Multimedia support of parametric modeling

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Abstract: Programs for technical modeling are used in almost every field or industry. We see them in technical industries as well as in our everyday life and even in areas where we would never expect to see them. It generally replaces the creativity and imagination of the designer, and in many cases it helps determine collision situations and points during the creation of new products. Multimedia has a significant on the effectiveness of teaching these software applications in the engineering study

Key-Words: vector models, computer aided design, technical modeling, parametric modeling

1 Introduction
As these named programs recently became less expensive and therefore may be obtained more easily, computer graphic design is also being used in practical school training, during regular classes as well as for the preparation of studying materials. Parametric modeler software also provides a tabular view of the components and maintain their links with other model views. As part of the edit graphically, this list is updated when a part is edited on the list are updated graphical views. Computers and computer aided design programs became indispensable during technical classes. The core of each CAD (computer aided design) system is a parametric modeler. The current trend in the process of object design - and not only for the design of technical objects - is the application of the parametric modeling process, which provides a certain method of expression. Using advanced computer graphic technologies you may design difficult phases of the object, while displaying the object in real time. The efficiency of parametric modeling is based on its philosophy. For example, a description of a technical part with the help of technical parameters and mathematical expressions allows the designer to perform immediate modifications and then automatically project these modifications onto the assemblies, layouts, drawings or related production and control tools. This reduces production costs even at the design stage of the future product.

2 Application of parametric modeling

Parametric modelers may use different environments and user interfaces, but the general principles of parametric modeling are similar. The relevant software application is mostly used as another creative tool. Models are created through sketching and through volume or spatial constructional elements. They must be clearly defined, without any redundant or contradictory information. There are always several solutions. Students must be able to deal with difficult and demanding logical tasks and must be able to use spatial imagination. This offers many opportunities for the application of alternative teaching methods, problem and project teaching techniques and the development of creative teamwork [1]. The art of learning to solve problems lies in the fact that the student acquires the ability to independently seek solutions and strategies and to make decisions in alternative situations. Information technologies offer many opportunities for the application of alternative teaching methods, such as the problem and project teaching techniques and the development of creative teamwork [2]. In order to strengthen cross-curricular relations, the Secondary School of Applied Cybernetics in Hradec Kralove introduced project teaching classes. One of the projects realized by the school is called the Virtual tour of objects. The technology of virtual reality is based on various fields such as programming, computer graphics, mathematics, but also on various artistic fields. Therefore, the above-mentioned project involves students focused on these fields of study. Students of the Computer Graphics class undergo classical art training and courses, which teach them the basics of computer graphic technology. Participants in the project are organized into two groups including
future experts of various disciplines. Some are technically oriented (e.g. programmers) and others are artists. To achieve creative cooperation between these groups of students is not always an easy task.

3 Current concept and standard explanation tools
The current prevailing and rather traditional concept of e-learning provided in virtual university projects is limited to discussions, research and to the evaluation of the LMS environment. Typical examples of the LMS in our universities are environments such as Moodle or WebCT. Today, e-learning is viewed as a rather simple remote administration tool for student projects, remote communication between teachers and course participants, or as a mechanism for external expert supervision focusing on the professional level of individual courses [3]. Professional discussions are still focused on unclear results, while trying to demonstrate the benefits and disadvantages of off-line and on-line learning, in which each approach has its proponents and opponents, both on the student, tutor and course administrator sides. So far no unanimous agreement on what would offer the optimal solution has been found. The reason is not the helplessness or insufficient professional knowledge of people participating in these discussions. Variability of contents plays a role and the specialization of university courses in combination with the individual learning styles of participants in a specific environment of the virtual learning method. Currently, only some projects take into consideration the comprehensive view of digital learning offered by a virtual university, as a functional unit or as a model, which assumes a thorough system analysis of all solid, obvious and useful functionalities of the virtual university, which is necessary for successful implementation. Only very rarely do we find the concept of a modern educational institution as an integral unit combining the advantages of today's hi-tech technology with a common point of interpersonal communication, where personal relations and relationships between teachers and students are created and where valid and strong intergenerational experiences are shared as part of the educational process [4].

