Some Aspects of Implementation of Information Technologies in the Teaching Process

Anna Victorovna Andreeva, Elizaveta Nikolaevna Mazhar and Natalya Aleksandrovna Maximova

Smolensk University for the Humanities and Smolensk State University, Smolensk, Russia

Abstract: This paper examines some aspects of implementation of information technologies in the teaching process as well as designing hypermedia educational tools. One of the objectives of the paper is to address the issue of making up program pedagogical resources as an intrinsic part of professionally-oriented knowledge base. The paper suggests a classification of the program pedagogical resources and the existing multimedia applications. It also discusses the requirements commonly made for multimedia encyclopedias, for products of implementing the searching approach in designing program pedagogical resources. One of such navigation tools is hypermedia encyclopedias. The paper also dwells on the structure of a typical hypermedia encyclopedia and some aspects which should be taken into consideration while devising them.

Key words: Information technologies · Educational process · Program pedagogical resources · Multimedia encyclopedias · Hypermedia encyclopedias · Knowledge base · Education · Audio-visual tools

INTRODUCTION

Development of science and technology, inrush of unsystematic information as well as abundance of knowledge which has been accumulated throughout the history of mankind compels specialists of all professional spheres to get an insight and proper comprehension of what is going on [1]. A modern specialist should be able to handle the information flow which, in turn, entails acquisition of certain skills on dealing with mental processes. Nowadays an ability to construct, examine and implement information models in practice makes up a significant aspect of information activity of specialists from all spheres, especially when we speak about education [2].

Various changes which are taking place in the modern society as well as transformation of the system of values provoke springing up of such ideas and concepts in the field of education which reflect proper comprehension of the radical and global character of these phenomena. Recently it has been stated in the scientific literature that at the period of modernizing the system of education such professional functions as making forecasts and projects as well as managing both content and process of the education move upfront [3]. The current system of education faces the following problems:

- Lowering of the overall and professional culture of an educator;
- Lack of scientific and methodical foundation to assess the quality of education;
- Lack of an efficient procedure to upgrade the quality of the education process;
- Disruption of the continuity mechanism of teaching forms and methods in educational institutions;
- Lack of proper information technologies skills and competence of teachers in the system of education.

DISCUSSIONS

The modern system of education requires a teacher who has a high level of professional pedagogical culture and is able to tackle all the above mentioned problems. Due to that there is an urgent necessity to upgrade the preparation of teachers to a whole new professional level which will be based on the multilevel system of higher professional education in Russia and will take into consideration the increasing fundamental character of education in conjunction with the introduction of modern educational technologies (audio- and telecommunication) into their studies and professional activity [4, 5]. In order to implement these educational technologies in class efficiently the teacher should acquire additional training, knowledge and skills in this field. The outcomes of the

Corresponding Author: Andreeva, Smolensk University for the Humanities, Gertsen Str. 2, Smolensk, Russia.

research carried out by the authors show that an average teacher regularly encounters such an enormous amount of information that it is rather difficult for them to follow all the latest innovations in their professional sphere, let alone trying to master these innovations in order to use them in scaffolding the teaching process. According to this research, about 70% of teachers don't have enough spare time to learn about any new technologies because they are overworked and so they are short of time. We would like to point out that the information about the latest technologies is mainly published in periodicals, it is also highlighted on portals and websites of various publishing houses and in teachers' private blogs. Thus, finding and processing these data is quite a time-consuming task [6, 7].

There arises a demand for some public professionally-oriented knowledge base with a good thematic search system which will enable teachers to check out all the existing educational technologies quickly and efficiently.

One of the approaches aimed at meeting the above-mentioned demand is represented by designing program pedagogical resources (PPR) as an integral part of the professionally-oriented knowledge base. Program pedagogical resources are resources which are needed for the technical maintenance of the teaching process and which contain a number of educational functions and can construct a dialogue both with the teacher and the student without any subjective attitude towards them (V.V. Naumov) [1, 3-5].

For the moment the following classification of program pedagogical resources is worth taking into consideration (V.V. Naumov) [6-10]:

Generative Program Pedagogical Resources: The user constructs (generates) the required teaching tasks on the basis of the existing database which, in turn, can be defined as a certain "tasks generator" or a universal manual designed with the help of modern multimedia technologies.

Generative-diagnostic Program Pedagogical Resources: The user generates some tasks taken from the database, however, they are made up with due consideration of the results of the previously held diagnosis of mental as well as behavioral characteristics of the target student audience.

Search (Navigation) Program Pedagogical Resources: These resources make up a certain information system which enables users to establish not only formal, but also notional connections between different fragments of information. Consequently, on the basis of a particular enquiry the program will be able to find on its own by means of certain algorithms the information which will be of due relevance and importance for the user. Designing such systems involves many practical problems which need to be solved. First of all, specially structured databases and knowledge bases as well as systems for searching and selecting information should be designed.

Heuristic (Rhetoric) Program Pedagogical Resources: These are systems which foster the formation of students' skills to deflate and/or prove certain arguments and statements and which come up with topics for discussions and reflection, make up texts about various phenomena and concepts etc.

Expert (Expert-correctional) Program Pedagogical Resources: The conclusions about the character of the students' intellectual decisions, their abilities, knowledge and experience are drawn on the basis of their progress in the field of the knowledge base of these particular program pedagogical resources.

Programs of Upbringing and Development: Educational programs can be applied not only to the organization of the teaching process, but also to the development of certain psychological aspects of the student's personality.

Psychological Exercisers and Simulators: The purpose of these systems is to scaffold the development of particular psychological functions such as attention, analysis, synthesis etc.

