CHAPTER 4
WEB-BASED TRAINING

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Objectives of the course:
- To provide the participants with the understanding of the e-learning role in the new economics.
- To give the knowledge and the know-how to design the powerful training
- To give the skills to create the web-based training classroom or course.

Structure of the course package. Training material is presented in two forms:
- Notes of lessons in MS Word format text supplemented with MS Power Point slides.
- Whole multimedia course in HTML format. Material is divided into 7 sections. Each section consists of introduction, lectures, case studies, activities and self-assessment questions. The activities foresee participants’ active involvement. The self-assessment questions have the knowledge summarising purpose. Bibliography, wide list of Internet resources and extensive list of terms are presented in HTML format.

Keywords: web-based, computer-based, training, e-learning, planning, design, development, production, implementation, evaluation, assessment, assignment, communication, collaboration, learner, tutor, trainer, internet, HTML, WWW.
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PowerPoint Slides 1-28 for the Chapter 4

SPECIAL WEB SITE CREATED FOR WEB BASED TRAINING
WEB-BASED TRAINING

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SLIDE 2
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SLIDE 3
Content of the training material:

Section 1 aim to help learners to understand the challenge of information technology, benefits of e-learning, and the learning place in new economy.

Section 2 aims to help learners to choose the tool for development their web-based training.

Section 3 aims to give learners knowledge about powerful training, the components required for effective instructions, web-based training approaches.

Section 4 describes the design process, gives the guide for course planning and design, helps learners to analyse the user need and to design the presentation and storage structure of their own course.
Section 5 discusses the web-based course content preparation and distribution. Section 6 aims to give the knowledge about forms of assessment and to help learners to implement online assessment. Section 7 discusses possible forms of web-based course evaluation, helps to create their own evaluation questionnaires.

**Delivery method.** Intensive teaching in computer classroom supported by teaching material on CD is planned. Overall duration of the standard course delivery is 30 hours:
- 24 hours for distance learning (theory material learning, case studies, self-questions, development of web-based course-project)
- 6 hours for face-to-face events (introductory lecture, labs, on-line test).

**Schedule for the standard delivery mode:**

<table>
<thead>
<tr>
<th>No</th>
<th>Delivery event</th>
<th>Face-to-face session (h)</th>
<th>Assignment/ Self-study</th>
<th>Number of self-study (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kick-off session</td>
<td>2</td>
<td>Introductory acquaintance with trainer and learning environment. Theory sections 1-2.</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Lecture and practice</td>
<td>2</td>
<td>Theory sections 3-5. Self-questions. Case studies.</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory work</td>
<td>2</td>
<td>Theory sections 6-7. Self-questions. Case studies</td>
<td>10</td>
</tr>
</tbody>
</table>

1. E-Learning

E-learning is defined as any use of technology for learning outside the boundaries of the physical classroom The growth of the Internet is bringing online education to people in corporations, institutes of higher learning, the government and other sectors [Hall, Brandon.2000]. The challenge of technology today is capturing information and building useful and meaningful databases whose contents are retrievable when and where needed. Both information technology and telecommunications are driving the need for e-learning and at the same time creating the means to accomplish it.

**The Corporate University.** In the knowledge economy, corporate universities and learning organizations are playing mission-critical roles within the organization. While some learning organizations may take traditional classroom approaches, others are using the benefits of e-learning to meet corporate objectives. Examples of other e-learning implementations within the enterprise include using technology to train technology, new product introductions, tracking regulatory compliance, on-demand task or skill references, degree programs from online universities and IT certifications.

**Enterprise-Wide E-Learning.** Companies are creating enterprise-wide e-learning strategies now. They identify how the entire workforce can use e-learning. Strategic, enterprise-wide implementation of e-learning typically comprises one-third to one-half of the total training budget. Employees who need to learn new software solutions all at one time don't have to be dragged, group by group, into packed classrooms. Rather, they can find training on their desktops when they need it.

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**Cost and Time Savings.** According to Training Magazine companies save between 50% to 70% when they replace instructor-led training with alternative electronic delivery. Housing and travel costs account for the majority of the savings. Modular e-learning allows training to be spread out over a period of several days. This flexibility allows the student to attend to business and then learn when he/she has the time to concentrate. The company benefits as the employee keeps work on schedule, and the student benefits by being able to progress with valuable course work.

Depending on the complexity of the topic and the individual skill level, some students learn faster or slower than others. E-learning allows students to learn at their own pace. The slower student can review course material as often as necessary, redoing exercises or simulations until the information converts to knowledge. An average of 50% time savings has been found when comparing time-to-learn in a classroom versus on a computer.

The scalability of e-learning allows one course to train thousands of students, as opposed to the ratios of 1 to 20 in the more traditional classes.

Computer-based training reduces the total cost of training when compared with instructor-led training. The total cost of training includes the cost of development and the cost of delivery. Interactive training has a higher cost of development and a lower cost of delivery, while traditional training has a lower cost of development and a higher cost of delivery. The lower delivery cost for interactive training results primarily from a reduction in training time and the elimination of travel. A positive return on investment requires a training population large enough for the savings in delivery to offset the development cost.

There is very strong evidence that computer-based training results in an equal or higher quality of learning over traditional instruction. A number of scientific studies have investigated this issue. The settings for the studies have included business and industry, the military, higher education institutions and elementary schools.

### 1.1. The Learning Management System

The most important foundation for e-learning in your organization is a learning management system (LMS). A [learning management system provides the infrastructure and database](https://www.unesco.org) from which employees may quickly tap e-learning courses, registration and needs assessment, as well as receive just-in-time training.

The infrastructure for e-learning gives managers the ability to track usage and scores, enable online registration, deliver courses and update calendars as needed. Learning management systems also can incorporate e-commerce to track payments from customers. Courses can be created once, then distributed to thousands of students simultaneously using LANs, WANs or the Internet.

Training has play an integral role in overall organizational strategy. E-culture is the synergy among e-learning, knowledge management, and performance support and management practices. To implement e-learning effectively, organization has first develop or adapt a clear vision of optimising learning, knowledge and performance and how current technology can activate this vision. The vision increases company’s openness to change. **Change is the reason and the fuel for e-learning.**

Successful e-learning implementations confirm the need to combine the impact of standard enterprise-wide activities with flexible and quick local innovations and efforts. The best-practice organizations are using e-learning in all topic areas -- new product training, management development, leadership, sales, service, manufacturing.

**Your organization could get e-learning content from three sources:**
Chapter 4 WEB-BASED TRAINING

- Packaged courseware providers
- Custom developers
- Own internal development.

E-learning is not about using the latest technology to replace the classroom. Nor is it about posting content on the Web to be downloaded or read. E-learning provides a new set of tools that can add value to all of the traditional learning modes - from classroom experiences to learning from books.

As learning moves closer to the job, blended instruction addresses the need for more just-in-time and project-based learning, performance support, open and distance learning, expert assistance and a generally greater variety of events and experiences.

It is important to say, that classroom-based training will continue to play an important role for a few reasons:

1. It is the best delivery approach for certain types of high-level learning,
2. It is the way some people prefer to learn and it is still the way many trainers prefer to teach.

In the issue

- Understand the challenges of e-learning for your department.
- An e-learning implementation can be difficult. It is necessary to invest significantly in planning and strategy development. Each organization's e-learning plan is very specific to its own context.
- Use templates and "learning objects" which allow for reuse of content in various courses with the aim to save money and time.
- Interactive training has a higher cost of development and a lower cost of delivery, while traditional training has a lower cost of development and a higher cost of delivery.
- Learning portals are Web sites that create a learning community and provide access to content and learning resources.

Note: Read more about learning in new economy in case studies and Internet resources. Carry out the activity “Learning place in the new economy” described in the course HTML format.

