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PERSONALIZED E-COURSE IMPLEMENTATION IN UNIVERSITY ENVIRONMENT

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ABSTRACT

The paper deals with the issue of e-courses personalization in selected LMS. Even though this topic has been the subject of research for a longer time, more effective concepts of learning through e-courses are still being sought. Part of the contribution is a brief explanation of the terms personalization and adaptivity, which are often mistaken or regarded as equivalent in practice. An overview of the current issue provides to reader concrete solutions to a personalized approach to education through the LMS Moodle. For purposes of research, LMS Moodle is used, which fulfils the conditions for meeting the goal of the research problem. SWOT analysis has been selected as an auxiliary tool for implementing the personalized e-course in the university environment. Further, the paper deals with the principles of creating an e-learning course as well as with the proposal of a specific methodology and its implementation in LMS Moodle. The results and findings from the research conducted so far are also available. The conclusion of the contribution deals with the summary of the results and findings as well as the further tendency in this field.

KEYWORDS

E-learning, LMS Moodle, Adaptive hypermedia systems, Personalization, Educational process, SWOT analysis

1 INTRODUCTION

Since the integration of Information and Communication Technologies (ICT) into the educational process, new ways of use of these technologies in education have been sought. One of them was the e-learning that represented new era in education. With the increasing trend of lifelong learning supported by ICT, some roles and competences of the teacher are changing. According to Burianová & Turčáni (2016), the digital competences of the teachers represent a bridge between the traditional learning and e-learning. Progressively, the educational process is starting to focus on the personality of the learner and the teacher is getting into the role of a tutor. E-learning has become the part of education in today's times thanks to its diverse use, from its presentation of digital content till the so-called Learning Management Systems (LMS) (Kostolányová, 2012).

Nowadays, students no longer have to wait for a specific time and place to learn. They can use technology not only for formal but also informal learning that is directly applied to their lessons or at home, on any computer, notebook, tablet or smartphone connected to the Internet (Burianová, Turčáni, Balogh, & Mudrák, 2018).

The use of e-learning technologies affects the planning, learning, design, control, and assessment of the learning process and the provision of educational content. For example, blended learning education is based on this idea (Burianová, Turčáni, Balogh, & Mudrák, 2018). When designing and implementing an e-

course, it was chosen this form of education. The individual solutions are described in the methodical part of the paper.

At the beginning of creating a computer support in the form of e-courses created in virtual environment, they brought some disadvantages among the advantages. One of them was disrespecting the individual attributes of the learners. This disadvantage has already been pointed out by multiple authors. The most famous one is Peter Brusilovsky who has already written a few scientific publications. He called the approach "one size fits all". An example of the concept is publishing the same study materials for the e-course participants. In 2007, Brusilovsky was one of the editors of the book *The Adaptive Web, Methods and Strategies of Web Personalization* which sets the objective of mapping the current situation in adaptive systems. In the book, each author describes their own approach to the issue of adaptation (Brusilovsky & Millan, 2007).

The mass education in the class with the help of standard e-learning is not capable of fulfilling the individual needs of students. Some of them are kept hold and start to get bored and then there are those for who the speed is too high and cannot understand everything. Some students might like the study topic, but they might not be satisfied with the teacher's teaching style. By time, these students might show dislike for the teacher and the subject. As a consequence, this results in impaired learning results (Brusilovsky, 2003; Magdin & Turčáni, 2015).

The reasons mentioned above led to efforts to personalize the content of e-learning courses according to individual attributes of particular classes of users. To some extent, every student is determined by a set of his individual attributes. These attributes can be expectations, motivation, learning habits and styles, needs, etc. according to which students can be categorized into particular groups (Despotović-Zrakić, Marković, Bogdanović, Barać, & Krčo, 2012).

Nowadays, efforts are being given to design more efficient concepts that could possibly be used in applied adaptive learning systems. The goal is to use system tools that help to identify automatically the mentioned individual attributes of students. The more aspects would be taken into account the more precise personalization could be created. Before the implementation of the personalized course itself, the first was to analyse the given LMS Moodle and to create an e-course model with the help of simulation tool Petri nets (PN) (Mudrák, Turčáni, & Burianová, 2018). The acquired knowledge will be applied to achieve the main goal which is creating a personalized e-course and implementing it in the educational process.

