

SEISMO-LAB

**Template for the Development of a Technology-
Enhanced Educational Scenario Template**

Project-based Learning

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1 Development of an Educational Scenario Template

1.1 Description of the Educational Scenario Template in Narrative Format

Describing an Educational Scenario Template	
1. Title of the Educational Scenario Template	Project-based Learning
2. Educational Problem	<p>Students must be engaged in a highly motivating learning experience, which is closely related to the tasks and challenges of the real world.</p> <p>Therefore, emphasis must be given on the learning-by-doing, where the activities in authentic context are strongly emphasized, which means the skills needed in working life, such as being able to work in teams, working in self-guided manner, and assessing of own actions (Thomas, 2000).</p>
3. Educational Scenario Template Objectives	<p>Knowledge The students should know and understand specific concepts and the analogies between them</p> <p>Skills The students should be able to:</p> <ul style="list-style-type: none"> • Create artifacts • Work in an autonomous and self-guided manner • Present and support what they have learned and share with others • Provide feedback to others • Defend a scientific argument • Recognize and analyze alternative explanations and models • Search and gather data <p>Attitudes The students should be able to:</p> <ul style="list-style-type: none"> • Be interested in Science Education matters • Communicate with others effectively • Appreciate feedback from other learners or teacher
4. Characteristics and Needs of Learners	<p>Cognitive The students have less than average knowledge level to mathematics and geometry. Limited knowledge of</p>

Describing an Educational Scenario Template

	<p>science subjects.</p> <p>Psychosocial Based on statistics less than 50% of the students have a significant interest in science (both boys and girls). A small number of them (about 15%) will follow careers in science (Sjøberg & Schreiner 2005, PISA 2006).</p> <p>Physiological The average age of students is 15-16 years.</p> <p>Needs The learners need to be engaged in tasks that will help them relate science matters with everyday life world.</p>
<p>5. Educational Approach of the Educational Scenario Template</p> <p>(a) Description of the Educational Approach rationale</p> <p>(b) Parameters that guarantee the implementation of the Educational Approach</p>	<p>(a) Project-based learning aims at giving students a highly motivating learning experience, which is closely related to the tasks and challenges of the real world. Project-based learning also supports learning so called "adult skills", which include skills such as working in teams, working in self-guided manner, and assessing of own actions. Project-based learning is also connected to the idea of attaining transferable skills such as problem solving (Helle et al., 2006).</p> <p>The projects in Project-based learning are challenging and complex tasks that are based on some topics, questions, or problems that are driving the working in projects. Challenging and complex tasks means here that the tasks must be such that they cannot be accomplished successfully without new learning taking place. The projects at hand usually involve elements from various subjects, which make them multidisciplinary and not bound to any particular subject domain.</p> <p>The nature of the tasks have to be such that it involves learners in various kinds of activities that support the learning, such as designing, problem-solving, decision making, and active investigation. In projects, the learners work autonomously and collaboratively in small groups, whereas the teacher is more in a role of the tutor facilitating the learning process (Henry, 2005).</p> <p>(b)</p> <ul style="list-style-type: none"> • It must be ensured that the required time for the project to be completed exists • It must be ensured that the appropriate cognitive background for the students exists • The teacher must prepare the topics for the students' projects beforehand. • The teacher, who supports the learning process, should understand his role as a facilitator of the

