

Model of e-book for distance-learning courses

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Abstract — Structure of electronic book, prepared as auxiliary materials of courses for specialists in the field of telecommunications and informatics, will be described. Assumptions undertaken and their grounds will be presented. Model of a single lecture, way of a control of student progress and technique of movement through the course content will be described.

Keywords — open and distance learning, continuing education, multimedia, compact disc.

1. Introduction

Continuing education especially professional continuing education have developed for last decade [1, 2], both in respect of the number of courses that are offered and the development of different educational forms. Different tools offered by multimedia techniques and Internet are widely used.

In 1985–95 a synchronous model of distance learning, using satellite television and feed-back for asking the lecturer, was developed. This model is used with pleasure for employee training by corporations, as it gives considerable savings of travel and accommodation (hotels) costs.

Increasing knowledge gained during attending lecturers, their better understanding and getting knowledge how to use the learning are necessity. Thus the possibility of self-education is a very important element in education process.

Traditional tools used for self-education are books, set of lecturers, printing materials. New multimedia technologies and Internet give new possibilities for preparing didactic materials in useful form facilitating material study by learners. Works concerning preparation of a new model of e-book that uses existing possibilities have been launched.

2. Basic assumptions of e-book model

Analysis of needs and possibilities has been made during preparation of the model design of course materials, some assumptions also have been undertaken [3].

First it is assumed that the course material will be provided in electronic form. Because of the big cost of connections and their low quality in Poland it is decided to place didactic material on CD. It will give students the possibility of course content studies without restraint. It is also assumed that material will be published by the use of information service accessible on-line. Location of course content on a single CD limits the amount of material possible for

transfer. Though capacity of one disc CD should be enough the possibility of the use of additional discs for content location should be taken into consideration.

Farther it is assumed that the material in electronic form should be transferable between many system platforms. Reproduction (playback) of material should be done by the use of non-commercial software. Tools for review of course content should be provided together with the material.

Next it is assumed that the form of the didactic material should ensure the highest interaction degree for the user. The possibility of most interesting and full presentation of material should be ensured.

Taking into account mentioned above assumptions and experiences of other teams preparing materials for distance learning [3, 4], it is assumed that didactic materials will be developed in the form of HTML documents. Programming language JavaScript will be used for dynamic management of the content of created documents.

It is noticed that authors of didactic materials prefer mostly MS Word editor and use it to prepare documents. It is decided to use MS FrontPage programme to facilitate document conversion from MS Word format to HTML. By the use of MS FrontPage a template of e-book will be developed for material presentation.

Lecture material will be enriched, according to the possibilities, using pictures, animations, sound comments, multimedia presentations, questions and tasks with answers or without answers. Besides basic lecture material, according to the possibilities, auxiliary materials in the PDF documents form (review possible by the use of free Acrobat Reader software) will be provided.

CD-ROM containing lecture and auxiliary materials will be provided with HTML browsers (Netscape Navigator and Internet Explorer), Acrobat Reader and, according to the possibilities and needs, applications for reproduction of multimedia files.

Such material after preparation will be published by the use WWW service accessible through educational portal.

3. E-book structure

The material, with regard to functional aspects, is divided into three main parts: introductory part, lecture's part, auxiliary part.

Introductory part contains large amount of information of different kind but needful and useful. All together is the preparation and introduction for students to appropriate part of material. The content of introductory part may be

different depending on needs. The following elements are assumed to place in this part:

- **Information about authors.** It presents authors of didactic materials, their professional profile, especially taking into consideration professional experience and didactic knowledge.
- **Course purpose.** It is formulated and prepared by authors. It presents level of knowledge and acquisitions which students should gain (according to authors intention) after getting knowledge of prepared material. In this part authors can present conditions for understanding didactic material: which minimum level of knowledge and in which areas learners should have to understand the material.
- **Requirements concerning credit for a course.** It is a point specific and characteristic for a given course. They are placed in the case when the course ends with the exam or test.
- **Requirements for equipment** and description concerning the way of CD use. They are a kind of advice and instruction prepared by software developers. Guides placed there may be obvious for many students but for others may be a great assistance.

Lecture's part contains series of didactic units, that can be called lectures. It is assumed that each lecture is a separated unit, basic course quantum, specified entity that student should learn himself. Material of subsequent lectures is obviously connected with each other by the structure and logic of the course and should be studied in the sequence assumed by the author.

Next it was assumed that a lecture is composed according to a given schema and it contains many essential, from student point of view, elements [4]. The elements are as follows:

- **Basic knowledge segments.** They contain didactic material that should be learnt by students. Segments can contain repetitions of material presented during lectures or presented in Internet. Certain parts of material can go beyond the course programme and be an extension recommended to study.
- Questions, problems and tests for **self-evaluation** enable student to get to know the degree of his knowledge. A very important problem is to create the possibility for a student to get to know if his degree of getting knowledge contained in the lecture and understanding of it, meet lecturer expectations and his requirements and in perspective enable to meet examination requirements.
- **Glossary** and subject matter index contain an arrangement of terms and definitions introduced into a given lecture. Glossary enables a student to ensure if all lecture contents are understood and learnt.

