

Promoting Scientific Literacy in Malta – A Practical Perspective



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Science Education in Malta

A long tradition of Science Education in Malta ...

- Teaching of Science at the University of Malta dates back to the foundation of the Chair of Mathematics in **1655** at the *Collegium Melitensis*.
- In Maltese schools, including primary schools there is also a long standing tradition of teaching science.



Defence of Thesis in Arithmetic by students of the University of Malta graduating in 1790 A.D.



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Science Education in Stella Maris College

Stella Maris College is no exception ...

- **1904:** Founding of Stella Maris College in Sliema, Malta (School transferred to present premises in Gzira in 1938)
- **1932:** Decision is taken to introduce a complete secondary course leading to the Oxford Local Examinations.
- **1935:** Physics is formally introduced: pupils sit with success for the then Junior and Senior Oxford Local Examinations.

Reference: *Stella Maris College - Through the years*

<http://www.global.net.mt/stellamariscollege/historysmc.html>



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Stella Maris College – A Lasallian School

Stella Maris College is a Roman Catholic college and run by the Brothers of the Christian Schools, an Order founded in 1694 by St. John Baptist De La Salle, Patron of Teachers.

It is made up of three schools:

- **St. Benild's School:**
Ages 5 – 7 (Grades 1 & 2), 156 pupils
- **The Junior School:**
Ages 7 – 11 (Grades 3 – 6), 360 pupils
- **The Senior School:**
Ages 11 – 16 (Forms 1 – 5), 548 pupils



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5 Axioms of Lasallian Education:

1. An educational community committed to Gospel values
2. Human & Christian development of young people in today's world
3. Teaching as a vocation - the spirit of a Lasallian school
4. Educational goals "in and by association" - Cooperation between Brothers, teachers, students, & parents.
5. **The Lasallian school prepares young people to take a mature and productive place in society and in the church as free and responsible citizens**

...as a result our school recognizes the importance of educating citizens who need to be scientifically literate.



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What makes a 'scientifically literate person'?

We would expect a scientifically literate person to be able to:

- (1) appreciate and understand the impact of science and technology on everyday life;
- (2) take informed personal decisions about things that involve science, such as health, diet, use of energy resources;
- (3) read and understand the essential points of media reports about matters that involve science;
- (4) reflect critically on the information included in, and (often more important) omitted from, such reports; and
- (5) take part confidently in discussions with others about issues involving science.

Ref: Nuffield Curriculum Centre / Univ. of York Science Education Group
<http://www.21stcenturyscience.org/newmodel/literacy.asp>



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When do we start?

... as early as possible !

- ❖ Children are being exposed to science and technology from a very early age, an inevitable effect of our society reaching higher levels of social and economic development.
- ❖ EU accession has accelerated this process. For example:
 - Malta is now required to pay more attention to the conservation of its environment;
 - Malta has to abide by higher safety standards



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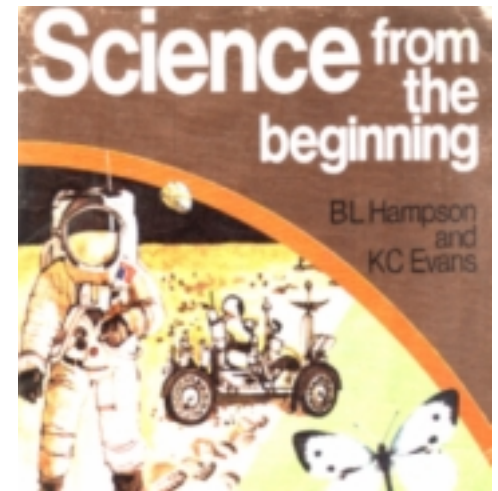


Science in the Primary School

One may argue that we always had 'science' as part of the primary curriculum.

Traditionally, primary school science has been ...

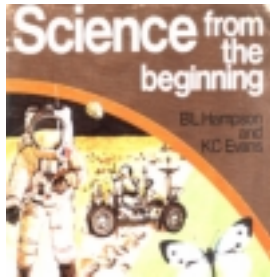
- ⇒ Taught by class teachers as an integral part of the school curriculum
- ⇒ Taught almost entirely from books
- ⇒ Lessons were mainly a presentation of facts ... facts, and more facts about frogs, flowers, *etc.*
- ⇒ Students were expected to memorise these facts ... no need to think about them!