2 PERSONALIZATION OF E-LEARNING

In scientific publications about personalized systems with adaptive potentials, there is a certain difference in opinions in the meaning of terms adaptability and personalization. It can also be caused by understanding them from various points of view. They are not used only in informatics which can be another reason for misunderstanding or various definitions by authors.

Authors, who deal with the adaptation of the user interface, distinguish between the concepts of adaptability and adaptivity. The main criterion is how the system customization is implemented. Adaptive systems dynamically change their features to constantly support the user in their activity, while adaptable systems only provide the user with various adaptation mechanisms for this change. Thus, dynamics can be considered one of the basic attributes of an adaptive system. According to Kostolányová (2012) an adaptive LMS monitors the behavior and characteristics of a student, stores this information and continually evaluates and updates the system. Based on the evaluation of this information according to Kapusta & Švec (2008) adaptive systems change their structure, functionality and interface to meet the different and changing needs of an individual or group.

Multiple authors indicate that system personalization represents supplying and providing personalized content to a particular user. In our opinion, the terms personalization and adaptability are closely related. Personalization is viewed as a problem solution how to provide the user with as much comfort as possible while working with the system. Bieliková & Návrat (2006) claim that besides providing individualized

information to the user, the objective of the personalization is to define which information is the most relevant for him and to present it to him in the most convenient way. Kostolányová & Šarmanová (2016) understand the term personalization as a solution adaptation for various problems, situations, environments, etc. to specific conditions and requirements of individuals.

According to Magdin & Tučáni (2015) education personalization is a way by which students learn with regard to their previous knowledge, skills and learning styles. Limongelli, Sciarrone, & Vaste (2011) state that personalization of the learning experience is closely related to the effectiveness of the learning process itself, as the personalized content is more easily assimilated by the learner who, as a result, is more strongly motivated.

According to Karagiannis & Satratzemi (2016), there are two approaches in personalized e-learning – static and dynamic. An example of a static approach is a specialized questionnaire at the beginning of the course where the student has to fill in order to find out his entry attributes (learning style, previous knowledge, motivation, etc.). According to this information, the course adapts in advance to the student, so it suits his needs. On the other hand, the dynamic approach is based on observation of user's activities in virtual learning environments (VLE) in real time. The system saves the data about the user into the database. Immediately after evaluation it adapts its content, user interface, etc. to the given user. Karagiannis & Satratzemi (2016) claim that better results are achieved with the second approach, because in the first one is dealing with the initial state of learners while the second deals with a specific state. Mudrák, Turčáni, & Burianová (2018) propose the combination of these approaches. In their opinion, with the static approach, it could be possible to find out information via diagnostic methods where this information would be hard to obtain. For new students it would enable to adapt the course right at the beginning. After receiving a sufficient amount of data about each user, there would be another adaptation with the dynamic approach.

The knowledge mentioned above would be summarized and an interrelationship would be described between personalization and adaptability. Adaptability of e-learning courses could be understood as means provided by the system that allows to collect and to save data about the user. Based on the information, it could enable a change of system elements leading to personalization.

Personalization of education through VLE has been solved for several years. Two major directions of implementation are presented in this area. Some authors have chosen to create their own VLEs according to their specific requirements, and on the other hand, they have created plugins or changed properties of some open-source LMS modules, such as Moodle.

Limongelli, Sciarrone, & Vaste (2011) created an LS-Plan system that was integrated into LMS Moodle. The system automatically organizes study material based on student knowledge and learning styles. It uses a three-level approach to dynamic adaptation, which the authors describe in detail in the article.

Despotović-Zrakić, Marković, Bogdanović, Barać, & Krčo (2012) developed a method to create adaptive learning courses for distance education in Moodle. The courses are organized and adapted to three groups of students according to their learning styles. The authors used the model FSLSM leaving the sensing/intuitive dimension out. It is interesting that for this purpose only default functions of LMS Moodle were used.

Magdin & Turčáni (2015) modified the module book in LMS Moodle that provides advanced adaptive behavior of the original module and called it AdaptiveBook. The authors used the questionnaire ILS (Index of Learning Styles) to assign the appropriate learning style to every student.

