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A Showcase of Projects for Science Education in Primary Classes

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Abstract

This presentation is a showcase of projects carried out in various State Primary Schools in Malta by a Primary Science Education Teacher. Various classroom practices were selected from a myriad of science classroom lessons, whole-school Science Day activities and National activities. These projects present an array of Primary Science classroom and School activities showing how scientific knowledge can be developed across the curriculum. Learners in primary schools (ages 5 to 11) take science lessons as an interesting, hands-on activity with the ability to transfer knowledge from one area of study to another. Their curiosity and intelligence is stimulated in class due to engaging hands-on activities and this tends to create ripple effects at home, thus engaging the interest of parents or guardians in Science Education. This is evident in parents' participation in Science Fairs or Open Day activities organized at school level. During such activities, they spend time with their children, working together on some scientific investigation or learning about some scientific concept through different engaging activities which the learners imprint in their memory.

Keywords: primary science, projects, hands-on, engaging, ripple-effect, cross-curricular

The Science Centre, Pembroke, Malta

The Science Centre, Pembroke, Malta, is the Centre for the Assistant Director of Education and the Education Officers who direct Science Programmes in Primary and Secondary State Schools. Separate subjects are taught by specialised teachers in Secondary schools such as Integrated Science, Biology, Chemistry and Physics. A cross-curricular subject such as Education for Sustainable Development is also catered for. Science in Primary Schools is delivered by "Peripatetic Primary Science Teachers" (PPST) who visit a group of primary schools each. The PPST, together with class teachers, provide a hands-on Science programme for their students. During a Science lesson PPST carry and introduce into the classroom natural and man-made materials, everyday kitchen equipment and Science Boxes: an assortment of basic science equipment, created and available at the Science Centre. The Primary Science syllabus is set according to three main themes "Sharing our world", "Energy" and "Materials" covering a number of basic science topics: sound, weather, habitats, light, electricity, plants, animals, materials, change, space, nutrition and forces. Over and above timetabled lessons during the scholastic year, PPST carry out a diversity of projects and initiatives inside and outside of schools.

This presentation originates out of my own experience as a member of the PPST in State Primary Schools. These projects illustrate what has been highly motivating and engaging me as an educator in the Primary Science for the past 7 years, showing how enthusiasm and scientific curiosity has also been *caught* by students, teachers and parents and not necessarily taught.

1. Class-based projects

1.a Christmas Tree at Z School (2015)

Students in Y3 (ages 7-8) were excited during lessons on the topic of Electricity using batteries and wires and crocodile clips as well as battery holders and small light bulbs. Since it was close to Christmas and the during the session the classroom lights were switched off to better appreciate the light of the small electric bulb, some children exclaimed that the classroom "is now like a Christmas tree!", sparking the idea of "The Christmas Tree Project", created such as card from cereal boxes and empty kitchen rolls.

1.b Musical instruments at Z School Exhibition (2016)

In order to illustrate the nature and Science of sound, the learners were given a variety of musical instruments to explore: real and home-made musical instruments, like shakers, elastic guitar and drums. The learners liked the home-made instruments and wanted to create some of their own, so they were and asked them bring with them a variety of boxes, cups, bottles, and any other packaging

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during the next lesson to build their instruments. This small spark of interest from one year 3 class was then rippled and transferred as the other four year 3 classes, influenced by their peers, asked for a "how-to" demo lesson so they can start their instrument project at school and continued working at home. This initiative was then promoted with an exhibition in the school foyer for anyone who produced a home-made musical instrument, even if it was a non-working model.

1.c.i. Science Across the Curriculum (2016)

The Light House Project was developed by taking the Topic "Light" across the curriculum with a year 3 class (ages 7-8). "The Light House" featured in their Class-Teacher's Social Studies lesson plans, and in an English Language Comprehension exercise, so the Peripatetic Science Teacher and the Class Teacher worked together as a team to include not only "Light" but also the topic of "Electricity" in the Science component. Alongside to this, a Design and Technology lesson was included so that students could actually design and create light house models and it was extended this further by another lesson on creating a simple switch to make the light house go on and off quickly.

1.c.ii – V School - Photography lessons (2018)

Currently at V School Y6 students (age 10-11) are involved in photography lessons during school hours leading to a school photography exhibition in April 2018, with their own best shots. During the Science lessons on Space and World Space Week, the students learnt about the development of lenses and the use of lenses in telescopes and binoculars. They noted the similarities and differences between the lenses of the telescopes and binoculars and those of the photo camera.

2. Open Day School Activities related to Science and Parental Involvement

School Open Days are important since parents visit school with their children to engage in hands on science activities creating a ripple effect. These projects were held in various schools between the years 2013 to 2017.

