Adaptive E-Learning Using METOD

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ABSTRACT
MetaTool for educational platform design (METOD) is a general computer supported educational development paradigm comprising special framework and flexible tools combined in MetaTool that enables even non-skilled ICT users to develop or adapt educational platforms that suit their needs. In METOD several learning theories and contemporary intelligent system design are integrated to introduce innovative educational methods and to improve the quality and accessibility of training and educational processes.

Keywords: *e-learning, adaptive learning*

1. INTRODUCTION
The rapid advancement in ICT enabled the development of computer supported educational platforms (CSET) which can improve the quality, user friendliness and accessibility of training, education and lifelong learning. Computer supported platforms are the basis for supporting or even developing new innovative types of learning, like problem based learning and evidence based learning [1].

However, literature overview and recent research results and results of some pre-studies [2, 3, 4] have shown that there are various disadvantages of current CSETs,: (i) that after the novelty effect of drill and practice wears off the motivational power is lost, (ii) the platforms are static - the educators or trainees can not adapt them to specific environments (e.g. people with special needs), changed educational requirements, new educational programmes and (iii) normally the educators or trainees can not develop such platforms by themselves.

We identified increasing demand for open and all-accessible training and learning and the need for prospective platforms enabling teachers, trainers, educators and even parents to build their own ICT educational platforms without ICT development and design knowledge. These initiatives led to the development of a special paradigm and development framework – MetaTool for Educational platform Design (METOD) within the Leonardo da Vinci Programme[5].

2. THE METOD PARADIGM AND METATOOL
The METOD paradigm is a collection of theoretical and practical findings and the repository of: various training environments, description of trainees' characteristics, possible pedagogical goals, different pedagogical and communication strategies and learning materials (implemented in MetaTool). It comprises numerous learning theories like adaptive learning, adaptive testing, and item response theory and contemporary intelligent system design [6]. The METOD paradigm concepts are implemented in MetaTool and specialized plug-in for learning management system.

MetaTool enables professional and non-professional educators (parents and other family members) to create e-learning platforms which can be imported into METOD-compatible viewer, e.g. Moodle [7], an open source content learning management system (CMS). After importing e-learning platform student can access materials and exercises of available courses. Each student has a different learning path, which is a sequence of materials and exercises that are displayed. The learning path is defined by student type and learning style of the student and it is adapted to if student type or learning style changes.

3. METOD EVALUATION
The evaluation for e-learning is very important. It includes user evaluation, which is divided into evaluation of the instruction and learning environment and evaluation of learning materials, and the evaluation from the developers of e-learning materials which includes evaluation of the instruction and learning environment. Several evaluation studies have been performed in order to get a real feedback about MetaTool and it's applicability in practice.

3.1 Test Site Evaluation Study: Faculty of Electrical Engineering and Computer Science)
The first testing of the users (trainees) response to the e-learning with Metod enhanced Moodle was performed on Faculty of Electrical Engineering and Computer Science, University of Maribor. E-materials for studying Checkland's soft system approach were prepared. The materials were imported in ordinary Moodle. The same materials were also imported in MetaTool and a Metod project was created. The Metod project was imported into Metod enhanced Moodle. From this small experiment we can conclude that e-learning with Metod enhancements in Moodle contributes to the learning ability but the results would be probably better when blended learning would be used.

3.2 Test Site Evaluation: University College of Nursing Studies
The efficiency of learning with e-learning materials can be tested when prior-knowledge and the knowledge after taking an e-learning course are compared. The difference in successfulness of solving pre-exam and post-exam shows the gain in trainee's knowledge.

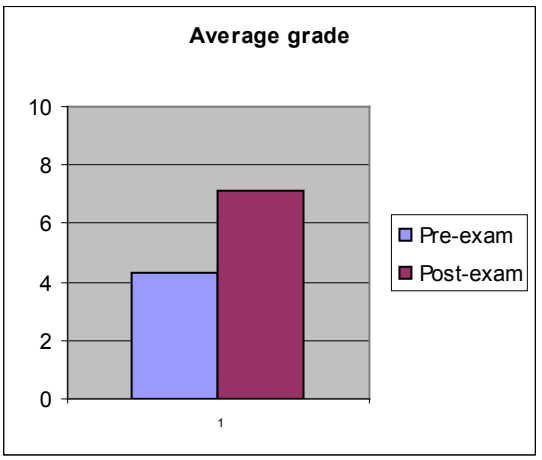
In this study students were using the e-learning materials created with MetaTool during classroom lectures. Before taking an e-learning course in Metod enhanced Moodle they performed a pre-test for evaluating their prior-knowledge. After learning they performed a post-test to establish how much they learned with e-course. The results showed that e-learning was successful.