4 Strengths and weaknesses of the traditional and the technological approach
Virtual learning through the use of technologies should be viewed as a functional unit trying to achieve the greatest possible teaching effectiveness. Technological tools and company applications focusing on hardware and software come up with astonishing innovations every day, which may be used - with a certain degree of inventiveness, in the process of effective learning. Today a student may complete his or her tasks using a mobile phone, laptop or PDA, while taking a train to school or study and read the necessary literature using an electronic reader after downloading the text for free or through the use of commercial products. Let us seek the maximum degree of analogy with the traditional university, where we not only analyze in detail, but intuitively feel the elements of traditional teaching as fundamentally beneficial. As an example, we would like to mention that during studies at the University of Technology, a group of students complied with a boring obligation to visit a not very important technical exhibition. At that time, a former assistant presented 2 international patents here. Since then the students not only kept their utmost respect for the teacher, but also formed a close relationship with the study subject. All of this because of the knowledge that this expert would share his skills, time and energy with the students [5]. Specific opportunities offered by communication technology may be further enhanced and thus we may take full advantage of the strength and the potential of digital communication. Therefore, connecting to and utilizing the strengths of traditional teaching is a joint task of these
experienced teachers, and at the same, it is a task for specifically focused teams of professionals dealing with information technology. This will enable us to achieve the necessary synergies with the common goal of these two professional groups, which still defend their preconceived attitudes to the digital communication of educational content with mutual disrespect. Due to the overestimation of the power of information technology in the minds of people and due to the extent and complexity of this task, this article does not try to present a comprehensive analysis of virtual communication with primary educational goals - that is to present a complex model of a virtual university with all the links necessary for such a model [6].

5 Implementation of multimedia explanation supports of parametric modeling

The progress in information technology has been changing the forms and methods of education. Application of multimedia supporting elements has improved the quality of the educational process. For example graphical symbols representing sketch links or values of parametrical dimensions are relatively small and usually it is not possible to magnify them together with other entities on the desktop. Therefore, for a visual and schematic job description and to display individual details, it is necessary to record the picture in high definition. Due to the high bandwidth, the use of online technologies is limited by the speed of the relevant Internet connection. Today's lifestyle requires speed and clarity.

![Sample of Adobe Captivate work environment](image)

From this point of view, various tools used during the education process which use clear and demonstrable samples are very useful and beneficial. That is why many software applications that use an interactive environment - and which work with real programs, are being developed (e.g. Microsoft Office – Word, Excel, PowerPoint, Access and others). Countless programs are used for this purpose. The main producer and developer of these applications is the well-known and recognized company Adobe (Adobe Systems Incorporated). Software produced by Adobe, such as Captivate, Director, Authorware, Robohelp etc. shares one common disadvantage. It is not free. Plus it is rather expensive, because it was mostly developed for companies. However, thanks to their valuable parameters and high quality, these programs are considered the best in the interactive multimedia education field. At the same time, there are also free programs/software available in the interactive multimedia education field. As an example, the most important free software is a program called Wink. All software offers format conversion as required by the final product. Applications produced by Adobe are able to create multimedia presentations but procedures and manuals I required use Flash, for animation, interactivity, and accompanying audio and video. Of course, the follow-up creation is a very time-consuming task for a person who also administers regular classes at the university. Further, the larger the project is, the greater are the hardware requirements. This creates another financial burden for workplaces and classrooms that use these modern methods. The author must be able to process several types of activities at the same time, unlike with other common programs. During the creation of the presentation the author becomes the graphic designer, animator, film editor, etc. To follow this development and to be able to visit the number of training sessions and courses is an impossible task for a university professor. Preparation of presentations used in classes and preparation of multimedia applications usually involves several people or a work team. Thanks to integrated functional guide modules, a basic version of this method is available for the ordinary user as well. There are many programs focusing on this topic. There are basic and well-known applications used for the creation of instructional presentations and webpage contents, such as non-commercial programs offering the user basic and quick tutorial messages (Microsoft Office PowerPoint, Publisher, Adobe Flash Professional, Replay Screencast, RoboDemo, CamStudioa and many others). However, today's multimedia applications require a certain degree of professionalism and specialization. Samples of applications used for the creation of
interactive multimedia presentations, which the teacher should be familiar with are: Wink, Camtasia Studio, Adobe Director, Adobe Authorware, Adobe RoboHelp, Adobe Captivate.

