

Experiences in Physics-e-learning in Poland

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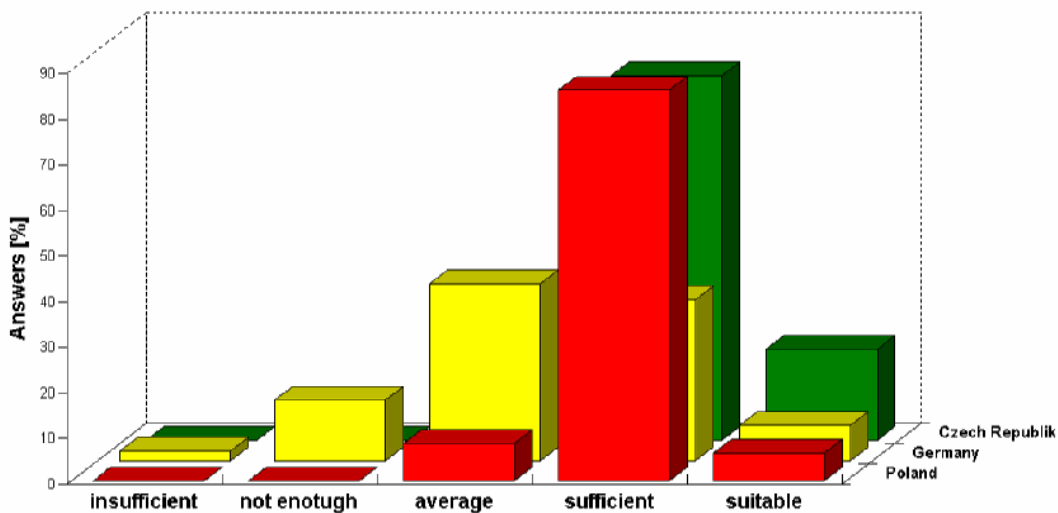
Abstract

The main rise of the low interest in physics study can be a low evaluation of physical education. It is necessary to prepare good materials for lectures and other activities of universities. It is possible to introduce e-learning methods and materials into university education. This paper presents the applied blended learning method of physics education in Technical High School of Economics in Warsaw

Introduction

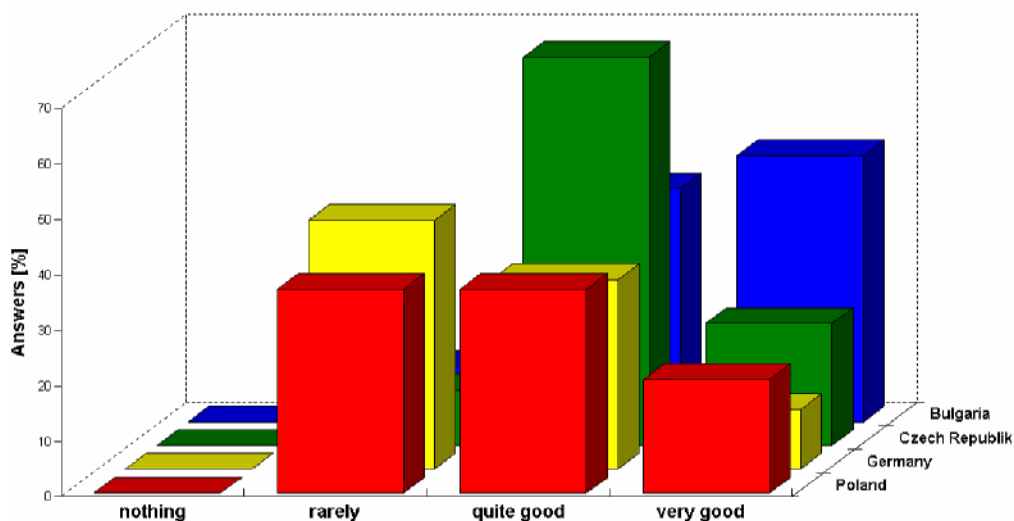
The interest in physics studies in Poland is rather low. The studies of physics are associated with the requirement of difficult, theoretical learning, which is an after-effect of tense "overloaded" school curricula for teaching physics and an insufficient number of hours necessary to realize the teaching aims. Therefore, new forms of education, such as e-learning, are being introduced at university level. Studies of this type are introduced especially in computer science and engineering studies, in which physics plays a dominant role. There are more and more attempts at introducing e-learning into physics studies too. It turns out, however, that learning of this type can bring not only advantages, but also negative results.