Describing an Educational Scenario Template	
	<p>learning process. The teacher should not be in the experts' role trying to impose his knowledge over the topic or directing the activities of the learners, but let the learners to do their learning and decisions in projects.</p> <ul style="list-style-type: none"> • Projects are central, not peripheral to the curriculum • Students must have access to PCs that are connected to the Internet.
6. Learning Activities:	
Phase 1: Definition of the Project Goal	<p>Organize into Groups The teacher divides the class into groups of students and ensures that these groups consist of students with different capacities.</p> <p>Presentation of the New Question/Problem The teacher introduces the new question/problem to the students.</p> <p>Discussion Students discuss about the new question/problem and contribute opinions and ideas and the teacher provides feedback on the students' opinions.</p>
Phase 2: Planning the Project	<p>Discussion among the Group Participants Students discuss into the context of their groups about the project to be created and the responsibilities of each group member. The teacher interferes to avoid possible misunderstandings.</p>
Phase 3: Doing the Project Work	<p>Collection of Information Each group member collects information about the topics related to their project work. The teacher can support the students by pointing out with questions some topics that the students might have given little or no attention or he/she may have prepared some material for students that serves as a starting point for further inquiries on those topics.</p> <p>Synthesis of Information After the students have collected the information, they synthesize together the collected pieces of information. The teacher can support the synthesis process by asking questions about various concepts and topics and their relations to each other.</p> <p>Create Project Students work collaboratively in order to create their project, while the teacher acts as a facilitator to their efforts.</p>
Phase 4: Presentation of the Outcomes	<p>Project Outcomes Presentation Each group of students presents the outcomes of the project to others and the teacher.</p>

Describing an Educational Scenario Template	
	<p>Discussion/Feedback Students answer to questions/comments of other students and the teacher.</p>
Phase 5: Assessing the Project Work	<p>Summative Assessment The teacher assesses the projects created by student groups</p>
7. Participating Roles:	<p>Student</p> <ul style="list-style-type: none"> • Actively participate in the learning process by expressing his/her ideas, experiences and opinions. <p>Group Participant</p> <ul style="list-style-type: none"> • Works collaboratively in small groups to create their project • Communicates and debates with other group participants • Searches, selects and synthesizes information • Creates the final project • Presents the final project • Assesses the other groups <p>Teacher</p> <ul style="list-style-type: none"> • Prepare the project topics for the students • Poses questions • Coordinates, mediates, communicates and guides students in order to overcome any difficulties • Evaluates the final project outcomes and the cooperation between the students
8. Tools, Services and Resources	<p>Tools:</p> <p>Hardware</p> <ul style="list-style-type: none"> • Computer • Projector <p>Software</p> <ul style="list-style-type: none"> • Text, image, audio or video viewer • Search Engines • Word Processor • VLE <p>Resources: problem statement, figure, graph, slide, simulation, experiment, table, self assessment, exercise, questionnaire, exam</p>