1.2. Use of Educational Technologies

SLIDE 4

To identify appropriate use of new information technologies (IT) and clarify the kind of educational opportunities they support helps a layered approach [Recker, M. 1997]. The layered framework integrates a bottom-up view of information technology usage and a top-down view of education. The Figure1.1. in slide 4 shows the layers comprising the framework:

1. Delivery of material
2. Media
3. Computational activities within educational technologies
4. Modes of communication
5. The learning phase

Delivery of material

SLIDE 5

The delivery is the transmission of educational materials between learners, teachers and providers. The technologies supported delivery of material is: CD-ROMs, computer networking, Internet.
The most popular is Internet now. The only thing keeping the Internet from becoming the dominant technology based education delivery environment is current bandwidth and speed limitations. The access to digital libraries and information is an important potential of the Internet. But information access is only one aspect. More pertinent to education is that networking supports the formation of new learning communities. Distribute groups of students, teachers, mentors; experts can be involved in knowledge-building activities with new forms of communication and information media.

**Media**

Information technology supports these types of physical media: text, 2-D, 3-D graphics, animation, digital audio, digital video, virtual reality.

Many factors affect the learning: students' background knowledge, their motivation and interests, their learning strategies and goals, and overall learning context. Therefore designers should focus on the cognitive and learning goals of particular educational contexts and seek to support those with educationally meaningful activities. The most important form of media is dynamic interactive representations, which learners can manipulate, that support a particular activity within discipline.

**Computational Activities**

These are computational activities that support learning: simulations, games, information browsing, and design environments.

**Simulations.** Computer simulations provide environments where learners can interact in a simulated world and engage in activities otherwise not possible in the real world. For example, the haircutting simulation might enable a student to manipulate with the shapes of the coiffure, to suit it to the face. Or in astronomy simulation, the student can manipulate the force of gravitational attraction between the bodies and see the resulting effect on planets. These activities obviously can’t be performed in the real world.

**Computer games.** From the pedagogical standpoint, the challenge becomes embedding content within similarly motivating environments.

**Information browsing.** Access to information requires teachers and learners to learn new skills of finding, evaluating and filtering the huge amount of information. This skills is called information literacy.

**Design environments.** These are environments where students can design and built manipulatable artifacts. Through hands-on-design activity students train themselves in, for example, software development, testing.

Computer based learning is interactive. There is no only mouse to click or button to push. **Activities on the web must be educationally meaningful.** Inventor of the WWW, Tim Berners-Lee (1996), proposes that designers must focus on supporting “inter-creativity” in computational activities. Learning environments must support both individual and collaborative abilities to build knowledge and to create.

**Communication Modes**

**SLIDE 6**

Modes of communication are typically considered along two dimensions:

1. Location
2. Time

Putting these dimensions together we have 2x2 matrix, presented in the Table1.
Asynchronous e-learning courses sometimes not satisfy the learners. The traditional, face-to-face classroom approach allows students to ask clarifying questions, drives a portion of the curriculum via discussion, and customizes the content to their immediate needs.

The collaboration tolls support:
- Student-driven content questions responded to by tutors, mentors, or other students
- Instructor-monitored programs containing instructor feedback
- Robust, instructor-facilitated courses featuring assignments and tests via push E-mails, instructor graded tests, and post-training support

Companies are using the web to provide an environment for team exercises, sharing of best practices, and building a learning community.

**Learning Phase**

From the educational standpoint this is the most important phase. Mayes (1995) proposes that within process of learning, there are 3 stages:

1. **Conceptualisation**, occurs when students are exposed to an new topic and asked to take on new concepts
2. **Construction**, occurs when students build ideas using these new concepts
3. **Dialogue**, when students talk about, debate, critique, and reflect upon these new concept.

---

**Table 1.1. Dimensions in modes of interactions.**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Same</th>
<th>Different</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TIME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same</td>
<td><strong>Same-time/same-place.</strong> Lectures, seminars in the classrooms</td>
<td><strong>Same-time/different-place.</strong> Teachers and students are separated geographically, but are involved in activities at the same time. For example: discussions are communicated via audio conference in distance education course. Synchronous communication tools: digital video and audio-conferencing, on-line chat.</td>
</tr>
<tr>
<td>Different</td>
<td><strong>Different-time/same-place.</strong> Depository of the digital documents (hypertext, multimedia). Authors can update documents continually. Readers and authors can visit the depository at different times. Documents can serve as means for making and maintaining social groups, and as ways for coordinating social practice. The documents bring teachers, experts and students together collaboratively construct their world.</td>
<td><strong>Different-time/different-place.</strong> Asynchronous approaches to communication: e-mail, e-mailing lists, on-line bulletin boards, Internet newsgroups. This approach provides a motivating and authentic collaborative context, in which students engage in inquiry and reflection activities.</td>
</tr>
</tbody>
</table>
These stages have the different implications in terms of the kind of activities, kind of IT and communication tools appropriate to each phase.

2. Tools

2.1. To buy or to develop own classroom or course?

Building a e-learning environment is not a quick and simple process. To develop an appropriate Web-based classroom requires a number of skills, a fair amount a time and reasonable level of resources. The educators aim to use a teaching approach that is effective, efficient and enjoyable. New approaches offer possibilities to facilitate these aims.

- Organisations use their internal development groups for e-learning specific content development.
- Organisations use external resources for e-learning for the following reasons:
  1. To obtain a unique skill set
  2. Speed up the development process,
  3. Access generic content,
  4. Reduce costs.

The manager of organisation (or educator) has to compare cost and risk of these two project options.

SLIDE 7

Note for tutor: find out, have learners understanding about web-based training?

Note: Carry out the activity “To Change Training in Your Institution” described in the course HTML format. Identify factors that influence the design of your web-based classroom.

Without appropriate tools, developing and maintaining e-classroom require significant effort, time, resources and technical skills. The a tools could be researched into 2 categories:

1. Common web-publishing tools
2. Integrated distributed learning environments: Internet applications that integrate the multimedia information presentation, collaboration, and management tools of the internet into a virtual or on-line distance learning environment.

The number of systems is developed to help educators to construct and maintain the computer-based classroom. Software development companies developed integrated distributed learning environments which combine powerful Internet collaboration tools like e-mail, synchronous and asynchronous discussion, shared work spaces, Internet-based computer and video-conferencing and access to the WWW into one common easy-to-use application specifically designed for education and training delivery.

Which of these tools to use? There is no one correct answer to this question. You have to compare the features, capabilities and requirements of these tools.

Note: read about tool selection requirements in Case study in course HTML format

2.2. Viewing Tools

Viewing tools include browsers and helper applications that will assist you and your learners in getting the most satisfaction from your Web-based classroom. The two
most popular browsers are those written by Netscape (Navigator) and Microsoft (Explorer).

When a browser asks the server for a file that contains information other than HTML, it may not be able to display the contents of the file itself and will need to call another called a helper application or plug-in; it helps the browser to display the file. For example, you may need a helper application to display a video, to play a sound, or to display a word-processed file.

Many software companies provide free viewers for their document format. These viewers allow learners to get a program that will view a file created by a specific application, but do not allow them to change their contents. For instance, Adobe Acrobat allows you to see PDF file, and Microsoft viewers allow you to see files created by Excel, PowerPoint, and Word.

It is possible simply download files without calling a helper application. The usual way is to press the Shift key before clicking on a file, that allows to save the file or try clicking the right mouse button and selecting something like "Save As…”

2.3. Authoring Tools

2.3.1. Common Tools

Educator can use easy-to-use HTML editors and common web publishing tools to post class notes, assignments, case studies, graphics, video clips, simple animations, and sound clips on the Internet (or internal intranets) in support of their classroom activities.

Note for tutor: find out the following: Knowledge level of learners. How well learners can work with computer in general? Are they familiar with Web browser and authoring tool?

Text Formats and Creation Tools

The vast majority of instructional and reference information on the Internet is stored in text format. Text often shapes the content and navigational structure of instructional multimedia.

Hyper Text Mark-up Language (.HTML): The most common type of text used for education delivery is HTML. It is the native language read by Web browsers like Netscape and Internet Explorer. Its hypertext format is very useful for building in structured branching and navigational logic for educational purposes. HTML code and the navigational hyperlinks can be created using HTML editors (see Web page creation tools). Basic HTML files can also be created by using most common word processors (such as Microsoft Word) and converting the text to HTML.

