VISUALISATION IN PREPARATION OF eLEARNING

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Abstract

ICT implementation in learning strongly influences not only each basic element of learning individually, but learning as a complex as well. Influence is being manifested in different ways and with different intensity. The final form of learning with significant usage of ICT is known as eLearning. Learning as a serious process requires a thorough preparation of a complete realisation. Every such preparation should necessarily have a predictive character. Within eLearning assignments are divided among members of a team that prepares and realizes learning. In this spirit, a teacher shares his responsibility with other team members: a designer, a tutor, a manager etc. depending upon a total number of team members. This paper observes eLearning, especially its preparation, as a specialized computer software where teacher, student and other team members are users respectively actors of a realisation. This way they are put in a situation where they have to use all tools that are otherwise used for development of computer software. Visualisation and graphic model of displaying individual activities provide a significant help, especially to teacher. Paper examines a possibility of using the tools such as UML – especially its Use Case Diagram and Mind Map in planning the learning activities.

Key words: education, learning, ICT, student, visualisation, software, model

1. Introduction

Practice has shown that the process of ICT implementation into the learning is not simple and requires a project approach and a team work. During the implementation of new educational technologies into the educational process, a teacher becomes a part of a team and has to skilfully connect pedagogical knowledge and skills with technological knowledge and skills. Other members of a team can be professionals in ICT usage. Team usually has three to five members, who besides teachers are persons in charge of preparing different parts of e-Learning such as: instruction and graphic designers and programmers in different areas (Caplan, 2005). Size of a team entitled for development of courses’ online segments depends upon institution where it is being developed, such as, graphic designer, web programmer and programmer – author of multimedia can be the same employee of an institution (Caplan, 2005). Within the formerly described team, Caplan (Caplan, 2005) puts an emphasis on a role of a team leader that is usually conferred to the instruction designer. Field professional is usually expected to prepare, in compliance with defined learning outcomes, the learning material for which his sole responsibility is that of authors’ rights. Instruction designer assists field professional in choosing the learning strategy and educational technology. Graphic designer in the above mentioned team
has an assignment of creating the graphic elements learning content in textual form, while the assignment of a programmer – author of multimedia, is to create educational audio and video material. Web programmer helps teacher to choose existing and create new organisational web patterns.

Learning that is supported by ICT can overtake the form of a hybrid learning and pure online learning. Considering the fact that the above mentioned forms enable a preparation of learning that also supports different styles of learning and teaching, creation of web patterns that are to be used for learning process is one of the priority assignments entrusted to e-Learning team. Different institutions use different platforms for performing the online learning. The most frequently used is Learning Management System (LMS Moodle) that can be upgraded and implemented by web patterns. Moodle is an acronym from Modular object-oriented dynamic learning interface and is an open-code project referring a possible insight and change of original application code that can be adjusted to individual needs (Bosnić, 2006).

Since LMS in a certain matter represents a computer software, its usage commonly requires connection with other tools. Equally, eCourse represents a system with a tendency of realizing the installed goals. Designing and preparation include persons who usually have different attitudes toward installed assignments. Consequently, different tools used for designing future processes commonly require a visualisation of models that will help their creation and lead to a desired form. Here we discuss two aspects of visualisation during the process of eCourse’s preparation, while observing the learning as a complete educational process and an information system.

2. Preparation of learning by ICT and learning as a real-world model

One of the main eTeacher’s assignments is modelling the learning process. In the preparation process of learning supported by ICT, we could apply information knowledge used for creation of a complex software and level approach for creation of eLearning as a real-world model. Derntl and Motschnig-Pitrik (Derntl et al, 2005) have developed a Blended Learning Systems Structure (BLESS) model with several levels: Learning Theory & Didactic Baseline; Blended Learning Courses; Course Scenarios; Blended Learning Patterns; Web Templates; Learning Platform. For this paper’s purpose especially interesting is Course Scenarios’ level. This level represents the first degree of abstracting the learning as a real-world model (Derntl et al, 2005).

In modelling of ICT-supported learning process it is important to respect pedagogic (didactic and methodical) principles and characteristics of ICT technology which contribute to more successful realisation of eLearning goals. Since modelling of eLearning combines principles of pedagogy with characteristics of technology, for the purpose of visualising the individual scenarios of learning process, we can use a conceptual map created with a help of MindMap tools and standard Unified Modelling Language (UML).

2.1. Visualisation of e-Learning and a conceptual map

“Conceptual map is a graphic tool for organisation and representation of knowledge” (Novak et al, 2006). Conceptual map represents concepts (nodes) and connections between them.
Concepts in a conceptual map are hierarchy-connected. It is possible for different scenarios of eLearning to design different conceptual maps according to different learning styles and different pre-knowledge levels. Novak (Novak et al, 2004) underlines a need for creation of individual concept networks within conceptual map as answers to specific questions or situations. Within a context of eLearning it is necessary to construct concept networks in comparison to installed learning outcomes. In such described pattern a creation of conceptual maps depends upon creativity and innovation of instruction designers and field professional in process of developing different learning scenarios, considering at the same time students’ needs and learning goals. When creating the conceptual map, it is necessary to clearly and precisely imagine content of concepts and their connections in order to make a map readable (Cabral et al, 2004).

