Innovative methods of knowledge transfer by multimedia library

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Abstract. The present situation of teaching and learning new knowledge taught in the classroom is highly variable depending on the specific topics concerned. If we analyze the manifold ways of teaching / learning at university level, we can notice a very good combination between classical and modern methods. The first category includes the classic chalk blackboard teaching, followed by the also classical learning based on paper reference material. The second category includes books published in PDF or PPT [1], which are printed on the type backing CD / DVD. Since 2006 the author was concerned about the transfer of information and knowledge through video files like AVI, FLV or MPEG using various means of transfer, from the free ones (via Internet) and continuing with those involving minimal costs, i.e. on CD / DVD support. Encouraged by the students’ interest in this kind of teaching material as proved by monitoring [2] the site http://www.cursuriuniversitarebraila.ugal.ro, the author has managed to publish with ISBN the first video book in Romania, which has a non conformist content in that the chapters are located not by paging but by the hour or minutes of shooting when they were made.

1. Current status and latest evolution of traditional transfer methods
The classic method has been improved for the first time teachers at the Bucharest Polytechnic University in the years ’82 -85 meaning that students were given a book containing the full summary matter in terms of definitions, terminology and mathematical apparatus and the teacher further developed the contents of that book on the blackboard. For individual study, a student could purchase a set of audio tapes with the recorded part of the whole course and, while listening, he was following the abstract mathematical demonstrations on paper. Unlike the vast majority of subjects, there is a separate category of subjects that are taught using a computer and when I say this I mean subjects such as infographics, assisted graphics and parametric modelling, finite element analysis, manufacturing simulation, etc. In this situation the book variants mentioned above, either classic or modern like PPT or PDF [3], are no longer sufficiently effective in knowledge teaching and transfer, because it is very difficult to explain in words each context menu that appears when pressing the mouse right button. Also extremely difficult is explaining both the dialogue between user and software and how the software responds depending on the state variables that were set at the beginning of the work session. Basically it has been succeeded in a very short time to pass from transferring information from paper support to electronic one [4]. After 1990 it was opened another stage in which the electronic transfer
of information took on unexpected shapes and sizes. The main advantage of this type of information transfer is the particularly low cost in comparison with the transfer on paper and last but not least the extremely small size of the physical volume that stores the information. In 1990 the most common storing medium was 1.44 MB diskette, then came the CD of 740 MB capacity, while at the present there are DVDs with increased capacity able to store 8 to 10 GB, sticks over 64GB and about 1TB SSDs. This technological evolution has in turn called for modernization and diversification of the means of transfer and storage of information during the teaching process.

In parallel there appeared all kinds of software, more or less efficient, allowing information to generate and edit as text or graphic type. Thus classic paper books began to exist in parallel with electronic books on CD or DVD under PDF or PPT formats. It should be noted that even accredited publishers adapted themselves to present conditions and have developed legislation accordingly so that they can produce bibliographic material in various electronic formats. If before 1990 in Romania was unthinkable for a journal to have ISSN on paper or electronically, now this situation is far more than normal. Additionally, modern publishers that have adapted to the technological evolution publish books in electronic format which can be assigned ISBN.

Upgrading traditional methods has been encouraged in terms of legislation and by the fact that ARACIS - Romanian Agency for Quality Assurance in Higher Education has also considered the teaching material created in electronic form and made available to students as CD / DVD or downloaded on e-learning platforms. All these ways of modern academic study are complementary to traditional methods but in some cases their absolute superiority becomes obvious. The author of this work has permanently been concerned to modernize his own methods of teaching graphic discipline such as Descriptive Geometry, Technical Drawing, Computer Aided Graphic, Parameterized Geometric Modelling and created chapters of books in PPT, HTML, AVI, MPEG, FLV formats which further grouped and obtained postcards on educational platform [5] or printed to DVDs. The author’s perseverance was encouraged by the students’ attitude towards these new innovative methods of teaching certain disciplines with a very specific content.

