EVALUATION OF USED E-LEARNING SUPPORT FROM STUDENTS' POINT OF VIEW

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Abstract. A multimedia support for the subject Material Science was created as the support of an educational process for students. It comprises videos of practical demonstrations of operation of various machines and measuring methods used at practical lessons. The videos are accompanied with word comments of the teacher, accompanying texts and needful graphical animations. It is a suitable didactic aid namely for students of a combined form of the study because of minimum direct teaching of these students nowadays. It is the only modern didactic aid at the Department of Material Science and Manufacturing Technology at present. The aim of the research was to ascertain interests of the students in e-learning supports within the subject Material Science by means of a questionnaire. The secondary aim was to judge a possibility to replace practical lessons only with a use of the multimedia e-learning supports. This aim was achieved based on a feedback of the users, i.e. the students, by means of the questionnaire distributed among the graduates of the subject Material Science. A reason was a detached look of the respondents at the investigated issue of the research. The survey showed that the students positively evaluated the practical lessons and work with sophisticated devices for their development. The students prefer an active involvement in their teaching during the practical lessons. This confirmed the assumption that independent multimedia support is important for understanding the subject matter during practical lessons but it cannot replace the adequate practical lessons. On the other hand, a greater proportion of the students, i.e. approx. 60 to 75 use multimedia support to prepare for the practice lecture or exam.

Keywords: multimedia support, didactic aids, practice, technical study areas, education.

Introduction

The practical experience in processing of anything in techniques for engineering students is very useful and important, too. Such experiences have often meant for them an increase of their opportunities and chances in the labour market [1]. The current funding of technical disciplines at public universities generally does not allow students to complete various exercises at the school itself, and especially to the extent that would be more beneficial (all of the activities require instrumentation, material and energy security, and it is obviously quite costly) [1; 2]. With the development of the information technology, the possibility of using the wide range of the multimedia technology which helps visualize the material is increasing [2]. A learning content delivered online gives learners the opportunity to control their own learning process [2]. The multimedia uses two or more media, such as a text, a graphic, an animation, an audio, or a video, to create more interesting content that the learners access via computer [2].

Teaching of students of technical study areas is essential and desirable for industry [3-6]. To ensure optimum conditions for teaching of technical subjects it is essential to have practical and teaching aids conforming to their time [5]. The teaching of technical subjects organized at the Department of Material Science and Manufacturing Technology was significantly improved by the e-learning platform of education in 2012, through the creation of multimedia learning materials focused on mechanical tests. The students familiarize with mechanical tests through the subject Material Science (second semester of the first year BSc. Study – Bachelor Degree). The above mentioned was implemented with the financial support of the Development Fund for Universities in the Czech Republic.

These e-learning supports created at the Department of Material Science and Manufacturing Technology, FE, CULS in Prague are used also at other universities in the Czech Republic and the Slovak Republic (for example: Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Production Technology and Management). The aim of the multimedia support is to serve as the study material for students at preparation for written tests where an explanation of the material test principle is a part of the written test.

On the basis of the long-term teaching experience, it is possible to assume a direct link between the success of students in the exam and their active participation in lectures and semester practical lectures [5]. From the above mentioned it can be assumed that the enhancement of the teaching by facilities of sophisticated and adequate equipment and other teaching aids will have a positive impact

on the success of students in the exam. It can be also assumed that the multimedia support will help deepen the connection with the discussed issues and that students will be able to repeat the test with a time lag, especially during the exam period [5]. The application of the technology of the virtual reality has similar beneficial issues not only in teaching but also in practice [7; 8]. In the subject Material Science students get new pieces of knowledge from the science and the research namely from the area of polymeric materials and composite materials based on polymers [9-12].

The aim of the research was to ascertain interests of students in e-learning supports within the subject Material Science by means of a questionnaire. The secondary aim was to judge a possibility to replace practical lessons only with a use of the multimedia e-learning supports. This aim was achieved based on a feedback of the users, i.e. students, by means of the questionnaire distributed among the graduates of the subject Material Science. A reason was a detached look of the respondents at the investigated issue of the research.

