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Efficient education of ergonomics in industrial engineering study program

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Abstract

The paper is focused on development of innovated course focused on ergonomics education in the conditions of the Czech Republic. Although the proposed course can be seen as a country oriented it is built on universal foundations, which can be applied everywhere. The ambition is to create innovated course content that will be fun and educated at the same time. During course preparations a Constructivism theories were applied to ensure better understanding of the ergonomics issue. The course is also constructed according to recommendations of International Ergonomics Association and Federation of European Ergonomics Societies.

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1. Introduction

Ergonomics is currently one of the most developed science disciplines in the Czech Republic. Ergonomics is according to IEA (International Ergonomics Association, 2000) defined as a scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. After access to the European Union in April 2003, it was necessary to harmonize all legislation according to EU rules.

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Safety at work along with ergonomics were some of the many areas covered by this harmonization. Although it is already over 10 years since these procedures were done, we still have reserves in the practical application of ergonomic rules. Within the product ergonomics, the situation is not so bad. Due to the operation of international companies ergonomics came earlier in the product design. At present so called process ergonomics, the application of ergonomic principles in the production design, is very actual. Interpretation of legislative regulations and rules is not always easy and therefore only a small group of experts who are able to implement ergonomic principles into businesses exists.

The fact, that ergonomics in manufacturing is still an asset of rather medium or large enterprises, is supported by absence of special degree or certificate courses in the Czech Republic, as it is in the case of some countries within the EU. There is no CPE accreditation by the Board of Certification in Professional Ergonomics, no Eur. Erg. accreditation by Federation of European Ergonomics Societies (FEES) or no Royal Charter from the Ergonomics Society of the United Kingdom, etc. (Bridger, 2012). Approved academic programs for ergonomists training are also missing. Education on universities in this area is often realized by several specialized subjects within product design or industrial engineering study programs. In industrial engineering there is often focus on physical ergonomics, because much of the production is still labor intensive.

To take action in our own hands a proposal for improved and balanced ergonomic course, which will be implemented in industrial engineering study program on University of West Bohemia in Pilsen, is presented in this paper.

2. Methodology

Education on universities in Czech Republic is provided still in more traditional way. As described by Barbosa (Barbosa, 2012) the teaching methods are based on memorization and repetition, without students' realization of the true meaning of the information. The prevailing thought is that the teacher has the knowledge and on the other hand the student knows nothing. This education can be seen as an act of depositing information in student's memory. In this way students get proper education and information though, but they do not stay in their head for a long time and are very rapidly displaced by other information.

More appropriate is the Constructivism approach or Constructivism theory. It is based on the idea that people construct their own knowledge through their personal experience. The effectiveness of Constructivism is that it prepares students for problem solving in complex environment (Al-Huneidi, 2013). They are more active in building and creating knowledge based on their experience and interpretations. Teacher's role is essential and important in learning process. He/she must act as a mentor and help students to interpret knowledge and guide them to refine their understanding and interpretations.

The basic theories of Constructivism are summarized in Table 1. (Janjai, 2012)

Table 1. Learning activities designed by using theories of constructivism.

Principle of learning	Learning activities
1. Construction of new knowledge	1. Request the students to describe their background experience on the subject to be learned. Encourage the students to propose the method for learning new knowledge according to their interest and competency.
2. Authentic learning	2. Let the students face real situations, such as problems in the classroom.
3. Activity-based approach	3. Request the students to construct the knowledge by themselves from various activities such as the study from documents, survey, interview and experiments.
4. Group process and member interaction	4. Assign the students to work together as groups, each of which has 4-6 students. Each member of the group has a specific role and mission. The outcome of the work was evaluated by all members of the group. 5. Request students to use the rule of PDCA (Plan, Do, Check, Act) to control their work to achieve the goal.

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