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## Improvement of the quality of teaching of accounting at technical universities

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### Abstract

The article is focused on the analysis of the options for the use of LCMS systems, and other ICTs in the process of education. On the basis of the survey, we ascertained the impact of the number and the quality of the interim instructions for the overall outcome of the students during the semester. The research was carried out at the Slovak technical university in Bratislava in teaching the subject of accounting in the context of an enlarged teaching of economic subjects. The aim of the research was to assess the impact of ICTs use, in particular, independent of the educational internet portal implemented on its own and the total outcome. At the same time we have tried to analyze the impact of the self-regulation and self-evaluation during the study on the overall evaluation. The obtained results should become the starting point for the implementation of the wider research in the framework of the Slovak universities. e.g. Slovak University of Technology in Bratislava, University of Economics in Bratislava, Paneuropean University of Bratislava, but also of the partner foreign universities.

Keywords: quality of education; self-regulation; self-evaluation; teaching of accounting; technical universities;

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## 1. Introduction

The current development of the innovative technologies and their implementation for the use in different areas of life requires the preparation of comprehensively educated specialists, who would ensure not only their development but also the development of the technologies and possibilities of their application for a wide use. Such a wide range of issues cannot be longer secured by the classical one-sided focused graduates of the technical universities (in particular faculties of electrical engineering, computer science but also biotechnologies, etc.).

A key part of the knowledge of the graduates from the technical university in present will no longer serve only for the development of the new technical and programming already existing security or developing innovative technologies, but their knowledge will and already contributes to a significant degree to the development of the employment through the creation of start-up companies and participates in the development of the innovative business activities (Luthje & Franke, 2002; Luthje & Franke, 2003). Equally important is the impact of social and intellectual capital (Spirkova, Caganova, & Bawa, 2015). The very study at the technical university, by its intensity assumes the active participation of the student in the process of obtaining new knowledge. With growing number of the students who in the future plan to do the business in the sector of the innovative technologies, it is necessary to look for accessible and effective alternative ways of transmitting knowledge from the economic field, which in the light of the complexity and scope of the study, they cannot be involved in the teaching directly.

The educational process at all levels of education is influenced by the introduction of information and communication technologies (ICTs). With the implementation of ICTs there is also directly coupled the development of the new ways and methods of teaching and learning at universities. ICTs have brought fundamental changes in the access to information. The educational process, such as the exchange of information between the subject and object of education, this means teachers and students, allows the efficient use of ICTs resources and at the same time in a flexible manner make available knowledge not only to students of a full-time study, but also students of the distance form of the study - figure 1.

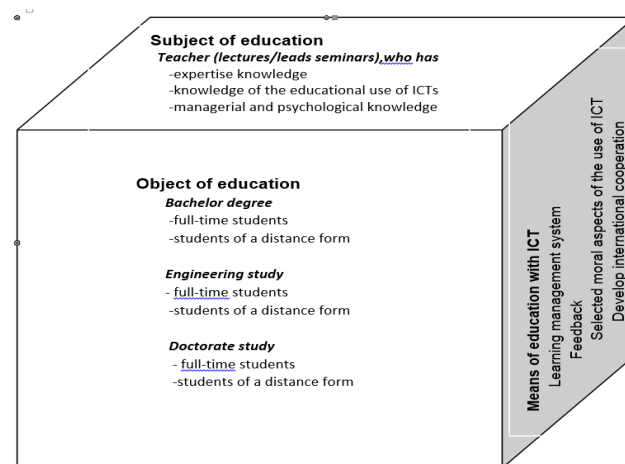


Figure1. Cube representing educational based on ICT process

Just the applications of new ICT have received many of the traditional economic subjects, which are taught at universities in the past, a new dynamic. The use of new technologies in the teaching process has become, and for the students of the technical university very interesting and such subjects such as business economics, or accounting. For the technically oriented students to new procedures used in the classroom become so much suggestive, that they themselves began to look for the possibility of their further use.

## 2. The means of the educational process based on ICT

It is necessary to use the new methods and procedures, as well as new teaching means, allowing of receiving, processing and providing the wide range of information. The basis should not only be at the right time obtained information, but also in a certain context processed and understood information. Under e-learning combination there is very often hidden everything that is connected with the use of computer technology in the teaching process - from the creation of digitized teaching materials in the electronic form, through different media and hyper-media elements, interactive applications (web or mobile) of the various programs used subsequently in the teaching process, the continuous testing of knowledge, the various video recordings of lectures made available through internet etc. E-learning should not be only the way to share and disseminate the information, or through a tests an item to check the knowledge. But only a small percentage of teachers can create and test forms, which control whether the student has understood the problem (Schmidt, 2010).

