PARSEL

POPULARITY AND RELEVANCE OF SCIENCE EDUCATION FOR SCIENTIFIC LITERACY

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INTERNATIONAL COUNCIL OF ASSOCIATIONS FOR SCIENCE EDUCATION
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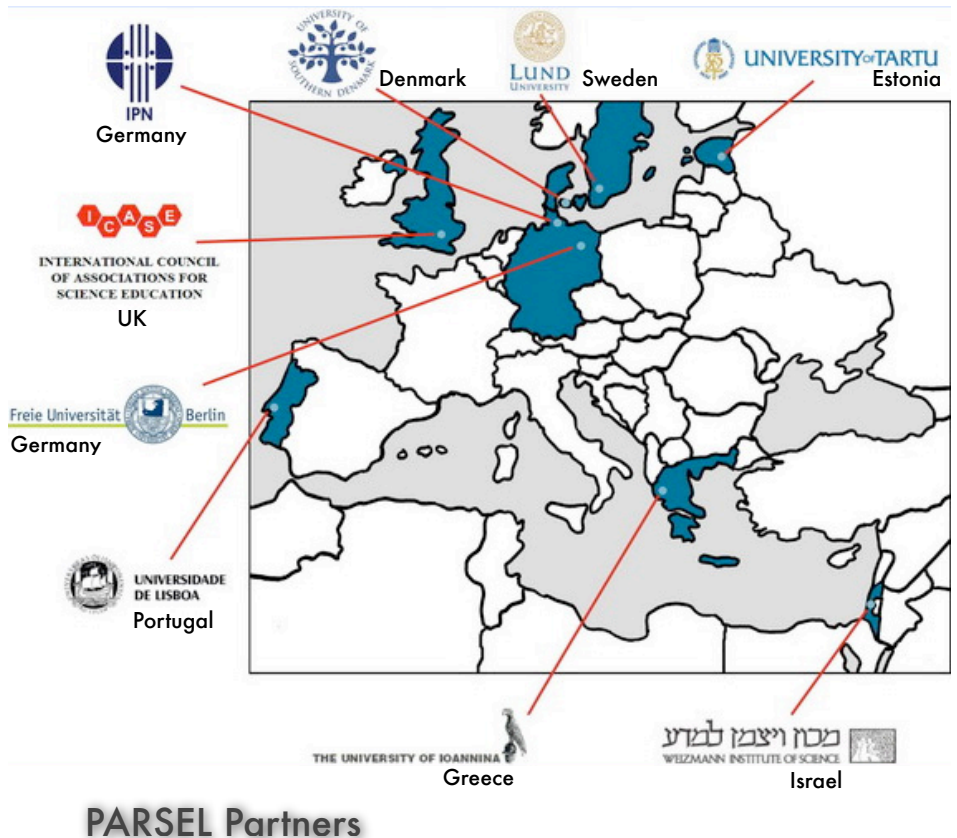
PARSEL MAIN OBJECTIVES

To promote scientific literacy and to enhance popularity and relevance of science teaching and learning

The main objectives of PARSEL are to develop, test and disseminate pan-european science education modules for teaching in grade 7 upwards. These modules are being developed, according to a common model, by a consortium involving 8 Universities (from Estonia, Denmark, Germany(2), Greece, Israel, Portugal and Sweden) and the International Council of Associations for Science Education (UK).
PARSEL modules are intended to promote scientific literacy and to enhance the popularity and the relevance of science teaching. Teachers are being asked to try out some of the modules in each of the countries and to report

back to PARSEL team on their suitability for enhancing the popularity and relevance of science teaching.
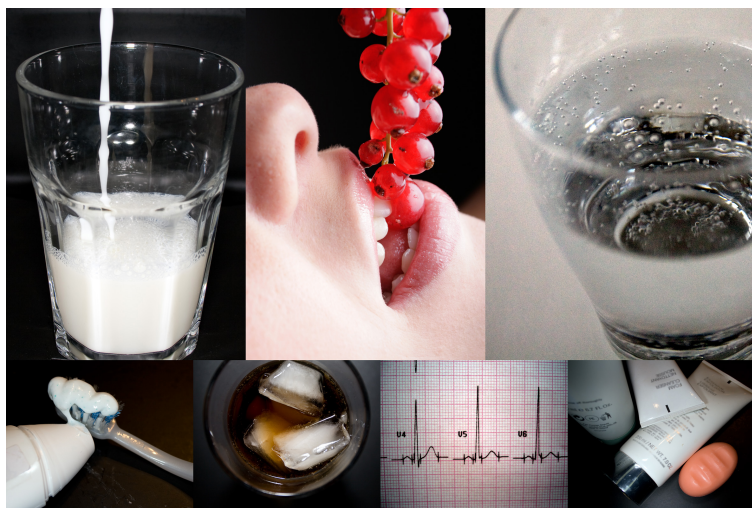
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THE PURPOSE OF PARSEL MODULES

The purpose of the modules is to raise the popularity and relevance of science teaching in the eyes of students, but at the same time ensure strong student learning towards enhancing scientific literacy.

