Digital Textbooks with Workbooks for Elementary and Secondary Education

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Abstract

An interactive model of a digital textbook supplemented with a workbook has been designed. It represents the basis for the textbook on the CD-ROM related to the printed one. The digital textbook contains inner links, as well as outer links - access to the Internet resources. It is comes with worksheets for teaching, learning, self-learning and the knowledge testing. The contents of the worksheets includes at least with two main parts: (i) an *education quiz* which is intended for learning and self-learning, (ii) a *knowledge quiz* that verifies the acquired knowledge. The model can be filled in with teaching contents in all areas of science, humanities as well as in arts. In addition, each lecture in the textbook is provided with a comprehensive glossary and the literature references.

Keywords: CD-ROM, digital textbook, education, Internet, links

Introduction

There is no doubt that today E-learning provided by digital media is crucial at all educational levels, but it does not exclude the traditional media. Comparing the traditional education with education applying the information communication technology (ICT), the considerable improvements can be achieved by using digital media, CD-ROMs and Internet, as well. Various tools are available in using the virtual multimedia, such as, *e.g.*, multimedia applied to the interactive learning, online learning, distance learning, self-education, life-long learning, *etc*. In addition, exchanging information using the Internet within a research sphere represents an unavoidable tool for the access to the world scientific society, as well as for creating a good basis for the teaching process.

A number of new journals and databases concerning education (Journals covered by ERA, 2003) can be found. Many books are devoted to the high education, *e.g.*, on the Web sites of the World Scientific Publishing, (Jain, Ichalkaranje & Tonfoni, 2003), (Meng Koh Khee & Guan Tay Eng, 2003), but not many resources concerning elementary and secondary schools are available. The most direct sources of new tools for learning and teaching in schools can be found on the Web sites of some search engines (SE), especially SE **About** (All New Tools for Teachers, 2003). These Web sites include free lesson plans in different areas, *i.e.*, geography, mathematics, literature, *etc.*, as well as a visual thesaurus of the English language. Resource links about homeschooling, as well as a sample *curriculum* for childhood age can be also found (Ever thought about homeschooling the child, 2003).

In addition, two special SE can be mentioned among many that offer education on the Web: (1) SE **EduHound** <http://www.eduhound.com> for education, families and children, with different search menus in seven main categories. Some of them are, *e.g.*, "Everything for education" - a pre-

screened category of more than 20.000 links in over 50 categories, and "Eduhound Teach Now" - a proposal for customised electronic teaching materials; (2) SE **alltheweb** <http://www.alltheweb.com> with the emphasis to the link [Teaching & Learning on the Web](). Tutorials are very important on the Web, many of them for learning about the Web and learning on the Web, *i.e.*, SE **tutorialfind** <http://www.tutorialfind.com> launched in July 2000 is a unique online educational resource devoted to offering the very best tutorials on the Web. Today it is the world's largest online tutorial directory with over 3500 tutorials in over 300 categories; the SE provides the links to the highest quality tutorials on the Web today.

The goal of this work was to create the textbooks with workbooks on CD-ROMs for elementary and secondary schools including the teaching material in the teaching areas of science, arts and the humanities. The textbook includes the teaching material. Worksheets would be an additional learning tool added to the textbook. Both the textbook and the worksheets would serve for education at school as well as at home, being particularly convenient for the physically disabled learners, and those who are temporarily unable to attend school. The worksheets contain an education quiz, and they also serve as a basis for the knowledge quiz, and the final test of knowledge.

This program intended for Croatian schools and users (using the Croatian language), but it is also applicable to users speaking other languages since translations could be provided.

Results

The project of digital learning presented in this report is just at its beginning. A detailed description of how the CD-ROM works, will be given shortly, but the fact is that only a computer presentation will provide a proper insight into the textbook.

The textbook is foreseen to appear in two media, *i.e.*, in the traditional form, and on a CD-ROM. Improvement of the learning process is supposed to be realised through the teaching process using CD-ROMs. The teaching material includes all areas of science, arts and the humanities, *i.e.,* the history, geography, physics, chemistry, biology, geology, *etc*. It covers all teaching material prescribed by the school *curriculum*.

The final products are the CD-ROMs, each of them for a particular teaching field, and for a different age group.

The basic textbook will appear both in printed and digital form, which can be called the first level of the textbook. The second level of the textbook is available only on the CD-ROM; it is connected with the first level by inner links (usually *word*), and contains the *"if you want to learn more..."* knowledge. The images can be enlarged. Literature resources, books, and other reference sources are added as well. Many sources lead to the Internet. Each lesson is supplemented with a small comprehensive glossary.