- **Bibliography** contains a list of most important items. Getting to know them may be helpful to understand lecture material. They can be as follows book chapters, scientific and technical publications, information contained in Internet, etc.

Understanding of materials and lecturers contents can be facilitated and hastened using auxiliary multimedia tools containing written comments, audio comments, simulations and animations, video insertions, etc. All mentioned, auxiliary multimedia tools should be used, by authors of lectures, purposely and in a well-founded manner. Use of auxiliary multimedia tools differentiates an e-book from a written book. Simple scanning of written-book pages and their presentation on a computer screen does not automatically create the electronic book. Purposeful use of auxiliary multimedia tools creates the new kind of a manual.

Auxiliary part can contain different elements, according to the course subject matter. However, listed below three components should be placed in this part according to the essential role they play in the education process:

- **Index** of all new definitions and terms introduced in subsequent lectures. Each definition and term is provided with a short description and information in which part of material the subject matter was introduced and described. List of that kind facilitates students to remind definitions and terms already known but not yet fix in the memory and eventually their repetition.
- **Library** of materials and publications should not be the usual sum of items mentioned in subsequent lecturers. In this part there is a place to give items, that can be the introduction to the taught material and also items that are the extension of this material. Valuable items can be the texts of current papers from conference proceedings and technical and scientific articles published lately. Lists of Internet addresses to materials placed in Internet by publishers and firms can be also given here.
- **Auxiliary software** attached in this part can facilitate to read certain texts, animations, to do simulation calculations or preparing simple projects.

The most important elements were considered in the assumed model of e-book and their list would probably become longer. However now it can be seen that the number of tools used in such electronic manual exceeds considerably everything that in a paper manual authors can invent and introduce.

4. Pages construction and navigation through the manual

Prepared electronic book was built in the dynamic HTML technology: HTML, Cascading Style Sheets, Java Script.

Thus the whole navigation is based on HTML references and dynamic processing of WWW pages by Java Script. After placing the mouse pointer to the reference the text being a reference is dynamically underlined. Functionally, navigation is a result of a book organisation.

Navigation begins from a front page, it is the **first navigational level**. Information about authors and the first page in a book can be called up from the front page. In each case a new window is opened. The first page of a book is the **second navigational level** and it enables input to single pages, concerning user introduction explaining how to work with a book, or input to the table of contents. Pages containing information about authors and user introduction how to work with a book form the introductory part. The table of contents is the **third navigational level**, it enables to open particular lectures and the index. A lecture is the last and **fourth navigational level**. It is impossible to come from one lecture into another lecture without return to the table of contents. The table of contents and lecturers (containing materials, problems, list of terms and bibliography) form the lecturer's part. Elements of auxiliary part are attainable by dispersed navigation according to its character. Index is accessible from the table of contents and lectures, while library of materials and publications from bibliography.

Construction of a first page of a book (Fig. 1a) is based on three basic elements: an upper information-navigational bar, a left navigational bar and a main window with the essential content of a page. All other pages of a book have the same form. Upper and left bars have azure background and form upside-down letter L. Reference to the previous level of navigation is placed in the left corner of an upper bar. Name of the subject and series of manuals is placed in the middle of an upper bar. A subject title and a page title are placed there (Fig. 1b) in the case of pages containing the user introduction and the table of contents. Left bar on the second navigational level and on pages accessible from it is empty.

Navigation at second and third levels is based on the content of the main window. The first page of a manual contains navigational menu in the form of a list of references to pages with introductory information and the table of contents. The table of contents (Fig. 2a) is a numbered list of lectures with two part description. The number of a lecture is the reference opening a given lecture, name of a lecture is the reference that unroll and roll up list of lecture segments in the table of contents. Number of a segment is the reference that opens a segment in a given lecture. At the bottom of the table of contents reference to the index is placed, that is opened in the new window.

Structure of a lecture (Fig. 2b) is based on the assumption that it is a separated unit, specified entity, that student should get to know. The lecture contains the main contents of a manual. The upper bar informs about the number of a lecture and its title. It contains the reference to the table of contents and **bookmarks** enabling to open each of the lecture functional unit. Bookmarks contain titles of func-