Adobe Acrobat (.PDF): Creates formatted text, which retain a “published” look and feel. Requires the Adobe Acrobat development tool to prepare .pdf files and the Adobe Acrobat browser plug-in for .pdf files to be displayed by common browser.

Common Text Formats (.TXT, .DOC, .RTF): Text files created in common word processors and text editors appear regularly on educational web sites for students to download and read using standard word processors and text editors on their local computer. A simple example would be embedding a Microsoft Word document (.doc), which students download and save to their hard disk for later access.

Traditional Multimedia Tools.

All of these tools use visual programming techniques to create applications and are capable of creating similar end products. They are however, quite different from
each other at the development level. Each system has distinct development terminology, methodology and metaphors for system interfaces. They are all authoring systems designed specifically for education, training and interactive information applications. Readers who interested in detailed distinctions and comparisons of each tool are referred to the web sites for each tool's parent company: Macromedia Authorware, Allen Communications Quest, Asymetrix Toolbook & Ingenium.

Web Page Creation Tools: Microsoft FrontPage, Macromedia Dreamweaver, Adobe PageMill, Netscape Composer, HotDog Pro, HTML Assistant, HoTMetaL.

Web Page Tools with Added Instruction Templates: Macromedia Dreamweaver w/Coursebuilder, click2learn Publisher.

Additional Web Page Creation Tools


Note: use Internet resources and search to find more information about advanced tools. Find out: What graphics tools are used in your organisation? What word processors are used in your organisation?

2.4. Communication Tools

The Internet has become a place of person to person interaction. There are a number of options now available for communication and collaboration. Tools such as e-mail, discussion lists, live chat, news groups, etc. are widely used in education. The applications such as Internet phones and desktop video conferencing and new shared work space tools are moving Internet conferencing to another level.

The use of computer-mediated communication (CMC) offers a wide array of possible pedagogical approaches. The instructional model underlying these communication methods is Collaborative Learning. Communication tools are necessary for the "learner guidance" and "practice/feedback" elements of effective instruction. Conferencing capabilities of the web are among the most active areas of development and educators continue are strong users. The use of CMC will be more successful if educator will be able to choose the most appropriate tool for training purposes.

Note: Read about conferencing standards and tools in Course HTML format.

2.5. Integrated Distributed Learning Environments

Integrated distributed learning environments (IDLE’s) are newer tools. They are based more on a collaborative learning instructional paradigm than the self-instructional paradigm of the multimedia authoring system. IDLEs make extensive use of the asynchronous and synchronous collaborative tools available via the internet. Because they have been built around the bandwidth limitations of the internet, they do not have the same sophistication of authoring logic built into them as traditional authoring tools. IDLE’s are not multimedia development environments. Essentially the media creation tools and authoring tools of the web are the authoring tools of Integrated Distributed Learning Environments (IDLE’s).

IDLE’s are client/server applications using standard internet protocols. Most have proprietary client side applications, but almost all now have enabled their software to be accessible via common Web browsers like Netscape Navigator and Microsoft Internet Explorer. The advantage of Web browsers as the interface for distributed
Learning environments is that they are popular, easy-to-use, require no additional proprietary software on a users computer and provide cross platform access.

**Educational Uses:** Integrated distributed learning environments were designed specifically for educational application. They have taken the stand alone synchronous and asynchronous collaboration capabilities of the internet and integrated them within a tool that mirrors the instructional process. These tools have primarily been used for the delivery of entire courses to remote learners (distance education), but they are being used increasingly as supplements to classroom-based education as well.

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**3. Powerful Training**

**SLIDE 8**

There are conceptual and practical differences between education and training.

**Education** is a process of building a knowledge base and the skills for further developing that knowledge base. Education often focuses on conceptual and historical knowledge.

**Training** focuses more on building the specific areas of knowledge, skills, or attitudes that directly influence a person's ability to perform a job, execute the task, or solve a problem.

Education focuses on **learning about**; training focuses on **learning how**.

### 3.1. Features of Powerful Training

Powerful training is: effective, efficient, and engaging.

**Effective** training accomplishes specific objectives relevant to participants' success.

Training is effective if it accomplishes its objectives and if those objectives are relevant to the participants' needs. Effective training provides a foundation that enables participants to perform the behaviours described in the objectives of the training, which in turn should relate directly to desired performance on the job or the life.

**Efficient** training meets those objectives without wasting time and energy.

Efficient training makes good use of participants' time and energies. The content and learning activities make the best use of time by directly supporting the learning objectives. The content and activities are as straightforward and uncomplicated as possible, so that the learner's energy is not drained unnecessarily.

**Engaging** training attracts and involves learners and incorporates their experience into the learning.

**Features of the powerful training [Milano, Michael, 1998]:**

- Is driven by objectives
• Focuses on application
• Fits the characteristics of the learners
• Balances the diverse realities of multiple learners
• Places minimum reliance on the lecture-process approach
• Avoids having to correct for the "right" response
• Includes appropriate evaluation points.

There is certain design process model to be followed in order to produce web-based training. We have detailed this process on the following pages.

3.2. Instructional Strategies

Web-based training could be defined as the use of the Internet for the delivery of designed, structured learning experiences. Like all structured learning, Web-based training is always the result of an instructional development process.

Instructional strategies are the methods used to present instructional sequences at the course level, unit level and lesson level. There are a number of guiding theories of instruction from behavioural, cognitive and constructivist perspectives [Nipper, Soren, 1999]. The most common approaches used for computer and Internet-based education is the cognitive approaches. Four components required for effective instruction:

1. Information presentation
2. Learner Guidance
3. Practice with Feedback
4. Learning Assessment

Whether at the course, unit, or lesson level, these four functions should be fulfilled for effective instruction to take place. Internet-based media can be introduced to support any or all of these elements of effective instruction. Consider these examples of Internet usage for education delivery:

Example 1: A web site is developed as information “container” to supplement classroom education with text (course notes, assignments, pointers to external web sites), and other types of media (graphics, video clips etc.).

This is the most common use of the web to support education and it supports only the information presentation function of effective instruction. This approach does not represent self-paced instruction or distance education but a replacement for the “course syllabus” and elements of course textbooks and references. The functions of learner guidance, practice and feedback, and student assessment are left to the classroom.

Example 2: A web site is created to supplement classroom education similar to example 1, but a news group and e-mail discussion list is established for the instructor to communicate asynchronously (not in real time) with students to help guide their understanding of content and exercises. The instructor has also developed an on-line student assessment application, which allows students to take some tests on-line and submit them electronically to the instructor.

In this example, the instructor has shifted more of the functions of effective instruction to Internet support including elements of learner guidance and learner assessment. The primary delivery vehicle is still the classroom however.
**Example 3:** An instructor with the support of an instructional designer and media developers prepares a series of Internet-based self-instructional tutorials or modules which present important concepts using simple simulations and video clips, provides interactive sequences of examples and non-examples to guide students through tough concepts, includes practice questions with computer generated corrective feedback, and finally presents on-line tests on the module concepts which are tracked and reported back to the instructor via an Internet application.

In this example, all four elements of effective learning have been shifted to the Internet environment. The modules are entirely self-instructional and no collaborative Internet tools like e-mail have been included. This approach is derived from the tradition of self-instructional, individualized computer-based training. Classroom sessions may still take place for other segments of the course.

**Example 4:** An instructor, with the support of an instructional designer and media developer prepares an Internet-based “distance education” course for remote students. Information is presented primarily using WWW pages, embedded media files like graphics, simple animations, video and sound clips, and a supporting textbook. Collaborative tools like e-mail, discussion lists, live chat and a shared workspace are used for learner guidance, dialogue, and practice activities. As an experiment, the instructor also embedded a few multi-media self-instructional tutorials with computer-generated practice and feedback as exercises within some course units. Finally, all testing and student assessment were completed using various Internet tools. An Internet application was used to track student activity and assessment.

In this example, the course was delivered “virtually” via the Internet. This approach is derived from the tradition of classroom, collaborative education. The electronic environment enhances the classroom model in a virtual space. In this context it is easy to recognize that many software tools could be used to support development and delivery of Web-based training.