In other words we can say that through these modern methods of knowledge transfer access was allowed to the latest information of graphic subjects without requiring the student to attend the class. Current technology and software open up new horizons in terms of academic education by upgrading the transmission of information to an audience previously selected by means of notification e-mails followed by confirmation of participation. Thus more and more companies but also universities organize courses or seminars of STEM type - Science, Technology, Engineering and Mathematics for both their students and specialists in a particular field, which communicate and transfer novelty information in their field of interest, to an audience located in totally different locations but connected to the Internet. This new method of communication and information transfer, which has not spread in all fields yet, but has great prospects for the future, brings about a number of indisputable advantages compared to others, namely: minimum seminar costs, possibility of permanent dialogue between the information transmitter and receiver, ensuring a high standard of comfort to each participant and not least getting the final video material recorded in AVI format. This method in which the seminar participants are from different locations, and he who provides the information makes available to those interested the opportunity to view online the seminar or course that runs on the PC, requires an Internet connection and installation on the teacher’s PC of a small Webinar software that can be download as trial version from http://www.gotomypc.eu/ address. Also in the category of modern methods of information must be mentioned and the method using Team Viewer. This method is particular in that all participants are found together in the same room and the teacher takes the remote control of the PC from that room and uses the entire database and licenses from that PC.

2. Outlining the innovative method and its main stages

An innovative method of transferring knowledge from technical fields, especially from computer–aided graphics, info-graphics, Finite Element Analysis and simulation of industrial processes, is based on taking over previously created video files by using the Camtasia software and getting
multimedia libraries [6] that meet a given curriculum. Basically the method has two phases: obtaining the video files and obtaining the multimedia library. Each of them is characterized by distinct working phases which in turn have some particularities. Thus, in the first stage special attention should be paid to the used video codec’s that are not recognized by all existing PCs in use at a time. Thus, the issues arising from the use of improper codec’s can be grouped into three categories, as follows:

- If use is made of specialized codec’s produced expressly for getting an exceptional video quality, there is a risk that multimedia library created on the basis of such a codec cannot be viewed unless the user downloads or purchases that codec.
- If use is made of default codec’s of the latest operating system available on the market at some point, the risk is that older PCs running older operating systems cannot open in optimal conditions the video files thus generated.
- If use is made of the default codec’s of older operating systems, this also can cause problems in the smooth viewing on newer PCs.

The compromise solution proposed by the author, which solves the above shortcomings, is the use of specialized tested codec’s of DiVX and Xvid type which are now free and can be downloaded from the Internet. As regards the stage of obtaining the multimedia library, the trial versions of the specialized software’s can be used. The author has chosen AutoRun Pro Enterprise II 6.0.

2.1. Stages of phase I – generating video files

To get quality video files that can be viewed without interruptions or distortions, since the preliminary phase it must be installed the codec for compression and visualization. After numerous testing’s, the author has chosen the codec XviD-15012003-1-1042711386 that proved to operate at high performance on all operating systems tested: Win XP, Win Vista, Win 7 Ultimate and Win 8.1 PRO.

The steps required to obtain video files are:

- Setting format AVI by establishing the number of frames/sec. and the video codec selected (figure 1);
- Configuring the video codec for optimal performance (figure 1);
- Setting the record area size extracted from the entire surface of the screen and setting the audio parameters (figure 2);
- Setting the customization of watermark type to ensure copyrights (figure 3).
- Generating AVI –format video file by Camtasia Recorder.

![Figure 1. Setting the AVI format and the codec selected.](image-url)
When Camtasia software is used on Win 7 Ultimate operating system, the default option involves using the following codec’s: Microsoft Video 1, Intel IYUV, Cinepak Codec by Radius, TechSmith Screen Capture and Full Frames (Uncompressed). Choosing the aforementioned codec was justified by its ability to achieve video files of high compression leading to a completion of the hard disk of about 2.5 - 3 MB per minute of screen filming to a resolution close to Full HD - 1920x1050 and approximately 7 frames / sec. The slight difference compared to full HD resolution was imposed by the need to have, at the bottom of the screen, an area where Camtasia set of buttons can be viewed permanently. It should be noted that the default variant of 17 frames / sec. leads to large files while a variant less than 5 frames / sec. can lead to a fragmented film which does not imply a continuous movement of the mouse on the screen.

Opening windows in Figure 1 is performed as shown by the arrows numbered 1, 2 or 3. Very important for a high quality video file are the settings "1 Pass - quality" for parameter Encoding Mode and "6 - Ultra High" for parameter Motion search precision. As regards the audio parameters it was taken into consideration choosing a format suitable to ensure an optimal listening sound without taking up much space on the hard disk. Opening windows in Figure 2 is performed in the order indicated by the arrows numbered 1 and 2.

