run the family, especially the male teachers who were the main breadwinners of the family. However, this was one of the major reasons for giving private tuition but only few teachers were frank enough to mention it.

Box 6: Private Tuition as a National Phenomenon

Private tuitions were like a **National Phenomenon in the Country**. Even when the teachers were not willing to give tuitions, they were forced to, as it is had become a culture to give and take private tuitions.

"It is considered fashionable to take tuitions here", said some teachers. Tuitions have existed in the country since 1920s. Earlier parents were taking tuitions and now children too were taking tuitions. It is an ongoing process.

In some **star schools** if the teachers do not give private tuitions then either they were not allowed to teach Standard IV, V and VI or they were transferred to another school.

One general-purpose teacher teaching Standard IV said that she does not give tuitions due to her personal commitments at home, **but** she had to make arrangement with another teacher to give tuitions to her class only than she was allowed to teach the Standard IV students.

Around 40% teachers were of the view that tuitions were not required at the primary level, if the students do well in school with the exception of the low ability students. "***Government should completely ban tuitions up to Standard V", said a head teacher of the school***. They felt that the private tuitions were robbing the children of their childhood, as they had no time left to play.

4.8.2 Students Views on Private Tuitions

"We take lessons (private tuitions) to learn more, to get good results and to become intelligent and to get good jobs", said all the students of upper primary.

The students also felt that the private tuitions were necessary for the following reasons–

- For revision and practice
- To get more detailed information
- To work better in class
- To do their homework
- To come first in class
- To pass in the exams
- Because their parents do not want them to watch TV at home

When asked whether they would prefer playing football in the afternoon rather than taking tuitions (lessons). Almost all the students said that they preferred to take lessons, as they were very important and also because they liked to take tuitions. They also said, that they do not feel tired of taking tuitions after school. "They play only during the weekend", said most of the students of upper primary.

On the other hand, the students look down upon their peers who preferred to play rather than go for *tuitions.* Only a few students said that they don't like tuitions.

5. CONCLUSION AND RECOMMENDATIONS

THE KEY FINDING OF THE SURVEY ARE CONCLUDED AS FOLLOWS:

- Almost 66% teachers and head teachers said that science should be introduced in Standard I because the teaching and learning of science starts at home at a very early age, when the child starts reasoning with the parents.
- All teachers felt that EVS and Science curriculum should be made more interesting and easy with topics related to daily life by adding ideas for games and experiments
- Most students in primary schools prefer EVS/ Science more than the languages (French and English)
- All the teacher and head teachers felt that mini science laboratory/ science room/ demonstration room OR proper science kits should be provided to each school to facilitate them in making teaching and learning of science more fun and attractive

- 10% of the General Purpose teachers had never studied science in secondary school
- Only 44% teachers of lower primary and 56% teacher of upper primary had studied science up to Form V
- All the teachers and the head teachers feel that Science should be taught by a subject specialist teacher with at least science qualification up to Form V
- All the teachers' felt the need for a teachers guide to help them in problem solving
- Only 53% teachers had attended refresher trainings for teaching of science, however, they did not found the training useful as the trainers (Inspectors) themselves did not have a science background
- Creole and French are used along with English by all the teachers to explain the scientific concepts to students
- 77% of the lower primary students prefer French to English as they have a limited English language vocabulary
- 53% of the upper primary students prefer writing technical science terms in English and learning in French and Creole
- Continuous Assessment, that is, assessing the child at each term rather than one end of the year final exam, is preferred by 86% of the teachers and head teachers
- All upper primary students take private tuitions to learn more and to get good marks
- 60% teachers feel that private tuitions are necessary to complete the syllabus

RECOMMENDATIONS MADE BY THE HEAD TEACHERS AND TEACHERS OF PRIMARY SCHOOLS

- EVS/ science curriculum to be reviewed and revised to make it more fun and interesting by adding games and experiments to facilitate students to learn the complex scientific concepts easily.
- Organization of Inter-School and Intra-School science exhibitions regularly
- Provision of Teaching aids/ science kits/ mini science laboratory to carry out experiments
- Introduction of science practical involving hands on experience (***la main a la pate: LAMAP***) and low cost equipment
- Resource persons from different fields should visit the school and talk about their experiences with the children