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Traditional Primary School Science Books



HERBS, TREES AND SHRUBS HAVE YOUNG

Most herbs, trees and shrubs can have young by means of flowers, fruits and seeds. A fruit grows from part of a flower. Fruits protect the seeds which develop inside them. Some kinds have only one seed. Other kinds contain many.

When the fruits of some kinds of plants ripen, they open to let their seeds escape. The fruits of other plants fall with the seeds still protected inside them.

Neither fruits nor seeds can force themselves to move. Gravity forces them to fall. Moving animals, moving air or moving water may carry them away to other places.

Some animals carry away fruits or seeds for food and lose a few. Animals also carry seeds accidentally. Some of these are carried in mud on the feet of mammals and birds.

The wind carries many fruits and seeds. Tiny light ones are most easily carried. Snapdragon and poppy seeds are tiny and light. When their fruits sway in the wind, seeds are slung out through small holes and carried away.

Moving water carries the fruits and seeds of some freshwater herbs. It also carries fruits and seeds which fall into it from herbs, trees and shrubs living nearby.

Seeds cannot choose where to fall or where to go. Of the many which are scattered from a parent plant, most are wasted. Only a few have the chance to grow into new plants.

FOR YOU TO DRAW

- 1 A plant with a flower and a fruit
- 2 A snapdragon fruit

FOR YOU TO WRITE

Complete the following sentences.

- 1 A fruit grows from part of a
- 2 Fruits the seeds which inside them.
- 3 Fruits and seeds are forced to fall by
- 4 They may be carried away by or

FOR YOU TO DO

- 1 Look for fruits on different plants. Observe their colour, size and shape.
- 2 Collect fallen fruits. Open some and observe the seeds.

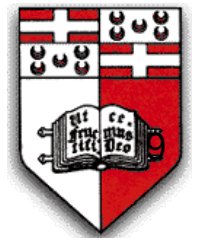
SEEDS ARE SCATTERED



... a vast collection of facts .



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Was 'Traditional Primary School Science' producing 'scientific literate pupils' ? ... Probably not !

BUT ...

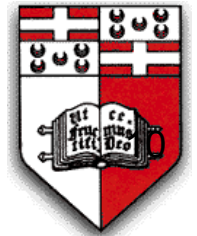
We have an obligation to ensure that our children receive a scientific education in an appropriate and creative way which will help them relate scientific principles to their everyday life.

In particular, we have to adhere to ...

- (1) **National legislation:** The Education Act (1988) allows the Minister of Education to set minimum standards for schooling in Malta through the setting of a National Minimum Curriculum (NMC).
- (2) **The Principles of a Lasallian Education:** Our school strongly believes that science is an essential part of the process which “prepares young people to take a mature and productive place in society” ...(one of the axioms of a Lasallian Education.)



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Malta's National Minimum Curriculum:

1989: The 1989 version of the NMC recognised the role of science in Primary but focused more on the content of science.

Scientific knowledge was listed as one of the five main aims of primary education.

1999: The NMC published in 1999 consolidates the role of science which now refers to **content, process and attitudes**.

In the near future ... It is expected that there will be a new science syllabus in state schools next year.



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Year 2000: A new approach to Science @ Stella Maris College Junior School

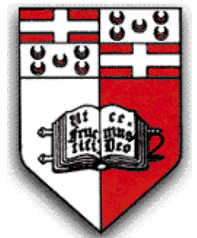
- (1) Junior School employed a science teacher for the Primary School (paid through parents' donations);
- (2) Junior School started setting up special rooms to teach science: 'Science room', 'Technology Room', 'Discovery Room';

This translates to ...