### 3.3. Web-based Training Approaches

**Note:** use the following list in the your course design step2.

The list of possible approaches (Web-based course components):

1. Presentations by tutors (mini-lectures)
2. Online publication details (copyright acknowledgements)
3. Teaching and learning model (role of discussion, role of collaboration),
4. Social communication (chat room or club)
5. Technical instructions (conferencing software details, technical requirements and advice)
6. Outline of course content (description, topics)
7. Online writing support (netiquette, citation, language/grammar tools)
8. Announcements (administrative news, new content)
9. Private communication (between students, tutor- student, between tutors)
10. Learning tasks and activities (individual tasks, collaborative tasks)
11. Assessed assignments (grading criteria, assignment submission)
12. Resource materials and documents (local and external sites, archived learners projects, recommended reading, online glossaries)
13. Materials on other media (CD ROM, print, video, audio)
14. FAQ
15. Public discussions (tutor or student led, course specific or related, forum or e-mail, current or archived)
16. Course evaluation (online questionnaire, e-mail feedback)
17. Timing (course schedule, interactive course map, assignments due to dates, scheduled online events)
18. Simulation
19. Tests

3.4. Web-Based Instruction Structures

To set up your Web-based training system to facilitate constructivist learning, you should ensure it contains the following elements:

- A section that will gain students’ attention.
- A summary that places the lesson in the context of the information students has already learned.
- Consistent presentation style and structure. The presentation should be clear and follow a style that is consistent with the material, divided into manageable segments.
- Group work. Wherever possible, give students a chance and the encouragement to cooperate.
- Embedded questions. Create links to relevant pages using statements that include answers to questions students may want answered.
- Practice. Allow students to practice the knowledge they have learned.
- Feedback. Feedback is needed to identify to students and the educator problems students are having in understanding.
- Review. Reviewing the lesson is important to consolidate students’ knowledge and to outline a context for the subject.
- Post knowledge. Encourage students to write up what they learned in the lesson in their own words or to write their own tutorial
- Learning guidance. You can provide students with a general guide.

Possible structures of tutorials are the following:

A structured tutorial simply presents a lesson, as a hierarchy of topics, one following the other, like a lecture or a textbook. Learners are presented with a list of possible topics, some of which have subtopics. The page also includes a navigation bar that students can use to move from one level of topic page to another, backward and forward. Each page in the tutorial has a navigation bar.

The unstructured tutorial is as an encyclopaedia. Look up a word in an encyclopaedia (for example, http://www.eb.com Britannica online) and it will provide a list of cross-references you can then proceed to look up. Such a tutorial structure is ideal for testing whether students understand the knowledge structure of a topic. In the topic's description, words and images act as links to other pages in the tutorial that explain the topic related to the word and provide yet more links.
A presentation structure is designed to provide a method of presenting information and is usually delivered in a linear fashion, such as lectures. You use a presentation structure on your Web-based system: a lecture, a slide show, or a guided tour of a topic.

**Note:** look at the structure of this material MS Power Point presentation. It has the linear fashion

An adaptive tutorial is one that picks the material to display based on information about the students.

A supervised tutorial is one students undertake with the help of a tutor with whom they are in communication.

A knowledge driven tutorial is one that operates by asking students a question at the end of the presentation of a topic. Selecting the correct answer will bring students to the next page of the tutorial.

A troubleshooting guide usually consists of set questions representing common problem and actions to perform in response to those questions. For example, car manual, which takes the form of a list of questions and procedures. A troubleshooting guide is ideal for hypertext implementation because trainer could provide links to relevant pages to match the answers to the questions.

Simulations give the possibility to interact with something. It could be simple picture or video loading or complicated simulations or laboratories experiments using languages like Java, Visual Basic. A simulation should be relevant to the topic are learned. It helps learners build mental model of the process.

**Note:** Analyse the Example of Simulation placed in the course HTML format.

A reference guide is simple list of terms learners may find useful. A reference guide usually consists of menu and terms. The glossary HTML page could be created with frames or without frames.

**Note:** Look at the glossary HTML page of this chapter 4. **Carry out** the activities described in the course HTML format: “The identification of elements of materials design”, “Web-based course planning”

### 4. The Design Process

**SLIDE 11**

Web-based education could be defined as the use of the Internet for the delivery of designed, structured learning experiences. Like all structured learning, Web-based education is always the result of an instructional development process. Standard phases of development process are described in the Table 4.1.

In the design phase, decisions are typically made regarding the instructional strategies and supporting media, which will be used to meet, defined learning objectives. A decision to use the Internet or World Wide Web as a delivery vehicle does not immediately define the types of authoring and development tools that will be used. That decision depends on what instructional strategies the Internet will be used to support, in what capacity the Internet will be used to deliver those instructional strategies, what specific media might be embedded within an Internet environment to support those strategies, and the technical and organizational limitations of the instructors, designers and students.
Table 4.1 The Design Process for Web-based learning

<table>
<thead>
<tr>
<th>Phase</th>
<th>Typical Activity</th>
<th>Product</th>
</tr>
</thead>
</table>
| Analysis               | • Project plan  
• Needs assessment  
• Audience analysis  
• Content/task analysis  
• Technical analysis and authoring/media tools selection  
• Set learning goals and structure | Analysis report |
| Design                 | • Learning objectives  
• Instructional strategies and lesson designs  
• Interaction design and media treatments  
• Evaluation design | • Design document with paper or electronic prototypes |
| Production and Pilot testing | • Media production/sourcing  
• Programming/coding  
• Authoring and integration of media elements  
• Pilot testing (field trials) and revision as needed | • Tested courseware ready for implementation |
| Implementation         | • Distribution of course  
• Reporting and tracking | Implemented course  
Student learning |
| Evaluation             | • Learning and effectiveness evaluations | • Evaluation report and recommendations |

Planning and design are the first steps in implementing your Web-based classroom. Planning helps you decide exactly what you want to do with your Web-based classroom and how you will achieve it. The design of your Web-based classroom helps identify its structure and appearance. This chapter introduces a simple five-step process that can help you plan and design your Web-based classroom.

4.1. Analysis

For most people, the primary purpose of building a Web-based classroom is to improve the experience of the students and teachers of a class [McCormack, Colin and Jones, David, 1998].

Step 1: Develop a List of Educational Goals

Inputs: An analysis of learners.

Output: A list of educational goals you want to achieve. Write down answers for each of the following questions:

---

What are the problems with your learners? What are the factors that waste time make it difficult for the learners?

What are the advantages or positive aspects of your learners? What do the participants most enjoy? What aspects differentiate your class from other classes?

What would you most like to do with the learners? Most educators have plans that they would love to implement but can't due to several factors. The Web-based classroom and the available tools might make them possible.

Develop a list of goals. Take your answers for the above questions and develop a list of educational goals that will help you address the problems, retain the positives, and achieve your aims. Not worry about practical implementation issues in this step.

Step 2: Identify Implementation Methods

Inputs: A list of educational goals you want to achieve and knowledge of what can be presented in a web-based classroom.

Outputs: List of possible non-Web based methods for achieving these goals. List of possible Web-based methods.

Use a mixture of traditional and Web-based approaches. Learners have different learning styles, time constraints, abilities, and learning environments. It is a good idea to use multiple approaches to achieve the one goal. Don't attempt to use complicated technical or educational solutions, nothing discourages students more than technology that fails or doesn't provide significant advantages.

Step 3: Prioritise Approaches

Inputs: The output of Step 2. One blank piece of paper for each approach identified in Step 2.

Outputs: A prioritised list of approaches.

In most cases, you will not have the time or resources to implement all of the approaches the previous step identified. It is therefore necessary to rank each approach. The idea is that the best approaches are relatively inexpensive in terms of time and resources to implement and provide significant benefit to both staff and students.

Note: Carry out the activities described in the course HTML format:
“User Needs Questionnaire Development”, “User needs analysis”.

4.2. Designing the Structure

Most Web-based classrooms evolve to provide access to a large amount of information, tasks, and resources. Any large collection of information must be structured in a logical and familiar manner. If it is not, the users of that information will not be able to perform the necessary tasks or access the required information.