- Association of Science Teachers should help the primary teachers in problem solving
- Introduction of 'Subject Specialist Teachers' to teach Mathematics, Science and ICT
- Combination of Creole/French/English for teaching and learning the scientific concept.
- Introduction of continuous assessment: weightage to be given to the grades for each term paper as this will be a better reflection of the child's ability than the existing one-time final examination
- Pupils should be assessed on their understanding of the scientific concepts and not on their language skill
- Mode of assessment to be extended from paper & pencil to practical work as this would be beneficial for pupils having language problem and for those who are manually skilled.
- An ideal teacher student ratio should be maintained in the schools for meaningful interaction between the teacher and the students
- Introduction of a teachers' guide to help teachers in understanding scientific concepts being covered, variety of teaching learning strategies which could be employed by them in teaching those topics, confidence building and assessment exercises
- Qualified MIE lecturers instead of school inspectors should organize the regular refresher trainings in Science in each term for the science teachers
- Zonal Education Offices should procure educational films and maintain video/DVD film libraries where from schools should be able to borrow films.
- Ministry of Education should develop guidelines on field trips by schools. The schools which organize field trips following the guidelines of the Ministry should not require permission of the Ministry
- Involvement of private sector for their commitment to the educational institutions and to the future workforce of the country: by providing incentives such as tax relief.
- Private tuitions should be completely banned in the primary schools to reduce the pressure from the children.

ANNEXES

ANNEX – 1

QUESTIONNAIRE FOR

HEAD TEACHERS & TEACHERS

ANNEX - 1

LIST OF SCHOOLS VISITED FOR THE SURVEY ON SCIENCE EDUCTAION DURING SEPTEMBER – OCTOBER 2003

S.NO.	Name	Zone	CPE Pass percentage for academic year 2002
1	X Christian Barbe GS	Zone 1 – Urban - ZEP	42.70%
2	New La Tour Koenig GS	Zone 1 – Rural	40.30%
3	R C Nuckchady GS	Zone 2 – Urban - ZEP	30.61%
4	St Mary's RCA, Moka	Zone 2 - Rural	58.70%
5	R Bundhun GS	Zone 2 - Rural	26.67%
6	St Joseph RCA	Zone 2 – Rural	82.14%
7	Sacred Angels	Zone 2 – Rural	37.93%
8	L'Esperance GS	Zone 2 – Rural	84.62%
9	ND de la Confiance RCA	Zone 3 - Urban	87.64%
10	R Espitalier Noel GS	Zone 3 – Urban – ZEP	21.43%
11	G Cheetamun GS	Zone 3 - Rural	43.51%
12	ND de Refuge RCA	Zone 3 - Rural	81.40%
13	St Paul RCA	Zone 4 – Urban	58.49%
14	S V Ringadoo GS	Zone 4 – Urban	95.80%
15	Flic en Flac GS	Zone 4 - Rural	61.90%

ANNEX – 2

QUESTIONNAIRE FOR

PRIMARY SCHOOL STUDENTS

ANNEX - 2

Mauritius Research Council

QUESTIONNAIRE FOR SCIENCE EDUCATION IN PRIMARY SCHOOLS
(For Head Teachers and Teachers)

Objective: *To carry out an audit on the teaching and learning of science at primary school.*

General Information

Name of the School _____

Date of Visit _____

Location of the School Rural Urban ZEP

Location of the school by zone Zone 1 Zone 2 Zone 3 Zone 4

CPE 2002 pass rate _____

Information about Teachers/ Head Teacher

No of Lower Primary GP Teacher Interviewed	Male		Female	
No of Lower Primary GP Teacher Interviewed	Male		Female	
HT of the School	Male		Female	
Computer Teacher	Male		Female	

Lower Primary Teachers Views on EVS Curriculum

Upper Primary Teachers Views on Science Curriculum

Computer Teachers Views on Computer Curriculum

HT/Teachers views on most suitable age to introduce Science

Standard I	
Standard IV	

Reasons for the same

Examination and Assessment

Are Teachers/HT in favour of continuous Assessment Yes ☐ No ☐

Reasons for the same

Infrastructure

Computer room in your school Yes _____ No _____
No. of Computers in School _____
Science Kit used in School Yes _____ No _____
Space for additional facilities such as science laboratories and computer room
Yes _____ No _____

Students Teacher Ratio in class

Std I
Std II
Std III
Std IV
Std V
Std VI
Repeaters

Meaningful interaction in class Yes No

Language

Medium of Instruction preferred by Lower and Upper Primary Teachers

No. of Lower Primary Teachers		No. of Upper Primary Teachers	
English		English	
French		French	
Creole		Creole	

