THE POSSIBILITIES OF EXPLOITATION OF E-LEARNING IN TECHNOLOGY-ORIENTED COURSES

Jana Moravčíková

This Publication has to be referred as: Moravcikova, J[ana] (2016). The Possibilities of Exploitation of E-Learning in Technology-Oriented Courses, Proceedings of the 27th DAAAM International Symposium, pp.0136-0141, B. Katalinic (Ed.), Published by DAAAM International, ISBN 978-3-902734-08-2, ISSN 1726-9679, Vienna, Austria
DOI: 10.2507/27th.daaam.proceedings.020

Abstract

Developing trends in area of modernization of E-learning are mainly based on the technical possibilities of information and communication technologies. These trends supplement the distance learning implemented through E-learning about new possibilities of formation, presentation and distribution of curriculum. Information and communication technologies allow develop a new way of teaching for institutions, streamlining and modernizing the possibilities of study and become an important means to support teaching. E-learning modules serve as a complement to the comprehensive study. The paper is focused on the possibility of creating and using E-learning to support teaching of technologically-oriented courses at Slovak Technical University. Contribution describes the possibility of creation of E-learning and study support for technological course "Fundamentals of production technologies II" in an environment Academic Information System (AIS) STU. Contribution aims to determine the outline of the course, instructions on how to set up E-learning and subsequently prepare E-learning support, its individual parts and describes connection of support with the course and students. It describes in detail the creation of E-learning library and its E-objects that are part of E-learning. E-learning enables active use of video, images and tests.

Keywords: E-learning; E-object; E-learning support; E-learning project; technology.

1. Introduction

E-learning can be understood as electronic media supported of learning process. The E-learning system, which is considered to be a new didactic method, enables to provide education not only in a distant form, however there are new possibilities for other forms of education, as well [1]. American founder of the E-learning industry Eliott Masie defines the E-learning as a tool that uses network technology to create, distribute, selection, administration and continuous updating of educational materials [1]. The company "Urdu and Weggen" used in their study the term of E-learning as providing information, educational materials and educational content by using of various forms of electronic media - internet, intranet, extranet, CD-ROM, satellite broadcast, interactive TV [2]. E-learning is used as synonym for education supported by technologies TBT - Technology based training. Other companies, such as "Block and Dobell," consider e-learning as a subset of distance education, and this process is defined as the interaction between the students and the source of information who is physically placed in a remote location [4]. The way of using ICT resources and the availability of information materials depends primarily on educational goals and content, the nature of the education

process, needs and possibilities for all the actors of the education process [5]. The issue of increasing the quality of the learning process using different methods of E-learning is currently the object of interest of many authors [6-19]. The problem is the absence of development of AIS STU E-learning in methodic. The aim of E-learning is to have the skills and knowledge to be useful in the job or can helping individuals to achieve personal learning goals [3]. Contribution describes the possibility of creation of E-learning and study support for technological course "Fundamentals of production technologies II" on bachelor study degree in an environment Academic Information System (AIS) STU.

2. The process of creation and implementation of E-learning in the AIS STU

2.1. Scheme of creation of E-learning in AIS environment

Schematic design of process making E-learning is shown in Fig. 1. It is a graphical representation of each step in the creation of E-learning courses in the AIS environment. Schema contains guide on how to establish E-learning and subsequently prepare E-learning support. The library is designed to store of particular file used in E-learning project. Uploaded files are, for example, different texts (e. g. PDF), animated images, videos and sound records.

The project distinguishes three types of libraries:

- The personal library of E-learning objects - objects that can be used for example in tests, only for personal use.
- Project library of E-learning objects - objects related to specific projects and objects may only be used by persons who are directly connected to the project.
- Public library of E-learning objects - objects who are defined as public, so they are available to the general public

After entering to the folder can be added to the library various "sub-folders" containing individual objects and therefore can be categorized each other.