Table 1: Description of the Educational Scenario Template

1.2 Graphical Representation of the Flow of Learning Activities

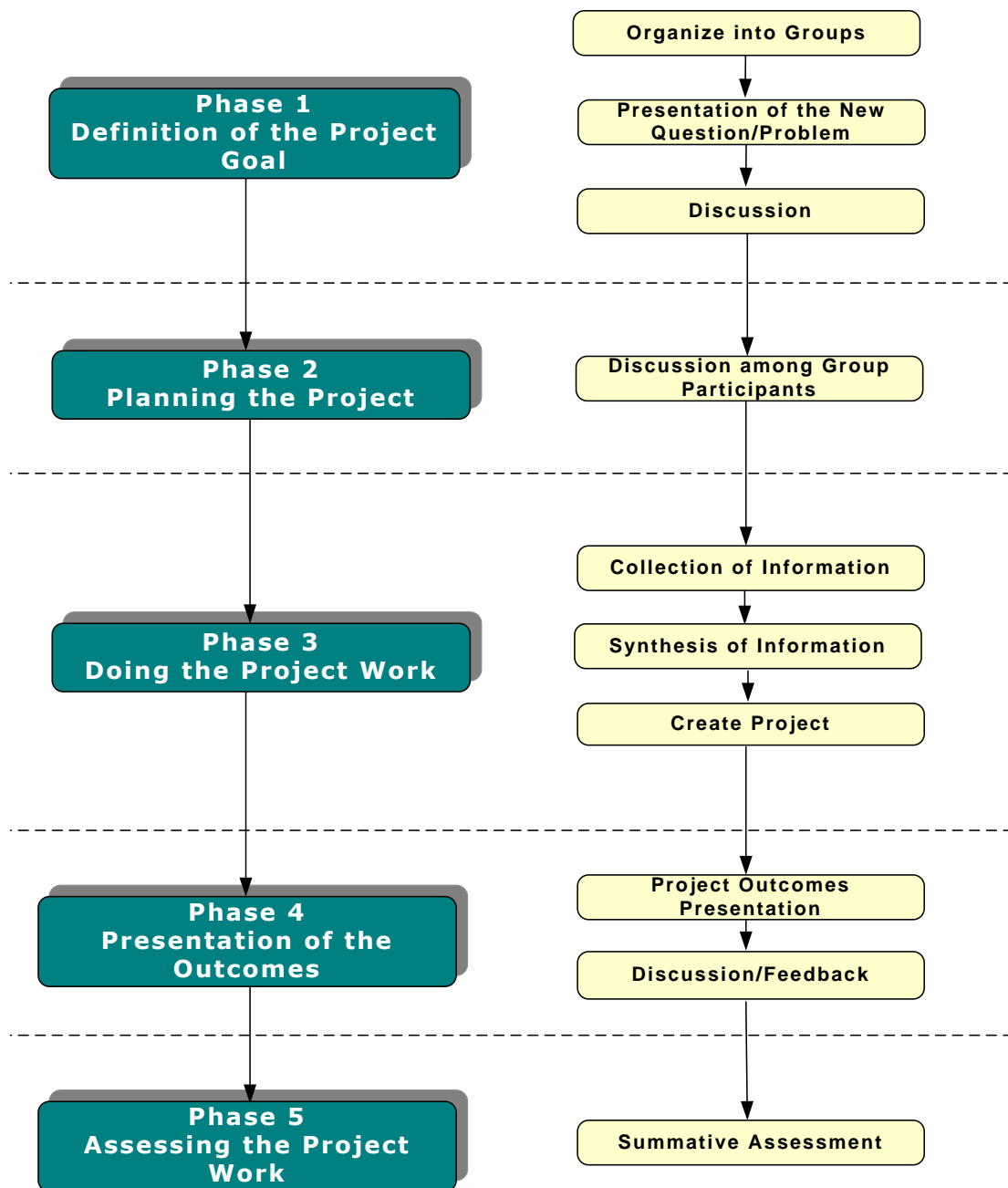
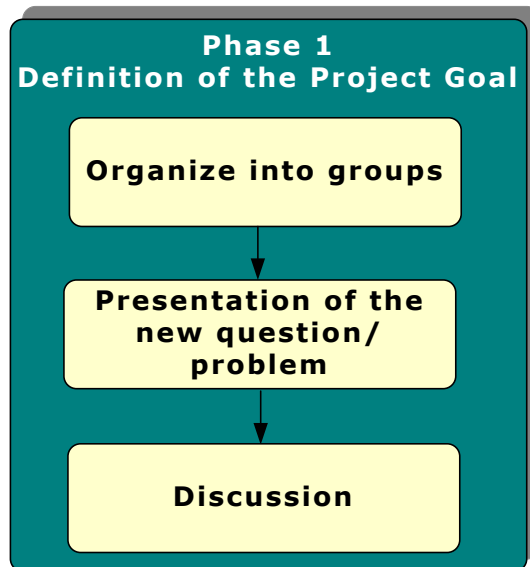


Figure 1: Flow of Learning Activities

1.3 Description of the Educational Scenario Template in Common Terms

1.3.1 Definition of the Project Goal



Type	Technique	Interaction	Roles	Tools/Services	Resources
Communicative – Presenting	Communicative – Negotiation	Who – Class Based Medium – Face to Face Timing – Synchronous	– Facilitator – Individual Learner	Hardware – Computer – Projector Software – Text, image, audio or video viewer	Slide
Information Handling – Analysing	Information Handling – Defining	Who – One to many Medium – Face to Face Timing – Synchronous	– Facilitator – Individual Learner	Hardware – Computer – Projector Software – Text, image, audio or video viewer	Problem Statement
Communicative – Discussing	Communicative – Coaching	Who – Class based Medium – Face to Face Timing – Synchronous	– Facilitator – Individual Learner	Hardware – Computer – Projector Software Text, image, audio or video viewer	Other

