



DEVELOPMENT OF E-LEARNING PLATFORM FOR GRAPHICAL EQUIPMENT OPERATORS

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Abstract:

E- Learning takes place in an electronically simulated environment and it is based on computer and internet technologies that are the next-generation instruction methods being developed today. E- Learning is not restricted by location as long as the user has the proper hardware, thus increasing number of participants with considerable reduction of education cost. This paper deals with research of implementing e-learning platform for vocational education of graphic equipment operators that takes place in an electronically simulated environment. This paper deals with advantages of such approach in comparison to traditional methods of graphic equipment operator education and advantages of specific technologies that can be used. As a result of this research one such e-learning system is developed by Department of graphic engineering and design for education of graphical equipment operators. System can be used as an independent education system or as an addition to traditional education methods in training of graphical equipment operators.

Keywords:

E- learning, simulation, communication, knowledge

1 INTRODUCTION

Training is the approach to improving knowledge, performance and instruction as the specific process that makes training work. People use training when it is necessary to shape learning in order to acquire a new skill or to utilize new knowledge in a specific way within a specific time frame. Training can be divided into four main elements: an intent to enhance performance in a specific way, typically derived via needs assessments and reflected in learning goals and instructional objectives. A design reflecting the instructional strategy that is best suited to the learning requirement and the learner's attributes, as well as the measurement strategy that gauges the effectiveness of the training [1]. The means and media by which the instruction is conveyed, which may include the classroom, a variety of technologies, independent study, or a combination of approaches.

Vocational education as such is a life-long process and people sometimes want to learn in such a way that it does not interfere with their job: typically, outside work hours and not at a fixed place. Employers are also in employees' education in order to improve their job performance. The desire to make education less dependent on time and place is mainly related to the increasing number of people who combine study and work in order to stay well prepared for changes in job requirements, to improve career perspectives, and to realize personal growth [2]. E- Learning takes place in an electronically simulated environment and it is based on computer and internet technologies that are the next-generation instruction methods being developed today. E- learning platform is a well-suited solution for vocational education in those conditions which will be shown in the experimental part of the paper.



1.1 E- learning usability for vocational education

E- learning isn't being adopted as widely or as quickly as some of analysts have predicted, actual adoption is significantly slower than predicted. Prediction in 1998. was that 50 percent of all workplace training would be delivered online by 2003. and actual percentage in developed world is about to 15 to 20 percent and significantly less in undeveloped countries. E- learning has delivered promised results in industry by eliminating training related travel costs (according to a report from IDC), but that isn't the case for academe. Although online learning promised to improve the quality and efficiency of teaching in universities, the actual results are not as promising. Although studies have demonstrated that online and classroom learning are essentially equally effective [3], other evidence suggests that instructors find teaching online courses to be more time - consuming than teaching the same course in a traditional classroom. Problems with student motivation and lack of social interface which causes underdevelopment of higher order skills mentioned in dual learning concept must be taken in to a consideration also. E- learning is still followed with problems in communication between different E- learning systems, which causes problems in knowledge accumulation. Standards will solve many problems with online learning but the standards are still not established in this industry.

Advantages of E-learning

- Reduction of travel cost and time
- Class work can be scheduled around personal time table
- Students can study wherever and whenever they have access to a computer and Internet
- Self-paced learning modules
- Flexibility to join discussions in chat rooms
- Different learning styles in one course
- Students have the option to select learning materials for their level of knowledge and interest

Disadvantages of E-learning

- Problems with motivation
- Isolation and lack of social interaction
- Instructor may not always be available on demand
- Some courses can be difficult to simulate
- Software usage can involve a learning curve
- This form of education may take getting used to
- Slow or unreliable Internet connections influences performance

1.2 Structure of E-learning systems for education and training of graphic equipment operators

E-learning system for education and training of graphic equipment operators must include capabilities for curriculum material presentation, communication system and simulation of given equipment that it is intended for.

1.2.1 Curriculum material presentation

The task of presenting curriculum material to students is one of most important tasks when building E-learning system. Lessons can be presented as a text, pictures, audio, audio video files or combination of these and can be interactive or static. Right way of presenting material can be determined in consideration to content. Not all content benefit from multimedia, on the other hand some of them can benefit greatly. When presenting statistical data and tables of data best results are achieved by static presentation in which students can immerse them self, while explanations how mechanisms work can



be best presented by animation. Having this in mind appropriate technologies must be chosen. Adobe Flash platform offers possibilities for integration of all formats mentioned as carriers of information. Adobe Flash platform also offers production of interactive presentations.

