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Adaptive lectures using feedback

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Abstract

Nowadays, we often meet with different levels of education, different groups of students and with different levels of knowledge in a given field. It is often, therefore, that a group is more active, better prepared, and vice versa. In classical teaching, lecturing often repeats some things that are already known. Sometimes it assumes some knowledge that students do not have, and this explanation is incompleted.
This contribution aims at enhancing the quality of teaching by adapting individual lectures to a given group of students with the use of very quick feedback.

Keywords:
Feedback
Adaptation of the learning process
Information technologies
Quality of education
Motivation
Checking education

1 Introduction

As a result of the diverse preparation of students at secondary schools, college students come in different levels of preparation. The grade they have reached doesn't have the same noticeable value. Usually a student with an excellent mark is weaker than a good marker.
The second factor of diversity is the impact of information technology. Some students are active IT users and gain their knowledge in a larger volume than is stated in the study plans. Often, the lessons learned are not systematized, they are not completed, but students get very high, unjustified self-confidence. As a result, they often do not attend lectures on subjects that are close to their liking. The result of such uneven visits to lectures, unequal preparation for lectures and exercises is the low level of knowledge of the students. They also do not know how to systematize acquired knowledge. Students' analytical and synthetic skills are also a major problem. Taking into account the different levels of Bloom Taxonomy of teaching objectives and the acquisition of study material: memorization, understanding, application, analysis, synthesis, evaluation and creative activity, students prepare their training at the first, second level.
To define cognitive goals, the taxonomy of B. Niemierko, which has distinguished two basic levels of adoption, is sometimes used and these levels are further subdivided into two subgroups.
• Level 1 - Knowledge: memorizing knowledge; understanding by knowledge;
• Level 2 - Skills: Using Knowledge in Typical Situations (Specific Transfer); use of knowledge in problem situations (non-specific transfer).
Even in this case, students will stop at the lower level most often.
The second group had little interest in studying at high school and showed little interest in studying at college.

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There is also another group of students. These are students who try to learn something but the low level of their knowledge from the past does not allow them to actively engage in teaching. Then they just sit on the lecture, they are passive. Teacher questions do not answer how they do not understand the issue. Teacher's questions are rhetorical, as several students answer these questions. They are always the same. It is by no means possible to identify or understand the subject in their answers.
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As a result of these diversity, the lectures become uninteresting, while others are too complex. Subsequently, students have little lecture. As a result of this factor, even those who know something lose their insight into the interrelationships of each topic.
Therefore, over the years, we have been dealing with IT usage issues to activate students in linking existing knowledge and switching to level 2 in accordance with Niemerko Taxonomy. As one of the conditions for solving the given task is the students' individual lectures and their active preparation, the part of the research is the motivation of the students to complete the lectures and exercises, and to constantly study the teaching materials.
For this purpose, we decided to create a quick feedback in education (Figure 1) and to use current information technologies and the active use of the technologies by the students.