What is meant by popularity ?

In the modules' context, popularity refers to students liking the science lessons and wishing to study the subject in school. It also refers to liking science in general. It is thus an emotional component that stems from the module and the way science is presented.

What is meant by relevance ?

In the context of the modules, relevance means the students recognise that the modules are worthy of study by them; they see the purpose in studying the modules and are thus motivated by them.

Please note:

• The modules are geared to initiating a reaction from students of being relevant from the first stage. Whether the relevance is maintained after the initial stage will depend on subsequent motivational aspects such as pace of learning, style of teaching, as well as the continuing purpose of studying the module. The modules tackle this relevance separately by guiding the learning process.

• Relevance in this context is not necessarily the same as specific relevance to the curriculum, or to the examination, or to the school textbook. However by stimulating student motivation, it is expected to guide students in the direction they wish to learn and this is expected to include textbook-related conceptualisations and techniques.

Answers to Possible Questions

1. When can I try out a module ?
Whenever it is suitable for you.

2. How much teaching time is required for the modules ?
Most modules are designed for 4 lessons of approximately 40-50 minutes.

3. Can I modify the modules ?
Yes, but please keep careful records of any modifications.

4. Can I use less than the suggested time allocation ?
Yes. If you wish to use less time, please make sure you understand the purpose of the module, otherwise the trying out will not be effective.

5. Are the modules to be used for revision, or actual teaching ?
It is very important that the modules are used for the actual teaching. They are not intended for revision at all. They have been written to introduce the conceptual science learning in a relevant manner. This will be lost if the conceptual science is already acquired before teaching the module.

6. Are the modules based on any theoretical consideration ?
Yes. See page 4 for more details.

7. Can I undertake student assessment in my own style ?
Yes, but it will be important for the trying out to determine student gains and especially to determine whether students find the module popular and relevant.

8. What happens if I do not have the equipment indicated ?
Seek advise from colleagues or the PARSEL team on how it is possible to improvise.

9. Who will pay for the duplication of the student instructions and worksheets ?
The PARSEL project based on a claim form (and receipt of duplication if undertaken outside the school).

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LEARNING PROMOTED BY PARSEL

In line with modern thinking, PARSEL is developed on an 'education through science' interpretation of science education. This means science teaching is expected to include all the goals of education. These include:

- cognitive goals through which students acquire scientific conceptual learning,

- goals associated with the development of process skills and the nature of science,

- attitudinal and aptitude skills acquired through making the subject popular and relevant,

- communication skills, through written, oral, graphical, tabular and symbolic means,

- social skills strongly related to career enhancement and future everyday life within society.

To achieve 'education through science' goals, students are guided to: think rather than remember; do rather than listen; discuss within groups as well as work individually and be expected to find out; experiment; make predictions; as well as report orally and in writing on solutions, processes and decisions made.

What is New in the PARSEL Modules ?

1. Materials have an emphasis on popularity and relevance.

2. Modules are written to promote wider educational goals. These are identified as: cognitive development; problem solving involving process skills and nature of science; personal development including communication skill development; social skill development including socio-scientific decision making.

3. The sub-division of the modules into 3 interrelated, but differing learning stages (identified as - setting the socio-scientific scene; inquiry based problem solving science learning; socio-scientific decision making).

4. The structuring of the modules into 5 sections - purpose (front page); student activities; teaching guide; assessment strategies, 'and where appropriate' teacher notes.

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The 3-STAGE PARSEL MODEL for Teaching-Learning Materials
(Promoting Scientific Literacy)