SLIDE 12

A Web site is actually a combination of two structures: the presentation structure and the storage structure. These structures can be exactly the same, completely different, or any combination in between. The greater the similarity between the two structures, the easier it is to maintain the Web site. The presentation structure is the mental model of the Web-based classroom's structure formed by visitors as they browse through the pages of the site. The storage structure is the hierarchy of files and directories (called folders) used on the Web server to store the classroom's Web
Chapter 4

WEB-BASED TRAINING

pages and other data. Figure 4. 1 in slide 12 demonstrates the relationship between the presentation and storage structures.

Note: Look at the example of Web-based classroom in the case study in course HTML format.

4.2.1. The Presentation Structure

SLIDE 13

The presentation structure defines how a learner can access and travel in the Web-based classroom. The quality of the presentation structure will influence whether or not visitors can find what they are looking for.

There are three common types of presentation structure: hierarchical, sequential, and hypermedia. Each type of structure has its advantages and problems. Which will you use depend on the purpose of the pages you are designing and the tasks people want to do with those pages.

The Hierarchical Structure. Much of the information uses a hierarchical structure. A hierarchical structure has a group of elements at one level, each of which can lead to other groups of elements. (Figure 4.2. in slide 13). The presented example of the hierarchical structure is a standard model of the traditional classroom.

Sequential Presentation Structure. A number of tasks performed in a Web-based classroom suit a more sequential presentation structure. Some examples include pages in a study guide or online text and the slides from an online lecture.

As its name suggests, the sequential presentation structure makes it possible to move through a number of pages, one after the other. This presentation structure closely simulates the operation of a book and is familiar to most people.

Note: The structure of this learning material is sequential.

Hypermedia Presentation Structure. The advantage of this structure is that it allows more freedom to visitors so they can discover their own path through the information and make connections that make sense to them. The downside of the hypermedia presentation structure is that visitors can forget where they are and get "lost in hyperspace." This is a problem that you can combat with appropriate structure and a page layout that always provides hints to visitors as to their current location.

The relationship between the presentation structures need not be an exclusive one. One set of pages can actually support multiple presentation structures.

Note: Analyse the case study Structure of Learning Materials in course HTML format.

4.2.2. The Storage Structure

SLIDE 14

All of the HTML pages, images, sounds, movies, and any other data that you distribute via your Web-based classroom must be stored in files on the hard-drive of the computer that acts as the Web server. The storage structure of your Web-based classroom is the structure formed by this collection of files and directories.

In most cases, almost no restrictions are placed on the organization of the storage structure. One requirement is to place all the HTML pages, sound files, and other data for a Web-based classroom into one directory. Although this is possible and can be quite simple with a small collection of data, it can make maintenance quite difficult.
as the number of files in a Web-based classroom grows. Maintenance can be considerably easier if directories are used to separate and organize files hierarchically into sections.

It is not necessary for the storage and presentation structures of a Web site to be similar, but it can make maintenance easier if there is some correlation (Figure 4.3 in slide 14).

Note: Read guidelines for structure design in course HTML format.

SLIDE 15
A well-designed appearance will make your site easier to navigate and will motivate and attract learners.

Step 4: Structure Design
Inputs: The output of Step 3. A prioritised list of approaches.
Outputs: A presentation and storage structure for your site.

Develop a list of tasks available from your Web-based classroom.

Group the tasks into related collections. Give the name to collections. These names later will be used as either titles for Web pages or as the names of directories. Organize collections into a sensible hierarchy.

Figure 4.4 in slide 15 shows two different structures for the same amount information. The narrow but deep structure means that users will have follow many links to get the information. The deep structure complicates navigation, but is useful for information administration. Too broad a structure means that a page can become cluttered with a large number of links.

Record the collections and structure. For each collection record the names, the tasks within each collection, and the hierarchy. Diagrams like those in Figure 4.3 may be useful in this step.

Develop the storage and presentation structure. A simple approach to this is that each separate collection has its own directory; each task with a collection name becomes a Web page that is the default page within its directory (for instance, index.html), and each task within a collection has its own directory and becomes the default page for that directory. This approach has the advantage that it is quite simple and straightforward to develop, and the resulting presentation and storage structures are very similar. However, it can result in quite long URLs.

Note: Read about limitations of the technology and general considerations in the course HTML format and [McCormack, Collin and Jones, David, 1998]. Carry out the activities described in the course HTML format: “Design of presentation and storage structure”

4.3. The Layout
The layout of a page deals with how its contents are organized.

Page Components and Templates Using a page template for the Web-based classroom is one approach for creating a consistent appearance. A page template is a skeleton Web page that contains most of the structure and components that form the presentation you have designed. The idea is that each new page for your Web-based classroom is created by taking an empty template and providing the content for the new page. Many modern Web publishing tools support the concept of page templates; some even supply a collection of example templates you can modify and use.
The common approach with page templates is to divide a page into a number of separate components. Three standard high-level components of a Web page are the header, the body and the footer.

Creating a Look and Feel. Creating an attractive, usable, and consistent appearance requires considerable time and some artistic ability, especially if you start from scratch. The following suggestions may help you in developing a look and feel:

Institutional design. Many institutions already have standard templates and icons that can be used in Web pages.

Existing templates. Many modern Web publishing tools provide page templates that can be adapted for your use.

Outsource. Hire someone to do the design for you.

Step 5: Designing a Page Layout

**Inputs:** The output of Step 4, a list of the pages and the content likely to be used in the Web-based classroom.

**Outputs:** A collection of page layout templates for the pages in your Web-based classroom

SLIDE 16

Identify all the page types. Your Web-based classroom will contain a number of page types; develop a list of them.

Identify and group the page elements each page type requires. Different page types will require different page elements. For example, a page from a study guide may need navigation links to the next page, previous page, glossary, and index.

Identify the feel or theme you want for your Web-based classroom. The feel or theme for your Web-based classroom can range from something as simple as “everything should be blue” to a full-fledged metaphor that extends through every page in your site.

Combine the elements and the theme. Where will the navigation bars go? Where will the links to the home page go? Using the identified theme, design the icons, colour and layout of these elements to fit the theme.

Produce page templates. Time to implement your paper-based prototypes. Write the HTML and create the graphics necessary to implement your design.

Final testing. Test the implementation of your design under various situations, including different connection speeds, resolutions, colour depths, and browsers. Testing should include using automated validation tools such as Doctor HTML and Bobby.

Note: Use Internet resources of this chapter to find useful HTML validator

5. Production

You can use a straightforward text editor (you simply need to include the proper HTML tags) or WYSIWYG editors (What You See Is What You Get) to write HTML pages. Useful tools were discussed in the Section 2.

If you have material in an existing file format, you may be able to find a utility or an add-on for the program that created the file in order to convert the material into HTML.
5.1. **Content Preparation**

5.1.1. **Using multimedia on the Web**

Multimedia consists of pictures, sounds, and video. In Chapter 6 of this material you can learn the various multimedia elements that you can incorporate into your Web pages.

5.1.1.1. **Using pictures**

You can include inline images within your Web page by writing the following code:

```html
<img src = "file.gif">
```

where file.gif is the name of the image. The picture is automatically loaded and displayed in the browser. If you do not want to have a picture loaded as part of your HTML page, you can provide a proper link to a picture via the following code:

```html
<a href="file.gif"> Link to picture, 150k</a>
```

This statement provides a link to a picture called file.gif. When a visitor clicks on the link, the picture will load in the browser window.

5.1.1.2. **Using Sound**

To include sound in your Web page, simply supply a link such as the following to a sound Laugh file:

```html
<a href="je.wav"> Laugh </a>
```

You can also place a picture before the link: (30K, WAV). When a student clicks on a link to a sound file, the browser downloads and plays it. If a browser cannot find an application to play the file, it will ask the browser's user to find one for it.