Karagiannis & Satratzemi (2016) decided to create a hybrid dynamic user model based both on learner knowledge and behavior. They are using the static modeling, in which the learner must answer ILS and declare his/her objectives at the beginning of the course. Regarding dynamic modeling, data comprising the number of visits to each type of learning object and the duration of these visits, are used as input in a decision tree algorithm. Besides mining behavior data, dynamic modeling implies knowledge progress calculation.

Zounek, Juhaňák, Staudková, & Poláček (2016) implement education through LMS Moodle based on constructivist principles, project and group teaching methods. In the concrete, students are becoming the e-course makers themselves, and together with the teacher, they form one work team. Teachers are in the role of tutors or coaches of individual teams and provide students with feedback on their work.

Bradáč, Šimík, Kotyrba, & Volná (2017) identified the properties they considered to be key in personalizing VLE using the data they obtained. Based on the results of the questionnaire, which was attended by students of Applied Informatics, they developed a specific proposal of a personalized e-course in LMS Moodle. They decided to personalize the e-course's difficulty based on student's previous knowledge. For this purpose, they used a test activity that was based on the gradual complexity of questions where students could reach different levels of knowledge (beginner, intermediate and advanced). Further, the authors recommend continuous testing of students during the whole semester and, in case of deviations of the results, their transfer between the groups. They are of the opinion that it should be provided with different forms of study material to students, but there is no need to identify their learning styles. They leave students free to choose different forms of study materials.

3 METHODS

To determine the advantages and disadvantages of LMS used, the most appropriate method is to analyze its properties. For this purpose, we decided to use a strategic SWOT analysis to present these findings as strengths and weaknesses as well as external factors affecting the system in terms of possibilities and threats (Bakhouyi, Dehbi, Talea, & Batouta, 2016).

3.1 SWOT analysis of LMS Moodle

In the internal analysis, we consider the strengths and weaknesses of LMS Moodle in terms of implementation in the university environment, namely at The Department of Informatics (DI) UKF in Nitra. In the external environment, we identify opportunities and threats in all major areas of the organization (Grasseová, Dubec, & Řehák, 2012). The university environment and all elements that affect it will be considered the external factor which influences a successful implementation.

Based on the results of the SWOT analysis, our goal will be to eliminate the negative factors associated with the use of LMS Moodle, respectively, to reassess the suitability of its use at the DI. After the initial analysis, however, we did not find a more serious reason to persuade us to think about changing the LMS used. This SWOT analysis, as a sketch of the initial findings, is presented in the article *Analysis and Implementation of Adaptive Course in Moodle* (Mudrák, 2017). Its updated version, for the sake of clarity, is also shown in Figure 1.

