

E-TOOLS FOR E-SCHOOLS

KEY ACTION 2: COOPERATION FOR INNOVATION AND THE EXCHANGE OF GOOD PRACTICES

STRATEGIC PARTNERSHIPS IN THE FIELD OF EDUCATION, TRAINING AND YOUTH

METHODOLOGY



Introduction

E-learning can be defined as the use of computer and Internet technologies to deliver a broad array of solutions to enable learning and improve performance.

These guidelines address mainly to **adult learners**, i.e. learners who have completed their formal education, but who are still motivated to improve their job-related tasks and knowledge. In EFES project case, those adult learners would be school teachers. Adult learners, in general, share some characteristics that are different from those of fulltime students, which influence the design of learning programmes. In particular, adult learners:

- need to know the benefits of learning (why they have to learn something);
- like to learn experientially;
- approach learning as problem-solving;
- learn better where they can see the immediate value and application of content; and
- prefer to study at a time, place and pace convenient for them.

1. Why is it necessary to develop e-learning through EFES Project?

Developing e-learning is more expensive than preparing classroom materials and training the trainers, especially if multimedia or highly interactive methods are used. However, delivery costs for e-learning (including costs of web servers and technical support) are considerably lower than those for classroom facilities, instructor time, participants' travel and job time lost to attend classroom sessions.

Moreover, e-learning reaches a wider target audience by engaging learners who have difficulty attending conventional classroom training because they are:

- geographically dispersed with limited time and/or resources to travel;
- busy with work or family commitments, which do not allow them to attend courses on specific dates with a fixed schedule;
- located in conflict and post-conflict areas and restricted in their mobility because of security reasons;
- limited from participating in classroom sessions because of cultural or religious beliefs;
- facing difficulties with real-time communication (e.g. foreign language learners or very shy learners).

E-learning can offer effective instructional methods, such as practicing with associated feedback, combining collaboration activities with self-paced study, personalizing learning paths based on learners' needs and using simulation and games.

Further, all learners receive the same quality of instruction because there is no dependence on a specific instructor.

A training program, in general, may aim at developing different types of skills:

- **cognitive skills**, which can involve knowledge and comprehension (e.g. understanding scientific concepts), following instructions (procedural skills), as well as applying methods in new situations to solve problems (thinking or mental skills);
- **interpersonal skills** (e.g. skills involved in active listening, presenting, negotiating, etc.); as well as
- **psychomotor skills**, involving the acquisition of physical perceptions and movements (e.g. making sports or driving a car).

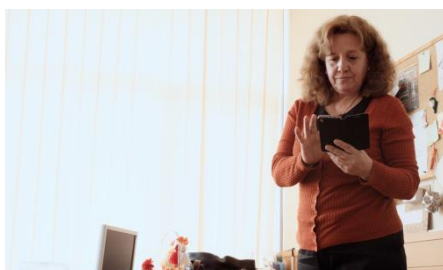
Most e-learning courses are developed to build cognitive skills; the cognitive domain is the most suitable for e-learning. Within the cognitive domain, thinking skills may require more interactive e-learning activities because those skills are learned better “by doing”.

Learning in the interpersonal domain can also be addressed in e-learning by using specific methods. For example, interactive role playing with appropriate feedback can be used to change attitudes and behaviors.

E-learning through EFES Project could be a good option for school teachers to attend, since...

- there could be a significant amount of content to be delivered to a large number of learners;
- learners could be from geographically dispersed locations;
- learners may have limited mobility;
- learners may have limited daily time to devote to learning;
- learners may have the least basic computer and Internet skills;
- learners could be highly motivated to learn and appreciate proceeding at their own pace;
- content could be reused for different learners’ groups in the future;
- training would aim to build cognitive skills rather than psychomotor skills;
- the course could address long-term rather than short-term training needs;
- data could be collected and tracked

There are two general **approaches to e-learning**: self-paced and facilitated/instructor-led. Self-paced learners are alone and completely independent, while facilitated and instructor-led e-learning courses provide different levels of support from tutors and instructors and collaboration among learners.



or



Self-paced learner

Facilitated/instructor-led

The EFES e-learning courses could apply the first one, i.e. **self-paced e-learning**, which has the following characteristics:

Learners could be offered e-learning courseware (also called Web-based training (WBT)), which could be complemented by supplemental resources and assessments. It could be

housed on the EFES project's Web server, and learners could access it from the online EFES LMS platform. They would be free to learn at their own pace and to define personal learning paths based on their individual needs and interests.

