One Approach for Personalization of E-learning

Donika Valcheva, Margarita Todorova, Oleg Asenov

Abstract: *An approach for personalization of the e-learning with preliminary processing and simulation of the teaching and learning process for priori assessment of the effectiveness and transformation of the existed e-learning content towards the individual student expectations is described, tested and visualized in this report. The presented approach has methodical value, according to the idea for dynamically adjustment of the individual learning profile of each student with the aim to increase the personalization level in the e-learning process.*

Key words: *E-learning, Effectiveness, Learning Styles, Personalization.*

INTRODUCTION

In the context of the modern economy, where the knowledge management is very important, the fast exchange of information and the continuous knowledge and skill improvement is the key for success. The interest about the problems, the common aspects and the application of e-learning is incessantly increasing. This interest is one of the basic reasons for the variety of opinions and interpretations about the term e-learning. A large number of authors [3, 8] think about e-learning as a learning process, assisted and realized with electronic tools and medias. In more concrete sense, which is mostly dominant in the educational society, the e-learning is defined as teaching and learning, which is assisted or distributed via Internet [2, 6, 7].

The common understanding for "assessing the effectiveness of the e-learning" is connected with creation of an objective feedback from the students to the developers of the e-learning courses (modules). In many papers [1, 3, 4, 5, 6, 9] the authors compare e-learning and the traditional way of teaching and studying and they point that one of the main advantage of the e-learning process is that it is realized mostly on-line, without the necessity of students' presence in the auditory hall. This gives them the possibility to plan the time resource. On the other hand the students expect that with e-learning they can reach high level of personalization, which is not achievable in the auditory forms.

The feedback, as an approach for assessing the effectiveness of a given course according the individual needs of the concrete student is in contradiction with the ideas and expectations of the students for personal online learning space.

Serious problem in e-learning is the lack of personalization of the teaching and learning process. In the Internet space can be found countless courses in one and the same theme, presented in different way, with different level of usage of multimedia elements, directed to different learning styles, with different duration and complexity.

The user has the very difficult task – to find in the ocean of e-learning courses, the most appropriate for his learning style, basic knowledge and skills. This is not always possible, and even when the choice of an appropriate course is a fact, the chance the initial goal (gaining knowledge and skills in a given field) to be reached for a short time is not high. This problem is deeply discussed in [1, 10, 11, 12, 13]. It is necessary to be created an approach, which will ensure knowledge (skills and competences) acquiring and opportunity for preliminary selection from great number of e-learning modules with the aim for personalization of the e-learning environment according to the individuality of each student and his expectations about the final results.

I. DESCRIPTION OF THE APPROACH

Fig.1 presents a block scheme of an approach for personalization of the e-learning with preliminary processing and simulation of the teaching and learning process for priori assessment of the effectiveness and for transformation of the existed e-learning content

towards the individual student expectations. This approach is based on existed e-learning content (e-learning modules), which is assessed with definite system of criteria for acquiring the important for the personalization content - E-modules metadata. From the point of view of the models for data presentation, it could be accepted that each course is presented by metadata structure.

The choice of the structure and the content of the metadata is based on the idea that each module can be described according the personalization needs and the presented metadata content must be understandable for the experts, which will process the courses in Stage 1 from the presented approach (Fig.1).