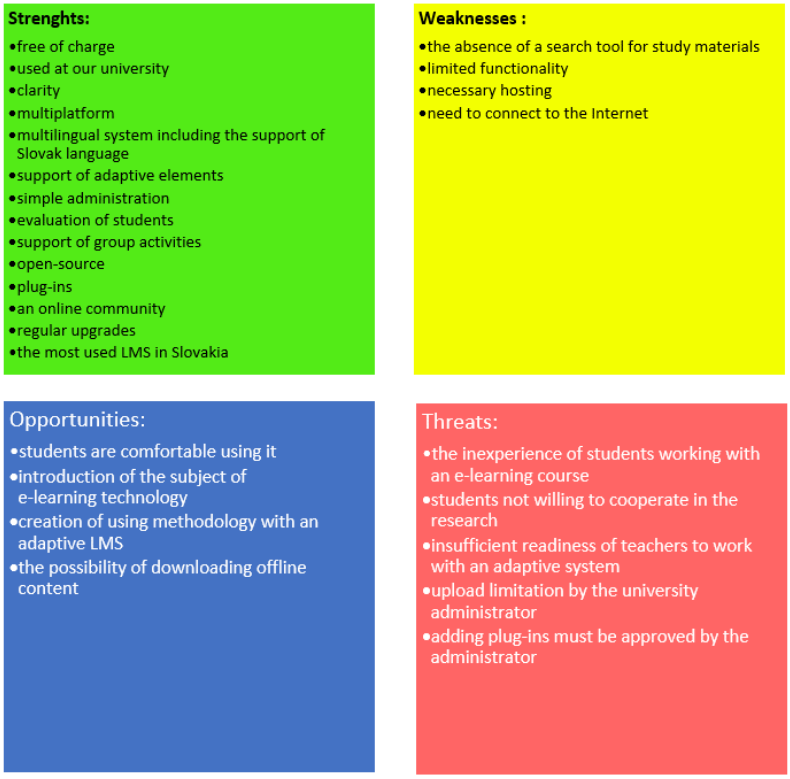

Figure 1 SWOT analysis of LMS Moodle in university environment

Apart from the fact that LMS Moodle is free, its use brings with it many other benefits. The most important criterion for us was the support of adaptive elements for personalizing the subject matter, which the system meets either by its predefined features or plug-ins that are available at https://moodle.org/plugins/. Since we are dealing with an open source platform, we can create new functionalities and implement them directly into the system under open license, specifically the GNU GPL. One of the weaknesses is considered the absence of a search engine, which would allow students to get a faster orientation in the study materials. The need to connect to the Internet is considered as a weakness because of that it may be to a certain extent restrictive, whether for course designers or students. However, students have the option of downloading some educational content and studying in offline form. The last weakness found is the need to establish hosting for the use of the system, which requires funding. However, this only applies if we want to create and manage our own LMS Moodle outside the university environment. The fact that our e-course is not created on our own server also brings with it certain limitations from the university side. These are next declared as threats. First is the rate of upload limitation, namely 128MB, which may be in some cases inadequate (especially when uploading larger projects or applications). The addition of plugins must be approved by the system administrator of the university, which may be restrictive, especially for course designers, in terms of research and innovation. The insufficient readiness of educators to deploy adaptive elements to the system is considered as the weakness too. At first, it will be necessary to confirm this claim by means of a questionnaire survey and a content analysis of the courses used at the university. In case of confirmation of the hypothesis mentioned above, the proposed methodology should also simplify this problem. University students often differ from each other by the attended secondary school. While most secondary schools in Slovakia use the form of e-learning, it is also through LMS Moodle (Tóthová, Šemeláková, & Hosťovecký, 2016). However, there are also schools that do not provide this form of education or use a different LMS. e would also like to verify this fact at the beginning of the winter semester about first-year students. The aim will be to find out whether students have experience with the use of LMS Moodle, respectively another LMS from the secondary school. If students are not working with this system, it is a possible solution in introducing a subject that will deal with using LMS Moodle, and which will teach students how to use effectively the e-learning environment as soon as they enter the university. Other

strengths and weaknesses of LMS Moodle, along with the possibilities and threats in its implementation, are presented in Figure 1.

In the present, the aim is to keep it up-to-date, especially for new findings. The next step will be to eliminate identified weaknesses through the strengths of the system and the opportunities offered by the university environment.

3.2 The methodology of e-course creation

The next step was to create an e-course structure and content based on adaptive possibilities and needs. For this purpose, modelling methods have been chosen that enabled to formalize the given problem. A visualization modelling system with the possibility of a simulation has been selected. For the indicated purposes, a modelling system with PN has emerged as the most appropriate. A specific model of student transition through the personalized e-course is presented in Mudrák (2017). To create a didactically effective e-course, it was essential to know the principles of its creation. When designing and creating a teaching with the support of e-learning, it was important to choose tools that would have actual didactic effect. The basic requirement was that the students would become active and creative working beings instead of receiving information in a passive way (Čapek, 2015). For the creator of the e-course, the educational objective should be determinative.

The design, the creation or the construction of teaching is called instructional design (ID). According to Zounek, Juhaňák, Staudková, & Poláček (2016) ID includes:

- tools (ID process, theories and models, digital technology, etc.)
- participants (of teaching, management, ID team, etc.),
- environment (school, LMS, etc.).

ID model represents a systematic arrangement of teaching that had an objective to support the processes of teaching. ID should be based on theories and principles of learning and it should describe each phase of teaching operations.

