УДК 681.3:378.1.147

METHODS OF ELECTRONIC MANUALS DEVELOPMENT

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Key words and phrases: editor of lessons; multimedia; manuals; remote education.

Abstract: The structure of multimedia electronic manuals for the purposes of remote education is considered. Forms of information presentation are analyzed. Examples of editor and development algorithms of electronic manuals are given.

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Guidelines of development of personal computers hardware and software, network and information technologies show, that information interchange is becoming more active. Possibility of quick transfer of information in various forms (text, graphics, video, sound) of any distance should be used in training tools. Thus, electronic manuals, receive new possibility of smart and intelligible representation of stated material and improve the quality of training. But manuals of a new generation require new ways and methods of information representation and development tools.

Structure of manuals. Developed electronic manuals should reflect an investigated subject completely. Therefore, according to the operating standard and the planned schedule of learning, each subject should be provided with the following components:

− the abstract of lectures covering completely all sections and conclusions on each section;

− methodical instructions on execution of laboratory, practical, testing, course tasks and projects;

− training tasks and variants of their solution;

− test tasks on each section or all sections on the whole;

− questions for repetition;

− questions to examination with standard tasks;

− a glossary;

− the list of recommended literature.

The structure of components is determined for a definite subject separately. For example, if in an investigated subject in the schedule there is no course operation correspondent components will be absent in the package of methodical developments.

Forms of information representation. Teaching manuals can be represented in several variants. Traditionally it is possible to view the form of representation as the structured file, for example, in *.htm format or *.html. The structure of such manual

should meet the standard, similar to methodical developments by an issued typographical way. For example, on data IRE (Institute of Remote Education) TSTU, the body text is recommended to consist of 5, 10 or 15 sections. The quantity of sections depends on quantity of class periods (up to 200 hours - 5 sections, from 200 till 300 - 10 sections, more than 300 hours- 15 sections). After each unit or a subject it is made out 3 training tasks together with solutions. Then according to the order of methodical components up to 10 test questions on each section are made, etc.

Development of such (abstracts of lectures) manuals, in electronic form, is simple enough and can be fulfilled, for example, with the help of the editor of MS Word. The peculiarity consists only in design of appropriate Web - documents. Advantage of such electronic manual is, that it can be fast transferred to the trainee, and that he can read it from the screen, or, having printed out, from the hardcopy. This eliminates the necessity to issue a manual in a number of copies which can be insufficient, or on the contrary redundant. Thus there is a possibility of operative amendments in the manual. However, the form of representation of the information as the static text and a set of figures (tables, diagrams) has an essential disadvantage - low coefficient of trainee perception. First of all this disadvantage concerns those subjects where dynamic processes are studied or perception of objects in three-dimensional view is required.