Fig. 1. Scheme of creation of E-learning in AIS environment

2.2 Structure determination methods of machining

At the beginning of the creation of E-learning it is necessary to create an outline - chapters of the course to be found in E-learning. Subfolders in the E-learning library will have the name of each chapter in E-learning support. Machining technology, for example, for grinding, it may be characterized by the following points:

- Process characterisation
- Kinematics of grinding
- Dynamics of grinding
- Basic methods
- Formation of chips
- Grinding tools
- Toolholder
- Workpiece clamping
- Machine tools
- Surface quality
- Wear and dressing of grinding tools

3. Course and e-learning condition, course structure of grinding

3.1 Create of E-learning project

The E-learning in AIS can create the registered user only. Created project can be made available to the whole university or only for a specific course. The project can be establish using the application eLearning projects (Fig. 2). Basic information about the created project is shown in Fig. 3. The project is prepared to teach in the Slovak language.

Fig. 2. Menu for establish of E-learning project

Project title:	E-Learning of selected studying themes - Fundamentals of production technologies II
Administrator:	Ing. Jana Moravčíková, PhD.
Project description:	Study support of the course Fundamentals of production technologies II ◀
Language:	Slovak
Department:	Institute of Production Technologies
Protected by password:	yes
Project status:	upcoming
Project start date :	14. 02. 2016
Number of workers in the project:	4
Number of tasks in the project:	0/0
Number of documents in the project:	0/0
Number of projects in the projects library:	101
Sample tests designed for the project:	0
Number of questions in test base:	30
Supports designed for the project:	9

Fig. 3 Basics information about created project

For E-learning was created the library of E-objects. The structure for technology characterisation was described in chapter 2.2. Into created sub-folders can be loaded various objects and files which will complement E-learning project. Fig. 4 documented the example of created subfolders for grinding technology.

Path: Knihovna k projektu / GRINDING

Sel.	Name	Quantity obj. / Fld.	Administrator	Information	Move	Modify	Go to folder
	..	0 / 2	J. Moravčíková				←
☐	Accuracy and roughness of surface	3 / 0	Ľ. Kayserová				→
☐	Basic methods	13 / 0	Ľ. Kayserová				→
☐	Cutting forces	2 / 0	Ľ. Kayserová				→
☐	Grinding devices	7 / 0	Ľ. Kayserová				→
☐	Grinding kinematics	7 / 0	Ľ. Kayserová				→
☐	Grinding tools	20 / 0	Ľ. Kayserová				→
☐	Characteristic	3 / 0	Ľ. Kayserová				→
☐	Chips formation	12 / 0	Ľ. Kayserová				→
☐	Thermal effects	5 / 0	Ľ. Kayserová				→
☐	Tool clamping	6 / 1	Ľ. Kayserová				→
☐	Wear of grinding tools	11 / 0	Ľ. Kayserová				→
☐	Workpiece clamping	11 / 0	Ľ. Kayserová				→

Delete the ticked folders and objects

Fig. 4 The list of created subfolders for grinding

After entering to subfolder is possible to add the required E-object. For example, to subfolder “*Basic methods*” were continually added 11 E-objects (pictures) which name defines the content of each E-object (Fig. 5). Next were prepared and added 5 videos, which documents the basic grinding methods.

Sel.	File name	Name	Size	Cardholder	Information	Display	Download	Move	Released	Metadata	Modify
	hrotove brusenie.jpg	Grinding of external cylindrical surfaces	14.63 KiB	Ľ. Kayserová							
	Internal Grinding Machine.mp4	Grinding of internal cylindrical surfaces	11.43 MiB	Ľ. Kayserová							
	rovinne brusenie.jpg	Surface grinding	184.72 KiB	Ľ. Kayserová							
	rovinne brusenie.mp4	Surface grinding	9.12 MiB	Ľ. Kayserová							
	tvarove brus.png	Shaped grinding	152.85 KiB	Ľ. Kayserová							
	Valcove vnutorne brusenie.mp4	Internal cylindrical grinding	6.19 MiB	Ľ. Kayserová							
	valcove brus.jpg	Cylindrical grinding	155.05 KiB	Ľ. Kayserová							
	Vonkajsie brusenie_valcove.mp4	Grinding of the external surfaces	6.08 MiB	Ľ. Kayserová							
	zakladne metody.jpg	Basic methods	43.92 KiB	Ľ. Kayserová							
	1_rovinne brusenie.jpg	Surface grinding	231.58 KiB	Ľ. Kayserová							
	1_tvarove brusenie.mp4	Shaped grinding	2.89 MiB	Ľ. Kayserová							
	2_brusenie vnutorne.jpg	Grinding of the internal surfaces	35.3 KiB	Ľ. Kayserová							
	2_tvarove brusenie.jpg	Shaped grinding	243.15 KiB	Ľ. Kayserová							