When creating an e-course with the use of any model, it was necessary to take into account the didactic principles that were laid down for the teaching process in accordance to educational objectives and the content. A precise formulation of educational objectives of the e-course simplified the choice of study content, didactic methods and improves the organization of teaching. When creating an e-course, two approaches arose regarding the course's organization, e.g. teacher-directed learning or learner-oriented learning. Zounek, Juhaňák, Staudková, & Poláček (2016) introduced a suggestion of particular phases of e-course creation from both views while they gave specific examples of system and tool use. In their publication, they dealt with:

- defining objectives,
- e-course scheduling,
- teaching and learning processes,
- evaluation of achieved results.

Mudrák, Turčáni, & Burianová (2018) describe the principles, requirements, and teaching strategies for creating a personalized e-course. They claim that an appropriately created course has set the objectives in advance even before the creative process. The objectives and the tasks should cover the content of the course and should be relevant to the study program. The objectives were formulated briefly and clearly pointing out the process of evaluation. It was important that the students knew about the objectives, and they have been provided. LMS Moodle provided a wide range of tools for the purpose, such as Wiki, Forum,

the option of mass information via e-mail, or a separate tool to define the goals of the e-course that can be find in Administration – Grade administration – Outcomes.

The time management of the course was convenient to design on the bases of the stated objectives. Among other things, entry knowledge, the size of the group, the difficulty, the character of the subject or content, methods would have been projected and implied into the timetable. The content would have given a precise picture about the course arrangement. The organization of the course, its graphic arrangement and structure would have been invariable during the whole course. For the purpose of the time management of the course, LMS Moodle provided pre-set functions *Calendar*, *Upcoming events*, *Completion tracking*, and also *Access restriction*.

LMS systems offered multiple options of student evaluation whether in a formative or summative way. LMS Moodle itself provided ways of evaluating students via activities such as *Quiz*, *Assignment*, *Workshop*, etc.

The e-course evaluation required knowing each participant's opinion about the way the teaching course worked. That is the reason why the e-course needed the option of teacher assessment or more precisely the teaching process and the e-course itself by students. Tools such as *Feedback*, *Survey* and *Forum* could be used in LMS Moodle for this purpose. *Feedback* could serve as a self-reflection of the teacher, it could lead to correction of the e-course or the teaching process itself (Mudrák, Turčáni, & Burianová, 2018).

3.3 Research methodology

The decision was made for a survey that was used as the education personalization tool. It has been applied in subjects Logic Systems (LS) and Computer Architecture (CA). When creating the tool, the following procedure took place:

- setting the objectives,
- the choice of research file,
- the specification of variables,
- the construction of the content part of the survey,
- data collection,
- computer data processing,
- data reading,
- results and conclusion of the survey.

The goal of the designed survey was to gain specific information about each student. The research sample included students of the first and second year studying at the Department of Informatics at CPU in Nitra taking the subjects Applied Informatics (AI) and Teacher Training of Academic Subjects (TTAS) with a combination of informatics. To create a survey, tools provided by LMS Moodle were used.

The subjects LS and AP took place every week in a form of a lecture and seminars. One experimental group and one control group have been created. The students in the control group had unlimited access to all materials during the whole semester, and they also studied in the original e-course. The students in experimental group studied in the proposed methodology and modification of the original e-course.

On the introduction lesson, the students were given a survey and a pre-test. The objective of the second one was to find out the students learning styles. For this purpose, the survey ILS has been used. According to the results of the ILS, the individual students were recommended to study materials and activities that most

correlated with their learning style. The goal of the pre-test was to find out information about new students highlighting their entry knowledge. For this, *Quiz* activity has been used the LMS Moodle environment.

The hypothesis No. 1 (H1) was set: *"There is no statistically significant difference in entry knowledge between the control and experimental group of students."*

Furthermore, it was an assumption that post-test results depend on the type of course used. Specific hypothesis No. 2 (H2) was set: *"The created personalized e-course has a more prominent effect on student learning efficiency as classic (non-personalized) e-courses."*

Confirmation of the H2 would mean that, in case of better results of the experimental groups in the post-test, which will verify the acquired knowledge of the students at the end of the e-course, compared to the control group, were the results of the application of the proposed e-course.