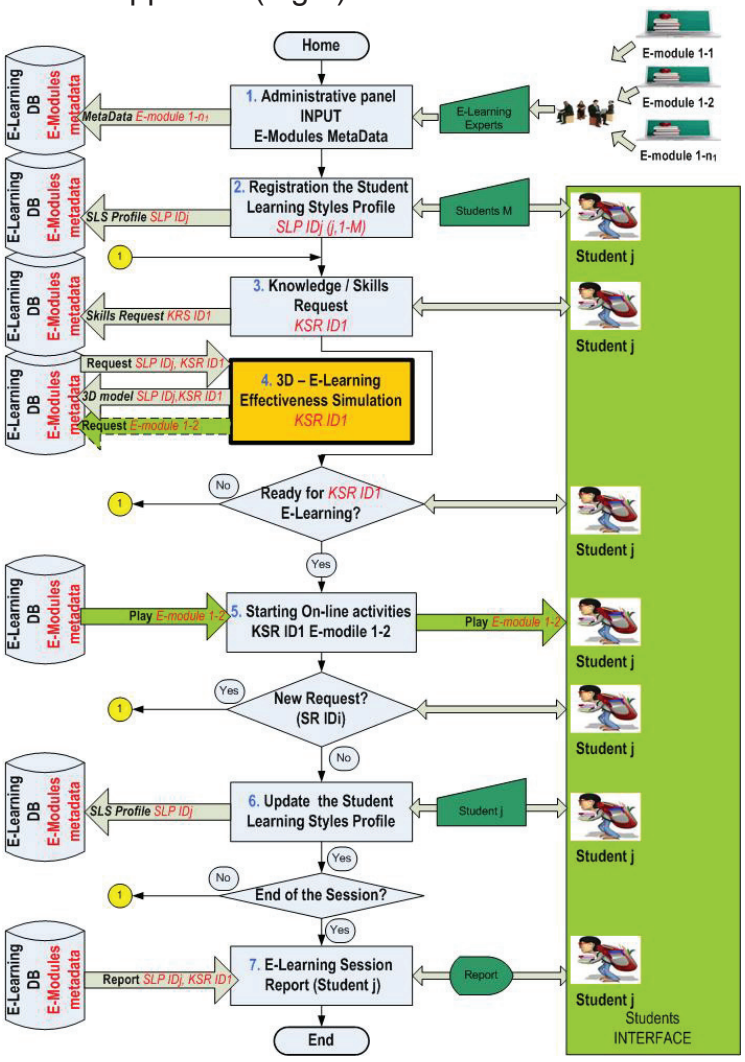

Fig.1. Block scheme of an approach for personalization of e-learning

The presented new approach consists of 7 stages:

Stage 1 – the e-modules (E-module 1-n) are described by experts with metadata (E-module metadata) and are stored in database (E-learning DB). This stage is deeply discussed in [1, 12].

Stage 2 – includes the student's registration and determination of his individual learning style. This is presented in the approach by the data structure SLP IDj. This stage is deeply presented in [1].

Stage 3 –includes the student request for learning (the request is presented in the approach by KSR IDj).

Stage 4 – in this stage the 3D simulator defines the best versions of the existed e-learning modules for the individual learning style of each student by applying the 3D module. The input data for the simulator are the students request KSR IDj and the student's learning profile - SLP IDj.

Stage 5 – the selected most effective e-learning module is offered to the student and the online activities are started.

Stage 6 – opportunity for actualization of the student profile. It is possible the input data about the students learning style to be changed because of some outside factors.

Stage 7 – end of the session and saving the updated information.

One example for metadata structure for presenting e-learning module is shown on Table 1.

Table 1. Metadata structure for describing e-learning module

Metadata structure	E-module 1-n1	E-module 2-n2	E-module 3-n3
Field of science			
Subject	1-"…."	2-"…."	3-"…."
Date of creation	12.05.2010	17.05.2010	21.02.2010
Language (s)	EN,BG	EN	BG
Author	"……."	"……."	"……."
Average duration (hours)	0,8	1,2	0,9
Learning by seeing in % from the whole learning process	70%	20%	50%
Learning by hearing in % from the whole learning process	20%	50%	20%
Learning by doing in % from the whole learning process	10%	30%	30%

The presented structure in Table 1 is an example and aims at visualization of the formalization level by metadata. The experts' task is to assess the proportion of the learning modalities that each course offers and thus to define to which learning style is most appropriate.

The last three elements from the metadata structure have direct connection with the learning styles and the suggested by the authors in [13] 3D model (stage 4 from the presented approach). On stage 2 of the approach questionnaire with the students is conducted in order to be defined for student j his personal style of learning, presented in the approach by the data structure SPL IDj (Fig.1).

Table 2 shows the content of the data structure SPL IDj, which presents the profile of student j.

The presented structure in Table 2 is a production of the structure for formalization of the learning content by metadata. In this way is ensured informational support of the 3D simulator for assessment the effectiveness of e-learning (Stage 4 of the approach), based and developed on the basis of the 3D model, deeply described in [13].

Data structure (Stage 3) KSR ID is used for formalization of the students' request for e-learning content. For good quality of applying the experimental approach it is necessary for the personalization of the e-learning to be assessed not only the personal learning style of the students, but also their individual needs for learning.

Table 2. Metadata structure for presenting student's profile

Data structure for presenting students' profile for students j, j+1, j+2	Student j	Student j+1	Student j+2
Name of the student	"……"	"……"	"……"
ID	XXXX	YYYY	ZZZZ
1-st preferred language	BG	BG	EN
2-nd preferred language	EN	EN	RUS
3-rd preferred language	RUS	RUS	BG
Effectiveness of acquiring knowledge by „seeing" in %	70%	20%	50%
Effectiveness of acquiring knowledge by „hearing" in %	20%	50%	20%
Effectiveness of acquiring knowledge by „doing" in %	10%	30%	30%

Table 3. Formalization of the students' request for e-learning content

Data structure for presenting the individual requests of student j, j+1, J+2	E-module 1-n_1	E-module 2-n_2	E-module 3-n_3
Name of the student	"……"	"……"	"……"
ID	XXXX	YYYY	ZZZZ
Field of science	"…."	"…."	"…."
Subject	1-"…."	2-"…."	3-"…."
Expected average duration (hours)	1,5	2,0	2,0
Actuality of the content – published not late than – data	01.01.2010	01.01.2010	01.01.2010

On the basis of the data structure from Tables 1, 2, 3 is formed the output information for applying the 3D model as a tool for assessment the effectiveness of e-learning. The information from Stages 1, 2, 3, according Fig.1 is stored in database - E-Learning DB.

