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Benefits of the support of polytechnic education for non-technical schools` students

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Abstract

The addition of the polytechnic education to the curriculum of non-technical schools is currently a highly discussed topic that reflects the declining interest in technical fields of study and activities. Approaches to promoting technological and polytechnic education are numerous. However, the problem tends to be simplified to the issue of processing materials, which does not take into account the wide range of techniques and technologies, nowadays largely represented by information and communication technologies.

With these facts in mind, an experiment was conducted, focused on the addition of a thematic unit of computer aided design (drafting) in 2D and 3D supported by CAD system to the curriculum of grammar schools with a 6- or 8-year study program, for the time period of 6 months. The submitted study presents a summary of contributions and results of the experiment, using the method of investigative research carried out among the teachers of grammar schools with a 6-or 8- study year programs, who had implemented the training of the above mentioned subject.

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Keywords: polytechnic education; pedagogical experiment; drawing documentation; CAD systems

1. Introduction

Technology is an internal part of our life, it is all around us. Nowadays, a person without necessary basic technical knowledge and skills would not be able to perform their social function properly, and, consequently, would

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not live a full life (Zubata, Plishke & Kropáč, 2011). Therefore, elementary technical knowledge and skills should be mediated to the general public, not just to the students of technical secondary schools, by the educational system. In terms of advanced educational systems, elementary technology training represents an integral part of the general curriculum taught at elementary and secondary schools. It is transferred to pupils and students via a school subject, different not only in name (practical training, practical activities, technical training, technical practice, technique, practice, technology etc.), but also in scope and content.

Over the recent years, the term "subjects of technical character" has been used in professional literature (Idrus, Mond & Abdullah, 2010). By means of this subject, pupils acquire not only theoretical knowledge, but also elementary work skills. The emphasis is usually placed on technical creativity, depending on students` fields of interest, and the training is carried out mostly within the framework of ooptional subjects. Despite the rapid development of computer technology in all developed countries` education systems, elementary manual activities of technical nature such as woodworking, metalworking, working with tools and simple machines, electrical work etc.), remain a part of the curriculum. A combination of the two aforementioned is more and more common. The aim of the technology or polytechnic education is to develop the skills of the learners in manipulating working tools and machines, adopting work culture, and to acquaint them with the scientific principles of contemporary production, safety rules, etc. (Mojžíšek, 1981).

At present, these objectives are further developed by the supportive role of ICT, as information technology today covers or supports a significant part of industrial production. The aforementioned goals shall be well achieved in technically oriented subjects, which are based on the combination of the two stated goal segments, and the content and process side of which are close to a number of professions, not only these called technical today (Manullang & Kons, 2012).

Even though teaching at primary and secondary schools is primarily focused on general training, preparation for the use of computer technology and technology in general grows in importance as a component of education (Granath, 2003, p. 129). These efforts have not only been declared, but also embedded in a wide range of curricular and policy documents, and in many cases they have also been financially supported by various grants. The above stated facts indicate that education systems clearly aim to promote polytechnic education. Unfortunately, at least in terms of the Czech education system, it is not always the case. During 2006 and 2007, the Faculty of Informatics and Statistics of the University of Economics in Prague in cooperation with the company CACIO-CSSI-SPIS conducted a complex research to analyze students' of grammar schools readiness for academic studies at technical universities.

The study involved 53 faculties all over the country. The conclusions of the study were alarming, as they revealed a lack of experts in technical fields, as well as the absence of expertise among teaching staff, and an inadequate level of education at grammar schools in technical disciplines, based on the rudiments of drawing documentation, as one of the most important prerequisites for successful studies at technical universities. Moreover, according to the conducted study, only a small percentage of grammar schools` students proceed with their studies at technical universities. They prefer fields of study more related to humanities, though their dispositions to study at technical universities might be very good (mathematics, chemistry, physics, etc.). Following the results of the aforementioned study, the author of this paper conducted a similar research in 2013 (Klement & Kubrický, 2013), a part of which was carried out at six 8 and 6 year grammar schools. Among others, a question concerning the reason why so few students of these grammar schools apply for technically oriented universities was asked. The most frequent answer received from the students was a claim that they were unable to assess the benefits of technology studies, because their high school`s curriculum did not involve any subject which would at least partially expound technology and technical issues to them.

Based on these results, we started to prepare in 2013 and implemented in 2014 an experiment, based on the inclusion to the set of ICT subjects taught at 8 and 6 year grammar schools of a thematic unit "Application of mathematics and chemistry in computer-aided technical drawing", which integrated both the technical area of technical drawing and drawing documentation, and the area of specialized CAD software tools used in these activities (Klement, 2001). The experiment thus consisted in the introduction of a new thematic unit to the established curriculum, and in the evaluation of the impact of thus conceived education on the students.