- A more practical approach to science
- Greater 'science expertise'
- Progression through scholastic years
- Coordination with other teachers



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In Practice ... Years 1 – 4 (Ages 5 – 8)

- Science taught by class teacher who has access to the expertise of the 'science teacher'.
- Science / technology classes could be held in the 'discovery room' (Years 1 & 2), the 'Technology Room' (Years 3 & 4).
- A 'time-table' slot of 1½ hour lessons is reserved for science classes.
- Science lessons held in smaller groups - Half class (15 boys) per lesson
- Lessons held fortnightly (per group)



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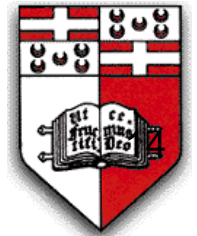


In Practice ... Years 5 – 6 (Ages 9 – 10)

- Science taught by the 'science teacher'.
- Science classes based in the 'Science Room'.
- A 'time-table' slot of 1½ hour lessons is reserved for science classes.
- Science lessons held in smaller groups - Half class (15 boys) per lesson which are again divided into 5 groups of 3 boys each.
- Lessons held weekly (per group)



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In Practice ... Science is taught within the 'thematic approach':

The 'Thematic Approach':

- School chooses 2 / 3 'themes' per term
- Covered through all subjects
- Same theme used for all the school (Years 1 – 6)
- Examples: Myself, Homes, Christmas, ...

Example of how this works for science:

<u>Topic</u>	<u>Year 1</u>	<u>Year 5</u>	<u>Year 6</u>
Myself	Measuring	Eye & Sight Lungs & Breathing	Bones & Muscles



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In Practice ... Methodology:

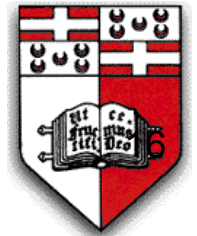
- Activities carried out
- Results & observations written – worksheets
- Results & observations discussed – groups
- Explanation & class discussion + written classwork
- Handouts with facts
 - To be assessed on

☆ Differentiated teaching and learning

☆ Differentiated testing



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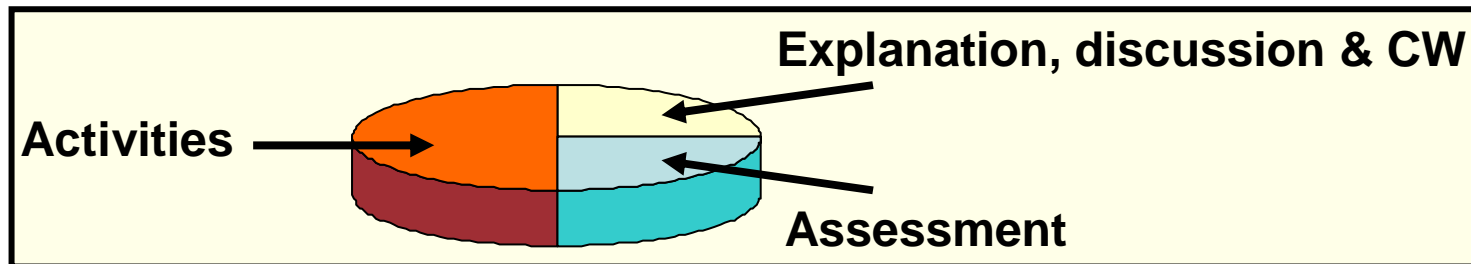
In Practice ... Methodology (cont.)

Example of a short topic – run over a 4-week period

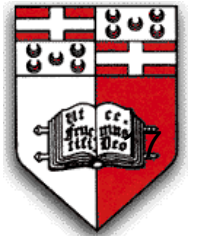
Weeks 1 & 2: Activities (*two 1 ½ - hour lessons*)

