Developing IBSE Scenarios using the COSMOS ASK Learning Design Authoring Toolkit (LDT)

Summary:

Science teachers are provided with a learning design authoring toolkit, namely COSMOS ASK-LDT , with predefined learning design templates suitable for designing IBSE Scenarios. The IBSE Scenarios developed with the use of COSMOS ASK-LDT are compatible with IMS Learning Design Specification and this enables science teachers to share their IBSE Scenarios through web-based repositories such as the COSMOS Learning Design Repository (www.cosmosportal.eu/).

Aims:

The main aim of this best practice is to support and guide science teachers in the process of designing IBSE Scenarios by using pre-defined learning design templates that follow the inquiry based teaching model.

Main activities:

The main activities of this best practice could be summarized as follows:

- Science teachers are presented with a methodology for expressing and designing the main elements of IBSE Scenarios;
- Science teachers are presented with the main functionalities of COSMOS ASK-LDT for developing IBSE Scenarios;
- Science teachers design and develop their own IBSE Scenarios following the presented methodology and
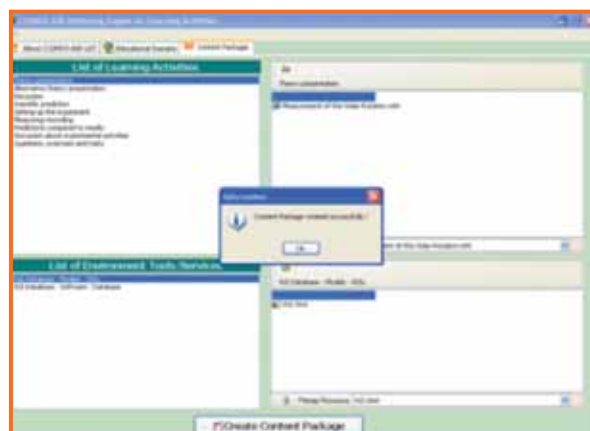
using the COSMOS ASK-LDT;

- Science teachers provide their feedback regarding the process of developing IBSE Scenarios following the presented methodology and using the COSMOS ASK-LDT.

Narrative:

The best practice targets science teachers of any educational level and support them in the process of designing and developing IBSE Scenarios that can be shared and reused via web-based repositories such as the COSMOS Learning Design Repository (www.cosmosportal.eu/).

First, the participants are presented with a methodology for expressing and designing the main elements of IBSE Scenarios. This methodology provide the means to (a) describe the main elements of an IBSE scenario in narrative format, (b) design the learning activities' flow of the IBSE Scenario and (c) describe the learning activities of the IBSE Scenario by using a common vocabulary. The next step includes the demonstration of the COSMOS-ASK-LDT main functionalities. COSMOS ASK-LDT is stand-alone graphical authoring tool, which enables its users to graphically design IBSE Scenarios based on the interconnection of learning activities. COSMOS ASK-LDT can export IBSE Scenarios conformant with the IMS Learning Design specification and publish them to existing web based repositories. Additionally, COSMOS ASK-LDT enables its users to characterize the learning activities used for developing IBSE Scenarios, based on a common vocabulary of terms derived from the "DialogPlus Taxonomy of Learning Activities" .

Afterwards, participants are using COSMOS ASK-LDT, so as to design and develop their own IBSE Scenarios by following the methodology presented in the first step. Finally, there is an evaluation activity, concerning the use of the methodology and the COSMOS ASK-LDT for designing and developing IBSE Scenarios.

Methods of learning/training:

- Combination of knowledge transmission, that is, presentation about the methodology for expressing and designing the main elements of an IBSE Scenario, and a demonstration of COSMOS ASK-LDT;
- Trainees-centered activities in which there is active participation, including activities where trainees are using COSMOS ASK-LDT for developing their IBSE Scenarios and they provide their feedback about this process.

End user:
Science teachers of any educational level

Involved actors:
Technology-enhanced learning experts and science teachers

Location:
Takes place in a classroom laboratory equipped with a data projector and workstations for the participants.

Languages available:
The proposed methodology and the tool interfaces are available in English language.

Where to find the application:
The COSMOS ASK-LDT can be downloaded from the COSMOS Learning Design Repository (www.cosmosportal.eu/).

Evaluation parameters:
Science teachers are able to evaluate the process of designing and developing IBSE Scenarios by using appropriately designed evaluation questionnaires. Furthermore, the usage and adoption of the developed IBSE Scenarios by the participated science teachers during their day-to-day teaching activities is another evaluation parameter.

Duration:
The total duration is fifteen (15) didactical hours. The first six (6) didactical hours consist of a

presentation about the methodology for expressing and designing the main elements of IBSE Scenarios. The next three (3) didactical hours consist of a demonstration of the COSMOS ASK-LDT main functionalities. The last six (6) didactical hours consist of hands-on session where participants design and develop their own IBSE Scenarios and they provide their feedback regarding this process.

Optimum number of participants:
20-25 participants.

Additional information or resources:
Additional information about the methodology for expressing and designing the main elements of IBSE Scenarios, as well as about the COSMOS ASK-LDT is available at the COSMOS Learning Design Repository (www.cosmosportal.eu/).

Teachers' Competencies

1	subject matter/content knowledge	x
2	nature of science	
3	Multidisciplinary	x
4	knowledge of contemporary science	
5	variety of (especially student-centred) instructional strategies	x
6	lifelong learning	x
7	self-reflection	x
8	teaching/ learning processes within the domain	x
9	using laboratories, experiments, projects	x
10	common sense knowledge and learning difficulties	
11	use of ICTs	x
12	knowledge, planning and use of curricular materials	x
13	Information and Communication Technologies with Technological Pedagogical Content Knowledge	x

Mapping best practices with main principles

8. **Doing science: experimenting, analyzing, interpreting, redefining explanations:**

COSMOS ASK-LDT provides to the science teachers the capability to use pre-defined templates (embedded in the tool) for developing their IBSE Scenarios. These templates guide science teachers to include in their IBSE Scenarios learning activities, which aim to support experimentation, analysis, interpretation and explanations redefinition.

9. **Assessment: formative ~ of students' learning and the summative ~ of their progress:**

Formative assessment is achieved though the IBSE Scenarios that are developed by the participants during the hands-on session.

10. **Cooperation among teachers and with experts:**

Cooperation among teachers and experts is achieved by using the COSMOS-ASK-LDT, which offers the capability to science teachers to export their IBSE Scenarios following the IMS LD Specification and share them with other science teachers through web-based repositories, such as the COSMOS Learning Design Repository (www.cosmosportal.eu/).