On the other hand, EFES e-learning providers would not have to schedule, manage or track learners through a process. The e-learning content could be developed according to a set of learning objectives and could be delivered using different media elements, such as text, graphics, audio and video (EFES WEB TV). It would provide as much learning support as possible (through explanations, examples, interactivity, feedback, glossaries, etc.), in order to make learners self-sufficient. However, some kind of support, such as e-mail-based technical support or e-tutoring, could be offered to learners. Finally, there could also be the potential to track learners' actions in a central database.

Content for the EFES e-learning course could include simple learning resources and interactive e-lessons

Simple learning resources are non-interactive resources, such as documents, PowerPoint presentations, videos or audio files. These materials are non-interactive in the sense that learners can only read or watch content without performing any other action. Nevertheless, the resources for the EFES e-learning courses could be quickly developed; they could match defined learning objectives and could be designed in a structured way, so that they could be a valuable learning resource, even though they don't provide any interactivity

The most common approach for self-paced e-learning is Web-based training consisting of a set of interactive e-lessons. An EFES e-lesson could be a linear sequence of screens, which can include a) text, graphics, animations, audio, video, also by using the WEB TV which could be embedded in the EFES LMS Platform, and b) interactivity in the form of questions and feedback. EFES e-lessons could also include recommended reading and links to online resources, as well as additional information on specific topics.

EFES e-learning activities could be **asynchronous**, i.e. time-independent. In a self-paced asynchronous course, like EFES e-learning courses, learning takes place at any time, with e-mail or discussion forums be the communication tools.

The **quality** of the EFES e-learning courses could be enhanced by:

- Learner-centred content: the e-learning curricula could be relevant and specific to schoolteachers' needs, roles and responsibilities in professional life. Skills, knowledge and information could be provided to this end,
- granularity: the e-learning content could be segmented to facilitate assimilation of new knowledge and to allow flexible scheduling of time for learning,
- engaging content: the instructional methods and techniques could be used creatively to develop an engaging and motivating learning experience,
- interactivity: frequent learner interaction could be necessary to sustain attention and promote learning,



- personalization: the EFES e-learning courses could be customizable to reflect learners' interests and needs

How the EFES e-learning course s could be developed?

Good design and planning are very important for e-learning projects. In e-learning, it is in the design and development of structured materials, which must be self-contained and able to be used multiple times without making ongoing adjustments.

The EFES e-learning course could be developed following the **ADDIE instructional design model**.

Instructional design is the systematic development of specifications using learning and instructional theory to ensure the quality of training. In job-related training, the aim of instructional design is to improve employee performance and to increase organizational efficiency and effectiveness.

The ADDIE model includes five stages: Analysis, Design, Development, Implementation and Evaluation.

ANALYSIS	DESIGN	DEVELOPMENT	IMPLEMENTATION	EVALUATION
<ul style="list-style-type: none"> • Needs analysis • Target audience analysis • Task and topic analysis 	<ul style="list-style-type: none"> • Learning objectives • Sequencing • Instructional strategy • Delivery strategy • Evaluation strategy 	<ul style="list-style-type: none"> • Content development • Storyboard development • Courseware development 	<ul style="list-style-type: none"> • Installation and distribution • Managing learner’s activities 	<ul style="list-style-type: none"> • Reactions • Learnings • Behaviour • Results

• Analysis

A detailed **analysis** (EFES National Report on good practices) has already been conducted by the EFES project participants at the start of the development effort, where some clear patterns and major trends have been observed. Although Italy, Greece and Bulgaria use different types of e-learning practices, such as e-learning platforms, authoring tools, repositories, digital libraries and web TVs, there is the recurring pattern of all three countries, using the same learning management system Moodle (eKnow – Italy; Greek School Network – Greece; u4ili6teto.bg - Bulgaria). This **justifies the use of Moodle in the EFES project** and could certainly facilitate the work of large educational communities in all three countries.

On the other hand, certain weaknesses and limitations have also been detected:

- Teachers find some of the applications time-consuming and difficult to use,
- some of the activities are not personalized, since they are usually targeted at a large scale audience,
- a big number of the described e-learning practices are paid and this could be a major obstacle, and they do not favor the development of teaching and learning communities.