Week 3: Explanation, discussion & class work

Week 4: Assessment

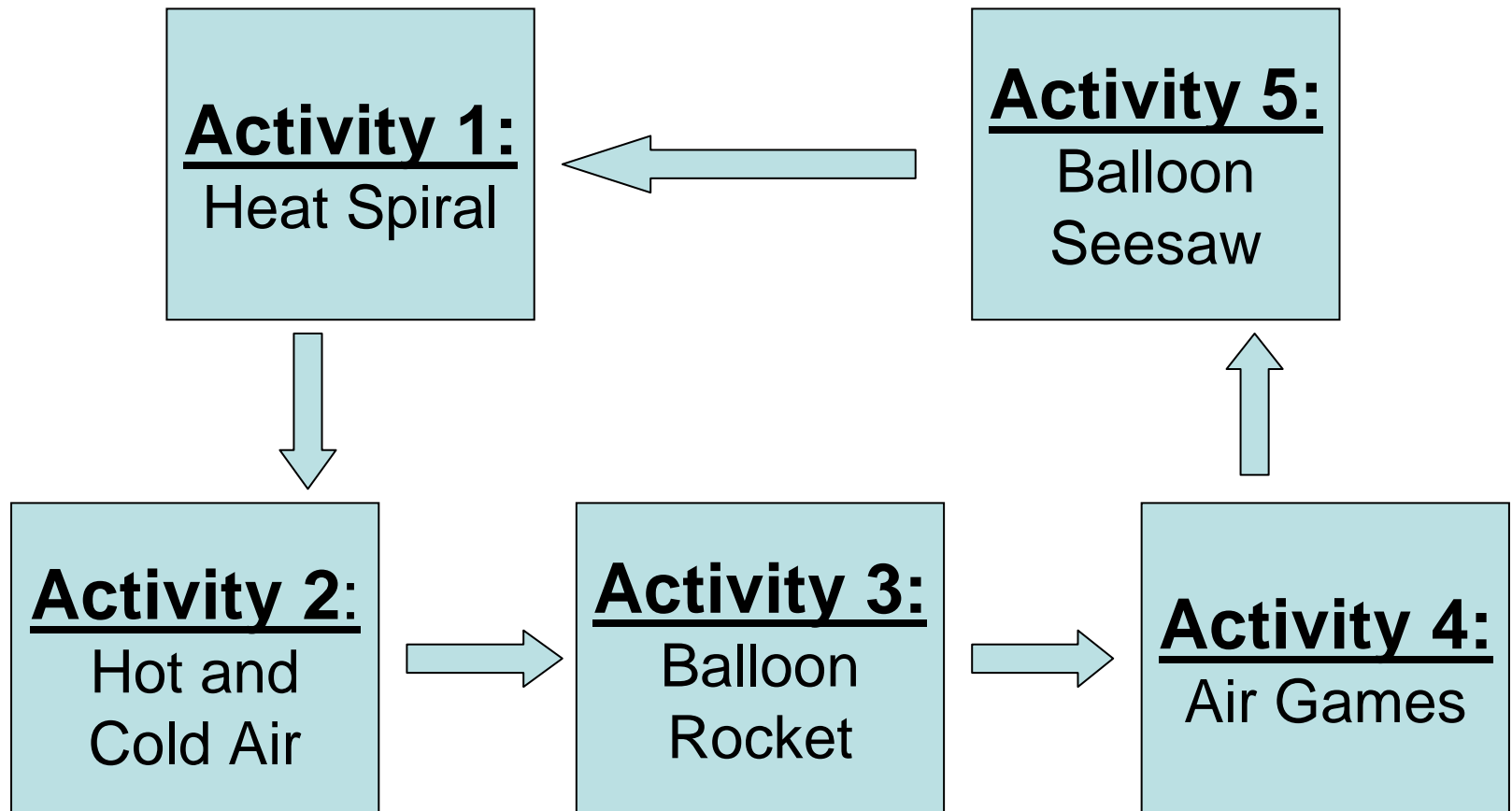


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Example ... Air (1)

The activities ... (Weeks 1 & 2: *two 1 ½ - hour lessons*)



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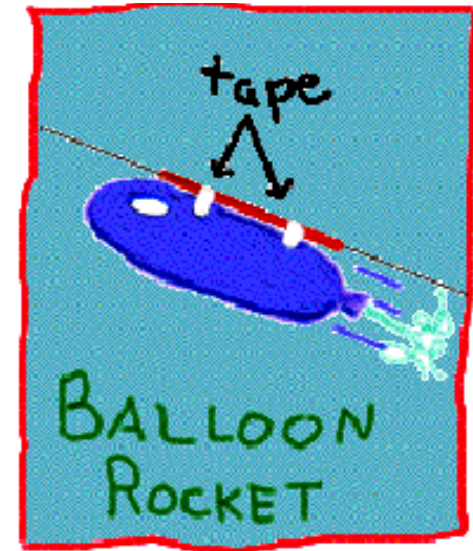
Example ... Air (2)

Activity 3: Balloon Rocket

To make a working balloon rocket, you will need:

- 1 balloon
- 1 long piece of string
- 1 plastic straw
- Tape

1. Tie one end of the string to a fixed object.
2. Put the other end of the string through the straw.
3. Pull the string tight and tie it to another fixed object across the room.
4. Blow up the balloon and hold the end. Tape the balloon to the straw.
5. Let go of the balloon.