**Sound File Format and Size.** The big problem with sound files is their size, which is usually related to its quality. If you do not adjust the quality of the sound sample when you are recording or storing it, a few seconds of sound will require many hundreds of thousands of kilobytes to store (and many seconds to transmit). That is why you should use them only when it is necessary for understanding. Two factors affect the size of a sound file: the sampling rate and the resolution. The sampling rate is the number of times per second that the sound being recorded is stored. Sound resolution refers to the range of the sound in terms of high and low notes. Most sound files are set at mono, 8 bit, with a 22 KHz sampling rate. These settings represent the best compromise between quality and size for most people.

**Recording Sound.** The One way is to record sound from a CD. Audio CD-playing utility will usually allow you to record some of the audio sound from CD and store it in a sound file. You can then convert this sound into a form that a browser will be able to handle. To record sound using a good-quality microphone, you need a computer capable of recording sound (most computers equipped with a sound card have a socket for a microphone).

5.1.1.3. **Using Video**

Video is useful for detailed demonstrations or experiments and to show real-life situations or examples. Like sound, video clips can be created from existing videotapes or recorded live.
You can include a video clip in a Web page by supplying a link to it, like this:
<a href="mig29.avi">Download video</a>

The students' browsers should be configured to run a helper application that will allow them to play the video as they did a sound clip. Again, you can include an icon that indicates the Web page visitor is about to download a video clip.

The problem with including video in your Web page is that video files consume a lot of disk space, so if an animation or a series of photos will do the job, use those instead.

5.1.1.4. Creating a Video File

You need to obtain a video-digitising board to translate the signals from your video equipment into a form the computer can store. You also need a video camera or a VCR to send the picture to your video-digitising board. It is usually advisable to have a large, fast hard disk to be able to cope with a flood of information from the video digitising board. Some digital cameras not only take digital snapshots, but also allow you to take multiple snapshots and put them together to form a movie.

5.1.1.5. Animation

Animation involves creating or obtaining pictures and putting them together one after another to create the illusion of movement. You can draw the pictures using any drawing package, but there are a number of methods for putting them together for display in a Web browser.

The most popular way to animate pictures is client-side animation using the GIF89a graphic file format. The GIF89a format allows you to put pictures inside one GIF file together with control instructions that indicate how long each picture is to be displayed, whether to loop the animation, and so on. With this method, you do not need special browser helpers or plug-ins to display the animation in your browser window, but you will need special software to put the images together into one GIF file. You can also use utilities to convert video files to animated GIFs.

Another alternative is to use a JavaScript utility for presenting a video-style interface in which the video is composed of a collection of individual GIF pictures.

5.1.1.6. Virtual Reality

Virtual reality is the creation of a reasonable perception of reality using electronic means. You can use virtual reality to construct a 3D display of buildings, environments, or objects in your browser or a helper application. The most common way of employing virtual reality on the Web is via Virtual Reality Modelling Language, or VRML. VRML allows you to write a description of a "world," the objects it contains, what they look like, and so on. Your students can download this description into a browser that will display the world you've created. Students can navigate through this world using various movement options, such as forward, back, up, and down.

Macromedia Flash offers exciting features for creating impressive, lush interactive web sites. The playback features include MP3 streaming audio, text fields for placing user-editable text in a movie, and enhancements to Flash actions that let you create sophisticated games, forms, and surveys. The authoring features include a streamlined publishing process, a redesigned Library window, a variety of new inspectors, and an enhanced graphical interface.

Note: use Internet resources to see examples of virtual reality. Play example of Macromedia Flash.
5.2. Content Distribution

How can you distribute the information you have prepared?

You can distribute the material using an HTTP server or on disk, CD-ROM.

If you plan to use a server, you may need to set it up yourself. The server must have sufficient disk space to store your course and have access to a network with a large enough capacity to handle the files related to your course or courses. You must ensure that you have sufficient access to the server to perform updates to the material whenever you want.

Another possibility is to distribute the material in archive form or on floppy disk or CD-ROM. This way, known as offline use, students can access the material while not connected to a network. If you do not intend using a server, all your links should be implicit ones (do not mention the server's name or any absolute paths). This enables you to use your HTML files with their associated links in any subdirectory and on any medium.

Two common forms of disk are used for offline viewing: a CD-ROM and a floppy disk. Each has different formats. CD-ROMs are less prone to damage during transit and they can store about 650MB of information per disk, whereas the average floppy can store only 1.44MB. On the other side, floppy disks are extremely cheap. Note that not all computers have built-in CD-ROM drives.

Another distribution method to enable local access is to place all your files in one large archive file and make this available for downloading. An archiving program allows you to place a large number of files into one file, which makes them easier to transport. A number of utilities can create executable archive files that will unpack themselves once run, making it easier for your users. However, this means that they must all have a platform similar to the one on which you created the self-extracting file. However, this approach has a number of disadvantages: students need a big enough storage area on disk; the download time could be long.

The best would be if you could combine pages on your server with information that students have on CD-ROM or their local disk drives. This hybrid system enables you to distribute core material and use it in pages on the server, which you are free to change at any time.

Note: Analyse the Web-based course material template in course HTML format.
Carry out the activity described in the course HTML format:
“Creation of the course home page”

6. Online Learner Assessment

The Assessment Technique. The assessment is an important aspect of every course. It shows how well students are doing or demonstrates to the learners themselves their progress. The assessment has two main purposes: to evaluate students' progress and to help students learn.

The most popular methods of assessing learners are following:

1. The test. The test is usually a short exercise that consists of questions students can answer simply- by choosing an option, filling in a word, creating an object- e.g. picture. Computer can mark a test automatically.
2. The essay. A longer exercise involves the use of knowledge in the production of an explanation, an essay, or peace of work. Computer cannot usually mark essay.
3. The evaluation. An evaluation involves an assessment of student's progress through observation, conversation, or feedback.
6.1. Forms of Assessment

6.1.1. The Test

Online test is a form, displayed in a browser window, with questions and spaces where learners place their answers. Learners press a button that results in correction of their answers. The results are then displayed to the student.

An example of the test is shown in the Figure 6.1 in slide 17.

Either a program on the server or a JavaScript-based mechanism contained in the HTML page could do marking.

6.1.2. Assignments

Tests are useful only for determining a limited set of learning accomplishments, for example, set of facts. Assignment form of assessment allows learners to demonstrate a competence in the topic and its applications. Students could submit assignments' materials in the following forms: of a word-processed document, a spreadsheet file, and computer programs. They could submit assessment material using Internet tools: e-mail, FTP, Web page to upload material onto the server.

Assignments are the essay questions of two types:

- **Extended response questions.** They can be used as a very general answer, to allowing the students to present their own opinion. For example, "Explain the circumstances under which a museum should not computerize".

- **Restricted response questions.** They can be used if teacher want to get more detailed answer. For example, "Give 10 reasons a museum should not computerize".

6.1.3. Evaluations

An evaluation involves an observation or reporting of students' activities or abilities (problem solving, work habits, social attitudes). Evaluation methods are the following:

- **One-to-one evaluation.** Trainer communicates with learner using online communication tolls.
- **Observed behaviour.** Learners are observed during discussion group and their ability noted.
- **Self-review.** Learners evaluate themselves using their journals.
- **Access records.** Trainer analyses the number and nature of learner's accesses to the course material stored in the server.

6.2. Assessment Design

The steps of assessment construction and use are following:

1. Determine the purpose of the assessment. What is a learning aim? Is your intention to evaluate students or teach them?
2. Develop the assessment definition (specification). Produce a list of the material learners should cover for this assessment. Determine the types of questions. Decide what you want to find out from your questions.

3. Select appropriate test items. Implement the test. Use appropriate tool. The possible list of tool services is presented in the Figure 6.3 in slide 19. Assemble the assessment. Create signposts to the assessment. Inform learners about it.

4. Administer the assessment. Set a time period for carrying out the test and collect the results.

5. Analyse the results. Draw conclusions from the results of the test.

6. Use the results. Send messages to students. Provide extra material.

6.3. Implementing a Test

SLIDE 21

6.3.1. Methods of implementation

Two methods of automatically marking a test could be used:

- Use CGI program on the server. Figure 6.4. in slide 21 shows the operational structure of browser server interaction.
- Use test in JavaScript on learner’s computer.