The practice calls for graduates of the technical university prepared for the use of modern information and communication technologies, who are able to work in time and continue in education. It is necessary to train professionals on knowledge of relevant technologies. It is important that, in parallel with their professional training at the same time they gradually develop their economic and managerial skills, which allow them after the study completion, immediate application in the business practice, for example when setting up a fast-growing start-up companies. In a broader context, we can say that it is about the need for interdisciplinary educated graduates of the technical university in the various areas, not only in technologies and natural sciences but also in social science and economic fields.

The requirements mentioned above are taken into account when settings the parameters and needs specifications for the graduates of technical universities. In the educational process it is permanently needed to look for the effective and at the same time innovative solutions for the promotion of education, which lead to the effective development of the economic and managerial skills of technically proficient students (knowledge of ICTs) of the individual technical disciplines. Selected characteristics of the proposed solutions are:

- 1) the active role of the students in the teaching process,
- 2) user-friendly integration of large amounts of quality information from various sources (laws, regulations)
- 3) active, independent and creative approach to problem solving,
- 4) personalized learning of new knowledge and its sorting.
- 5) Individual time frame etc.

Based on the above characteristics, we have tried to evaluate and choose the appropriate technical solution. In the selection, due to our goal and the possibilities, we looked at two alternatives, either use of a Learning Content Management System (LCMS), or create our own solution based on an internet educational portal.

LCMS as a software tool for the management, production and dissemination of e-learning content, available free of charge as open source or distributed in the form of a variety of commercial solutions is currently probably the most widely used item for the educational process promotion on the basis of ICT, that contains a functionality for administration and organization of e-learning.

Some of our university workplaces already purchased various commercial systems in the past, but in practice at our technical university in direct and indirect teaching, the most frequently there are used non-commercial LCMS systems. Probably the best-known and also the most commonly used by our university there is free system management of training courses is the LCMS Moodle, which is used in teaching of various online courses.

This system is supported by the system administrator, at the same time it is the creator of the courses and offers sophisticated management of the process of education of the students as well as the software compatible with the most used teaching standards (such as the Sharable Content Object Reference Model-SCORM), it does not impose any special requirements on computer literacy and is also suitable for non-professionals. All specified tasks can be evaluated by the pre-specified point scale. His high positives include the multilingual support built in with the option of text strings

translation directly through the web. It combines all the tools of modern technology in an appropriate manner and can be equally well applied in the teaching of economic subjects. However, we have decided for the second alternative, it means our choice fell on the option to create our own solution on the basis of an internet education portal for the purposes of teaching of economic subjects at our university.

### **2.1. Internet educational portal**

In this section, we will deploy a custom solution on the basis of an internet educational portal, as one of the several options for the use of ICTs or the LCMS in the educational process. The portal was originally supposed to be a practical application for the purpose of improving the teaching process in the subject of accounting. Currently, it has become a key tool of the digital communications among the teachers (subjects) and student (object of learning). Custom solutions internet education portal we have chosen due to the implementation of the online course on accounting. With its application, however, we have achieved a significant increase in quality and efficiency in the area of education of other economic subjects at our university. Through the use of the portal, students can actively test their knowledge. Portal, however, at the same time performs a passive function that provides students online access to course material. The current generation of students, referred to as digital natives (Prensky, 2001), differs significantly from those who studied at the university in previous years. Young people currently grow up under the pressure of constantly emerging information and communication technologies (such as Smartphones, wearable technology, fashionable technology, wearable devices, tech togs, or fashion electronics, etc). ICTs will play a big role not only in their everyday study or work lives, but also in leisure activities and entertainment. The young generation already cannot imagine mutual communication without them. For them it is an essential information source when searching for necessary information when making payments in shops, relax etc (Isman & Gungoren, 2014).