Materials and methods

The concept of the multimedia support corresponds to the focus of other related technical subjects, e.g., Manufacturing Technology. The aim of the solution was to acquaint the students with practical examples of laboratory testing, principles of standardized tests and finally operating of machines and equipment by using the multimedia support. The teaching videos were filmed by using the multimedia system, i.e. a video camera and PC and these videos have been implemented into the teaching materials. The multimedia support gives students pieces of information by means of the audio and the video records of the practical problems accompanied with texts and animations. Students approach this didactic aid by means of the computer.

A questionnaire was distributed in the following semester to the students of the second year of the Bachelor study within the course Material Science to ensure optimum conditions for the formation of the feedback for the teaching. The subject of the investigation, within which the survey was conducted, i.e. Material Science, is included in the second semester of the first year of the Bachelor degree programme. The investigation was performed at all study programs of the Faculty of Engineering at CULS in Prague. There were 144 students in the full-time study and 32 students in combined study. A questionnaire survey had the main objective to determine the benefits of the implementation of teaching aids during the lesson. Those were lacking in the course Material Science in previous years. The results of the questionnaire can help decide a creation of other didactic aids at the Department of Material Science and Manufacturing Technology.

Results and discussion

The questionnaire provided the following pieces of knowledge. The students of full-time and combined forms of education are satisfied at the practical training with an active involvement in the measurement (Fig. 1). The respondents considered as essential to listen to the educator's interpretation coupled with practical demonstrations and other resources (Fig. 2) in terms of sources of the information retrieval, i.e. learning materials. A consultation with other students, a use of consulting hours of a teacher and Facebook have been shown as other sources of information for students according to the questionnaire. Other sources of information are the dominant sources of information for the students of combined studies. The obvious reason is that the students of the combined form have only one study block taking eight hours so they need other adequate sources of information (e.g., the multimedia support). However, the use of independent multimedia support is not so useful (desirable) for students how it would be expected.

An emphasis is put on students' homework, i.e. the acquisition of knowledge applied when solving the given problem during the practical lectures within the teaching technical subjects at the university. The results show that students use the e-learning electronic support (Fig. 3) for preparation for the practical lectures. The obvious reason is that students must practically operate the testing machines during the lecture. There are textbooks for practical lectures and the multimedia support with the detailed procedure of machine operators which students practically meet with. The involvement of students in the measurement is taken into account during the practical lecture. The effectiveness of the use of the multimedia support for preparation of practical lectures is evident from Fig. 4. It was positive for the majority of the respondents. The students prefer the usability of the

multimedia support in preparation for the exam (Fig. 5), in particular, the students of the combined study. It has been shown in the previous questionnaire survey during the semester, i.e. before the exam of the subject Material Science that 66 of the respondents plan to use the multimedia support to prepare for the exam [5].