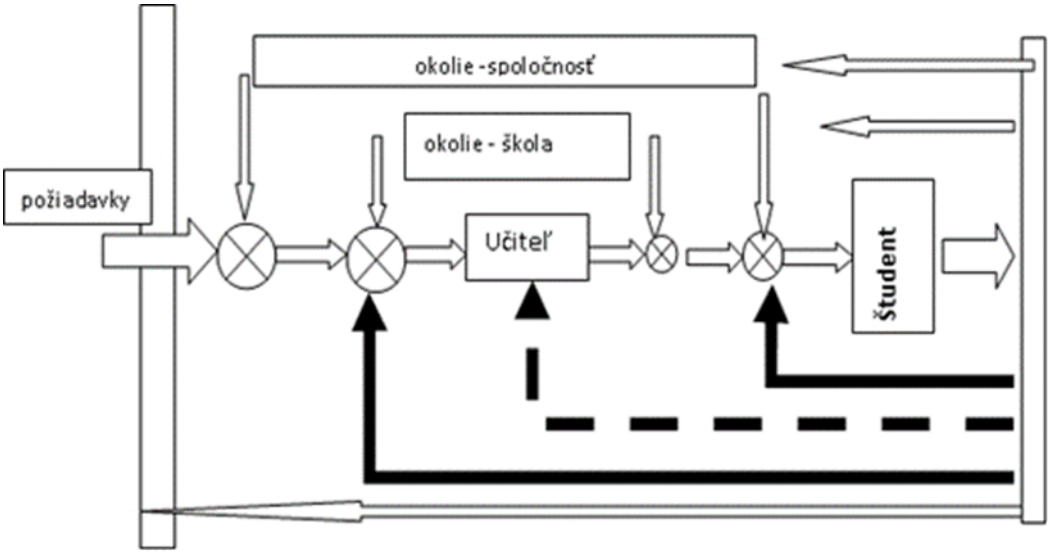

Fig. 1 Feedback in Education.

2 Motivational task

The aim of our work is to extend the motivational role with IT. The main task of motivating a student is not only to motivate him to go to every lecture as well as to practice regularly, but also to prepare for each lecture.
When we want to motivate students to attend classes, we must alert them to the fact that all the answers that will be broadcast during the lectures and exercises will be registered. If there is no answer, it is a signal that there was not a given lecture.
The second part of the motivation is achieved with the help of the given feedback, given that each student knows that all his / her answers will be registered and stored in the data base and he will be evaluated on the basis of them either as a part-time work during the semester or the entered result is also counted overall rating

2.1 Check the attendance of lectures

During each lecture, the teacher introduces a number of 5-10 questions into his presentation, aiming to determine students' readiness (Figure 2).

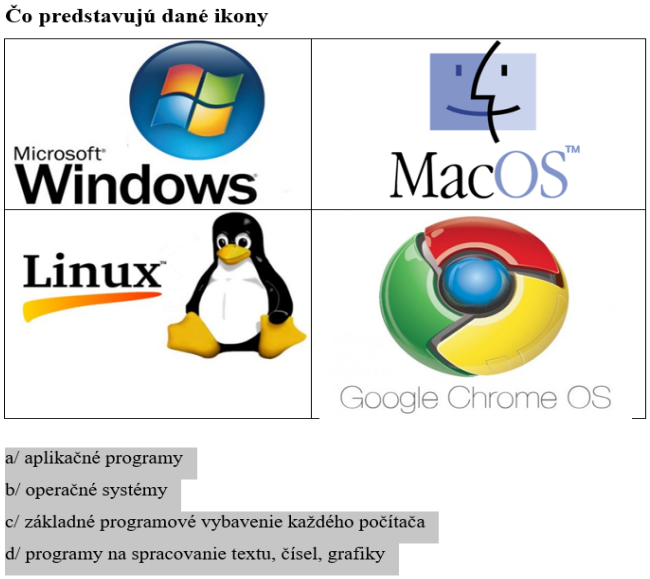

Fig. 2 Preview of the presentation

Individual students' answers are registered in a database. In this way, the teacher can get a complete overview of when the student was on a lecture before he was ready for it. If students tell you how to register their answers, students will be encouraged. No answer can be counted as an incorrect answer, or it may be even more important. Therefore, the student decides to enter an answer, which may also be incorrect, but at least points to the fact that he attended the lecture and followed the lecture. In this way, a regular visit to each lecture and the effort to register all questions can be started. Consequently, active participation in the lecture will also be reflected by improving the quality of responses and gaining better knowledge.

2.2 Check for correctness of responses

During each lecture, the teacher puts in his presentation a number of 5-10 questions, which aim not only to find out if the student was on the lecture but also to prepare for the lecture on the basis of the materials provided. It is also possible to check whether the students also remember the content of the previous lectures and the interrelationships between the acquired knowledge. In order to better motivate students' work, we create a data base in which all student responses are kept. On the basis of the results obtained, the amount of correct answers, we propose to carry out an interim evaluation. In this way, students get an assessment not only on the basis of one or two tests but really for work throughout the semester.