For example, learning of working techniques with modern resources of visual programming is impossible without a computer. So it is important to know not only structure of the menu, the command list and their syntax, but also a sequence of operations. The manual in this case represents a set of a great number of figures of a computer screen and smaller quantity of the text. The set of figures shows a sequence of operations. Presentation of such material in the lecture becomes rather inconvenient. Demonstrating of operations on a computer (television screen monitors) assumes a small amount of students. Simultaneously there is a problem of making an abstract of material by the student. In such case it is offered to replace or supplement the traditional manual by a "film". It is the second form of representation of the information. The name "film" is conventional since has it has more simple organization. The frame represents a picture of the screen with appropriate open menu. Duration of a frame can amount several seconds. On a frame the pointer of "mouse" automatically moves.
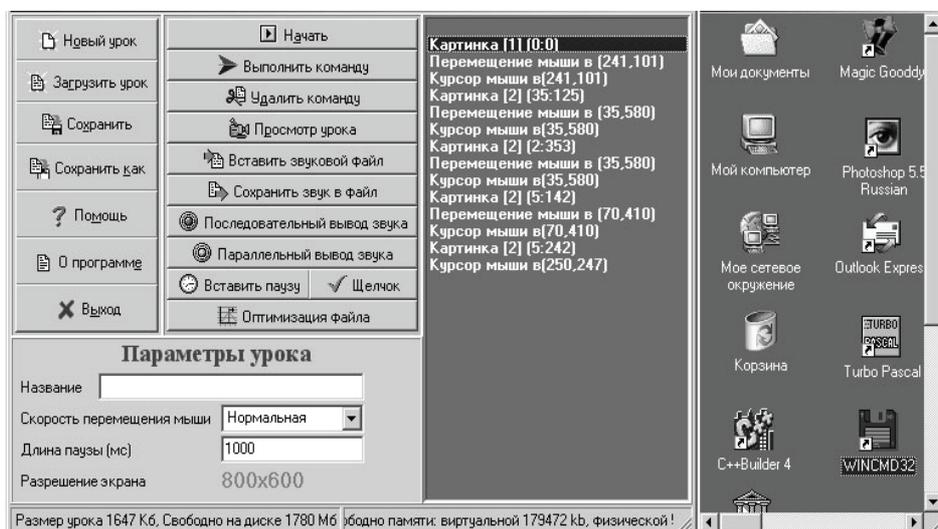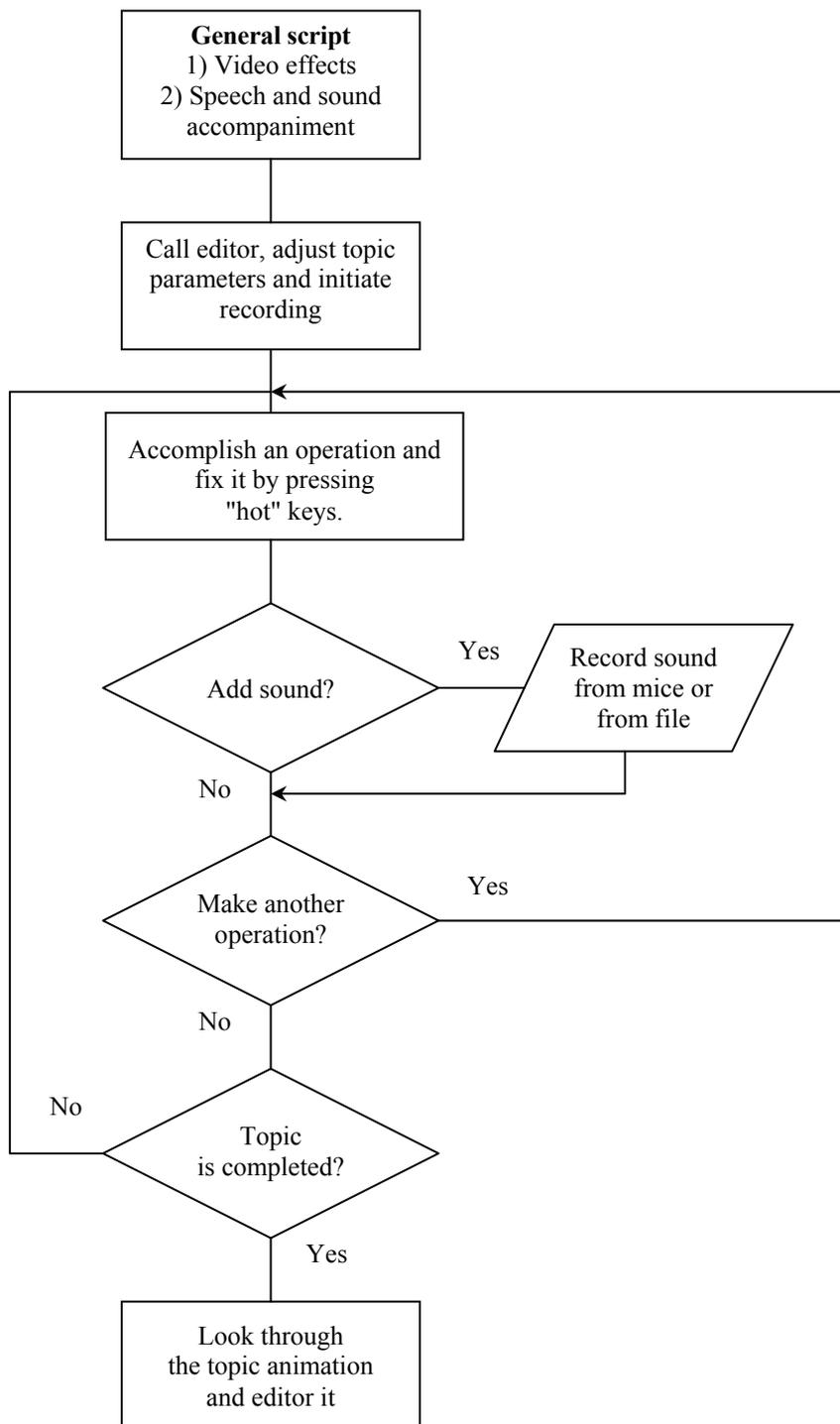

Fig. 1   Editor Window, Maximized

General script
1) Video effects
2) Speech and sound accompaniment

Call editor, adjust topic parameters and initiate recording

Accomplish an operation and fix it by pressing "hot" keys.