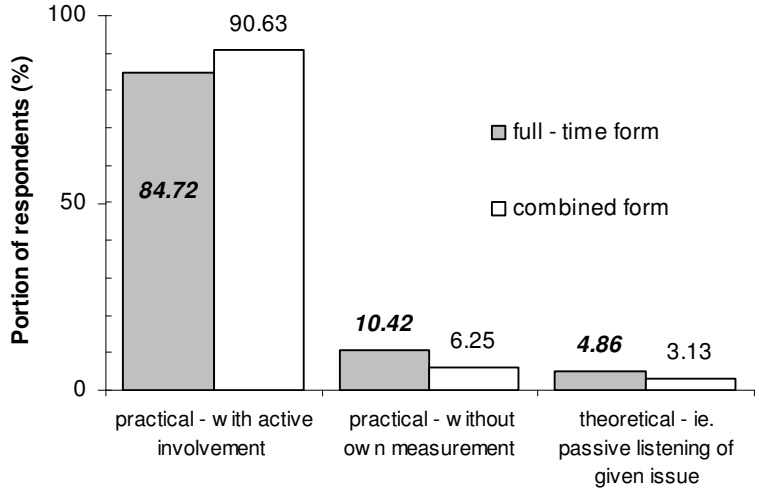

Fig. 1. **Which type of lessons did you prefer in Material Science course**

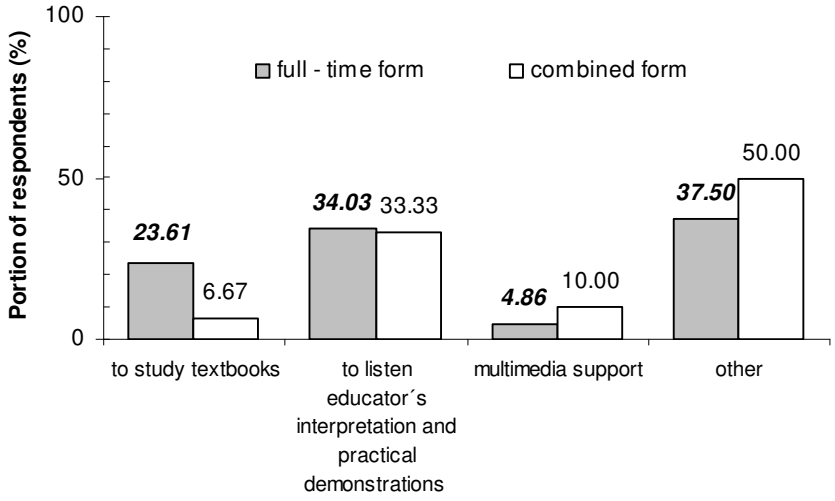

Fig. 2. **To understand the discussed issues during practical lecture it is sufficient**

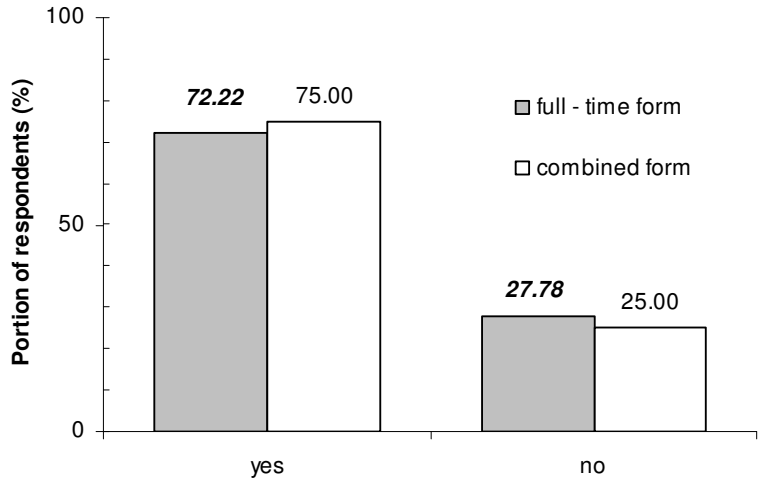

Fig. 3. **I used the multimedia support from e-learning electronic support for preparation for the lectures**

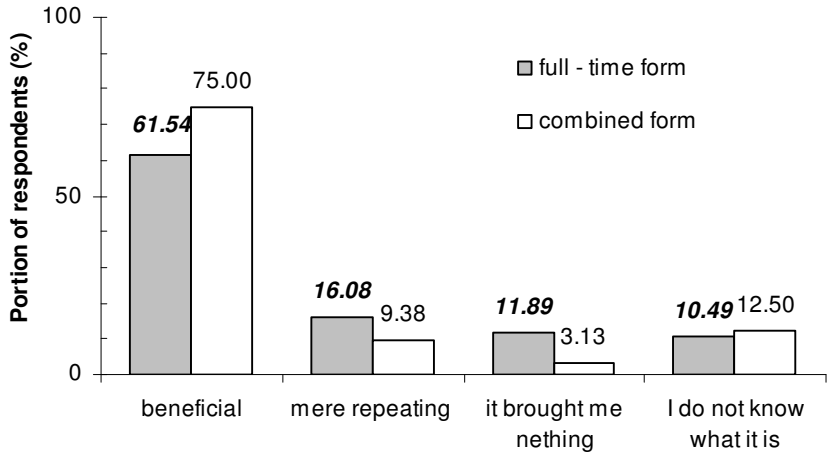

Fig. 4. **E-learning electronic support located at https://moodle.czu.cz/ i.e. multimedia support of subtasks of measurements were for me**