In order to be able to create an as efficient e-course as possible, it was needed to identify the flaws of the hitherto used e-course in the subject LS. A sample of students was provided. The students of the control group studied the standard way, e.g. that they had the unlimited and voluntary access to all materials and activities. In the experimental group of students few options were used such as conditional access, activity performance, feedback via Lesson and Quizzes to control the teaching with LMS Moodle. Both groups studied in a form of a blended learning. Students of the experimental group were provided with a survey created in LMS Moodle. The goal of the survey was to obtain an overview and basic information about the students that participated in the e-course. The results were exported into a spreadsheet of Microsoft Excel where the results were processed.

As the second survey, the students filled in the Felder-Soloman ILS survey. The results were interpreted in the course and were processed in a form of chart and diagram as well. There were efforts to find other standardized survey that would suit the need of the research, however it was unsuccessful.

The next subject of interest was to observe the study results of students in the e-course and to find out the differences between the control and the experimental group.

The results of the students were also compared based on the type of attended secondary school. There was set the hypothesis No. 3 (H3): *"Attended secondary school has an impact on entry knowledge of Applied Informatics (AI) students."*

4 RESULTS

The pilot experiment has been divided into three phases. In the first one, surveys have been used as diagnostic tools. In the second phase, a pre-test in a paper form has been applied in the control and the experimental group where the content included some key questions regarding the subject LS. The observation of student activity in the e-course was a part of the second phase, and system tools of LMS Moodle were used. The third phase represented the end of the subject with an exam which was considered to be the post-test.

From the processed data, it has found that some students tended to "cheat" in such a way that in the first attempt the *Test* was only "guessed" to find the right answers through the feedback. In the second attempt, these responses were already written off, because the questions were repeated in the test and only their order was changed.

Part of the Test's evaluation was also a feedback that referred students to a particular location in the e-course or website, in the case of an incorrect answer. Student attitudes towards this kind of feedback compared to the classical (correct/incorrect or revealing the correct answer) were identified by the interview method, and it was received positive feedback.

These findings confirm that it is necessary to change the e-course test methodology in the following way:

- not to give correct answers in the feedback, but motivate the student to look for them by referring to the study material, which contains the given knowledge,
- to create the query database from which questions will be randomly generated for each Test activity,
- to create sufficiently reliable questions (open answers, multiple choice, sufficient count of answers, etc.)
- limited number of attempts, or time constraints.

Another subject of interest was the comparison of the groups in terms of activity and attended secondary school. In the first case, it was found that students who were more conscientious with the course activities achieved better results both in the pre-test and in post-test. Specifically, the Test activity was used to help students to verify and fix their knowledge. This comparison can be seen in Table 1. Of course, these results could have been affected by many other factors, but we are still convinced that student e-course activity affects his / her achievements.

Table 1 Comparison of student results in relation to activity

Activity	Average pre-test results:	Average post-test results:	overall average
Below average	3,250	2,058	2,513
Above average	2,600	1,661	2,123

The total activity of the students was also observed during the whole semester. It is presented in Figure 2. The observation of the activities and conditional activities were used in the first month of teaching in the semester. During this period, at least a double of activities was observed compared to the period after the credit week where the conditional activities have not been used. Another finding was that the majority of students started to show more activities in the e-course immediately before the important events such as credits and exams.