6 Simple and efficient sample, demonstrating the creation of multimedia supporting elements

Not all tools require professional knowledge. An example of a very efficient environment used for the creation of multimedia supporting elements without the need for extensive professional knowledge is the software Captivate. The web page of Digitalmedia server (a part of the Adobe server), describes the use of the Captivate software. Only three learning stages should be sufficient and the user should be able to create highly efficient instructional presentations or simulations in the Captivate program. Captivate automatically records all actions you perform on the screen. High speed computer networks enable continuous high definition video streams between the source and the end user. Another alternative is video transfer using a "video on demand" system. Digital technology also enables reproduction of audiovisual recordings stored on optical disk recorded by a computer, TV or player. As we see, the applications of these technologies are very broad-ranging. For example, transfer of a picture/image of a multimedia disc (usually ISO format) between the client and FTP server is also possible, which is very useful for example for distance learning students. Audiovisual recording may be done with a video camera, and with other necessary technical devices. An alternative solution is the application of a system used to record meetings or to make them accessible, for example Sonic Foundry Mediasite. However, this system is more suited to recording meetings during which a computer presents static images only. of or recording meetings with animations or video sequences or performances that contain a demonstration of computer software, it is better to use other technologies. The important issue is to select the correct lighting intensity of the person doing the presentation in order to achieve high quality recording, but at the same time, this light may negatively affect the recording of the visual presentation happening at the same time. However, for the visual description of work done in a parametrical modeler, the recording quality of the person doing the presentation is not as important as the recording of the computer desktop. Usually, every move of the mouse cursor is crucial. Uncertain or jerky motion of the mouse cursor or searching through drop-down menus during the presentation is confusing for students. The same is true for the use of shortcut keys, which cannot be seen on the computer desktop. Only a few systems used to record the computer desktop enable the user to visually display activated sections of the keyboard or mouse. The majority of parametrical modelers enable the user to work efficiently with shortcut keys; however, during a presentation I consider the use of shortcuts inappropriate. The situation may change when we begin to use multimedia teaching materials. In order to implement and use multimedia teaching, it is not important whether this process involves integrated multimedia or individual tools/aids in different formats which enable the user to present the relevant information. The important issue is that these tools activate more of the students’ senses simultaneously. Multimedia materials are elements of the so-called educational process supported by technology (technology-based training), which provide information, teaching/education materials and educational content through different forms of electronic media; therefore they are part of e-learning. Detailed results of the research are available in a book called Alternative technologies used for the creation of multimedia teaching supports. Adobe Captivate is a potential tool for the creation of interactive multimedia educational methods and for simulations of the functionality and control of various software applications. While working with a parametrical modeler, the image of the computer desktop is recorded as well as actions and events occurring due to the use of the keyboard or mouse. Then, using the editing mode, the user may add to the picture of the recorded desktop voice commentaries, text descriptions, raster images in various formats, audiovisual sequences in AVI format (audio video interleave), simple vector graphics, presentations in Microsoft PowerPoint or possibly other interactive elements (e.g. press buttons, links, etc.). The finished work may be stored as a self-executable file (Windows executable), Microsoft AVI or in a format supported by Macromedia Flash (SWF, FLA, FLV). These may be shared via web interface or FTP server (file transfer protocol). The advantage of this option is that the user needs only a minimal knowledge of computer graphics, multimedia and video.
programming. The desktop of a computer may be recorded using other software tools as well (e.g., TechSmith SnagIt, Hyperionics HyperCam Technology LLC, etc.) and compressed visual sequences in Microsoft AVI format created without needing large available storage on your hard drive. Audio commentaries may be stored individually or simultaneously. The quality of the audio recording is based on the quality of the sound card and the external microphone. The workplace where the audio recording is done should be well prepared for acoustic recording because background noises negatively affect the recording quality and may destroy the entire work. The picture and audio recordings may be synchronized by using tools for processing audiovisual materials such as programs belonging to the software suites Adobe Premiere, Sony Vegas or Canopus Edius. You may also use multiple audio and video tracks and perform various editing operations. For example you may change the speed of the playback of individual sections, or apply various transition effects or filters, insert subtitles, etc.

7 Conclusion
As the literature says, human beings have huge creative audiovisual thinking abilities and when they think, they use visual images rather than words. So-called visual thinking is mostly used in abstract fields. The perception of visual information represents the largest share of the entire perception done through all our senses. Visual presentation catches the attention, awakens interest and helps with conceptualization. Presentation together with practical demonstration is much more effective. Many terms and thoughts may be understood through visual methods rather than through verbal methods only, for example, practical skills. They should serve to help to expand the visual image. Therefore, it is necessary to keep in mind during the creation of a multimedia teaching educational application to add voice commentaries only to information that is not clear from the presentation itself. Regardless of the applied technology, it is clear that the creation of multimedia teaching supporting elements, and not only in connection with parametrical modeling, may be done by one person/teacher only and therefore it deserves a bigger share of our attention.

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