The internet portal should be the one of the key tools of digital communication between the subject and object of education. The current generation of young people prefer visual interactive activities carried out through digital online media. They prefer the digital form of the solution to the "paper" ( the presentation of the results in comparison to writing and giving the projects, in paper form). Students at the technical university are not willing to solve the tasks, pass the papers and tests. In the framework of the technical university mutual testing has been replaced by testing of knowledge through ICT. Also this moment contributed to the change. Verification of knowledge from the fields of accounting, financial management, banking, financial intelligence etc., in large amount led to the new approach also on our side. We used the digital literacy, but also another of the characteristics of our students. We have supported their natural desire after a fun discovery of new knowledge, which they prefer to the passive learning. After the change of the approach, they stopped to feel the burden of often repetitive learning, which is required for the successful completion of the subject as the accounting.

The fact that the solution to the greater part of tasks is voluntary, the student solves the given tasks with less stress. They are not anymore under the pressure of a forthcoming deadline for a mandatory transfer. The change in approach is also reflected on our side. We had to customize our requirements in particular to disponsible technical possibilities and available technologies. We have chosen the time-consuming and technically more demanding alternative, but it complied with our requirements to verify the results. We found that high-quality and regular feedback within the self-evaluation and self-regulation (Schunk, 2005; Zimmerman, 1989; Zimmerman, 1990; Zimmerman, 1994; Zimmerman & Bandura, 1994) enables us to achieve significantly better results. There was survey dedicated to clearly verify and confirm that finding. It which was implemented in the past semesters of teaching of the accounting.

Regular solution, mostly voluntary tasks without stressful deadlines and tasks transfers has led to increase of the quality of education. The criterion of quality is in our case the total sum of the scores on the tasks, the increase of the average evaluation of each assignment for final evaluation. The above hypothesis can be formulated as follows: H1 – Increased number of tasks, which are resolved by students voluntarily during a semester increases the average value of the results from each assignment. The survey was conducted on a sample of 50 students in the subject of accounting. Students had available a number of electronic materials which have been placed in the database of

an internet educational portal or in the form of a web page or a separate testing system. The first material is a web page, on which are located the study of texts relating to the subject matter. There is also a description of the tasks of the subject, a preview of the creation of the project, examples of tests and etc.

Its target groups should be not only current students but also former graduates, who need to supplement or expand knowledge from the subject matter of accounting. Individual students from the selected target group so they can benefit from a wide system of information support of the issue of accounting in the business as well as a number of other communication tools. This project builds on the Accounting software for the needs of the educational process, in which there was designed and programmatically implemented the application intended for use in the subject Accounting at the Institute of management of Slovak University of Technology in Bratislava. By using this program there are presented the procedures of computer processing of accounting records to the students. Students then can check their knowledge and a built-in algorithm is able to automatically evaluate their success. One of a large number of advantages of the use of the software is also a direct link with the internet, which allows to students the on-line update of laws and regulations, which is in the case of continuously changing legislation another good advantage of technological IT progress.

Its functional modules enable to facilitate, for example, a report of the users (in particular students but also other users), create groups, discussing, chatting, testing and at the same time, its functionality enables to the display bulletin boards with news and messages, calendar events, share documents, study results, but also other statistics which enable to improve the entire process of education. The essence of this system is not in its technical solutions, but in how it integrates the already known technologies and creates conditions for a new way of learning. It is very important to realize that even with this method of education we need to see the final goal and accordingly to choose the way in which it is achieved.

## **2.2. Description of the work with the portal and its use**

The internet portal for the study of accounting provides in addition to the functions from the original application also the possibilities of interaction among the users. It is eliminating the need for distribution, the portal is accessible from any point of internet network. A centralized operation is more convenient also from the point of view of security: administrators can set and change access rights and all changes to the programming code. In the database there are instantly applied to all users. The system was designed the way that can be used by all faculties of the Slovak University of Technology in Bratislava, although it was originally developed in cooperation with students of the Faculty of electrical engineering and information technology. The system supports single user authentication. All those who have an e-mail client in the school in the Academic Information System may be using the same user name and password to get into accounting. When working with the portal there are used several methods of navigation and control

Link bar - contains links to the selected pages. Bookmark of the currently opened page, or the link above which is located the mouse pointer, are highlighted.

Menu sections - allows the access to all content and all of the features of the portal. The list of available sections expands depending on whether the user is logged in, or has management rights.

Links in text - direct the user to related sections with the relevant content. From the regular text they are distinguished with a blue colour, when placing the mouse pointer over the link the colour changes to red. They are used for example in the "Users" section, where a link on the name of administrator navigates to the section of the Contact, and it is possible to send him a message.