The number of physicists in Poland is rather low. For example in comparison with Germany, there are 4 times fewer students of physics. On the other hand, international studies with 273 participations in 4 countries [1] show that the Polish graduates, mostly employed at schools, have a good opinion about their study.



This picture presents, how physicists from different countries evaluate their physics education. The Polish physicist and the Polish teachers of physics mostly evaluate their preparation for work as sufficient.

It is not so good in the section, where physicist evaluate their lectures and their practical work at the university or high school physics study. The next picture presents, that the Polish physicist evaluate their physics study as average.



University lectures and practices are no longer a good tool for evaluation. Physicists in Poland see this activity mostly as average. It is necessary to prepare good materials for lectures and other activities of universities. It is possible to introduce e-learning methods and materials into university education.

E-learning in Poland

The e-learning methods of study in Poland are not very popular, but they have a long tradition. Now around 40 percent of students are learning extramurally, but only a few are using e-learning methods. The difficulties come from the restrictions of Polish law, which sees as necessary to execute 60 percent of lectures from traditional studies.

The physics in these studies is still not popular. Only several high schools offer this subject in e-learning education. Mostly is it only a subject or an additional specialization of study. There are not universities or high schools, which offers physics as a ground specialization of studies.

The introducing of physics is very difficult. This experimental study entails experimental methods of teaching and learning today. The realization of university experiments only with a computer is not possible in many cases. Preparing any on-line experiment is still very expensive. International cooperation in this matter can help solve this problem.

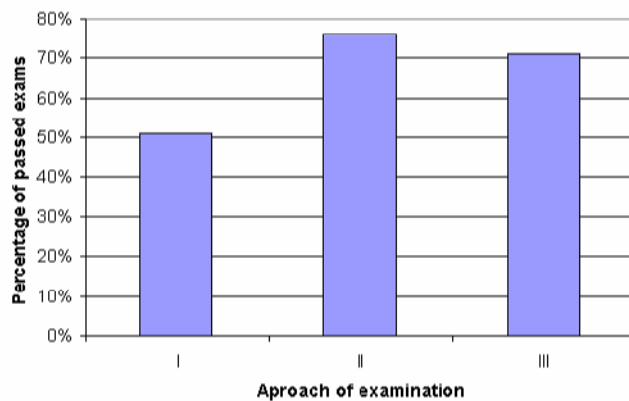
Viewed from another angle, e-learning will help the teaching-learning process fulfill individual aims for every student. It is to free students from restrictions such as that of time and place. Depending on the software, the student is able to choose the content of teaching material himself. Different methods are sometimes also available. The routes to reaching the goals can be modified. Due to the predisposition of individual students, some processes of learning can be accelerated. For this reason it follows, that it is a practical time-saving technique.

It turns out that even costs of education are lower. The necessity of survival of lecture-halls is not important, and teachers carry out their duties and task only once. There are also lower costs of commuting as well as accommodation in university centers. The necessity of taking days off work does not occur. Consequently, the risk of job loss is lower, and sufficient incomes are ensured. Many reports speak of an improvement of the quality of learning, because we can resort to expert knowledge and we enjoy multiple representations of teaching materials.

All these features of e-learning provide a solid foundation for development of such methods of teaching and learning. In physics education as such it is necessary to develop not only the traditional methods of knowledge transfer, but also network methods of experimental research. The first experiences in this matter shows, that many students have quite new problems, which are not noted in traditional studies. Some experiments in this subject were carried out in Technical High School of Economics in Warsaw.