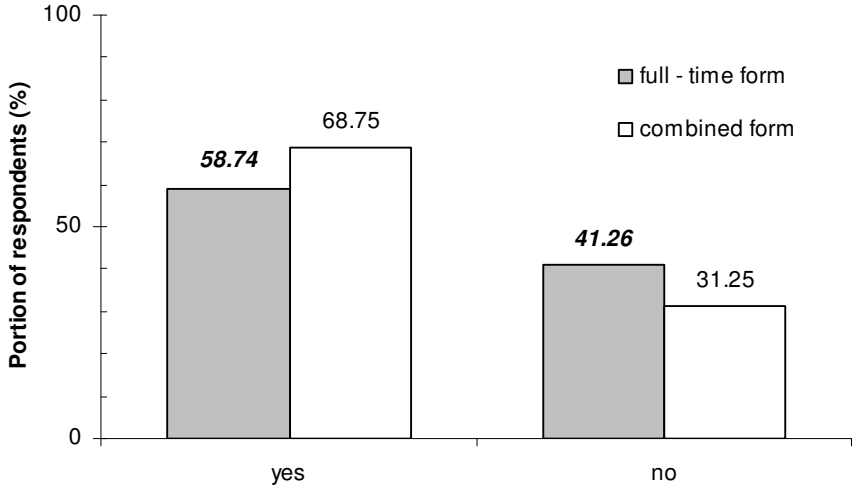

Fig. 5. **I used electronic multimedia support during preparation for the exam**

The students positively evaluate the acquisition of practical skills with the operation of the modern laboratory equipment (Fig. 6). It should be noted that the students have the opportunity to use the multimedia support, where they are acquainted with the process of measuring the mechanical properties of various materials. On the other hand, the students prefer practical lectures and gaining practical skills by operating the modern laboratory equipment. Therefore, it is not advisable to turn only to theoretical exercises with the use of the multimedia support. The multimedia support is aimed at enhancing the students' pieces of knowledge. They do not serve as an elimination of the practical training during the lecture.

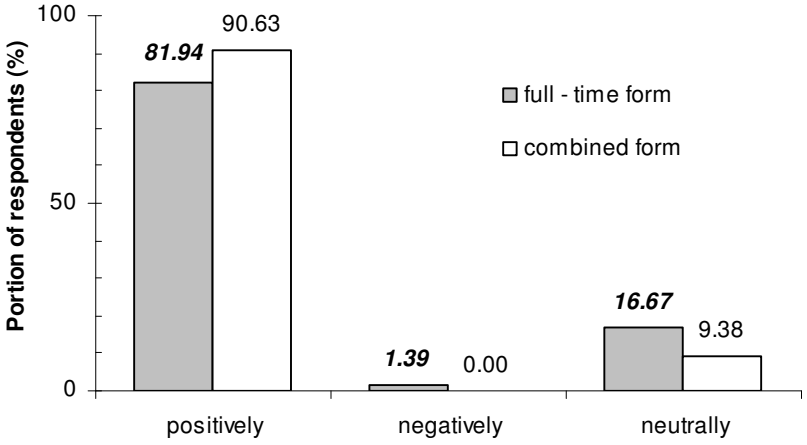

Fig. 6. **Gaining of practical skills of modern laboratory equipment I evaluate**

The subject Material Science ranks among the most difficult subjects at the Faculty of Engineering, which is evident from Fig. 7. The students' responses in the survey correspond to the statistics of the exam results from the university information system. Not only pieces of knowledge, but also understanding of the given issues are important for successful completion of the course.