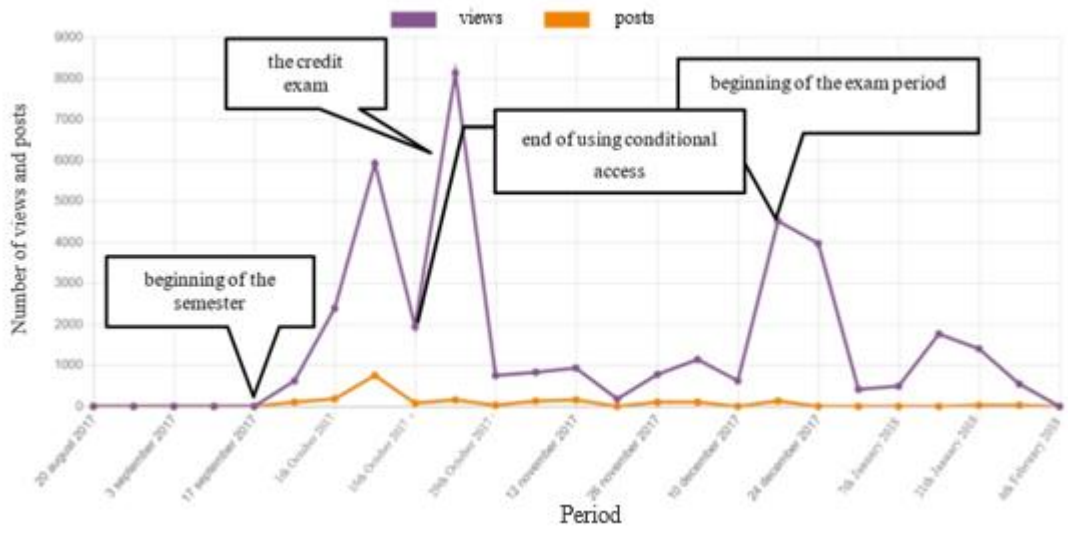

Figure 2 The total activity of students in the course during the Winter Semester

The average values of both groups (control and experimental) are processed in Table 2. Students in the control group in both cases reached a worse average by 0.2 compared to the experimental group. However, it should be noted that the experimental group consisted of a larger number of students.

Table 2 Average results from pre-test and post-test experimental and control group

AVG pre-test		AVG post-test	
control	**experimental**	**control**	**experimental**
3,0	2,8	2,0	1,8

In the next case, the hypothesis H3 was confirmed. Students graduating from secondary schools of electrotechnical engineering had better results from the pre-test compared to students from other secondary schools. Surprisingly, they showed worse results at post-tests (Table 3). Comparison of results is also shown in Figure 3 and Figure 4.

Table 3 Average results from pre-test and post-test experimental and control group

Comparison of student results in relation to completed school		
School	Pre-test	Post-test
SOŠ Electrotechnical engineering	2,300	1,767
Other schools	2,717	1,630

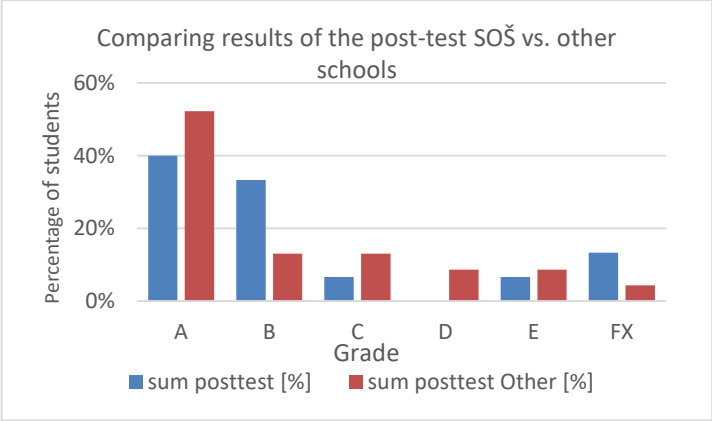

Figure 3 Comparing students results in the post-test from SOŠ vs. other schools

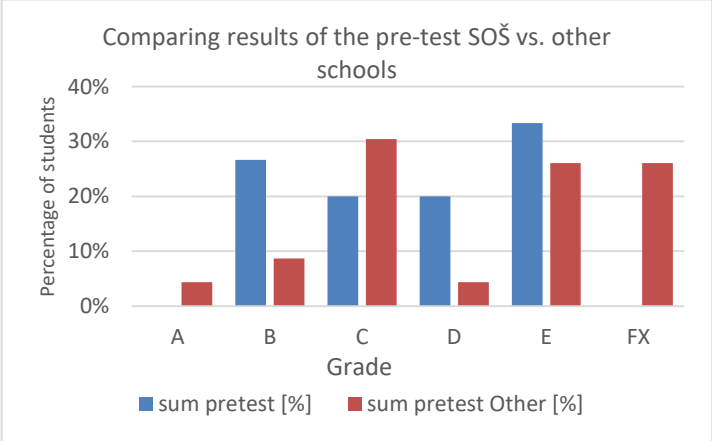

Figure 4 Comparing students results in the pre-test from SOŠ vs. other schools

Finally, the overall success of students in the post-test from both experimental and control group has been compared to a group of students studying the subject until 2015. The results of these students were obtained from the Academic Information System (AIS). Content and methodology of the subject haven't changed

during last years. The sample of students from AIS included the study results of 919 students and we considered it equivalent to the control sample. Specifically, the grade percentage of each group has been compared. The experimental group alone had a decreasing trend towards worse evaluation. The control group and the sample data from AIS had a slight correlation among the results. The results are shown in Table 4 and Figure 5 for better clearness.