Table 2: Definition of the Project Goal

1.3.2. Planning the Project

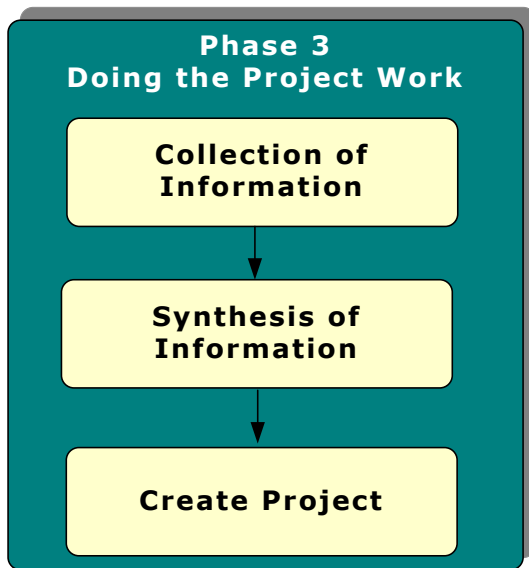
Phase 2
Planning the Project

Discussion among Group Participants

Type	Technique	Interaction	Roles	Tools/Services	Resources
Communicative - Discussing	Communicative - Debate	Who - Group based Medium - Face to Face Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer - Projector Software - Text, image, audio or video viewer	Other

Table 3: Planning the Project

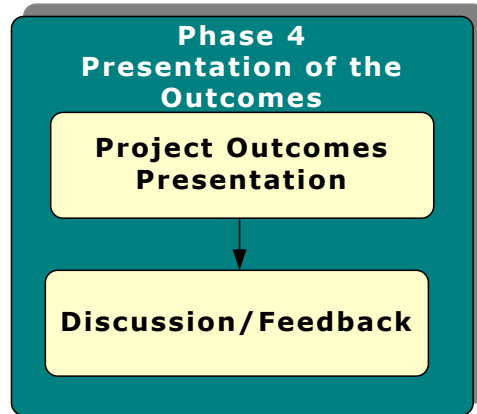
1.3.3. Doing the Project Work



Type	Technique	Interaction	Roles	Tools/services	Resources
Inf. Handling - Gathering	Inf. Handling - Web Search	Who - Group based Medium - Online Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer Software - Search engines - VLE	Graph
Productive - Synthesizing	Communicative - Arguing	Who - Group based Medium - Face to Face Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer Software - Text, image, audio or video viewer	Other
Productive - Creating	Productive - Artifact	Who - Group based Medium - Face to Face Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer Software - Word processor	Other

Table 4: Doing the Project Work

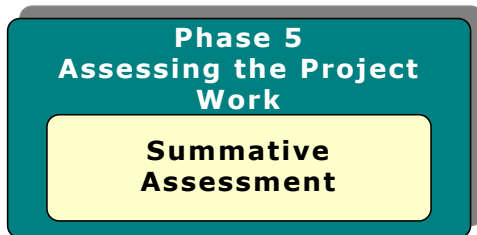
1.3.4. Presentation of the Outcomes



Type	Technique	Interaction	Roles	Tools/services	Resources
Communicative - Presenting	Productive - Presentation	Who - Class based Medium - Face to Face Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer - Projector Software - Text, image, audio or video viewer	Slide
Communicative - Critiquing	Communicative - Articulate reasoning	Who - Class based Medium - Face to Face Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer - Projector Software - Text, image, audio or video viewer	Other

Table 5: Presentation of the Outcomes

1.3.5. Assessing the Project Work



Type	Technique	Interaction	Roles	Tools/services	Resources
Communicative - Critiquing	Communicative - Arguing	Who - Class based Medium - Face to Face Timing - Synchronous	- Group participant - Facilitator	Hardware - Computer - Projector Software - Text, image, audio or video viewer	Other

