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Motivation of Medical Students to Study Sciences

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Abstract

Natural sciences and their applications (medical biophysics, medical chemistry and medical biology) represent an inevitable part of medical curriculum. They are often negatively evaluated and a lack of motivation to their study is observed. The attitudes of medical students towards natural sciences are influenced by their negative experiences from the previous study. Nevertheless, knowledge from the natural sciences represents the necessary basis for better understanding of the basic principles of the medical diagnostic and therapeutic methods. Therefore, the indispensable role of natural science teachers is to achieve positive attitudes and motivate students to study them. Our research project is focused on the identification and subsequent application of motivating approaches in natural sciences teaching. Pedagogical investigation using anonymous questionnaires was done with the aim to specify respondents' (first year students of Comenius University in Bratislava, Faculty of Medicine) motivation and attitudes towards teaching and learning natural sciences before starting medicine study and after the first semester of medicine study.

Keywords: University medical education, student's motivation, natural sciences.

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1. Introduction

Medical study and practice put high demands on analytic and synthetic thinking of students and health professionals. These requirements could be developed during university study of natural sciences as an inevitable component of medical curriculum. Natural sciences (medical biophysics, medical chemistry and medical biology) are usually included in the group of theoretical/supporting disciplines, and they are thought at the beginning of the medical study (World Federation for Medical Education, 2003).

The attitudes of medical students after graduation at general secondary schools regarding the study of natural sciences are mostly negative and their knowledge is insufficient (Balazsiova, 2014). Therefore, it is necessary to search motivating approaches and strategies in the teaching process and try to change these negative attitudes in a positive way by improving the motivation of medical students towards learning the natural sciences.

Our research project 'Motivating factors of medical students for better understanding the fundamental science knowledge in relation to medical diagnostic and therapeutic methods' is focused on the identification and, subsequently, the creation of motivating the teaching of the natural sciences (Kralova, 2016).

By generalising and simplifying a complex phenomenon such as teaching, it is possible to create a model in which the participants of education are in their mutual positions and relationships, on the base of which their roles and functions are defined.

The choice of a suitable (i.e., effective) teaching strategy consists, among other things, of the correct selection and layout of the content of teaching, correct formulation of goals, correct selection and use of didactic means, including methods, forms, didactic techniques and technology (Figure 1).

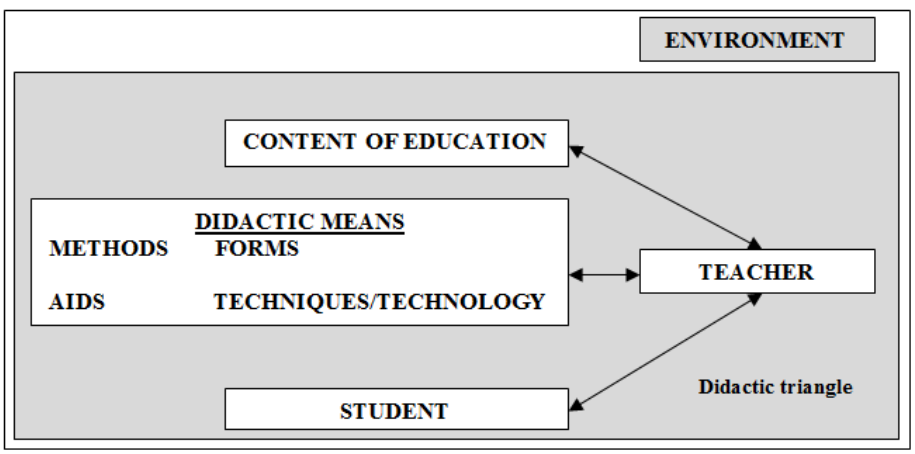

Figure 1. Model of teaching, the participants of teaching (didactic triangle). Modified by Slavik (Slavik, 2012)

2. Purpose of the study

There are currently many views abouts how to teach natural sciences. The primary objective is to make the student be able to use the obtained knowledge and skills in his/her specialisation and practical life. This should help the student to understand the basic natural phenomena/concepts/laws and better/deeper understand the real world that surrounds him/her. In addition, emphasis is placed on the development of logical thinking capabilities, scientific way of thinking and the use of scientific research methods. Besides, to the cognitive component, this goal also interferes with the affective and creative component of the student's personality development.