Table 4 Comparison of experimental, control and AIS group results

Students success rate by 2015 in percentage (AIS)					
A	B	C	D	E	FX
23,39%	11,64%	17,19%	15,67%	22,31%	9,79%
Students success rate of the experimental group in percentage					
A	B	C	D	E	FX
40,91%	18,18%	13,64%	9,09%	9,09%	9,09%
Students success rate of the control group in percentage					
A	B	C	D	E	FX
21,05%	5,26%	42,11%	0,00%	31,58%	0,00%

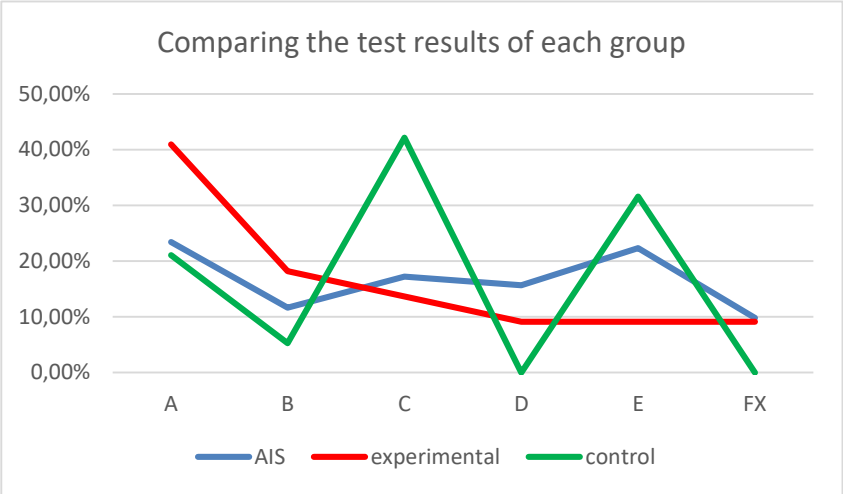

Figure 5 Comparing the test results of each group

The findings might represent that the quality of the achieved results students from the subject LS studying in this type of e-course might be on a right track.

CONCLUSION

Although the issue has been solved at an international level for a long time, in practice we are constantly confronted with insufficient personalization of education for students with characteristic features. On this basis, it is necessary to analyze more closely the status of the student, the level of his / her knowledge on the subject, as well as the individual parts of the educational process. For this purpose, e-courses were selected for KI UKF, which were subjected to a thorough analysis to identify their shortcomings. Using some parts of the proposed methodology, it was able to compare the impact of individual activities on the learning and outcomes of the students from the subjects.

Regarding the impact of used methodology on students, it was reflected in a student's activity during the semester. This fact also affected the results of students from the subject. Among other things, the assumptions about the diversity of students were confirmed, specifically their initial knowledge, which is more strongly influenced by the secondary school.

In the future, the aim will be to replace all identified e-course shortcomings with more effective methodical concepts. It has been described some of them in this article. The focus will be on using Moodle's adaptive

capabilities and using the appropriate e-course structure using personalization capabilities. Applying of the proposed methodology is being expected not only the increased effectiveness of the educational process but also achieving better results in terms of knowledge.

The presented and described issue deal with individual activities accompanying the students in the given subjects and is part of a research project within the UGA grant agency. The results of the project will be published as scientific articles at international conferences and journals registered in the SCOPUS and WoS databases in the following period. The proposed e-course will be fully implemented in the school year 2018/2019 at the beginning of the winter semester. The obtained data from questionnaires, pretests, post-tests will be processed and evaluated to improve education in the given field.

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