E-learning systems for education and graphic equipment operator training developed by the Department for Graphic Engineering and Design in Novi Sad is entirely developed as an Adobe AIR (Adobe Integrated Runtime) based rich internet application. Adobe AIR is a cross-platform runtime that building and deployment of rich web applications and content to desktop. Adobe AIR has a rich set of features, with support for building applications using HTML, JavaScript, Flex and Flash allowing them to run on the desktop and go beyond the limitations they would normally have if they were running in a web browser (figure 1). In comparison to traditional desktop applications, AIR applications are simple to deploy, easy and cost-effective to build, have better web integration and will run on all three major operating systems.



Figure 1: Adobe AIR functionality

1.2.2 Communication system

Each E-learning platform must provide communication channels for data transfer. Two-way communication is essential for successful conducting of learning process. There are different solutions of Two-way communication: asynchronous and synchronous [4].

Asynchronous communication is not taking place in real time, people evolved in communication must wait for reply and it is slow even if all parties are pre present at the same time. Asynchronous communication can be achieved through e-mail or internet forums. It has advantages when student and teacher are not present at the same time, or there is more than two people who can benefit from reading the conversation.

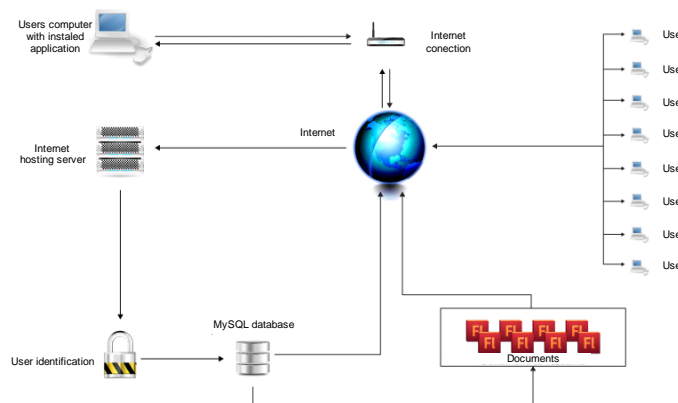


Figure 2: Data transfer and communication in E- learning algorithm



Synchronous communication is type communication that has elements of real time communication, meaning that two or more people do not wait for reply from one another. Technologies recommended for this type of communication would be online chat, teleconferencing or videoconferencing. Algorithm of data transfer and communication in E- learning system is shown in figure 2. Two types of communication give different results, while asynchronous communication enhances speed of knowledge absorption, the synchronous communication is beneficial in regards to social aspects which are one of the obstacles to implementation of E-learning in vocational education.

1.2.3 Functional simulation of paper cutting graphical system

Problem-based and project-based learning is very important in order to prepare trainee for real world problems. Simulation program essentially allows the user to conduct an operations of the process through simulation without actually performing that operation. E- learning systems can mimic real world situations and problems to some extent depending on the complexity and versatility of possible problem solutions. Simulating machine operation and JDF like programming for graphical equipment can prepare trainee for operating real machines by mimicking user interface of graphic equipment. Shortening the time needed for practice on the real machine saves production resources otherwise used for practice. Electronically simulated machine operation can save often expensive recourses and prevent injuries and equipment destruction by inexperienced trainee. Flash based animation supported by ActionScript programming language offer all the tools needed for creating such simulation. Figure 3 shows simulation operation algorithm.