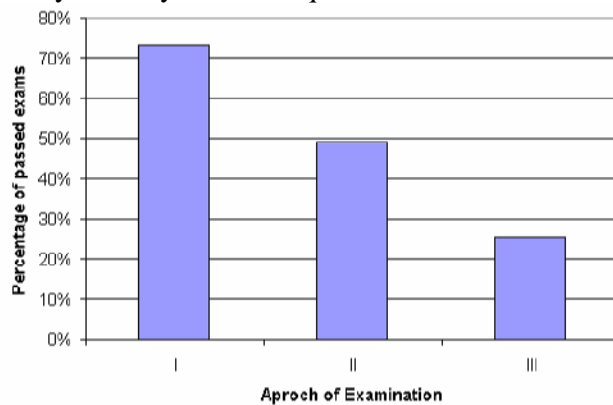
Experiences in Physics

The e-learning studies in Technical High School of Economics in Warsaw have a market-placed name "Studia 220", which means that the price of this study is only 220 zł (around 50€) per month. Many students can become scholarship and in this way these studies are practically free. Changing the traditional methods of work is, however, in many cases very difficult. The difficulties are shown in the picture below, which presents the percentage of passed examinations in the first, second and third attempt.



before restrictions

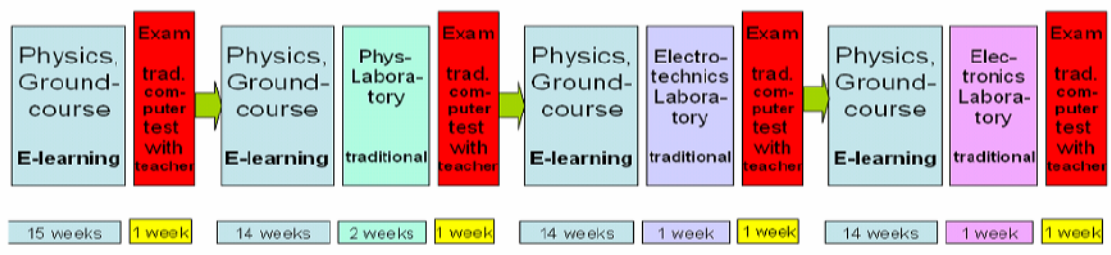
A detailed analysis of students' achievement while working with e-learning tools shows, that only 50% of examinations are passed in the first attempt. 83% and 86% of all examinations are passed in the second and the third attempt respectively. The result is connected with students' behavior before and during examination sessions. A modification of teaching curriculum as well as methods of learning has not influenced on students' interest. Just now, if the number of re/takes was reduced from 3 to 2 and the third approach was possible only under special circumstances, the regularity of study would be quite different but similar to traditional process of study.



after restrictions

The restrictions and assimilation with traditional methods of study are very important during the first phase of e-learning studies. In this way the Technical High School of Economics in Warsaw introduced a method of blended learning [2], which combines methods of e-learning

through the Internet and traditional methods of physics study in a physical laboratory. The picture below presents the applied blended learning method of physics education in Technical High School of Economics in Warsaw.



The future of physics-e-learning

The future of physics teaching with e-learning methods in Poland is connected with international research in this matter [3]. Of special importance is a platform of e-learning, which should include not only simple e-learning presentation of physical materials, which are accessible on CD-ROMs or in the Internet, but also physical simulations and experiments. There are many analyses and investigations with an introduction of simulation and real experiments in education. Each institution of high education in Europe tries individual and oft separated ways to solve these problems. It is necessary to lunch international investigations, which can lead to a uniform learning platform, which also include possibilities of physical experiments.

On-line experiments are of greet value. The preparation and supporting of such experiments is relatively expensive. Not all universities or high schools can have every experiment for remote education. However, it is possible to prepare a network of experiments, which will be accessible for many institutions via the Internet. In this way, each student can work an appropriate experiment in an attainable time.

Interest in this kind of study is growing. The demand for an appropriate platform is also very high. The international investigations should reduce costs for each institution. The obvious need for a learning platform can lead to progress in this matter and to preparing of efficient platform for many subjects.

Literatur

[1] Lechner H., Svoboda E., Galanov P., Meger Z., 1996, „Studienfach Didaktik der Physik in der Lehrerbildung – eine vergleichende Analyse aus der Sicht berufspraktischer Anforderungen verschiedener Länder“, Zur Didaktik der Physik – Probleme und Perspektiven, S. 240-242, Leuchtturm-Verlag
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