With a help of a conceptual map, a structure of constructing the knowledge upon didactic and methodical principles of modelling the eLearning will be elaborated. Upon feedback information of eLearning model’s efficiency, a conceptual map will be upgraded and revised so that it will never be completely finished. Based upon created map, a teacher will approach to collecting the learning material while other members of a team entitled for modelling of ICT learning will approach to finding the best possible software for performing the installed activities.

Cmap Tools is software that enables a creation and usage of a conceptual map. The advantage of using the Cmap Tools can be observed from several aspects. Authors put special emphasis (Cabral et al, 2004) on exporting the maps in XML format due to possibility of re-usage and creation of several eLearning scenarios. Course Scenarios’ level (Derntl et al, 2005) gives multiple importances to creation of a conceptual map while basic advantage is a possibility of eLearning’s graphic visualisation.

![Example of using the CmapTools](image)

**2.2. Visualisation of eLearning and Unified Modelling Language (UML)**

Feature of an object-oriented approach, in software engineering, is a determination to describe a real world to a manner common to people. Modern software engineering sets upon object-oriented approach of system’s modelling. UML (Unified Modelling Language) is a standardised language for that segment. UML represents an assembly of graphic notations outlined through 13 diagrams that help to describe and design object-oriented software systems. Mentioned diagrams enable a graphic visualisation and specification, modelling, construction and documentation of systems. In that sense, UML does not provide strict specifications: its role is characterised by virtue of its usage. Different demands require different approach so diagrams are allowed whenever necessary, in different phases of software system’s development.

If each real system can be described by object approach then eLearning can be observed as a real-system’s part so we can try to model it by object approach. Description of that system, it’s modelling to be more specific, can be obtained in a visually appropriate mode, by usage of
graphic notations given through UML diagrams. Of all possible diagrams, our attention will be given to Use Case diagram.

Picture 2 Example of using UML tools

Use Case is a static diagram that describes a mode of its usage, whether by users or other systems. It indicates how cases are connected through system and to each other, and how they can be approached by users. Use Case diagram displays actions of people and systems outside the observed system, together with reactions of observed system towards them. Within software system it is being used for system’s analysis and it represents a common foundation for understanding between analytics, programmers and final users, who are also sketched as actors within a system.

In concordance with already mentioned, by visualising the process of eLearning, it becomes a foundation of understanding between eLearning participants. Use Case diagram can visualise role of students, tutors, designers, managers and teachers. It is very important that participants of eLearning align their activities so that learning can be realised in most successful way. Tools and language for creation of graphic model can in that process have an enormous role. Use Case diagram, through visualisation of learning activities, can closely explain what the participants are expected to do, respectively what are their roles. At the same time, the outcomes depend upon number of eLearning process’ participants. Participants, according to Use Case diagrams, become actors and these actors have specific activities given as “use case”. Actors are not part of a whole system, but they solely use system. Activities are defined according to a concrete case, since they are connected to actors. Division of activities is not totally minimized, on use case level, but it remains understandable for all participants. All participants of eLearning process should be able to “read” diagram. Therefore it is preferable for them to be more simple and understandable. eLearning participants don’t have to invest much time in learning how to apply Use Case diagrams. It is said that “picture can spell thousands of words”. Visualisation in this case is a strong facility that can be used for demonstration of eLearning activities to all participants. During the work with students, who for the first time meet the above described diagram, it has been proved that visualisation is intuitive, usage of graphic elements is well accepted, and since those graphic elements in Use Case diagram are not that numerous, not too much time is required for acceptance of Use Case diagrams as a proper visualisation tool.
1. Conclusion

Learning, regardless to its form and realisation, has clearly installed goals defined by connection mode between its elements. Naturally, the basic line represent student and teacher, but the quality and complexity of their relationship is determined by learning goal, learning content and context – environment in which and for which it is performed. This kind of relationship between mentioned elements in situation and environment that allow application of a specific technology require systematic approach. Indirectly, that implies that learning also stands for business and information system that requires application of methods and techniques that have already been practiced in other environments. Normally, development of eCourse is specific, according to individual case. It can be possible for individual team members to unite specific assignments in preparation of eCourses. That usually represents an advantage that can lower the price of a complete process, but the urge to cooperate with other team members also demands additional engagements and understanding of “other peoples’ assignments”.

Modelling as a process of creating models that will serve for simulation of real-time circumstances is indisputable phase in development of each system, eLearning included. Disposable tools include parts which can display processes in a shape of visual models, adjustable and comprehensive to all. In the process a special attention should be given to visualisation of learning preparation and visualisation of learning contents that are basically different terms with a similar realisation. That is the main reason for this paper to discuss conceptual maps and UML as a tool.

The Polytechnic of Rijeka, within learning frames of a Specialist Graduate Study of Information Science, as one of the learning activities also practices the participation in a project team entitled for creation of online course with randomly chosen theme. Students, the information science experts, realise roles of individual team members during the creation of online learning material (course) that helps them to get prepared for that kind of assignments in their future profession. In the process they use mentioned tools. Finally, the online course is implemented in Learning Management System (LMS Moodle). Students, as prospective information science experts, use knowledge from the programming field and exchange the original Moodle application code when developing online courses.

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