3 Checking lectures and understanding the lessons learned from the past

The primary task of the teacher is to find out how many students understand the substance explained, and also understand the interrelationship between past exile or bond with other subjects, even with different areas of ordinary life. That is why we will divide this chapter into two parts. The first will deal with the control of the understanding of the current interpretation, and the second part will be aimed at checking in the interrelationship between the subjects already discussed.

3.1 Checking the understanding of the lecture

During the lecture, the role of the teacher is to control how many students understand the substance he is explaining. It is possible that students do not follow the given teaching or do not understand what was said. Therefore, it is often necessary to ask questions that students must answer. In many cases, however, only one or two students answer these questions, who are in the first row and the others are passive. The teacher can not estimate how correct or incorrect the student's response is to everyone, or just to those who follow and who engage in communication. In order to overcome this shortcoming - to keep the students' attention constantly, in order to explain what they do not know and repeat what is known, communication between the teacher and all the students must be continually (Figure 3).

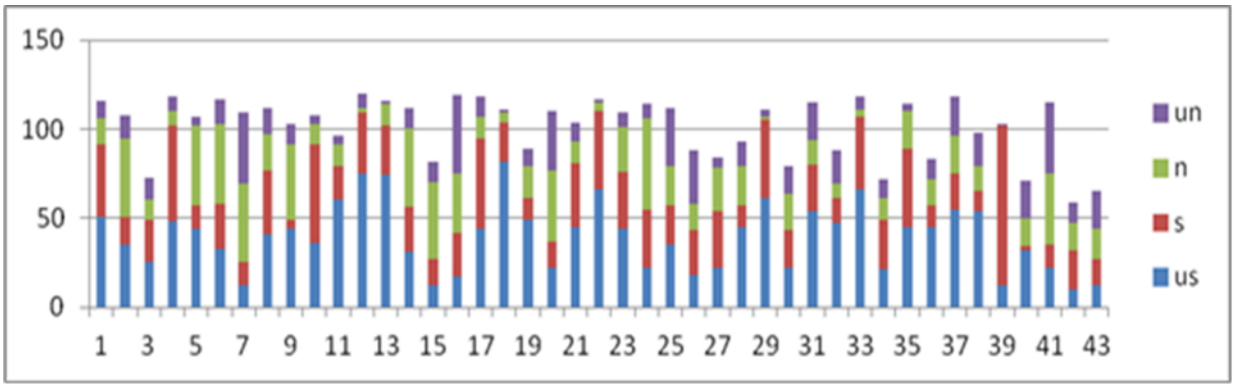

Fig. 3 Track the correctness of responses

The realization of communication between students and the teacher and the number of students is 20-50 or even more is very problematic. In fact, to master, register and manage their activities as students understand teaching without using modern information technology is not possible. For this purpose, it is advisable to use the communication possibilities of the teacher computer with mobile student devices (Figure 5). If a teacher wishes to ask a question to convince students that they understand his explanation, he will display it in his presentation and all students choose one of the possible answers. Responses are chosen so that one is completely correct, one can be more or less correct, one is neutral, one is more or less incorrect and one is totally incorrect. Using these questions and answers from the students, the teacher gains accurate feedback on how much the students at that moment understand what they are trying to explain to them.