The 3D simulator for assessment the effectiveness of e-learning (Stage 4) is based and developed according the 3D model of e-learning. The input data for the simulator is the student's request KSR IDj and the profile of the student j - SPL IDj. In the concrete example are assessed all N courses with subject „1-..", which are described with metadata in E-Learning DB – E-Module 1-1, E-Module 1-2, E-Module 1-N.

II. EXPERIMENTAL TESTING OF THE APPROACH

The mean of the graphical visualization is to present in geometrical form the difference between the metadata for the character of the e-learning content (module, course) and the individual student learning style, conformable to the difference from the average and the expected duration of a chosen e-content.

For the goals of the experimental testing 10 courses are selected. Each of the courses is developed in different versions and each version differs with its metadata description. For better visualization of the results all the selected versions are with dominant percentage for learning by seeing style. 20 students with different profile and learning style participate in the experimental testing. The idea is to be examined the effectiveness of a given e-learning course for students with different profile (i.e. with different ration of the three basic modalities).

Fig.2a and 2b show the results of the testing for two students in the experiment. The minimum value corresponds to the most appropriate version for the student to learn.

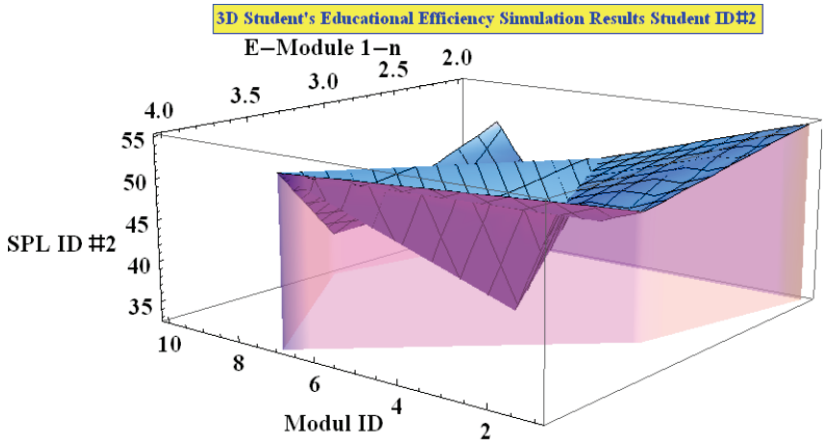

Fig.2a Result for student with learning by hearing 50%, learning by seeing 20%, learning by doing 30%

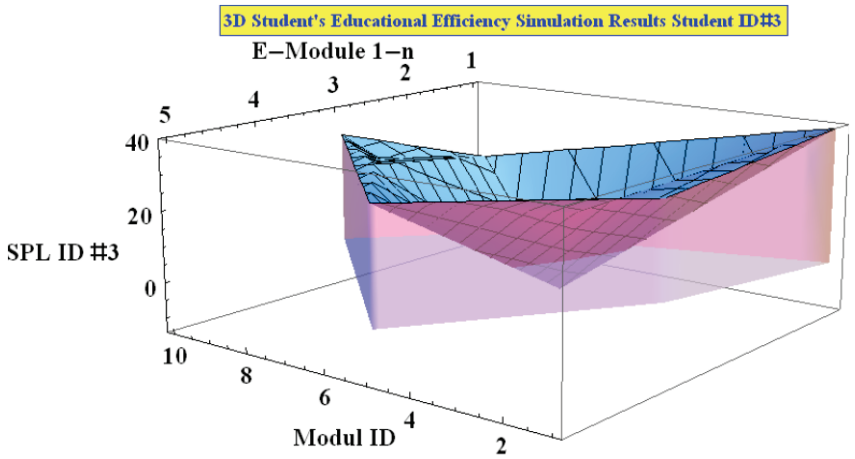

Fig.2b Result for student with learning by hearing 20%, learning by seeing 50%, learning by doing 30%

CONCLUSIONS

The integral character of the assessment for effectiveness, which is formed by applying the 3D model of e-learning [13], because each of the students' perceptual modalities is taken into consideration, is visualized in this paper.

On stage 5 the most effective e-learning module according the individual student's learning style and needs is offered and the real learning process is conducted. In finishing the learning session in the experimental approach there is an opportunity for new testing of the student – Stage 6. The actualization of the student's profile gives possibility for feedback after finishing the course. In the experimental approach this feedback is not directed towards assessment of the e-learning content or way of presenting the material, but towards improving the student self-assessment about his preferred learning styling. In this way one of the basic disadvantages in the presented approach – the formation of the learning styles by self-assessment is not always subjective. With each module the student corrects the proportion of the three perceptual modalities in his individual profile. The presented experimental approach for applying the 3D model for assessment of the e-learning effectiveness is important not only for presenting and applying the 3D model, but also it has methodical value, according to the idea for dynamically adjustment of the individual learning profile of each student with the aim to increase the personalization level in the e-learning process.

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