In conclusion, the lack of a unifying approach (including both technical support and pedagogical guidance) makes the decision to **integrate web TV with the learning management system Moodle** even more significant and well-grounded as it could ultimately combine the best learning practices, target the existing needs, provide practical examples and show how teachers apply ICT in their work.

• Design

The following step could be the **design** stage, which could encompass the following activities:

- formulating a set of learning objectives required to achieve the general, high-level course objective;
- defining the order, in which the objectives should be achieved (sequencing); and
- selecting instructional, media, evaluation and delivery strategies.

The outcome of the design stage could be a blueprint that could be used as a reference to develop the course. The blueprint could illustrate the curriculum structure (e.g. its organization in courses, units, lessons, activities); the learning objectives associated with each unit; and the delivery methods and formats (e.g. interactive self-paced materials) to deliver each unit.

In order to develop specific learning objectives and the **curriculum** outline, a **content analysis** is necessary. Content analysis is probably the most critical step in the instructional design process. If the designer does not include accurate and relevant content, then there is little value in finding the best instructional methods and media to transfer the information to learners.

The Subject Matter Experts (SMEs) and the Instructional Designers (IDs) could work together to perform the analysis. This process could help the ID to familiarize with the content; moreover, it forces the SME to work through each individual content element and indicate the most important and challenging aspects that should be considered. During this process, both of ID and SME have the opportunity to view the content from the learner's perspective. For the EFES e-learning course, content identification and analysis could be done by applying the method of the **topic analysis**. The topic analysis is carried out to identify and classify the course content and it is appropriate for courses that are primarily designed to provide information or achieve broader educational objectives.

The topic analysis aims to: a) identify course content, and b) classify content elements.

Visual instruments, such as mind maps, concept maps and process diagrams may help the ID and the SME clarify connections among content elements. Mind maps may be used to visualize and organize ideas. They may represent words, ideas, tasks, or other items linked to and arranged around a central key word or idea. Concept maps and causal maps are diagrams used to illustrate connections among concepts and cause-effect relationships, while process diagrams are commonly used to indicate the general flow of processes. Classifying content elements helps to further recognize connections among them thus contributing to the refinement of the draft course outline. Content elements can be classified according to the types of content they represent.

A **learning objective** is a statement describing a competency or performance capability to be acquired by the learner. For the EFES e-learning courses, learning objectives could be specified for the course as well as for each single activity. By looking at the content elements identified in the topic analysis, it is possible to translate the overall course goal into more specific learning objectives. Learning objectives could define the expected outcome of each learning

unit. For example, could schoolteachers be able to memorize the steps of a procedure or could they actually be able to perform it?

How could the above learning objectives be sequenced when structuring the EFES e-learning course? One of the methods used to define the course sequence is the prerequisite method and this is going to be used by the EFES project. That method uses a learning objectives hierarchy, teaching first those skills that seem to be prerequisites for all other skills. A hierarchy among learning objectives may be created by using the results of the topic analysis. The outcome of sequencing is a **course structure**, where each element corresponds to a specific learning objective and contributes to the achievement of the overall course goal.

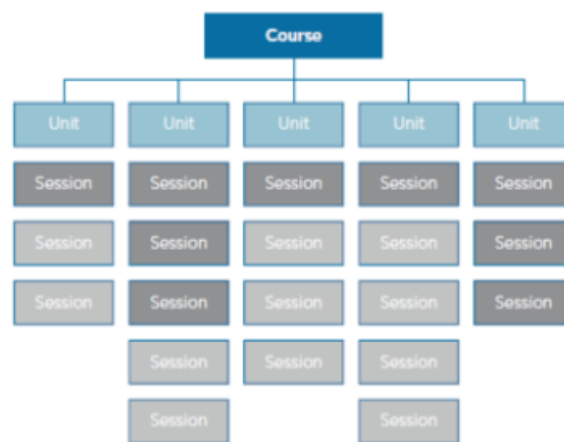


Diagram of an example of a structure for an e-learning course

A course may include several units, which include a number of sessions (see image above). In a self-paced e-learning course, like EFES project’s course, each session is a learning object made by a set of screens including text and media elements. Developing the course using a modular approach allows the definition of a number of personal learning paths that respond to different individual interests and learning needs. Entry tests or task-related questions can be submitted to learners to help them identify the right subset of relevant course elements.