The worksheets on the CD-ROM contain educational games, *i.e.,* knowledge quizzes, questions with hidden answers, *Help*, and many other forms of interactive contents. The *education quiz* on the CD-ROM comprises images and multiple-choice questions. Learners are offered three answers to each question. The answers are connected with the solutions: either *"right"* or *"wrong"*. If the given answer is correct, the learner can proceed to the next question. If the answer is wrong, he has to turn back to the previous question. A *Help* file with the basic knowledge from the textbook is also provided.

Within the *test-program* that contains questions relating to a particular lesson, the percentage of correct answers can also be seen. Therefore, the learner can learn by himself, and he can also verify his knowledge himself. "Quick checks" throughout the test of knowledge will allow the learner to assess his progress.

For a better understanding of how the inner links on the CD-ROMs work (*i.e.*, how the inner links connect a text from the first level to the second level), the program can be compared to the programming of the inner links in *Britannica on line* (Encyclopaedia Britannica 2003, Windows/Macintosh CD).

Two examples from the first and second level of the biology textbook can be described as follows:

Example 1 : BIOLOGY, Chapter 1, Lesson 1: Origin of the Life on Earth

Figure 1: Constellation

• First level: Figure 1 and text:

For thousands of years people have been observing the movement of stars, constellations, *galaxies*, planets, *etc.*, ...

• Second level: Figure and explanation from *link*:

Clusters of stars make constellations, and millions of stars make galaxies. The arrow shows our planetary system at the periphery of the Milky Way *galaxy*.

Example 2 : BIOLOGY, Chapter 1, Lesson 2: Explanation from link <u>DNA</u>:

• The chosen term from the lesson at the first level text can be "DNA";

• The word *<u>DNA</u>* is the link from the first level text connected to the explanation of the term, which appears in the second level text. Besides, the double-helix scheme of the DNA molecule is represented. Each term related the double helix is explained. The newest literature source, presumably from the Internet, is added at the end of each lesson. In order to find the references, the learner is instructed either to visit the library or to access to the Internet that can be done promptly.

Figure 2: Milky way

The PPT presentation including several excerpts from the interactive textbook on the CD-ROM can be seen by clicking here. The text on the PPT, originally from the interactive CD-ROM, has been translated from Croatian to English. A completed interactive model will be represented at the IS+ITE Conference.

Discussion

There are many advantages of introducing the digital in addition to traditional learning:

• The information-technological reform of education today is very much present;

• Understanding and application of the information communication technology (ICT) is very important for a young person to recognise that there are different sources of information, and that they can be found in traditional libraries, as well as, on the Web;

- In this way the knowledge about information retrieval can be automatically accepted;

- Learners become aware of the global network of knowledge; they acquire global literacy;

- Learners get used to the Internet tools;

- A learner extends his knowledge as much as he wants;

- The most important point is that the learners can develop their own initiatives, which open the way to creativity. They must learn critical thinking and research skills to get prepared for a life-time of changing information needs. Effective learning about information retrieval, use and analysis is tied to a particular information need, often discipline-specific.

Conclusion

ICT has enabled a fast communication, and it has become a precondition for information literacy. Use of information tools can be regarded as the basic requirement for all development, for developing information literacy at all levels of education, for life-long learning, for distance learning, for everyone. In the case of schools, particular attention should be paid to training for trainers. Therefore, great importance has to be attached to the implementation of ICT in education, as well as to customising the electronic teaching materials. Much stronger motivation can be expected for learning through the modern media, and thereby achieving a much more effective learning process than the traditional one.

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Biography

Đurdica Težak (<www.chem.pmf.hr/~tezak>) finished her B.Sc. and Ph.D. studies in chemistry at the Chemistry Department of the Faculty of Science, University of Zagreb. She is an associate professor at the same faculty. From 1988 to 1995 she was the Head of the Chemistry Department.

Her research area is covering physical chemistry of colloids and interfaces, colloid stability, dynamics of aggregation processes in solutions, association colloids, lyotropic liquid crystals. She has published 80 papers (46 research publications, 25 in Conference Proceedings, 3 in books), 2 books, 1 Proceedings, 3 notebooks; a number of theses were done under her supervision. She is also involved in the information science research and tutorials. As a member of Croatian and international professional organisations, she organised two international Symposia in Croatia, in 1994 and 1998.