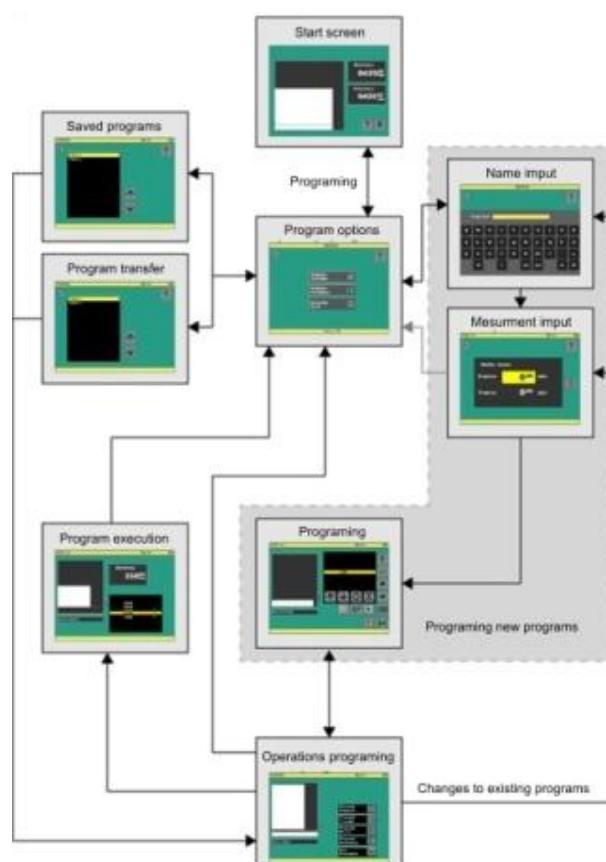


Figure 3: Simulation operation algorithm



2 EXPERIMENTAL

Survey was conducted in order to determine usability of such e-learning platform for vocational education of paper cutting machine operator in particular. Survey was conducted amongst experienced operators of paper cutting machines and teaching staff directly involved with training courses in post print production which includes also the training on paper cutting machine. Other studies have examined in depth the usability of usual teaching methods in e-learning such video, audio or interactive lessons. Complete simulation of equipment operation is not often used and as such not examined enough. Purpose of this survey is to determine opinions of teaching staff in regards to usability of such simulations for e-learning purpose.

2.1 Participants

Ten participants were evolved in this survey, five of them experienced operators of paper cutting machine and five members of teaching staff at the Department of Graphic engineering and design. All of the participants have experience in operating paper cutting machine and have satisfactory level of skills in using computer. This is small number of participants but having in mind that this e-learning platform is in the development stage the survey could not include participants from another similar institutions.

2.2 Procedure

Computer simulation of user interface of paper cutting machine produced in Adobe Flash software shown in figure 4 was shown to participants and they were asked to operate the simulation as it was real paper cutting machine control table. If participants had any trouble operating the simulation caused by difference in input method between computer keyboard and machine control table they were assisted and asked to write how much of inconvenience that was for them.



Figure 4: View of simulated machine interface

Instrument for conducting survey was questioner containing scales from 1 to 10 (1 being lowest grade and 10 highest) for judging the simulation on important issues such as similarity of simulation graphics and machine interface, similarity of function, simplicity of usage, interactivity, comprehensiveness of simulation, need for upgrading, training usability. Participants also had a chance to write their own thoughts on simulation and possibilities for upgrading. All participants were asked to do some usual operations as simple cutting and some more advanced operations such as programming of the machine.



3 RESULTS AND DISCUSSION

Results of the survey are shown in the table 1. as average grade for all participants and they present very high marks for simulation of this type. No significant difference between judgment of equipment operators and teaching staff was noticed.

Table 1: Results of the survey as average grade for all participants

Criteria	Average grade of all participants
Similarity of simulation graphics and machine interface	9,75
Similarity of function	8,9
Simplicity of usage	9
Interactivity	9,5
Comprehensiveness of simulation	9
Training usability	9
Need for upgrading	2,5

Similarity of simulation graphics and machine interface has gathered very high grades (average 9,75) from which it can be concluded that Flash based applications offer good possibilities for replication of machine interface. Functionality similarities have slightly lower grade (average 8,9) than other criteria. From comments given it can be concluded that buttons that are not pressed but rather flipped or turned cause some problems for simulating functionality and user confusion how to operate them. Simplicity of usage and interactivity got high grades, again flip or turn buttons caused some problems with simplicity of usage. Comprehensiveness of simulation of simulation was judged as very high also with some minor details that were omitted. Training usability most importantly got high grades and both the experienced operators of paper cutting machine and members of teaching staff concluded that simulation could be useful in the vocational training.

Beside the comments on behalf of functionality of simulation which are unique to each participant there are recurring comments. It is interesting to notice that equipment operators noticed absence of sound effects and have emphasized that sound effects could enhance simulations effects. This comment and lack of it in teaching staff is very interesting effect that should be further examined in future studies.

4 CONCLUSION

E-learning platform can be applied to vocational education of graphic equipment operators . Up-to-date technologies must be utilized to ensure highest possible functionality of presentation, communication and simulation. Adobe Flash and Adobe AIR platform in combination with Adobe Flash application offer needed tools for successful development of simulations and integration of other wide spread technologies for presentation and communication. With implementation of mentioned technologies E- learning systems can be used as a supplement to traditional learning in some cases can be used as only education method. Conducted survey showed high grades given by experts in every aspect, thus proving the usability of simulation for training.



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