Once the course structure has been defined, the ID could propose the best mix of **methods and techniques** for the EFES e-learning course. The design of the e-learning course could involve combination of the two following instructional methods:

- Expositive methods - which emphasize “absorption” of new information. They include presentations, case studies, worked examples, demonstrations.
- Application methods - which emphasize the active processes that learners use to perform procedural and principle based tasks and build new knowledge. They include demonstration-practise method, job aids, case-based or scenario-based exercises, role play, simulations and serious games, guided research, project work.

Each method could be delivered in different formats, using different types of media and communication tools. For example, a presentation can be delivered as a Power Point file or as a recorded (or live) video presentation in the EFES WebTV. Delivery formats could be selected

based on additional factors related to learners, technological and organizational constraints (e.g. budget) and available time.

In more detail, **expositive methods** require learners to listen and read or observe. A SME could deliver knowledge on a specific topic, which could be complemented by tests and exercises to evaluate learners' memorization and/or understanding of the content. These methods are used for acquiring information, but they can be combined with other methods to create different types of learning courses. Presentations, especially in video formats, as in the EFS WebTV, can also be used to sensitize and influence learners' attitudes toward specific subjects. For the specific project, expositive methods could include:

- presentations: organized information on a specific topic
- case studies: real, significant cases related to the topic
- worked examples: examples of the topic with comments and explicit reference to the theory
- demonstrations: illustrations of how a task can be performed

They could be delivered through the following formats:

1. **Simple learning content**, such as documents and PowerPoint presentations, with no interactivity.
2. **Interactive e-lessons** using text, images, audio, animations and practice (i.e. questions and feedback).
3. **Presentations** made by an expert, which are broadcast in real time or recorded for learners to watch at any time. The lessons can be recorded in both video and audio formats (podcasts).

Application methods, in more detail, involve the learners in practical activities, which can range from simple exercises (such as the demonstration-practise method) to more complex methods like simulations or research activities. For the EFES e-learning courses the following application methods could be implemented:

- Demonstration-practise method, which is used to teach a procedure – usually a software procedure, such as how to use MOODLE – using directive learning. The procedure could be first demonstrated by an expert, and then learners could be asked to practice the procedure by interacting with the system or software. This method can be realized through interactive e-lessons, using a combination of animations and operational simulations (based on a sequence of operations) that allow learners to interact with the system and receive feedback on his/her actions.
- Job aids, which provide just-in-time knowledge. They usually provide immediate answers to specific questions, helping users accomplish job tasks. For example, learners may be provided with a checklist to help them draft a communication strategy for a specific audience. This method can be realized through printed documents, such as checklists, technical glossaries and manuals, online help or more sophisticated interactive online systems.
- Case-based exercises, which are used to develop cognitive skills in a specific domain. Learners could be asked to apply knowledge and principles to a concrete situation.

Typically, this method is built around a scenario, e.g. a challenging situation where learners are required to make decisions by choosing among different options. This method can be realized through:

- e-learning linear lessons using text, images, audio, animations and practice (questions and feedback); feedback is provided to learners by comments on the appropriateness of their choices, after which they proceed to the next situation.
- electronic simulations, based on branched scenarios (also called experiential simulations); each learner's choice produces a consequence that generates feedback. The feedback is provided through a follow-up situation that produces more choices.

In the design stage, two more aspects may be defined as well, the implementation-delivery strategy and the evaluation strategy.

When selecting the **delivery** formats for the EFES e-learning course, a number of factors could be considered, including learner-related factors, technology aspects, and organizational requirements.

As for the evaluation strategy for this course, the purpose of the evaluation could be established first of all. The purpose might be to: check the quality of the course to improve it before it is implemented (formative evaluation); measure the effectiveness of training and learning immediately after the course has been implemented (confirmative evaluation); or evaluate an old course to see if it is still valid or needs to be modified (summative evaluation). Then, learners' progress evaluation could be defined by providing relevant certification. This could also influence the choice of the assessment tests that could be integrated into the course. The assessment tests could be aligned with the learning objectives. For this reason, the assessment tests could be drafted from the first stages of the project, just after the definition of the learning objectives for each learning unit.