	STAGE 1 Setting the scene	STAGE 2 Inquiry-based problem solving	STAGE 3 (Socio-)Scientific decision making
TEACHING-LEARNING APPROACH	Material presented through a real life title and scenario. The scenario provides the stimulus for the subsequent learning.	Teacher guided, student-centred learning materials includes Problem Solving, Nature of Science and/or Conceptual Science Learning (and consolidation of the conceptual learning through adequate feedback - assessment).	Teacher guided, student centred materials includes reasoned (socio-) scientific decision making (and consolidation of the conceptual learning through adequate feedback - assessment).
EDUCATIONAL SKILLS BEING DEVELOPED	Recognition of the link between the real life situation and science learning.	Development of: 1.Process skills in specific setting. 2.Conceptual acquisition. 3.Interpersonal, intrapersonal and communication skills in a specific setting.	Development of: 1.Social/interpersonal skills in a specific setting. 2.Justified decision making involving conceptual science and a variety of relevant social factors. 3.Intrapersonal and communication skills in a specific setting.
SCIENCE EDUCATION LEARNING	Introducing a socio-scientific learning area.	Detailing the related science conceptual learning to be acquired through inquiry based, experimentally driven, problem solving and identified on a need 'to-appreciate-the-issue' basis.	Applying conceptual science science to reasoned, (socio-) scientific decision making, related to the issue.
POPULARITY AND RELEVANCE	Stimulating POPULARITY and RELEVANCE of science teaching.	Enhancing RELEVANCE related to the student's real life and/or career.	Strengthening student RELEVANCE and enhancing SCIENTIFIC LITERACY.
GROUNDED IN ACTIVITY THEORY	Showing NEEDS and stimulating MOTIVATION for learning.	Providing needed ACTION through appropriate ACTIVITIES.	Providing needed ACTION through appropriate ACTIVITIES and REFLECTION.

EXPLAINING THE COMPONENTS IN THE PARSEL MODULES

The modules are composed of 4 or 5 sections:

SECTION 1 - The Cover Pages

This gives, on the first page:

1. **The title of the module**. The title has been carefully created so as to reflect an issue or concern that is likely to be relevant to most students. The title carefully avoids words or a technical nature and mentioning the conceptual learning that will subsequently take place. The title is often a question.

2. **The grade level and main science conceptual learning**. The grade level is given as a range of grades at either junior secondary (grades 7-9) or upper secondary (grades 10-12). The main conceptual learning is expected to be directly related to the curriculum.

3. **An abstract**. The abstract is a short introduction to the intentions of the module.

4. **An indicator that there are 4 or 5 sections** and briefly, what each section covers.

This gives, on the second page:

5. **The intended learning outcomes or competencies** to be developed through studying this module. These cover 4 learning domains: conceptual; nature of science/process skill; personal development; social development.

6. **A descriptor of the intentions** of the set of modules within the PARSEL project.

SECTION 2 - The Student Activities

This section comprises:

1. **A scenario**. This is seen as an important component of the module and is intended to 'set the scene' for the learning. The scenario tries to relate to real life and to draw upon prior knowledge of students, much being in the social domain. Students are expected to read the scenario as the first step in teaching through the module.

2. **Student tasks**. This indicates to the students what they need to do and is given in sequence to facilitate the learning. The degree of specificity of the instructions relates to the learning demands of the module and the teacher may supply additional materials. The tasks represent the totality of the learning to be undertaken by the students through the module.

SECTION 3 - Teaching Guide

This section comprises:

1. **Learning outcomes per lesson**. This is written to assist the teacher in recognising the intended learning outcomes for each lesson. It is only a suggestion and for the teacher wishing guidance in this direction.

2. **Suggested teaching strategy**. Points for the teacher to consider are given in this part. The parts are numbered in sequence and can be grouped by suggested lessons. The information is intended to be in sufficient detail for the teacher to appreciate the intended suggestions. However the teacher is free to modify the approach to suit the specific situation.

3. **Link between the learning outcomes and the student activities**.

SECTION 4 - Assessment of Students

This section concentrates on **formative assessment**, sometimes referred to as 'assessment for learning'. This is assessment carried out by the teacher as part of teaching in the classroom. Such type of assessment may not occur every lesson, it may not assess each student on a particular occasion and it may not assess all aspects that were targets for the lesson. It occurs based on teacher recognition of its need, its frequency and the extent to which it does cover all students in the class.

In the module, ideas for assessment are given in three styles:

1. **Assessment centred on skills** to be achieved within the intended goals of education.

2. **Assessment related to the learning outcomes** to be achieved per lesson.

3. **Assessment based on the selected procedure of assessing chosen by the teacher** – by teacher marking written work; by teacher observation of the students; by oral communication with the teacher.

SECTION 5 - Teacher Notes (Optional)

This section is optional and it is intended as extra support for the teacher. As such it may contain:

1. **Student worksheets** which the teacher can use as given, or modified to suit the particular lesson or group of students.

2. **Explanation notes** to make aspects clearer for the teacher.

3. **Background information** which may help the teacher in understanding the topic, or the scientific background.

4. **Details of calculation or answers to questions** asked in the student activities.

PARSEL PARTNERS

Leibniz Institute for Science Education - Germany

University of Tartu - Estonia

Weizmann Institute of Science - Israel

University of Lisbon - Portugal

Lund University - Sweden

University of Southern Denmark - Odense - Denmark

Freie Universität Berlin - Germany

University of Ioannina - Greece

ICASE (Hatfield, Herts) - UK

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http://www.parsel.eu