Add sound?

Yes

Record sound from mice or from file

No

Make another operation?

Yes

No

Topic is completed?

No

Yes

Look through the topic animation and editor it

Fig. 2   The sequence of manual creation

Simultaneously an operation is explained by a speech signal and sound signals, for example, creating effect of pressing the button of a "mouse". Change of the frame is made after reaching the given point by the pointer or ends by a speech signal. Such approach in presentation of a material as testing has shown, improves perception. Similarly it is possible to develop "films" for an illustration of computers and devices operation, it is essential to have a set of figures in the digital format.

Development tools. On faculty of CAD TSTU within several years questions of development of electronic multimedia manuals were researched. One of results is the program " LesEdit v2.0 ", registered in ROSPATENT under number № 2001610537, intended for development of multimedia manuals as "films". On Fig. 1 the main window of the editor is shown.

It can be divided into three parts. In the first part (on the left) units of manual contents are allocated, in the second part (in the center) operations of animation are recorded, and in the third part (on the right) the edited frame is represented. Recording of frames is made by pressing "hot" keys, thus minimizing the window.

The editor allows fulfilling the following operations. Standard: to create, load, save as, save the file; the help exit; customize video-mode and temporary characteristics. Special: to begin recording, view all lesson or one command, delete the command; insert or save the file of a soundtrack; insert a pause and click; organize sequential or parallel output of a sound; optimize size of a lesson.

With the help of the stated operations the "film" of a lesson, a topic or a unit is made. Then all sections are gathered in one manual. The offered editor allows simultaneously and independently from each other to develop video and sound of several topics of one manual, thus reducing considerably preparation period of a manual.

The method of sequential development of the manual is illustrated by algorithm of executable operations and is shown on Fig. 2. At the first stage the script of animation appropriate to a technique of training is formed. The common script is divided into two parts - for video effects and a soundtrack. This stage is the most crucial since it determines the strategy of material presentation.

After the editor program is activated according to the script, the teacher starts to work with the software product and fix his operations. Speech support can be recorded simultaneously with operations or later during editing. At the final stage the created subject is viewed, superfluous operations are deleted and new ones are added.

Minimal requirements to hardware are the following. Normal operation of the program needs a computer with the processor of a Pentium - 100, 16 MB of RAM, 15 MB on a hard disk, a video-card supporting 16 - or 24 - bit color, a sound map and a microphone.

The sphere of the editor application is not only creation of "films" on software products, but also for any subjects where graphics is displayed on the monitor. The described editor was shown several times at exhibitions, fairs and conferences of a regional and an international level.

Методы разработки электронных учебных пособий

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Ключевые слова и фразы: методы разработки учебных пособий; программные средства; редактор учебных пособий; электронные мультимедийные учебные пособия.

Аннотация: Рассматриваются вопросы разработки мультимедийных электронных учебных пособий. Показаны структура электронного учебного пособия и формы представления информации. Приведено описание программного обеспечения, разработанного на кафедре САПР, позволяющего создавать и редактировать мультимедийные учебные пособия.

Methoden der Erarbeitung der elektronischen Lehrwerke

Zusammenfassung: Es werden die Fragen der Erarbeitung der multimedien elektronischen Lehrwerke betrachtet. Es sind die Struktur des elektronischen Lehrwerkes und die Formen der Representation der Information aufgezeigt. Es ist die Beschreibung der auf dem Lehrstuhl „Systeme der automatisierten Projektierung" erarbeiteten Software, die die Lehrwerke zu schaffen und zu editieren erlaubt, angeführt.

Méthodes du développement des manuels électroniques

Résumé: Sont examinés les problèmes du développement des manuels multimédia. On montre la structure du manuel électronique et les formes de la représentation de l'information. On donne la description du logiciel conçu à la chaire de CAO qui permet de créer et de rédiger les manuels multimédia.