3.2 Checking the understanding of the links from the previous lectures

In the case of checking the interconnections between the individual parts of the subject, it is possible to proceed with the use of similar technologies as well as the control of attention. In the first case, we were asked questions about the substance that was just explained. In this case, we may display a particular schema of interconnections, an electrical or other scheme that has already been taken over to the previous lesson. The diagrams, the pictures will have omitted places, so that students complete what is missing. In this way, it is also possible to write a relationship or formula in which instead of certain variables and coefficients we insert the general parameter. The role of students is to supplement the parameter and explain other options (Figure 4). The aim of the cross-link control thus established is to make sure that students understand the interrelation between the taught substances in particular hours. In the process of control it is possible to assign tasks related to other areas of common practice. Based on the results, the teacher can get an idea of how students can transform acquired knowledge not only into the subject but also into other related subjects. After receiving the answers, students can ask for a response to how much they thought they should be answered. Analysis of these answers will allow students to understand the possibilities of solving given tasks.

Čo predstavuje daná schéma

a/ schéma procesora
b/ schéma počítačovej siete
c/ schéma počítača
d/ schéma počítača von Neumana

dodatočné otázky
- Čo sú to vstupné zariadenia
- Čo sú výstupné zariadenia
- Čo je to ALU
- Načo je tam radič
-

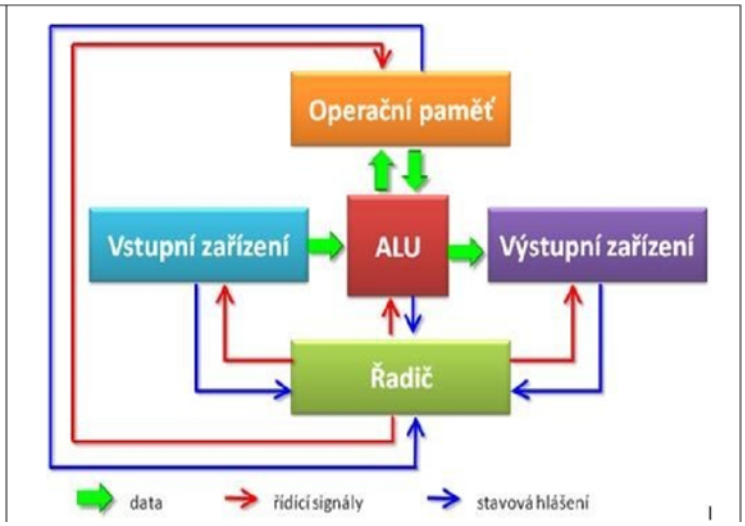

Fig.4 Question 4 with additional questions

It follows that in such a way it is possible to change the structure of the explanation from passive listening to the active entry of individual students

4 Technical and programming means for implementing very fast feedback

In implementing these tasks, we use the principle of very quick feedback. This is second-level feedback, between the student's outcomes and the teacher's assigned tasks. Implementation of such a link is not possible without the use of current information technologies (Figure 5).

Fig. 5 Connecting Student Phones with a Teaching Computer

In addition, it is necessary to select program security to support the operation of the devices. On the teacher's side, we assume a computer that allows you to share a connection using a wifi device. The second option is to use general internet connections and create an independent application. The third option is to create a system with two levels of management, where the student database and their answers are created in one place. Using the presentation, the teacher enters the individual questions and then answers from the students who joined the application are stored in the database.

4.1 Basic Internet Applications

There are currently several systems that allow students to answer questions and record student responses. These systems (Figure 6) are aimed not only at collecting data from students, but also providing information to the teacher about their knowledge.