3.3 Test Site Evaluation: E-Course on Learning Computer Skills
In this study students were using Moodle platform with Metod extensions. E-learning materials for learning basic computer skills were created with MetaTool. The following content was covered: Information Network Services, Basic Concepts of IT, Using a Computer and Managing Files and Word Processing.

The people with special need were also included. The e-learning materials were adapted for them in the following way: (i) the e-learning materials for heard of hearing people and deaf included video with the interpreter and (ii) weak-sighted people had the possibility to use software magnifiers. We tested the efficiency of learning and the trainees satisfaction with e-learning materials and platform.

3.4 Pilot Sites Evaluation
Pilot sites were included in the project with the purpose of testing the MetaTool. The teachers in the schools that were included as pilot sites prepared e-learning materials using MetaTool and they used the materials with their students in their classes. The studies showed that the creation of e-courses with MetaTool is not too demanding. The course creators were satisfied with the help from import and export wizards; however some minor flaws had to be fixed.

Graph 1. The results of test site evaluation at the School of Nursing



The trainees found learning with e-courses very interesting. Their response to e-courses and platform was mostly positive. However, we have to aware that e-learning is not suitable for everyone. The Metod enhanced platform was also tested with people with special needs. The survey results show that deaf and heard of hearing people learned a lot in adapted e-courses. They were satisfied with the courses but since their prior knowledge was generally lower compared to other trainees, they had to spend more time for learning how to manage the course.

4. RESULTS

Because of the space limit we can not present all the results so we will describe only the results for Evaluation study no. 2: Test site evaluation: University College of Nursing Studies.

Fifty-three students at the University College of Nursing Studies were involved into the study. As we mentioned above, the pre-exam and post-exam method was used to evaluate their knowledge. The results showed that e-learning was successful since the average gain in student performance was 27.9% (Graph 1).

At the end of course the students filed out the questionnaire for evaluation of e-course and e-materials. The results are presented below:

- **Question 1**: What is your learning style [8]?
  Most of the students (50%) involved in the survey think that they learn most through seeing. Others learn most with listening (30%) or if they are actively integrated in the process of learning (20%).
- **Question 2**: Were the materials in the course well adapted to your learning style?
  Most of the students have the opinion that their learning style is well represented in learning materials (around 90%).
- **Question 3**: Are you satisfied with the comprehensibility of the text in e-learning materials?
  Most of the students think that the text in e-learning materials is simple and understandable (around 80%).
- **Question 4**: Are you satisfied with the number of practical examples in e-learning materials?
  All except one of the students think that e-learning materials include enough practical examples.
- **Question 5**: Are you satisfied with the number of visual materials?
  E-learning materials should include more visual materials by the opinion of most of the students (55%). Others think that there was sufficient number of visual materials.
- **Question 6**: Are you fond of e-learning and would you like to try it again?
  The analysis showed that more than 50% of students were fond of e-learning and would like to try it again.

From the results of the questionnaire we can conclude that students were generally satisfied with e-course and that all learning styles and learning types were well represented in e-course. The Metod enhancements were well accepted by students.

5. DISCUSSION AND CONCLUSION

Several evaluation studies have been performed in order to get a real feedback about MetaTool and it's applicability in practice. The studies showed that the creation of e-courses with MetaTool is not too demanding. The course creators were satisfied with the help from import and export wizards; however some minor flaws had to be fixed. The trainees found learning with e-courses very interesting. Their response to e-courses and platform was mostly positive. However, we have to aware that e-learning is not suitable for everyone. The MetaTool and Metod enhanced Moodle proved to be very useful for trainees of different ages and also for trainees with special needs. However, the tool will be extended and updates (according to the practical needs) will be available on the project web page in the future.

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