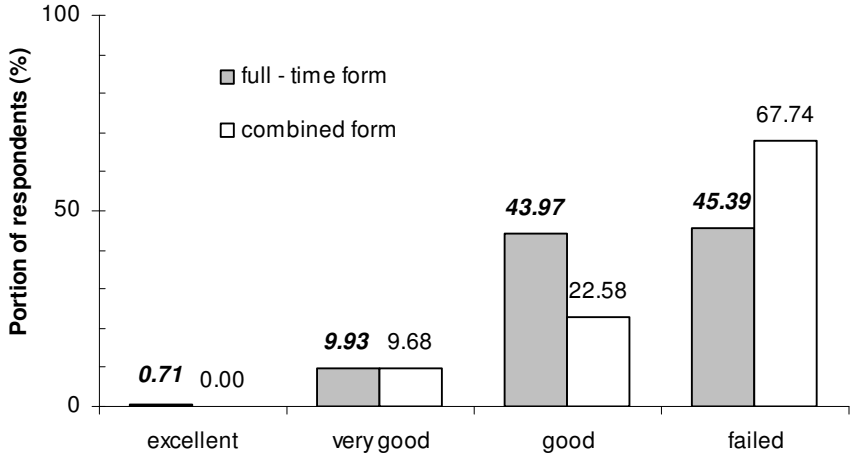

Fig. 7. **I passed the exam of the course Material Science with a result**

The research results confirm the conclusions of Kazaine who states that students use various combinations of study materials, i.e., e.g., presentations with texts in a combination with video materials [2]. This means that students want to use a variety of learning materials in order not to overload one perceptual channel [2]. Kazaine also states on the basis of other researches that not every student can successfully study in the same place, by the same style and the same way, i.e. use the e-learning support [2]. However, a positive response from the students to the multimedia support using the combination of information flows in a form of a video, an audio, an animation and a text followed from the questionnaire.

Conclusions

The survey which was performed within the scope of Material Science showed that the students positively evaluated the practical lectures and the work with sophisticated devices for their own development. The students prefer an active involvement in teaching during the practical exercises. The students prefer a practical demonstration of the measurement and an interpretation of the teacher and other sources, e.g., a discussion with other students to understand the issues of partial subtasks. This confirms the logical assumption that the independent multimedia supports (e-learning) are inadequate for understanding of the subject matter during practical lessons and they cannot fully substitute the practical lessons with the active involvement of students. On the other hand, a greater proportion of the students, i.e. approx. 60 to 75 use the multimedia support for preparation for the practical exercise or for the exam. Namely, the students of the combined study form positively evaluate the asked multimedia support compared to the students of the full-time study form according to the questionnaire results. The students positively evaluate acquiring of practical skills by operating the modern laboratory equipment. Therefore, it is not advisable to turn only to theoretical exercises with the use of the multimedia support. However, this negative trend prevails within teaching technical subjects. The financial demands of mechanical tests, i.e., e.g., production of test specimens, overhead expenses etc. are the reasons for this negative trend. Multimedia supports are aimed at enhancing the students' knowledge rather than eliminate the practical lectures.

This is a didactic aid above all enabling students to cope with the demanding issues. It should be noted, that also students from non-technical schools come to technically oriented universities. The students who are entering the manufacturing companies often have to face the testing process at different stages of the production cycle. Universities should not educate only theoretically well prepared graduates. It is not possible to assume that graduates will perform only control positions, but, for instance, also positions of technologists etc. The knowledge of using the conventional test equipment is essential for these graduates, especially in the bachelor study program. The knowledge and possibilities of the use of standards are also essential.

In the year 2014 a total reconstruction of the laboratories of the Faculty of Engineering, where the practical lectures take place, was performed. So in the year 2014 teaching of the practical lectures was not possible. The practical lectures took place in lecture halls. This showed a significance of the e-learning support.

Distant teaching of students secured by means of the e-learning support, such as, e.g., the lectures prepared in the application Media site, is the current trend. However, the results of the questionnaire distributed among the graduates of the technically focused subject Material Science proved that the students preferred practical lessons.

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