Problems with the CGI-based test are the following:

- Because the program is stored on the server, the server must be able to execute the program.
- The learner must have access to the server.
- The tests created on one operating system cannot easily be moved to other platform.

The problems with the JavaScript-based tests are the following:

- It is not possible to keep a record of the results of JavaScript-based tests, if the learner uses his own computer for testing. The record could be kept if the tests are stored on the server.
- The answers are included with the JavaScript program. If students know how to display the source of HTML page, students can view answers. Encrypting or encoding the answers could solve this problem.

6.3.2. Test design

Test questions may be created as combinations of the following parts: a piece of text, a link to an image, an inline image, a link to a sound file, a link to a video file, a link to an animated image.

Try to formulate questions in a simple form as possible. Test becomes meaningless if learners cannot understand the questions. Tests and assessments consist of several types of items depending on the type of the answers: one from many, several from many, answer as text-key, answer as text.

Enhanced item - answer as text-key, answer as text. An enhanced item asks a student to type he/she response either as key-text or as free-style text into a text box. Key-text response to an enhanced item is scored as either correct or incorrect. A correct answer receives full credit of 100% and an incorrect answer receives a score of 0%.
Fill in your answer and then click on Submit.

1. What is a capital of the France?

Submit Reset

Figure 6.5. An example of the text answer.

**Multiple-choice item - one from many.** A multiple-choice item presents a problem and asks a student to select the right answer (single response) to the given item from a list of possible answers. For a multiple-choice item, student’s response is scored as either correct or incorrect. A correct answer receives a score of 100 percent and an incorrect answer receives a score of 0 percent. If learner must show his possibility to make decision and select one "right" answer, the radio buttons are used. It is possible to insert pictures, photos, and video in the question as in example in Figure 6.6.

Enter the answer by clicking the option button corresponding your selection.

2. What is this?

- Telephone
- Thermometer
- Mouse

Submit Reset

Figure 6.6 An example of the one right option.

**Multiple-choice item - “several from many”.** A multiple-choice item presents a problem and asks a student to select the best set of answers to the given item from a list of possible answers. In the case of a multiple-choice, multiple-response item (for which the correct response consists of more than one answer), the item is scored as being correct (100 percent) only if all the correct answers are selected. Partial credit (e.g. 60 percent, 80 percent) is given for a response that does not include all the correct answers for the item. In the Figure 7.6 there are choices for 4 answers. Three of answers are "correct: first, second, fourth. The mark of learner would be calculated according the rules of this test tool (value of the learners choice).

Enter the answers by clicking the check boxes corresponding your selection. Multi choice answer.

3. What towns are in Italy?

- Siena
- Firence
- Paris
- Rome

Submit Reset

Figure 6.7 An example of the multiple - choice answer.
Enter the answers by clicking the check boxes corresponding your selection. Multi choice answer.

4. Select as much as possible one style clips.

Figure 6.8 An example of the multiple-choice answer.

6.4. Tools

There are a number of tools for creating online tests. Usually test creators—Test tools are the part of the Web classroom builders. Trainers may create a new test or edit existing tests (assessments) related to the course material, review and evaluate the students’ answers, form a testing schedule etc. with the test tool. Test creator is a program written in Perl or C++, or Java language for creating and editing tests. Another program called Test marker would be used to mark test. Test creator is placed in the cgi-bin directory of a Web server and is called using trainer’s interface or URL.

SLIDE 22
The example of Test tool trainer’s interface is shown in Figure 6.9 in SLIDE 22.

SLIDE 23
Trainer writes questions and possible answers in the forms as shown in the Figure 6.10 in SLIDE 23. The text of a question can contain HTML tags that allow links to be placed in questions or inline images to be loaded as a part of the question.

SLIDE 24, SLIDE 25, SLIDE 26
Tutors—trainers usually use course administration tool, assessment management, and student tracking tools for class management.

Note: The HTML example of the test is presented in the case study.

6.5. Test Creation

6.5.1. Hidden Answers (self-tests)

One of the simplest methods of presenting self-test is to hide the answer and tell students how to reveal the answer, when they want to see it.

One of the possibilities is use a hyperlink to the answer. Self-tests of this learning material are created in this way. You see the question and , if you click the word /Answer/, the answer reveals. To create this link, teacher declares an anchor for answer just before the answer in the learning material, and the link for the answers points to that answer.

Another possibility is to type answer at the same place of the page but hide the link to it. Anytime learners click on the answer link, the colour of the link will change, thereby revealing it. For example:
What tools are appropriate for construction and maintaining of Web-based classrooms?
(Click the underneath this line to reveal the answer).

Hiding the links is done by changing the background colour of the links to be the same as the background colour of the page, thus making the link "invisible". At the page start the declaration of BODY background colour white was placed. The answer was defined as the following link:

```html
<A NAME="ans1"> </A> <A HREF="#ans1"> Tools for Web-based classrooms development are: WebCT, TopClass, Webfuse, Luvit. </A>
```

When learner clicked on the link, this link became "visited" and link changed colour, in our case to black.

6.5.2. Simple Test

The following is a description of the test shown in the Figure 6.8. You can create the test as a HTML form using visual editor, for example, Microsoft FrontPage, Netscape Composer. The form consists of two parts: interface and handler program (script). You can use a form handler to process the results of your forms, or use a custom script, or send data results by e-mail.

![Simple test example](image)

Figure 6.8 Simple test example.
This test HTML text is presented in the Case study in course HTML format.

If you use FrontPage you can create a form anywhere on a page outside of an existing form. Microsoft FrontPage inserts a rectangular area outlined with a dashed line where you can add text and form fields, such as text boxes, radio buttons, check boxes, drop-down menus, and push buttons. A submit button and a reset button are also included in the form. Learners click the submit button after filling out a test-form, and the information they enter is sent to the form handler you set up.

**Note:** In order to use this feature, the Microsoft FrontPage Server Extensions must be installed on your Web server and they must be correctly configured for e-mail.

Send form results in an e-mail message. If you haven't the script for results processing, you can send test (form) results in an e-mail message. Each time a site learner submits a form, a message containing the results of the form is sent to the e-mail address you specify.

7. Evaluation

Evaluation is an important part of any development and implementation process and Web-based education system [Robertson, Bernadette, 1994]. It enables developers to produce the best possible system. The concept of evaluation is usually taken to mean the estimation of the value of a system. However evaluation should not be viewed simply as a process of measurement and calculation but a method of learning about your system, your students and yourself. In other words evaluation should contribute to a system's use and development.

Possible forms of an evaluation are the following:
- An answer to a specific question: e.g. how do the students feel about the system?
- A development plan: e.g. which of the following facilities should next be implemented.

The aspects of evaluating your Web-based education system and its users will be discussed here. Some guidelines on evaluations will be suggested.

7.1. Types of Evaluation

You can evaluate the system components: tests, communication facilities, or do a complete evaluation of your system. The different types of evaluation attempt to ascertain different things:

**The platform and software used:** To check that the platform and software that you are using is up to the task.

**The effectiveness** of the system: Is the system solving the problems it was meant to address?

**The impact** of a system on educators and students: How are educators and students reacting to the system. Does it make a difference to the students’ results, attitude, motivation or development?

**The efficiency** of the system: Ease of maintenance, ease of navigation, reliability of the system.

**The usability** of the system: is the system easy to use from your point of view and the students point of view, i.e. can material be added, located, read, etc. without problems.
The quality of the system: The quality of the content of the system in terms of readability and educational value, the quality and clarity of the presentation.

Depending on the purpose of the evaluation you may need different people to carry it out. For example, if the developer of a Web-based course does their own evaluation and reports astounding success then people don't believe the results.

A questionnaire or a survey is a rapid means of collecting opinion on a wide variety of questions. Most educators will be familiar with end of term student questionnaires where students will rate the course they have attended. The questionnaires we will use will represent these in that the method of reply is to simply select a point on a scale. To encourage honest replies questionnaires are usually anonymous.

Note: an example of questionnaire is shown in Case study in the course HTML format.

