APPLICATION DEVELOPMENT FOR LEARNING ABOUT GRAPHIC SYSTEMS INTEGRATED IN THE PLATFORM OF E-LEARNING

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Abstract: This paper presents a segment of the research focused on developed applications for all graphic systems (prepress, press and postpress), within the developing platform for learning about them. A simple application user interface makes it easier to communicate with the user and increases the interest in learning. In order to save resources, prevent workplace injuries, save equipment damage by inexperienced users and save time spent on machine training applications are made for a large number of graphic systems. This paper presents a segment of developed applications for graphics systems Riso EZ570, KBA Rapida 7 and Horizon AFC-544AKT. The aim of the research is to analyze the process of developing applications for distance learning in the graphic systems and possibilities for their improvement.

Key words: graphic systems, applications, e-learning

1. INTRODUCTION

Initial ideas for the development of a platform for distance learning were inspired by the desire to overcome the physical distance for the sake of knowledge transfer. Overcoming the traditional method of learning is largely aided by the development of the Internet. Internet technology is the key to the revolution in learning, but by itself it cannot improve the quality of learning. In this regard, the development of distance learning is rapidly supported by scientific research, particularly by the faculty. The conclusions of these studies are as follows, distance education (e-learning) offers numerous advantages (Table 1) but was unable to overcome its limitations. In these constraints primarily counted to e-learning from the user requires certain skills and possession of equipment that the equipment can fail at any time and interrupt the educational process, students need to motivate themselves for learning, etc.

Those who believe that technology will completely replace the great teachers in the classroom and motivated students in front of them, instructors who train employees on machines were mistaken as well as those who believe that learning via the Internet is passing trend [1]. Learning is a continuous cultural process, not just a series of events. The idea that is learning relocated from classrooms and...
laboratories in the new digital work environment provides a new opportunity to make learning accessible to anyone, anytime and anywhere. Such organized learning gives the importance of learning outside of formal learning programs, encourage the development and improvement of multimedia materials in these platforms.

2. E-LEARNING IN GRAPHIC INDUSTRY

Employees in graphic or any other industry want and need to learn according to their schedule. They want to learn as quickly as possible. Learning must be fully accessible, with the possibility of knowledge transfer in plants, offices, homes, hotel rooms, etc. [2]. With new technologies, this can be achieved and thus save downtime of machines for training and increase the organizational mobility. Some of the operators would like to learn slowly, a little bit every week or when their schedule allows. While still training in real systems in real laboratories play an important role in the education of the employees, the needs of employees who have different requirements for learning can be efficiently fulfilled by combining them with new technology learning, e-learning.

One of the most important strategies for management of modern enterprises is improving the knowledge and skills of engineers through frequent training and exercises. If graphic company expect from a leading engineering to often devote time to training or teach other employees and prepare materials for presentations, it will remain less time that they engage themselves in the production process. Their participation decrease in the educational process of operators and increase of the quality of training materials can reduce costs and increase the productivity of the graphic company.

Results of experiments showed that a new approach to learning can help experienced engineers to efficiently create high-quality courses for e-learning, and therefore inexperienced engineers can be in step with the times to get fresh information about advanced technologies and obtain the required knowledge. There are different systems for managing e-learning: WiZiQ, Moodle, ATutor, Blackboard, and others. For the purpose of creating an e-learning system and training for operators in the graphic industry after viewing educational platforms and their opportunities, it was chosen Moodle platform [3].

3. MOODLE PLATFORM

Moodle (Modular Object-Oriented Dynamic Learning Environment) is one of the most popular and most used open source system for controlling Distance Learning (Learning Management System - LMS). LMS is a set of standardized components for learning, designed so as to connect learning with existing IT systems within an organization or through a portal for learning. The aim of the LMS is to provide in a short period a centralized learning environment via a computer that does not depend on the geographical relocation of users, their previous knowledge or position in the company. Moodle is available from many sources (websites, books, files, links, etc.) and activities (forums, assignments, quizzes, lessons, databases, dictionaries, etc.) to support teaching and learning, but what distinguishes the work with it over the traditional method of learning is to explore possibilities of computers to integrate multimedia content. Creating multimedia elements is a very powerful concept, but it is not possible using Moodle, so when it comes to the use of multimedia content in Moodle it mainly referring to the creation of multimedia using other software tools and then the integration of multimedia into Moodle. [4]