![Figure 2. Setting the audio parameters.](image)

It is also required to select a customized variant of the video file in order to prevent the breach of copyright. In this sense, a watermark logo type was designed to appear in the bottom right corner, engraved in shades of gray, and which has a size so chosen as not to hinder the details in all video files. Figure 3 indicates the settings that allow editing dimensions, editing position and degree of transparency of the logo chosen.

2.2. Stages of phase II – generating multimedia library

In this working phase it was intended to generate a user-friendly interface, allowing optimal use of the multimedia library i.e easy access to the contents, bibliography, and files necessary to perform tutorial exercises and not least viewing the video files created for each chapter.

The stages required to achieve the multimedia library are the following:

- Defining a new project taking over the name of the multimedia library published "Drawing and 3D Infographics”;
- Inserting a background image on the multimedia library to be created;
- Choice and location of the buttons for accessing multimedia library related chapters.
• Define the buttons to access utilities such as contents, bibliography, Browse CD, necessary files, etc
• Adding elements of visual identity of the publisher willing to publish the multimedia library.
• Making interface links to the files, which are to open when each button is activated individually.

Figure 3. Watermark logo setting window.  
Figure 4. Setting Chapter- type buttons. 
Figure 5. Setting Files Needed-type buttons.  
Figure 6. Final interface of multimedia library.

To generate multimedia library was used version 6.0 of the software "AutoRun Pro Enterprise II 6.0" trial version has certain limitations which even can be successfully used for educational purposes. Each button defined in the access window can be assigned a variety of shapes and colours that provide a particularly user-friendly interface. Also for each button a type of action is defined to be activated when pushing that button. For example, with „Chapter” buttons, as shown in Figure 4 too, option “Open / Run File” must be selected to open the video file, followed by a description in the "Settings" of the place where that video file is in order to be opened. Figure 5 illustrates the window where "Filles Needed" button is assigned action "Browse CD / Folder" and the path is indicated where these files must be found. The end result of phase II which created a communication interface between the user and the multimedia library is shown in Figure 6. In this figure one can see multiple information such...
3. Conclusions and future concerns

This method of knowledge transfer through multimedia libraries emerged from the desire to increase access of students and specialists in the field of assisted graphics to modern means of information likely to lead to the development of the above mentioned skills. The method presented in this paper is characterized by the following particular issues:

- It is a distinct link in the set of methods of knowledge transfer to students and specialists in the field, along with the classic paper book, e-mail communication and last but not least, internet accessing for information;
- It allows easy access to the educational material contained in the multimedia library;
- Provides the user the possibility to select, based on the table of contents, the portion of information looked for;
- Video viewing allows fast forward or back running and eventually repeat viewing of the detailed explanations.
- Unlike a traditional book, which is taken out from the library by a user for a fairly large period of time, the multimedia variant makes that period shorter, because the user is only required to copy the contents on his personal PC and return it in a very short time.
- Multimedia Library contains both demo files presented in the video chapters and files that can be used as a starting point in solving the proposed exercises.
- The author gets recognition in this field following the publication in CNCSIS recognized publishing house.

In the future the method will be supplemented with a version for mobile phones and with the organization of a Webinar session so as to transmit online those categories of specialized information according to narrow segments of training but conducted to a very high level of performance.

References

[1] Goanţă A M 2009 Proc. Int. Conf. Euro-mini conference – Kords Communication Innovative Methods For Graphics Teaching On Technical Directions, Knowledge-Based Technologies and or Methodologies for Strategic Decisions of Sustainable Development Lituania Vilnius September 30-October 3, pp.375-380.
[2] Goanţă A M 2015 Innovative methods for knowledge transfer, publish by IOP Conf. Series: Materials Science and Engineering 95 (2015) 012113.
[3] Najjar L J 1996 Multimedia information and learning J of Educational Multimedia and Hypermedia 5 (2), 129-50.
[4] Weller M, Pegler C, and Mason R 2005 Use of innovative technologies on an e-learning course, Internet and Higher Education 8 61–71.
[5] Goanţă A M 2011 E-learning method applied to technical graphics subjects Journal of Industrial Design and Engineering Graphics, 12 13-16.
[6] Alessi S M and Trollip S R 2011 Multimedia for Learning: Methods and Development (3rd ed.) MA: Allin & Bacon Inc. Boston.