Fig. 5 Example of added objects in subfolder “Basic methods”

After adding all required E-objects, user can show the preview of object number in subfolders by “Tree of folders” (Fig. 6) which can be used for quick and simple orientation of created project. The “Folders tree” shown the all subfolders of project and number of inserted E-objects in individual subfolders.

Basic information E-objects library	Workers Tests base	Time schedule Study documents	Documentation Scripter's tools	Tasks
Tree of folders	Folders and objects	All objects	Searching	Settings

The tree of folders demonstrates the hierarchy of all folders placed in the library of e-objects. To go to a folder click on its name. The tree can be adapted by opening and closing the individual folders.

Knihovna k projektu

- Gaugers
- GRINDING**
 - Accuracy and roughness of surface (3 objects)
 - Basic methods (13 objects)
 - Cutting forces (2 objects)
 - Grinding devices (7 objects)
 - Grinding kinematics (7 objects)
 - Grinding tools (20 objects)
 - Characteristic (3 objects)
 - Chips formation (12 objects)
 - Thermal effects (5 objects)
 - Tool clamping (6 objects)
 - Videa (1 object)
 - Wear of grinding tools (11 objects)
 - Workpiece clamping (11 objects)

Fig. 6 Subfolders tree in E-objects library

3.2. Development of study support

The study support is possible create only after inserting all of required E-objects which is the E-support created. The study support contain interactive parts, such as glossary of terms, animated pictures and videos. Sample of prepared study support of part “workpiece clamping during grinding” is shown on Fig. 7. From the created E-learning support can be accessible progressively formed individual parts of the topics with are actually teaches or set up automatic publishing of the topics on the specified date.

Grinding

Contents

- Process characterisation
- Grinding kinematics
- Dynamics of grinding
- Basic methods
- Chips formation
- Grinding tools
- Tools clamping
- Workpiece clamping
- Grinding devices
- Surface quality
- Wearing and dressing of grinding tools
- Thermal effects
- Videos
- Test
- References

Fig. 37 Follower rest

• to [collets](#) (Fig. 38) - for clamping of short workpieces of small diameter

Fig. 38 Collets

Fig. 7 Sample of study support of „Workpiece clamping“

From the created E-learning support can be accessible progressively formed individual parts of the topics with are actually teaches or set up automatic publishing of the topics on the specified date.

4. Conclusion

The aim was to create an E-learning project for the course Fundamentals of Production Technologies II. For the processing of support was used and processing using the machining many wedges cutting tool with undefined geometry of cutting wedge - grinding. Part of the course support was created using the E-learning in Academic information system of STU, in which was incremental added E-learning materials for students of the faculty which have teaching and testing character. Prepared project is ready to process and characterize other machining technologies, which are content of the course Fundamentals of production technologies II. To the E-learning for the E-learning project "Fundamentals of production technology II" were added 13 sub-sections - chapters related to grinding, one of which contained only links to videos from Youtube.com website and another test questions. Within the support, it is appropriate to establish testing test base too, that allows continuous verification of the acquired knowledge. Prepared support is implemented into education of the course. As a result, it was observed improvement in exam results from acquired knowledge.