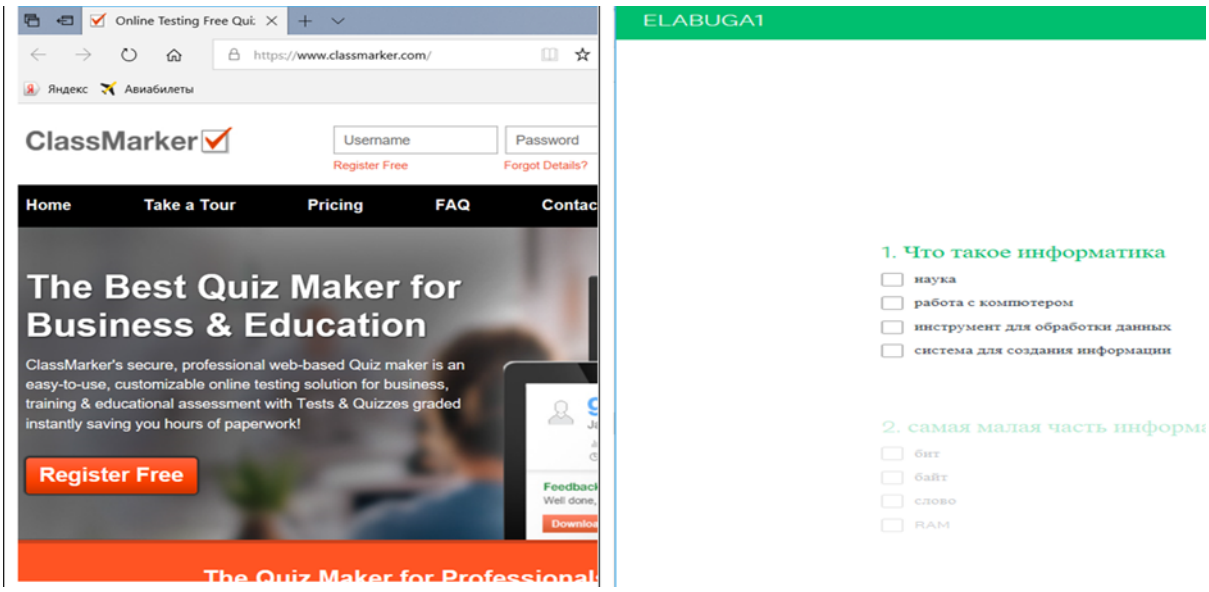

Fig. 6 Using standard Elabuge applications

In addition to these Internet applications, there are several systems that are also available at our department. Working with them is identical, but they are not yet geared to using non-informants. As part of the diploma thesis, we develop a system that is free, easy to use and has no time limitation for use.

4.2 Distributed data processing system

The new direction of the development of the topic is the distributed data processing method. Every teacher has his / her base to ask questions and answers. Based on this, the student's activity is evaluated. Any teacher of another subject has a similar system. The principles of distributed data processing and the creation of distributed databases allow the creation of a single database of students, relatively independent database of results from all subjects. Such a system allows a relatively independent work of the teacher, allowing it to work in the Internet environment, but also in island mode. All systems are interconnected. The system will allow you to gain an overall view of the student, to combine knowledge from each subject. The results of such a system can be used by students when reporting to work

5 Changing the lecture management process

Taking advantage of the above-mentioned attention assessment system, the student's knowledge during curriculum exposition allows some pedagogical practices to be changed. One such option is to change the teacher's and student's training. A teacher in advance of the students will learn about the content of the lectures, publish some of their study texts on the Internet, display the content of their lectures, and so on. Students can partly prepare for the lecture. In classical teaching (Figure 7), the topic or part of the subject is first explained, then control questions are entered. In a quick feedback lesson, initial pictures or test assignments are first entered, then each context is explained (Figure 8).
The teacher only displays a partial schema of a particular object, machine, process, and then asks what kind of questions it might be, why does it work? , which mathematical model is right? ... etc. At the same time, 5 options expressed by verbal responses, formulas, schemes, pictures. Students choose the right answer.

Consequently, in the form of a brief discussion, based on the results display on the resulting device, students justify their solution.
The role of a pedagogue is mainly to guide the discussion and finally to make a specific summary of the material.