4. MULTIMEDIA IN MOODLE

Integration of text, images, audio and video within a single medium represents multimedia. The emergence of multimedia refers to the period of development of computer technology before the invention of the Internet, but the Internet began a real revolution in the application and method of generating multimedia content. Sharing multimedia content over the Internet was initially represented a considerable effort, because of limitations in the share of information through the Internet. Multimedia as a combination of multiple media in one uses a larger space in the computer's memory, but with today's technological capabilities, fast Internet, this limitation increasingly losing importance. Creating multimedia for learning about graphic systems is based on the use of software tools Adobe Flash, and 3D Max.

5. THE VIRTUAL ENVIRONMENT

The graphic interface (system of software components icons, menus, command line) is an essential part of communication between users and applications of graphics systems. In addition to the graphical interface, the application includes a virtual environment. "Virtual environment" is a teaching environment located in computer-generated and supported communication systems, consisting a set of communication groups, work spaces and rooms that have been built [5].

5.1. The virtual environment of graphics laboratory

With the careful development of multimodal interactive interface, it is possible to offer a new graphical interface with the 3D environment. Figure 1 shows the segment of virtual laboratories with graphic machines.

Fig.1. Segment of virtual graphic machines

Modern 3D technology solutions provide the ability to move and explore space, without direct presence with a
searchable knowledge base of graphic systems and its components for easy access to the marked segments of the application. The application has the capabilities for users to test themselves.

The user moves around through the application virtual rooms (printing office or laboratories), which reinforces the sense of belonging, or presence, and thus increases the involvement, motivation and participation in learning. The user can call a graphical interface at any time to quickly access desired content, without the need to move around the virtual environment. The concept of interactive applications is presented in Figure 2.

**Fig. 2. The concept of applications interactive laboratories**

### 5.2. Digital printing machines

When choosing a particular graphic system either through a virtual environment or a graphical interface, the user can focus on the review of the certain graphic system. Figure 3 shows an example of a 3D visualization of digital printing machine with access to information on individual segments of the system.

**Fig. 3. Visualization of Riso EZ570 Digital Printing System**

### 5.3. Offset printing machines

Offset printing technique includes over 80% of the market so that printing offset printing machines take especially significant place in graphic production processes. In addition to getting acquainted with the appearance of graphic systems for offset printing (Figure 4), greater interest is the examination of the internal structure elements with which graphic system works. Figure 5 shows the mesh of the 3D model of the system of cylinders within the machine KBA Rapida 75. The mesh is due to the generation of 3D models in 3D max, involving the animation of cylinders user can identify and arrangement of rollers system for color and wetting, cylinder arrangement and movement of sheet on which is printed.

**Fig. 4. KBA Rapida 75 machine for offset printing**

**Fig. 5. 3D model mesh of a system of cylinders**

Complete information of all printing units gets to render a model that gives an overall information of the structure and process of the machine (Figure 6).

**Fig. 6. Structural and process view of machine**

Figure 7 presents the structure of the transmission system for sheet delivery system.

**Fig. 7. Sheet delivery system**
5.4. Postpress machines
In the case of postpress machines (Figure 8) the user of the application can see the operation of folding graphical materials, where the developed application can show moving and folding sheets in slow motion.

![Folding machine Horizon AFC-544AKT](image)

**Fig.8. Folding machine Horizon AFC-544AKT**

6. DISCUSSION
In order to improve the educational process in the printing industry, a platform for distance learning in the virtual environment has been developed. The platform is adaptable in terms of selecting a large number of machines in the virtual space and depending on the machine about you want to study. The paper presents the segments of developed platform for distance learning in the field of graphic machines in different printing techniques including the main capabilities of user-machine interaction.

7. CONCLUSION
The virtual environment attracts the interest of users of the application; a conventional graphical user interface leaves the possibility for simplified application management. Multimedia applications integrated into the learning platform Moodle increase the quality of learning about graphic systems. Further research in terms of the development of multimedia content for the purposes of the e-learning platform about graphic systems would be based on a detailed visualization of setting graphic systems, with the present requirements for setting machine on the ground, simulation of possible errors during the folding process and visualization software of digital machines with the possibility of creating tasks as jobs for which future operator will adjust the parameters for printing.

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