Table 6: Assessing the Project Work

2. References

- Helle, L., Tynjälä, P., Olkinuora, E. (2006). Project-based learning in post-secondary education - theory, practice and rubber sling shots. *Higher Education*, 51, 287-314.
- Henry J. (2005). *Teaching through Projects (Open and Distance Learning Series)*, Routledge.
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- Sjøberg, S. & Schreiner, C. (2005). How do learners in different cultures relate to science and technology? Results and perspectives from the project ROSE. *Asia Pacific Forum on Science Learning and Teaching*, 6, 1-16.
- Thomas, J. W. (2000). A Review of Research on Project-based Learning. Internet WWW-page, Available at:
http://www.bobpearlman.org/BestPractices/PBL_Research.pdf.

3. Annex

The vocabulary used for the Learning Activities description in common terms, is explained in the following table:

Annex		
Dimension	Type and Value	Description
<i>Type</i>	Communicative: Discussing	Discussion among the participating roles
	Communicative: Presenting	Presentation of a specific subject/work
	Communicative: Critiquing	Critique on a specific subject
	Information Handling: Analysing	Analysing a concept or a problem
	Information Handling: Gathering	Gathering data for solving a problem
	Productive: Synthesizing	Synthesizing data into a new whole
	Productive: Creating	Creating an artefact
<i>Technique</i>	Communicative: Coaching	The teacher guides students
	Communicative: Debate	A structured discussion of opposing points of view
	Communicative: Arguing	A verbal dispute
	Communicative: Articulate reasoning	Students explain their reasoning via speaking
	Communicative: Negotiation	A discussion that is intended to produce agreement
	Information Handling: Defining	Describing the meaning of a concept or term or problem
	Information Handling: Web Search	Searching the world wide web for information about a specified topic using for example a search engine
	Productive: Artefact	Something created by a person or process
	Productive: Presentation	Presentation of a subject
<i>Interaction</i>	Who: One to many	Interaction of a person with a group of persons
	Who: Class based	In the context of the classroom
	Who: Group based	In the context of the groups
	Medium: Face to Face	Face to face interaction of the participating role with others or content

Annex		
	Medium: Online	Interaction via the use of Internet
	Timing: Synchronous	Synchronous interaction of the participating role with content
<i>Roles</i>	Individual Learner	The individual learner
	Group participant	A student participating in a group of students
	Facilitator	The teacher in a role of facilitator of the learning process
<i>Tools/ Services</i>	Hardware: Computer	An electronic, digital device that stores and processes information
	Hardware: Projector	A hardware device that enables an image to be projected onto a flat surface
	Software: Search engines	Searching the world wide web for information about a specified topic using a search engine such as Google.
	Software: Text, image, audio or video viewer	A software tool for displaying text, images, audio or video
	Software: Word Processor	Software that enables to perform word processing functions (i.e insert, print, delete text)
	Software: VLE	COSMOS portal
<i>Resources</i>	Problem Statement	Document for defining a problem
	Slide	Hypermedia document
	Figure	A figure is any graphic, text, table or other representation that is unaligned from the main flow of text
	Graph	Pictorial representation of information
	Simulation	An application that imitates a physical process or object by causing a computer to respond mathematically to data and changing conditions as though it were the process or object itself
	Experiment	An action or operation undertaken in order to discover something unknown, to test a hypothesis, or establish or illustrate some known truth
	Table	An arrangement of information in columns and lines
	Self assessment	An assessment or evaluation of oneself, one's actions or attitudes by oneself
	Exercise	Document for practicing a skill or understanding

Annex		
	Questionnaire	A list of questions by which information is sought from a selected group
	Exam	Document for testing, the knowledge or ability of students
	Other	It can be any of the following resources: Figure, graph, slide, simulation, experiment, table, self assessment, exercise, questionnaire, exam

Table 7: Learning Activities Description