5. Acknowledgements

This contribution is a part of the KEGA project of Ministry of Education, Science, Research and Sport of the Slovak Republic, No. 032STU-/2014 "Blended Learning principles implementation into teaching of programming of CNC machine tools with advanced kinematic structure".

6. References

- [1] Lepiš, F. (2015). E-learning – Tomorrow Communication, Available from: <http://www.pulib.sk/elpub2/FHPV/Pavelka1/8.pdf> Accessed: 2015-11-18
- [2] <http://teachersupport.info/blog/19-01-2015/introduction-elearning#.VmKg5Pnqiko>, (2015). Education support, Accessed on: 2015-11-26
- [3] Clark, R.; Mayer R. E. (2011). E-learning and the Science of Instruction, John Wiley & Sons
- [4] Baresova, A. (2011). E-learning ve vzdělávání dospělých, page 29, 197 s. ISBN 978-808-7480-007, Praha Vox
- [5] Zounek, J. (2009). E-learning - jedna z podob učení v moderní společnosti, Masarykova univerzita, Brno, 2009, page 37-38
- [6] Jordan, A; Carlile, O; Stack, A. (2008). Approaches to Learning: A Guide for teachers. 2008 Publisher: McGraw Hill, Glasgow
- [7] Ally, M.; Fahy, A. (2004). Foundations of educational Theory for online learning. Edited by: Anderson, T.; Elloumi, F. Theory and practice of online learning, pages: 3-31, Publisher: Athabasca University, Athabasca, Canada
- [8] Ambrose, S.A.; Bridges, M.W.; Di Pietro, M.; et al. (2010). How Learning Works: 7 Research-Based Principles for Smart Teaching. Publisher: John Wiley & Sons, Jossey-Bass, San Francisco, CA
- [9] Clark, R. C.; Mayer, R. E. (2003). E-Learning and the science of instruction. Publisher: Wiley., New York, NY
- [10] MacDonald, J. (2008). Blended learning and online tutoring: A good practice guide. 2008. Publisher: Gower, Aldershot, UK
- [11] Moore, Joi L.; Dickson-Deane, C.; Galyen, K. (2011). E-Learning, online learning, and distance learning environments: Are they the same? Internet and higher education, Volume: 14 Issue: 2 Special Issue: SI, pages: 129-135, Published: MAR
- [12] Bates, A. (2015). Teaching in a digital age Published: URL: <http://opentextbc.ca/teachinginadigitalage/>
- [13] McVey, M. E. (2016). E-learning and education for sustainability. International review of education, Volume: 62, Issue: 1, Pages: 117-121
- [14] Graham, C. R. (2006). Blended learning systems. CJ Bonk & CR Graham, The handbook of blended learning: Global perspectives, local designs, Publisher: Pfeiffer, Available from: <http://www.click4it.org/images/a/a8/Graham.pdf>
- [15] Fryer, L.K., Bovee, H. N. (2016). Supporting students' motivation for e-learning: Teachers matter on and offline. Internet and higher education, Volume: 30, Pages: 21-29
- [16] Keller, John M. (2008). First principles of motivation to learn and E-learning. Distance Education, Volume: 29, Issue: 2 Pages: 175-185
- [17] Esteban, A. M.; Zapata R. M. (2016). Learning Strategies and E-Learning. Some Notes on the Foundations of Learning Design in Virtual Learning Environments. Red-Revista de Educacion Adistancia, Issue: 50, Article Number: 15
- [18] Makraiova, J., Pokorna, E. (2013). Person-organisation fit in the context of cultural learning. 24TH DAAAM International Symposium on Intelligent Manufacturing and Automation, Book Series: Procedia Engineering 69 (2014) 712 – 719.
- [19] Andreev, Kuvshinov, S., Pryanichnikov, V., Poduraev, Y. (2013). Education on the basis of virtual learning robotics laboratory and group-controlled robots. 24TH DAAAM International Symposium on Intelligent Manufacturing and Automation, Book Series: Procedia Engineering 69 (2014) 35 – 40.