2a. In every Open Day every class from Kindergarten to Y6 (ages 4 to 11+) developed a Science Project in which parents and students could team and work on a science activity such as creating an erupting and messy volcano, investigating friction, testing the senses, learning about our lungs and how we breathe through a model, chromatography, creating an electromagnet, a balloon car, floating and sinking, different shapes of sails, what boat shape keeps most marbles, density rainbows, a paper volcano without any mess. Parents and children appreciated the fact that they could work together in class during these science activities with parents exclaimed that they had really enjoyed it and that they wished to try out other experiments at home with their children.

2b.The "Eggsperiment" - The students of a particular school were given the task of designing and creating a package which could hold and keep intact a raw egg dropped from a two-storey height. The package was to be created at home, together with friends and input from adults at home. Parents took the challenge and discussed it outside the school when accompanying children to and from the school, at times stopping the Science Teacher to ask questions if such or such a material could be used. When the trial day came there were 120 entries and these were so varied in their structure.

3. School-based Projects

3a - Garage Project Z School A – D&T sessions (2016)

A particular school had a garage used as a store. The students were encouraged to think and discuss how it utilised as a learning space and they asked for "zones" for reading, discussing, experimenting and so on. During Science lessons - with the assistance of the Education Officer of Education for Sustainable Development - the learners used D&T tools to create models of how this garage would look like, re-using materials such as tyres, large wooden reels used for underground cables, wood and metal. The students also asked for a car and a loft in the garage. They were so surprised when their design and their model was actualised, since the loft was created and a small car was driven in the garage.

3.b - Christmas Decorations Competition (Z School B 2017)

A school held a classroom decoration competition during Christmas. A particular class wanted to include what was being learnt on electricity from the Science lessons. The students wanted to light up their innovative Christmas tree made out of new drain-pipe cut-outs and left overs. They wanted stand-alone individual lights so they used LEDs with batteries which lasted long, ensuring victory.

4. Participation in National Science Competitions

A school held a Science Competition (ages 8 to 11) to select a number of activities which would represent the school in a National Science Competition. 105 different experiments were presented and

8 were entered in the national competition. The school won the title of "The school with the largest number of Science projects presented", and won third place with an individual student's project.

5. X'HemM…?! (*lit.* what is going on…?)

The X'HemM…?! Project, coined from a play on the words "Xjenza" and "Mathematika" to reflect the idea of STEM, focuses on Primary Science and Math activities outside school. The Venues were chosen due to their national and/or historic importance such as Birgu, a fortified town, Mellieha, a village with a long settlement history, St Elmo Fortress in Valletta with its role in the Great Siege of Malta in 1565, Pembroke Gardens, and Ta' Qali, the site of The National Stadium, Sport Complexes and the Aviation Museum. During X'HemM…?! activities the students as a class are assigned to a Station presenting a Math or Science Activity. The students are given a task in which they observe, measure, investigate and discuss the scientific or mathematical aspects with their class teachers and the Peripatetic Science Teachers or Mathematic support teachers, who facilitate the Science or Math Station. Currently, to work across the curriculum, during this year's 2018 Edition of X'HemM…?! Physical Education is also being included in the activities.

Conclusion

The interest in Science, at Primary level, from my own experience, appears to be growing, a child's step at a time. This is the impression I get whenever children express their wonder when learning. This happens especially when they compare their observations to what they already know. Take for example, a 9 year old who compared the repulsion of like-poles of magnets to fingers pressing the sides of a balloon, "Wow! It is like pressing a bubble!" Or, in another example, when exploring sound, a 10 year old exclaimed: "The tuning forks push each other away when one is vibrating and the other is not and the vibrating one is touching the stationary one; just like magnets which push each other away."

Parents, too express their interest in what their children are learning: "my son is very interested in science and is looking forward to show you some books on science experiments." Or "Sir, I am happy that you used playdough during the lessons to build models of the solar system, my children asked me to do the same at home; which I did." Parents from the Parent Teacher Association (PTA), helping out for the annual Christmas concert at school, remarked how interested their children were during Science lessons on the topic of Space. This was held during World Space Week, October 2017 with the Theme: "Exploring New Worlds in Space" in which students focused on "rockets to explore space". A very simple working model of a rocket was created out of a small plastic bottle for propulsion and a kitchen towel card roll. According to the PTA parents, their children's interest continued at home. In fact this caused a ripple effect of interest as everyone at home got engaged in this rocket model making. Parents remarked that their children experimented with creating simple rockets at home "for some five hours and put aside all their electronic gadgets for such a long period of time as they were so engaged!"

This has been a very brief overview of some Primary Science Projects in a few state Primary Schools in Malta; by all means these are not the only ones, so keep looking out for more on http://sciencecentremalta.net/.