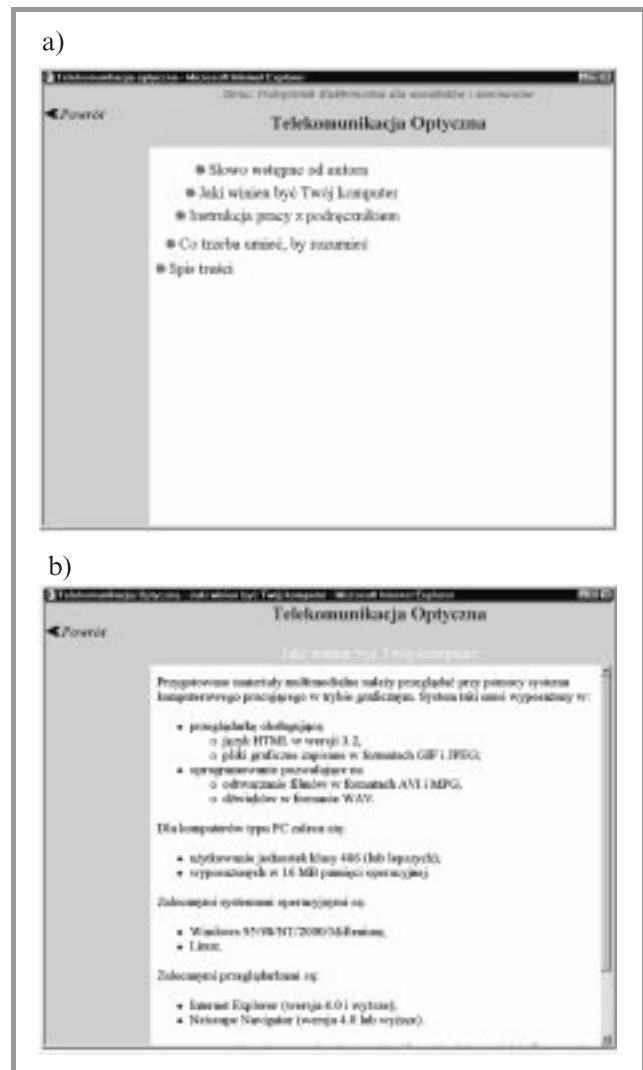


Fig. 1. (a) First page of a book. (b) Description of requirements concerning user computer.

tional parts. The title of a current bookmark is enlarged in comparison with others, colour of background is the same as the colour of background of the essential content (white). Non-active bookmarks have grey background. If pointer is placed under non-active bookmark its background lightens and the title becomes enlarged. In order to come to the part presented by the bookmark, the mouse pointer should be placed under the bookmark and then the left mouse button should be pressed.

The left bar of WWW page changes according to the actual functional part. Common element for all parts is a **book icon** with a question mark that is the reference to the index. For materials the left bar will contain references to the **segments**. For the current segment references to its **screens** will be specified. In the part "Problems" the left bar can contain the references to particular problems, tasks and tests. For dictionary and bibliography the left bar has not dedicated content. For preparing materials it was assumed that users will have the minimum resolution of a screen



Fig. 2. (a) Table of contents. (b) Lecture material.

800 × 600 points and they will work in a full-screen mode to acquire materials. The result of the assumption is to assume that the essential content will be presented in a very small degree in a format of 600 × 500 points. These assumptions are reflected on the organisation of presented material.

The lecture material was divided into segments, for the purpose to acquire a knowledge easier. Each segment is a single HTML file. For the purpose of easier orientation and navigation segments are divided into agreed screens being the smallest basic organisational unit of a lecture material. At the beginning of a page, the title of a segment is placed, farther screens, with screen titles at the beginning, are placed. The segment title and screen titles are HTML references. Important messages are brought into relief by the style or colour of a font. Definitions of laws are denoted by the use of red and blue fonts and the name of a given law is in the bold style. Conclusions are distinguished as a navy blue text on azure background with a key word "Conclusion" in a bold style. Important phrases are brought

into relief by the use of a bold style. The signs below figures are written by the use of italics style.

Lecture material is rich in illustrations. Illustrations occur in the different configurations. Single illustrations with a description are the basic form. Pairs of illustrations (arranged horizontally or vertically) with a common sign below also occur. Larger sets of illustrations with a common sign occur seldom. Often the size of readable illustration is too big to be placed on one page. In such case the miniature of illustration is put in the page and it is the reference (distinguished by the use of a colour frame) to the new window filled only with the illustration. Each of illustrations is opened in a separated window. Animations and films are put in four ways: directly on the page (picture with the first frame and control buttons is visible), using reference in the form of a picture with selected frame, using the reference in the form of an icon or using reference in the form of text. Sound elements are accessible by the use of references in the form of an icon with a loudspeaker or reference with text. Items of bibliography can also be references. For the purpose to use the references mouse pointer should be placed on one of them and started by press the left mouse button.

5. Summary

For preparation of a model of an electronic book it was assumed that a student has a contact with the lecturer during the studies. However the contact is not sufficient to get knowledge of the material and a student should additionally by himself work to enlarge his knowledge and its understanding. Electronic book is prepared as a tool for self-education and it should help him in this work.

Periodic contact with a lecturer by the use of Internet and electronic mail can be the assistance in the studies of the material. The contact can be used to send questions and answers, to receive comments concerning tasks and tests being solved.

Compact disc with such prepared material can be used successfully instead of materials printed for courses, seminars and postgraduate studies. It can decrease the number of lecture hours, skipping most of learning process for self-education.

Labour consumption for preparation of an electronic book is much bigger than for a book or sets of lectures written using traditional printing technology. It requires the work of multidisciplinary team and achievement of an appropriate experience. Preparation of single didactic material page in A4 format can take about half or one hour, when there are only simple texts and pictures. It could take three or more hours too, when team have to prepare animations, films, sound commentaries or supplementary applications.

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