Teachers/HT Views on Language Preference

Teachers/Teachers quality

Qualification of Lower Primary Teacher	***No of Teachers***
Never Studied Science at Secondary Level	
Studied Science Up to Form III	
Studied Science Up to Form V	
Studied Science Up to Form VI	

Qualification of Upper Primary Teacher	***No of Teachers***
Never Studied Science at Secondary Level	
Studied Science Up to Form III	
Studied Science Up to Form V	
Studied Science Up to Form VI	

EVS/Science should be taught by –	
GP Teacher	
Subject specialist teacher	

Refresher Training Attended Yes ☐ No ☐

Frequency of the training

Once a year	
Twice a year	
Any other	

Views on Making Science Fun and Attractive

Views on improving Science Teaching in Schools

Teachers/HT views on -

Importance of Practical Work

Importance of Field visits

Importance of Use of Multimedia

Science Kits

Mobile Science Lab

Teachers/HT views on Tuitions

ANNEX – 3

QUESTIONNAIRE FOR

PRIMARY SCHOOL INSPECTORS

ANNEX - 3

Mauritius Research Council

QUESTIONNAIRE FOR SCIENCE EDUCATION IN PRIMARY SCHOOLS
(For Primary School Students)

Objective: *To carry out an audit on the teaching and learning of science at primary school.*

General Information

Name of the School

Date of Visit

Location of the School Rural/ Urban/ ZEP

Location of the school by zone Zone 1 Zone 2 Zone 3 Zone 4

CPE 2002 pass rate

Students

No of Lower Primary Students Interviewed	Girls		Boys	
No of Upper Primary Students Interviewed	Girls		Boys	

Preference for Subjects

Subjects preferred by Lower Primary Student	No of Students
EVS	
Mathematics	
English	
French	
Computer	

Subjects preferred by Upper Primary Student	No of Students
Science	
Mathematics	
English	
French	
Computer	

Lower Primary Students Views on EVS Curriculum

Upper Primary Students Views on Science Curriculum

Lower Primary Students Views on Computer Curriculum

Upper Primary Students Views on Computer Curriculum

Students need to study Science subjects at school

For scientific knowledge to get a good job

Because they need basic science knowledge in there day-to-day life

EVS/Science is needed in everyday life	Yes		No	
In school	Yes		No	
Outside school	Yes		No	
At home	Yes		No	
Students find EVS/Science interesting because of the				
Teacher	Yes		No	
The subject matter	Yes		No	
Any other reason	Yes		No	

Computer ownership

No. of Lower Primary students having computer at home

No. of Upper Primary students having computer at home

The Computer are used for –

- Word
- Design
- Internet
- Email
- Games
- Any other

Language

Medium of Instruction preferred by Lower and Upper Primary Students

No. of Lower Primary Students		No. of Upper Primary Students	
English		English	
French		French	
Creole		Creole	

Students' views on Language Preference

Students views on practical

Do the students like practical?	Yes		No	
Have they done any experiments themselves?	Yes		No	
Do they watch the teacher demonstrate the experiment?	Yes		No	
Have they gone for field visits in there EVS/Science class?	Yes		No	
If yes, how often				
Once a week				
Once a month				
Once a year				
Any other				

Places where they have visited

Places where they would like to visit

Have they visited Science exhibitions?				
Lower Primary	Yes		No	
Upper Primary	Yes		No	

Do they use science kits for practical?				
Lower Primary	Yes		No	
Upper Primary	Yes		No	

Do you use low-cost equipment for science practical?

Lower Primary	Yes		No	
Upper Primary	Yes		No	

Do you use multimedia (TV, Video, CD Rom etc.) to learn science?

Lower Primary	Yes		No	
Upper Primary	Yes		No	

Do you work in a group/ or alone?

Lower Primary	Group	Alone	Any Other
Upper Primary	Group	Alone	Any Other

Tuitions

No of Lower Primary Students taking Tuitions _____
Subjects for which they are taking tuitions _____
No. of Upper Primary Students taking tuitions _____
Subject for which they are taking tuitions _____

Students Views on Tuitions

Science Output

Lower Primary Students would like to join the following professions when they grow up-

Upper Primary Students would like to join the following professions when they grow up-