Programs of Esthetic Creativity: To this type belong educational and standard graphic and musical editors as well as educational animation studios.

Program designers most often resort to multimedia means in order to implement the abovementioned approaches. K. V. Orlov and L. I. Senokosov in their "Dictionary of Information Technologies" give the following definition of the multimedia – this is a collective concept which is used to denote various computer technologies based on several informedia such as graphics, text, video, photographs, animation and sound effects [11, 12,13].
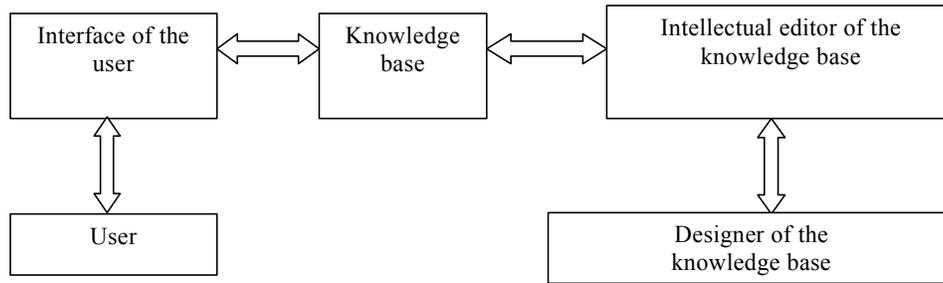
Scheme 1: Structure of a hypermedia encyclopedia

V.G. Manujlov suggests the following classification of the existing multimedia applications in his works:

- Presentation which is held by means of PowerPoint;
- Demonstration which is carried out by means of PowerPoint;
- Web-page;
- Website;
- Portal.

Multimedia encyclopedias result from the implication of search (navigation) approach to designing program pedagogical resources. In order to compose a high-quality encyclopedia it is necessary to structure the material for it adequately and precisely so that all the excessive data are eliminated whereas the informational content increases. A rather high-quality system of navigation is also needed to ensure proper search for information in the encyclopedia. Both the speed of the search as well as a possibility to narrow the search base by means of optimizing the structure of enquiries can be regarded as sound criteria to choose the optimal navigation system. Generalizing his overall experience of designing multimedia master-templates V.G. Manujlov distinguishes several kinds of navigation schemes 1:

Linear Scheme: In implementation of this scheme the forward movement is effected successively starting with the first page whereas the backward movement is in the reverse order. This structure is the most non-optimal since any search which takes place in a system with such structure will be very time-consuming because the search system has to process all the data meticulously, to find the necessary information and only after that to come back.

Hierarchical Scheme: In this system a user is free to choose the sequence of page-by-page movement within the branches of the tree network structure in full compliance with the logic of moving on the pages which is programmed by the designer.

Non-linear Scheme: Such systems allow a user to move from every page to every other page.

Mixed Scheme: This scheme is a conglomerate of all the above-mentioned schemes.

One of the kinds of program pedagogical resources is a hypermedia encyclopedia. Hypermedia encyclopedia (HME) is a program medium which contains the specialist's knowledge in a particular subject field, enables to pass on this knowledge for consultation of less qualified users and allows to create interaction between personal computer, a person, sound, video and animation combined on the basis of the hypertext. We would like to point out the following structure of a hypermedia encyclopedia [3-5, 14-16].

The main constituent part of a hypermedia encyclopedia is a knowledge base.

There are several stages in designing a knowledge base [9, 17, 18]:

Identifying a Problem and Specifying the Subject Field: At this stage a particular field of knowledge is chosen, designing goals and sources of knowledge are determined. In other words, an informal definition of the problem is made.

Retrieving Knowledge: At this stage the designer of the knowledge base works with the primary source of information in order to select the data which are needed. The quality and volume of a knowledge base are subjective to some extent because it depends on the designer's ability to work with the information efficiently. This procedure is carried out by means of activating the mental processes which were developed earlier such as analysis, synthesis, generalization, abstraction, structuring and project designing.

Structuring and Conceptualization of the Knowledge:
At this stage they define terminology, a list of main concepts and their characteristics, classify the selected terminology and establish logical connections between them. In the process of structuring, first of all, they make up a hierarchical model of the topic in question and then determine the functional interactions in the form of a graphic chart, a table or a diagram.

Formalization of the Knowledge: Designing a knowledge base in the language selected for its presentation.

Implementation: This stage includes designing a program complex and creating a prototype of the system.

Testing: This stage involves detection of mistakes and implementation of the prototype of the system.

O.K. Kozlov, E.V. Pastukhova, E.K. Solodova and E.N. Kholodov point out some aspects which should be taken into consideration while designing electronic hypermedia encyclopedias:

- Maximum visual materials (resort to all the available multimedia technologies and tools).
- Availability of some feedback from both the computer and the student.
- Individual control of the acquired knowledge at every stage of the teaching process.
- Possibility of learning by means of paper medium.
- Possibility of designing teaching materials with different levels of difficulty.
- Dynamic structure and contents of the material, possibility to edit and correct the contents.

CONCLUSION

To draw a conclusion, we would like to point out that introduction of technical audio-visual resources as well as audio-visual and telecommunication educational technologies in the classroom requires additional knowledge and skills from the teacher. Modern teachers are expected not only to be aware of the existing technical tools and information technologies, but also to know the methods of implementing them in the teaching process, to acquire skills of handling various technical means, to be able to design and efficiently use in class up-to-date didactical materials. Consequently, a teacher should be properly trained and, thus, ready to implement the existing modern educational resources and, more than that, to design new innovative ones.

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