Forms - allow the communication of the user with the system. On the basis of the data entered into the form, the relevant function is performed. After filling in the available fields, the navigation starts by clicking on the active button. A graphical representation of the form elements is determined by the setting of the internet browser. One of the main functions of using the form is e.g. Login / Logout.

Navigation among groups and organizations - is a special case of navigation through a form. It is used by users who are assigned to more than one group, or have multiple administrator rights. The

content of the most sections is adapted to the individual groups/organizations, therefore, in the case of the need for change, there is necessary to select the appropriate item in the roll out list and click on the button. Panel navigation is only shown to signed-in users.

### 3. Evaluation of the results

In order to improve the organization of the educational process, systemic approach and intensification of the study by the form of self-regulation (self-management) and self-evaluation, we have proceeded to the implementation of the course accounting. In the framework of this subject we have addressed voluntary tasks and tests. Designed test system allows separate normative testing of students, thus we have obtained the important feedback.

Of the many practical benefits, in particular, it is important to mention possibilities which the system offers when evaluating the knowledge of students, what in the case of accounting requires a lot of time. The portal offers to students the test examples/guidelines that are used for testing the solutions of practical examples and repeated training. From the alphabetically sorted list of the available examples they can choose. Of course all examples, including the correct results must be entered in the system. Correct pre-calculation and the calculation should be amended in the Accounting log, when working, there can also help the Main book. After clicking on the Evaluate of the example there are shown the correct results and the success of the solution. Consequently, it is possible to continue in accounting, or using the key to Solve again, erase all filled in values and return to the beginning.

Evaluated tasks can be solved only once in a given period of time, and the success rate will also be reflected in the Assessment. We work with them the same way as with the Test tasks, but there is possible to open a task first after the date of the beginning of the solution, recording the data in the Accounting log, is possible only until the final deadline. After task Evaluation there is no longer possible to make additional modifications and the final Evaluation is binding. Tasks are listed chronologically in the section. System will specify after the task completion, what was the success rate of the solutions, which pre-calculation and calculations were incorrect and will show the correct solution to the student. The system provides significantly more very interesting information, on the basis of which a teacher's evaluation of the student's work and knowledge during the semester can be substantially more complex. The time that the teacher is lost in the preparation of the system to the "new semester" obtained during the semester. There was created a special course for the students on the basis of an internet educational portal, which in addition to the study materials already contained the above mentioned test examples/ guidelines that are used for testing the solutions of practical examples and repeated training. This summary of the tasks was required or voluntarily addressed in the course of the semester. During the semester students solve multiple tasks and participated in the discussion by using the forums on the selected topics. Students had to address obligatory 6 tasks during 13-weeks semester.

This means that they received the tasks for which solution they had allocated 2 weeks. Furthermore, they were able to solve voluntarily 11 other individual tasks (it means in total 17= 6+11 tasks), which were designed the way to enable creation of the more complex required project, which in our case means to solve more and more into the depth some partial tasks relating to the preparation of the financial statements. A detailed analysis of the obtained results pointed to the fact that not only mandatory but mainly intensive, although mostly voluntary, periodic, controlled preparation during the semester is assumption of obtaining good results. In the following section, there is a part of the results of the students from the selected study group of 13 students (rows in Table 1.) and individual tasks out of 17 (from A to Q - columns in Table 1.). Since the different tasks were evaluated by different value, varying the value of the maximum of possible acquired points, all results were converted to relative values. Subsequently, they were calculated some additional characteristics – the number of the considered criteria, number of achieved points, the average value of the obtained points from the individual tasks.