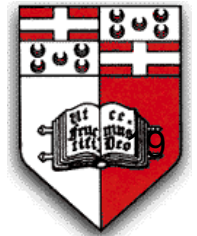


What happens?

Why do you think this is happening?



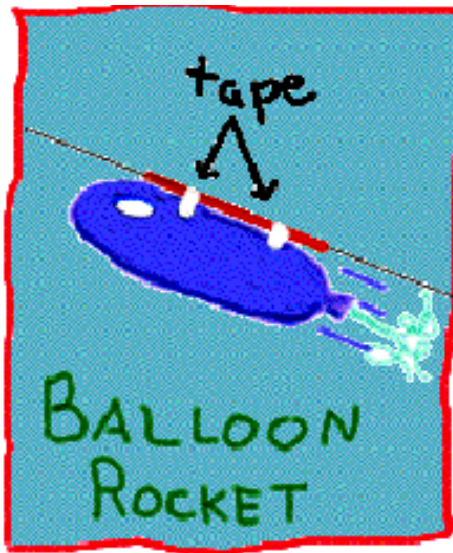
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Example ... Air (3)

Explanation, discussion & class work ... (Week 3: *one 1 ½ - hour lesson*)

Activity 3: Balloon Rocket



This is a simple experiment that is quite similar to the way rockets work. When the air is being let out of the balloon, the air pushes the balloon forward.

Usually if you let go of the balloon, it flies all around the room. However, since it is connected to a string, this gives the balloon a direction.



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Example ... Air (4)

Assessment ... (Week 4: *one 1 ½ - hour lesson*)

1. Scientists who study the weather are called:

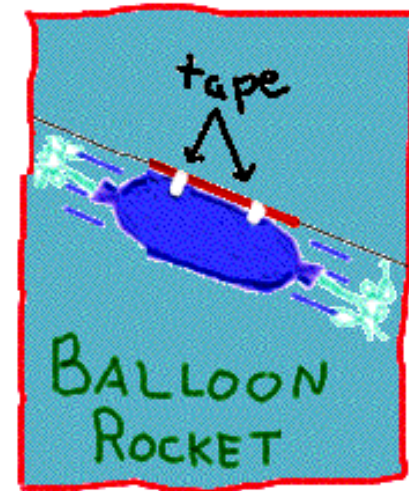
- a. Astronomers
- b. Meteorologists
- c. Weatherologists

5. What does the weather instrument called the anemometer do?

7. In a new balloon rocket activity (see picture), Mr. Mifsud used a new type of balloon which was open at both ends.

What do you think happened when Mr. Mifsud removed the pegs and let the air come out?

Why?



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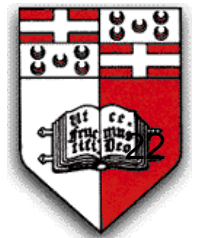
In addition to all this ...

School started to participate more in national and EU science related projects:

- ❖ The national 'Dinja Wahda' campaign organised by Birdlife
- ❖ The national 'Progett Skart' – an environment / waste separation project;
- ❖ EU Comenius projects: 3 year Comenius project 'Health and Well-Being' with 4 other schools in different EU countries.



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The results:

- Increased interest and participation in science classes
- Better observation skills
- Improved investigative skills
- Increased assimilation



... results which suggest that we are having some success in producing *'scientifically literate pupils'*



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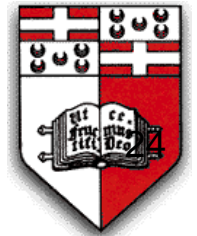
Our Future Plans:

- Investing in more space and resources
- Ongoing pedagogical improvement
- Participation in more National & EU Comenius projects
- Working closer with the University of Malta

... all this to be even more successful in producing 'scientifically literate pupils'



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Acknowledgments

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HiSci

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Thank you!



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