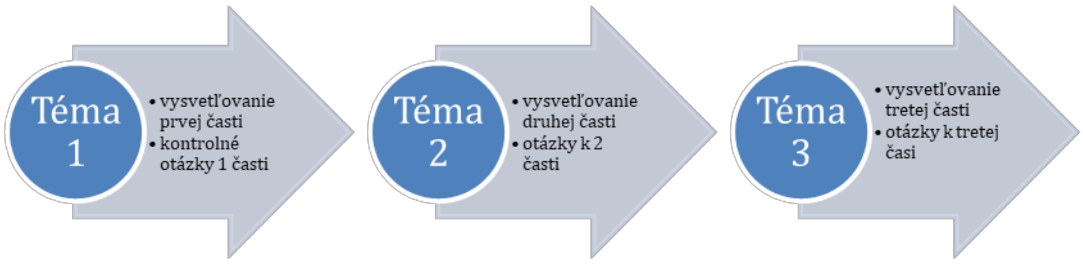

Fig. 7 Standard teaching process

Changing the Explanation Order (Figure 8) - Check-to-Speech - Explanation encourages students to defend their minds. If they even thought wrongly, they would remember what their problem was in such a defense.

Fig. 8 Modified teaching process

The following figure (Figure 9) shows the results of the students' success in introducing the system and after two months.

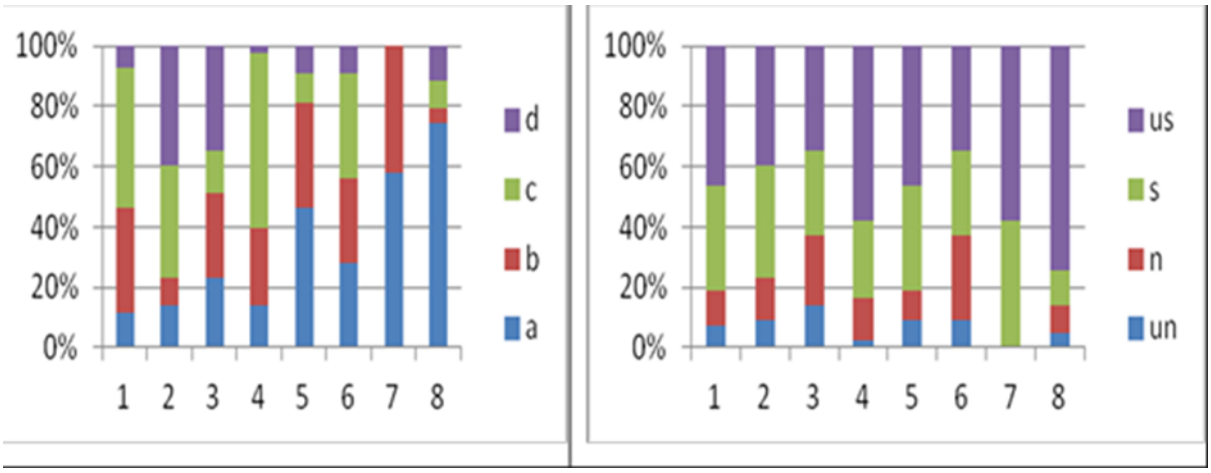

Fig. 9 Changes in results using the given method

The dynamics of the change in the results of using the technology indicates an increased share of completely correct and correct answers. It is also possible to see a reduction in the proportion of incorrect answers.

6 Conclusion

The method of using the very fast feedback to change the structure of teaching with the use of modern mobile devices addresses one of the main tasks of modern education. This is mainly the fact that students become active participants in the process of explaining the new topic. To achieve this goal, we use the modern facilities that the students control very well. Many times, teachers are struggling with students not to use mobile devices. In this case, we also use these devices as a means of communication, as well as a means of obtaining

the right answer. It is also possible to use these tools to explain your answer - search for facts to confirm your answers.

Making quick feedback during lessons makes it possible to increase the effectiveness of pedagogue and student work. There is no need to focus on the parts that students already know, understand and even defend their opinions. They can be taught at higher levels of learning - transferring knowledge to other areas. Of course, in this case, the speech is ***no about feedback but about forward management***. We assume that such teaching is currently more advantageous than classical practice.

However, this way of explaining new curriculum requires more pedagogical preparation, better knowledge of the subject, and higher management habits for managing the learning process.

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