**Table 1. Adjustment of the obtained results**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Count	Sum	Average
0.6	0	0	0.7	0	0	0	0	0	0	0	0	0.5	0.4	0	0.15	0.85	6	3.2	0.53333333
0.7	1	0.9	0.9	0	0	0	0	0.5	0	0	0	0.4	0	0.9	0	1	8	6.3	0.7875
0.7	0.2	0.6	0.9	0.5	0	0	0.8	0.5	0.45	0	0	0.4	0	0.6	0	0.8	11	6.45	0.58636364
0.85	0.9	0	0.6	0	0	0.85	0.8	0	0.5	0.14	0.85	0.7	0.4	0.5	0	0	11	7.09	0.64454545
0	0	0.6	0	0.8	0	0	0	0	0.9	0.6	0.45	0.8	0	0.75	0	0.9	8	5.8	0.725
1	0.9	0	0.9	0.9	0	0	0.9	0.5	0.9	0	1	0.7	0	1	0	1	11	9.7	0.88181818
0	0	0	0.8	0	0.75	0.8	0	0.5	0.5	0	0.85	0.4	0.8	0	0	0	8	5.4	0.675
0.9	0.7	0.95	0.8	0.9	0	0	0.9	0.7	1	0	1	1	0	0.75	0.25	0.85	13	10.7	0.82307692
0	0.5	0	0	0.5	0	0	0.7	0	0	0	1	0.8	0	0.5	0	0.85	7	4.85	0.69285714
0	0	0	0	0	0.6	0.2	0	0.3	0	0.4	0	0	0	0	0.6	0.55	6	2.65	0.44166667
0.7	0.8	0.8	0.7	0.5	0	0	0.8	0.7	0.9	0	0.85	0.6	0	0.85	0	0.8	12	9	0.75
0.7	0.7	0.8	0.7	0.4	0	0	0.5	0.5	0.9	0	0.9	0.6	0	0	0	0.7	11	7.4	0.67272727
0	0.5	0.8	0	0	0.75	0.77	0	0.5	0	0.35	0	0	0	0	0	0	6	3.67	0.61166667

On the basis of the obtained results there was created a pivot table (Table 2) depending on the average for each assignment depending on the number of solved tasks. From the graphical interpretation (Figure 2.) it is seen that when an increasing number of solved tasks, it is possible to observe the improvement of the student in solving individual assignments.

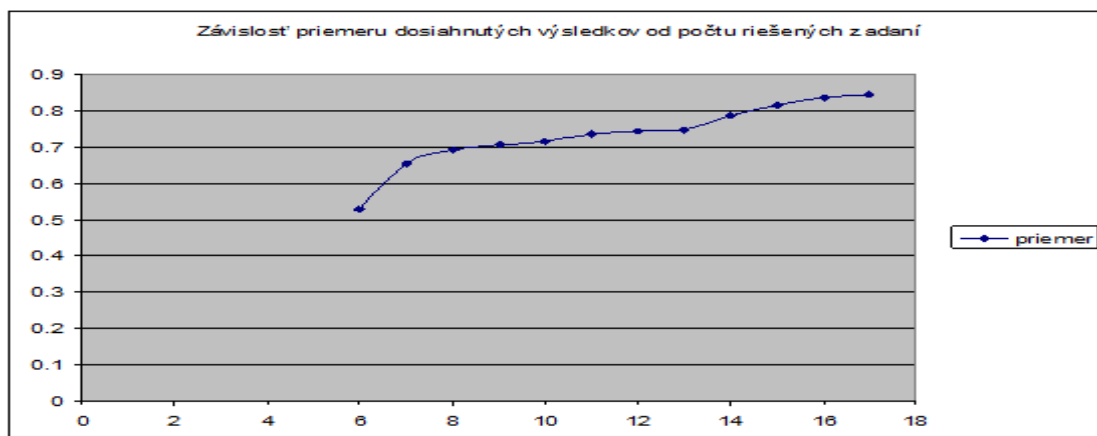


Figure 2. Dependence of the average of success rate from the number of entries

Table 2. The calculation of the average of the success rate depending on the population of solutions

The number of the considered entering	Average
6.00	0.529166667
7.00	0.653571429
8.00	0.69212963
9.00	0.706481481
10.00	0.715763889
11.00	0.734402852
12.00	0.745238095
13.00	0.747195513
14.00	0.788525132
15.00	0.815720165
16.00	0.837037037
17.00	0.846405229
Total Sum	0.751431873

#### 4. Conclusion

The online learning portal implemented on its own has its advantages as well as disadvantages. We use it as a primary means of digital communication between the subject and the object of education. It means that it ensures the main part of the digital communication among students, teachers, but also the other participants of training. We have created it with the aim to improve the teaching of accounting and other related economic subjects. Despite the higher amount of time and technical difficulty coming from the need of its implementation on its own overhead, it has undoubtedly more advantages. The most important and substantial one, due to which we have decided to create the portal is a confirmation of the hypothesis that an important element of the modern education is voluntary self-regulation (self-management) and self-evaluation in the educational process. These significant aspects of the modern education allow the students to manage their training on their own and also provide a higher continuous training in average and students during the whole educational period. It increases the quality of education of economic subjects at the technical university. The results presented in this article may be a prerequisite for the initiation of more extensive research aimed to obtain information on the optimum number of entries, possibilities of change entered during a semester, etc.

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