The questionnaire presented in the Case study is designed as HTML form version which, when filled out and submitted, will email the results of the form to the evaluator.

### 7.2. Evaluating the Quality of a Web-Based Training System

If you want to evaluate your system as a whole there are a number of factors, all related to establishing the quality of the education system, which are looked at. An expert in the field usually performs this type of evaluation. The evaluation criterions are the following [McCormack, Collin, Jones. 1997]:

- Can the system be easily changed by developers or the educator to accommodate changing needs?
- User interface quality: is navigation easy?
- Learning styles supported: what type of learning style does the system support?
- Assessment: are the assessment tools easy to use?
- Feedback: can the students send feedback on the system?
- Quality of support tools: are there suitable support tools available to the students, authoring programs, video file players, etc.?
- Ease of setting up and maintaining on the part of the educator.
- Ease of setting up on the part of the student.
- Platform restrictions: is the system restricted to any particular platform?
- Benefits: does the system accomplish any of the benefits listed below?
- Reduction in time spent on non educational tasks
- Increase in student satisfaction
- Improvement in student results
- Increase in staff satisfaction
- Increase in contact time/ interaction
- Reduction in the number of dropouts
- Cost.

Many educators obtain good results in evaluation by asking three simple questions:

1. What worked for you?
2. What did not work well for you?
3. Give three suggestions for improvement.

**Conclusion.** Evaluation is a continuous process, which should be an integral part of your Web-based education system. The type of evaluation you choose and the tools you use to collect data are very much dependent on your individual circumstances and requirements.
**Note:** Carry out the activities described in the course HTML format: "Quality of the internet resources", “Evaluation of Web-based training system efficiency”
### 7.3. CASE STUDY: Learning material evaluation form

<table>
<thead>
<tr>
<th>Question</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
<th>Option 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you enjoy reading of this material?</td>
<td>@Yes</td>
<td>◐No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What did you learn most as a result of this training?</td>
<td>Fill in your answer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What activity was most beneficial for your learning?</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
<tr>
<td>The activities enhanced the readings</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
<tr>
<td>What changes could be made in the learning materials to make them more effective?</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
<tr>
<td>The materials have broadened my view of what is available in educational technology</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
<tr>
<td>How often did you use the following:</td>
<td>Browser:</td>
<td>Authoring tool:</td>
<td>Search in e-libraries:</td>
<td>Search in internet:</td>
<td>E-mail:</td>
</tr>
<tr>
<td>□ 2X per week</td>
<td>□ 2X per week</td>
<td>□ 2X per week</td>
<td>□ 2X per week</td>
<td>□ 2X per week</td>
<td>□ 2X per week</td>
</tr>
<tr>
<td>□ 1 - 2X / week</td>
<td>□ 1 - 2X / week</td>
<td>□ 1 per day</td>
<td>□ 1 per day</td>
<td>□ 1 per day</td>
<td>□ 1 per day</td>
</tr>
<tr>
<td>□ 20X per day</td>
<td>□ 20X per day</td>
<td>□ 20X per day</td>
<td>□ 20X per day</td>
<td>□ 20X per day</td>
<td>□ 20X per day</td>
</tr>
<tr>
<td>My technology background enabled me to be successful in my web-based course development.</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
<tr>
<td>Rank the various components in terms of benefit to you in understanding the topic of WWW technology in education.</td>
<td>Doing my own web-based classroom 1 2 3 4 5</td>
<td>Training activities of this material 1 2 3 4 5</td>
<td>Readings 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circle 1 = most useful, 5 = least useful</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
<tr>
<td>I am more inclined to make use of technology in my classroom because of this course</td>
<td>□ Agree</td>
<td>□Partially agree</td>
<td>□Neutral</td>
<td>□Partially disagree</td>
<td>□Disagree</td>
</tr>
</tbody>
</table>
8. Bibliography


9. Resources on Internet

Note: see wide list of Internet resources in course HTML format.


http://www.linezine.com Learning in new economy


http://www.click2learn.com

http://www.webct.com

http://elinara.ktu.lt/courses/eurolw Example of Web-based distance education course

http://saule.pit.ktu.lt/TT/ Example of multimedia test tool

10. Glossary of Main Terms

Note: see the extensive list of terms in the Glossary.

Activity A device which helps learners to understand a new topic. Activities might include: recalling/reflecting on own experience; listing examples; analysing mini case studies; making calculations and drawing diagrams.
Asynchronous communication  A method of communication where messages are sent and received over a time period.

Assignment  A piece of work completed by the learner and sent to a tutor for comment and assessment.

Browser  A piece of software which is designed mainly to read text and display pictures and other multimedia information.

CBT (Computer-Based Training)  The use of a computer to teach (especially skills and knowledge) in a way, which requires the learner to provide responses to the computer presentation.

CD-ROM  Compact Disk Read Only Memory. An ordinary compact disk (CD), which contains data, which can be read by a computer.

CGI (Common Gateway Interface)  A standard developed to allow http servers to receive and process information from Web browsers.

Chat tools  Programs, which allow synchronous communication between individuals or groups.

Computer-Mediated-Communication (CMC)  Communication that takes place through, or is facilitated by, computers.

Computer Supported Cooperative Work (CSCW)  Software, which facilitates group work, commonly known as groupware, usually contains such features as: bulletin boards, email facilities, common work areas, document sharing and version management.

Database  A collection of records, which store information, kept on a computer.

Design  The phase which turns an idea for web-based training (or open learning) course into a specification ready for development.

Development  The phase, which turns a specification into an approved version ready for production.

Dial up connection  The method of connecting to a computer network using a modem and a phone line.

Distance education  Distance education is a development in education that uses technology to facilitate learning without the limitations of time or place.

Download  The copying of a file from one computer to another using a network is known as a download.

Form  A page of HTML, which can contain boxes where the user of the browser viewing the HTML page can fill in information and have it processed, either by a server or a program contained in the HTML page.

Home page  A document on the Internet, written in HTML, that represents the top level of any related pages. It is designed to be the first page that a person sees when they access a particular Web address.

HTML  Hypertext Mark-up Language. A Hypertext formatted document. Browsers can interpret HTML.

HTTP  Hypertext Transport Protocol. The name of the protocol, which transfers information around the Web.

HTTPS  Secure HTTP, a version of HTTP, which encrypts the information being transmitted over the Web to prevent unauthorized people reading it.

Hypertext  A collection of pages of information which contain cross-references or links to other documents.
**Hypermedia**  An addition to the idea of hypertext to include sound, video and pictures.

**Internet**  The world's largest WAN, a global system of interconnected computers connected via different types of computers but using a common protocol for communications. The Internet consists of a set of links between machines.

**Intranet**  A networked system, which uses the same, protocols as the Internet but is confined to a particular organization.

**Learning Environment**  Is the software designed as an all-in-one solution that can facilitate online learning for an organization. A learning environment is characterized by an interface that allows students to register and take courses.

**Learning Management System (LMS)**  Is software that automates the administration of training events. The LMS registers users, tracks courses in a catalogue, and records data from learners.

**Learning portals**  Are web sites that provide a combination of courses, collaboration and community.

**Multimedia**  A presentation which takes place in the form of sounds, text, pictures and videos.

**Online course**  The use of computers and a network (such as the Internet) for conducting a learning course.

**PDF**  Portable Document Format. Developed by Adobe, PDF is a file format for a document, which means the document can be displayed in the form, it was created no matter what platform or set-up the user is using.

**Plug-in**  A piece of software used as part of a Web browser to extend the browser's capabilities. Plug-ins perform some task that the Web browser cannot, e.g. a plug-in can be used to play sound files or show a video.

**RTF**  Rich Text Format. A standard format developed by Microsoft for the conversion of word processor documents into a form, which can be recognized by different word processors.

**Server**  1. A computer, which is intended to allow other computers to connect to it and access information, stored on it or uses its other resources. 2. A program running on a computer which acts as a server can also be known as a server if its function is to receive requests from client computers (or programs), process them and return information.

**Study guide**  Material in any medium, designed to accompany and help learners use a course resource.

**Upload**  Copying a file from your computer to another computer via a network is called an upload.