• **Development**

In the third stage (**development**), the e-learning content could be actually produced. The content may vary considerably, depending on the available resources (e.g. structured PDF documents, audio or video files, assignments and tests). The EFES e-learning course could be developed following three main steps:

- content development: writing or collecting all the required knowledge and information;
- storyboard development: integrating instructional methods (all the pedagogical elements needed to support the learning process) and media elements. This is done by developing the storyboard, a document that describes all the components of the final interactive products, including images, text, interactions, assessment tests; and
- courseware development: developing media and interactive components, producing the course in different formats for Web delivery and integrating the content elements into a learning platform that learners can access.

In creating the **storyboard** for EFES e-lessons, the ID could reorganize the content provided by the SME into a sequence of slides, which could correspond to the screens of the final interactive lesson.

For example, it could be organized as follows:

- LEARNING OBJECTIVES (1 Screen)
- INTRODUCTION (1 to 3 Screens)
- CONTENT (4 to 25 Screens)
- SUMMARY (1 Screen)

1) Learning objectives: A first screen containing a clear and informal description of learning objectives for the lesson.

2) Introduction: one or more introductory screens describing how the knowledge gained from the course could be used and the benefits of having that knowledge. The purpose of the introduction is to motivate learners to proceed with the lesson.

3) Content (core of the lesson): a set of screens (from 4 to 25) which make up the core of the lesson. These combine: text, media elements, examples, and practice questions. Their purpose is to facilitate learning of knowledge and skills. A range of instructional techniques and guidelines on how to use media elements could be used to present the content.

4) Summary: list of key points in the lesson. The purpose of the summary is to help the learner memorize the lesson's key points.

In the EFES e-learning course, the following **instructional techniques** for presenting the content could be used:

- Storytelling: it provides information through a story narrative, which places content in a realistic context and illustrates actions and decisions of one or more characters. It can use illustrations, pictures or video sequences.
- Scenario-based approach: Lessons using this approach are built around a scenario. Typically, the scenario is a challenging situation in which learners are required to make decisions by choosing among different options. Learners are provided with all the information required to make the right decisions. Feedback is provided to the learners for each option to explain why their choices are correct or incorrect. The feedback can also show the consequences of their decisions.
- Toolkit approach: An e-lesson can take the form of a toolkit which allows learners to select from among a set of independent topics, rather than follow a sequential approach. Learners are invited to choose the topics that interest them the most.
- Demonstration-practise method: it is used to teach a procedure. You first demonstrate the procedure, and then you ask the learner to practice the procedure by interacting with the system.

Practice and assessment questions could also be designed to reinforce the achievement of learning objectives. Questions play an important role in involving learners and keeping their attention.

In the EFES e-learning courses, practice and tests could mainly consist of questions associated with response options and feedback. They could have the following structure: a question or statement; an operational message that indicates to the learner how to perform the required

operations (e.g. click, drag, press a key); a series of options; the correct answer; and feedback for the correct and incorrect answers.

The question formats could include:

- True or False: A statement with two options (true/false or yes/no), where only one is correct,
- multiple choice: A statement that provides different options; only one is correct. This type of interaction allows for providing different feedback for each selected option,
- multiple responses: The correct answer consists of more than one option, all of which must be selected,
- matching: This type of interaction presents two series of elements. The learner must associate each element of the first series with an element of the second. The example shows a drag-and-drop exercise,
- ordering: The learner has to order several elements in a sequence, e.g. the logical sequence of several phases, steps or operations to be performed,

Once the storyboards are ready, the development team could create the **final interactive e-lessons**. Alpha and beta versions are prepared for testing and review before distributing the course online.

Courseware development could require the work of a group of professionals. Specifically:

- a course integrator to assemble all the course components and set up the course interface; this person could also be responsible for quality assurance testing;
- graphics developers to create graphics and animations, including navigation buttons and icons;
- multimedia developers for audio and video editing;
- HTML/XML coders if there is a need to develop tailored templates; and
- programmers to develop complex interactions.

• **Implementation**

After the production of the e-learning content and its integration into the EFES LMS platform, the **implementation** stage could come, where the course could be delivered to learners. The courseware could be installed on a server and made accessible for learners.

• **Evaluation**

Finally, the EFES e-learning project could be **evaluated** regarding the learners' reactions, the achievement of learning objectives, the transfer of job-related knowledge and skills, and the impact of the project on the educational community.

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