First Experience with E-Learning Course Supporting the Practical Training in Medical Biophysics

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Abstract

Students of general medicine at Faculty of Medicine Comenius University in Bratislava learn biophysics in three different forms - 24 hours of face-to-face lectures, 36 hours of practical training and additional 140 hours of self-study. Different levels of students' initial knowledge combined with a lack of contemporary textbooks is a great challenge to develop a modern form of study material suitable for study managed by student themselves.

The first version of the e-learning course “Practical training in Biophysics” was offered to experimental groups of general medicine students in the winter semester 2016/17. Data provided by the learning management system were analyzed in order to recognize students’ learning manners and preferences.

Students used the course content in average during 24 ± 8 days during the semester. Study materials related to physical units’ conversion, measurement errors and essentials of statistical data processing were used by almost all students. Regarding resources specific to particular practical tasks, students in average have seen in advance (81 ± 16) % of them and (40 ± 17) % of these resources again after the measurement. Resources explaining theoretical backgrounds of particular tasks were used most often. Nevertheless, students’ performance during the practical training often showed lack of understanding. It is necessary to extend the course with other forms of educational materials (contextual problem-based learning) and self-evaluation time-bounded tasks.

Keywords: e-learning, university education, medical biophysics.

1 Introduction

The subject Medical Biophysics belongs to theoretical basis of medical education. It is taught in the first semester at the Faculty of Medicine, Comenius University in Bratislava (FM CU). Time allocated to face-to-face teaching is very limited. There are totally 24 hours of lectures and 36 hours of practical training. Students should devote additional 140 hours to self-study.

Our former research showed that initial knowledge and skills of students are very heterogeneous [1]. This is influenced mainly by the fact that our students come from different countries and most of them had at least one year break in physics education before starting their study at FM CU. Students’ understanding of particular topics in physics seems to be far away from the level that enables effective study of Medical Biophysics. These findings resulted to the development and implementation of the e-learning course supporting the face-to-face practical training in Medical biophysics at FM CU.

2 Methodology

The e-learning management system Moodle is used at the Comenius University. The first version of the course “Practical training in Biophysics” was offered to 35 students of general medicine studying in Slovak language and 32 students studying in English language in the winter semester 2016/17. Students were briefly informed about the LMS Moodle and the content of the course at the beginning of the semester, during the first practical training. The use of the e-learning course was voluntary for students.

The course offers:

1 General information on organization of the study (e.g. occupational health and safety requirements, assessment rules, guidance on using the electronic form of measurement report, semestral project guidelines, tasks schedule).
2 General physics information - study material supporting high school physics repetition (conversion of physical units, measurement errors) and essentials of statistical data processing.

3 Study materials related to each particular practical task - totally 18 sections containing the theoretical background of the practical task, measuring instruction (practical description of the measurement method) and the electronic form of the measurement report (electronic forms of each measurement report are available also on the website of the Institute of Medical Physics, Biophysics, Informatics and Telemedicine). Several sections included also links to external information sources – video-guides of measurement procedures, web-lectures etc.

The course also includes links to science-popularizing articles introducing some of recommended topics of semestral project. Several forums were opened to provoke peer education.

No time limits were set up in the course. All of its parts were available to students from the moment of creation (most often from the beginning of the semester). Teacher repeatedly invited students to use relevant parts of the course as a part of their preparation for practical training.

Data provided by the learning management system were analyzed and compared with tasks/schedule and informal assessment of students in order to recognize students learning manners and preferences.

The paper presents results of analyzing the use of the e-learning course “Practical training in Biophysics” by 35 invited Slovak students. Five more Slovak students enrolled into the course. These students were not included in the research, because their practical training schedule and assessment was not available. None of involved students had previous regular experience with e-learning. One of the students has seen the LMS Moodle, but he used it only once during his high-school study.

3 RESULTS

Students used the course as an electronic library. They did not use offered discussion activities. The possible reason is that students meet during the semester almost daily at school and more over they live in the campus, where they have possibility to discuss face-to face.

Students used the course content in an average of 24 ± 8 days during the semester (days when students only viewed the title page of the course were not included).

3.1 General information on organization of the study

All students viewed the occupational health and safety requirements.

Totally 22 students (63%) viewed the guidance on using the electronic form of measurement report, eight of them viewed the document for the first time in second half of the semester after submitting half of their measurement reports. Slovak students usually have basic experience with using Microsoft Excel because it is widely used in Slovak high schools. In spite of this at least 4 students did not know change the form of cells and use formulas – these students used the Excel form as a “typewriter” and calculated each value by calculator. All of these four students viewed the guidelines for the first time in second half of the semester.

Semestral project guidelines were used by 23 students (66%), eight of them viewed the guidelines for the first time less than 10 days before submitting the semestral project. This may not pose a problem as the document is published on the website of the Institute as well.

Recommended literature was viewed by 19 students (54%), 13 of them viewed the document in first two week of semester. Some students who did not view the document asked at the end of semester what other sources (except of moodle-course and one widely used textbook) they can use to study for the exam. They were surprised that list of recommended literature is published in moodle from the very beginning of semester.

3.2 General physics information

Study materials related to physical units’ conversion, measurement errors and essentials of statistical data processing with illustrative examples were used by almost all students (86% to 97%). Students did not feel self-confidence in these topics and returned to study materials usually several times (in average 4 times to measurement errors and 5.5 times to essentials of statistical data processing).
Web-lecture on basic terms of medical statistics was visited by 26 students (74%) and web-lecture on sample characteristics by 14 students (40%).

3.3 Study materials related to practical tasks

Students have seen in advance (prior to the particular measurement) in average \((81 \pm 16)\) % of offered resources related to particular practical tasks. Students viewed repeatedly \((40 \pm 17)\) % of offered resources after the measurement. Five students (14%) viewed each published study material at least once. Totally 15 students (43%) used the course after the semester during the examination period, although the course was not intended for preparation for the final exam in Medical biophysics.

At the beginning of the semester students visited the course mostly two or three days before the practical training. The number of students who visited the respective resources for the first time shortly than 24 hours before the practical training increased at the end of the semester up to 8 students (23%). Materials explaining theoretical backgrounds of particular tasks were used most frequently – in average 2.9 times (prior to the measurement; after the measurement, when students performed their measurement reports and often also in period of credit tests). Of course, it is possible that students used published documents more often, if they downloaded them.

4 CONCLUSIONS

First year experience of e-learning course supporting the practical training in Medical biophysics indicates that students consider it as useful. Nevertheless students’ performance during the practical training often showed lack of understanding. It is necessary to extend the course with other forms of educational materials (contextual problem-based learning) and self-evaluation time-bounded tasks.

Students who rarely used the course usually had basic knowledge deficiencies that limited their use of offered materials. We need to pay special attention to these students and provide them extraordinary support at the very beginning of their study to overcome their initial barriers.

It would be useful to change also appearance of some particular section in the course. This seems to be in the LMS Moodle used at the Comenius University technically impossible.

ACKNOWLEDGEMENTS

This work was supported by KEGA 037UK-4/2016 „Monitoring and development of scientific abilities of university students of medical and biomedical study programmes”.

REFERENCES