Therefore, it is necessary to find motivating approaches and strategies in teaching process and try to change these negative attitudes in a positive way. One of the possibilities of how to motivate students is the inclusion of the so-called semester projects into the requirements for the successful completion of the subject (Kralova, Ferencova & Trnka, 2017).

3. Methods

The results of the pedagogical investigation using an anonymous questionnaire at the end of the first semester of the medical study of the academic year 2016/2017 are presented (131 respondents – first year students of Faculty of Medicine, Comenius University, Bratislava, 38 males and 93 females). The investigation was focused on the previous and current attitudes and level of their motivation concerning natural sciences (medical biophysics, medical chemistry, medical biology and human genetics). Respondents rated their attitudes on the scale from 0 (negative) to 10 (positive). The attitudes of respondents and level of their motivation to study natural sciences were categorised into five categories (negative, slightly negative, neutral, slightly positive and positive). All the obtained data of questionnaire were saved in the electronic database in the MS Excel, statistically evaluated (expressed in percentage and analysed in dependence on age, sex, demographic factors and type of completed secondary school) and graphically represented using the basic statistical and graphical tools available in the MS Excel.

4. Findings and results

The analysis of our survey data showed the motivation of respondents to study medicine. We are comparing the results published in 2005 with the actual results in 2016. The main motivating factors to study medicine were: aspiration to be a doctor (23.0%/17.2%), help people (17.0%/17.1%), interest in the medicine (10.0%/16.9%) and scientific research (2.0%/14.7%), respectively.

The attitudes of respondents to the natural sciences after graduation at general secondary schools (physics, chemistry and biology) were negative and/or slightly negative – 45.0%, 6.3%, 0.0%; neutral – 28.5%, 20.5%, 16.0%; slightly positive – 17.6%, 59.8%, 67.2%, positive – 3.8%, 13.4%, 16.8%, respectively) (Figure 2).

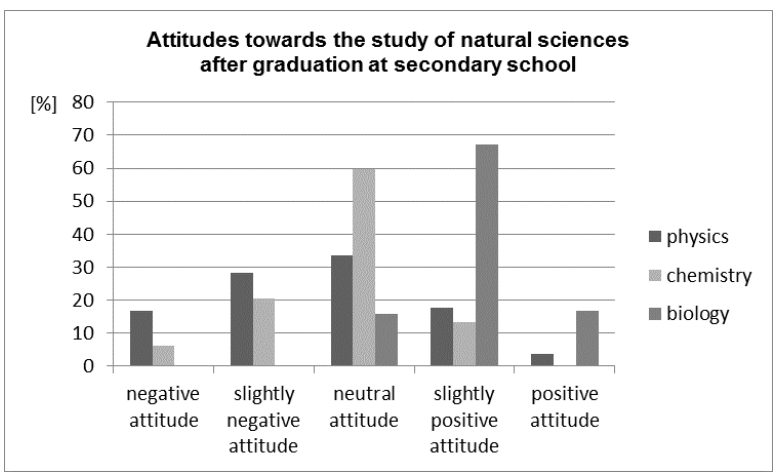

Figure 2. Attitudes towards the study of natural sciences after graduation at secondary school

The attitudes of respondents to the natural sciences (medical biophysics, medical chemistry, medical biology and human genetics) in the first year of study were negative and/or slightly negative – 22.2%, 6.0%, 3%; neutral – 51.9%, 39.0%, 30.5%; slightly positive – 22.1%, 47.0%, 55.0%; positive – 3.8%, 8%, 11.5%, respectively (Figure 3).

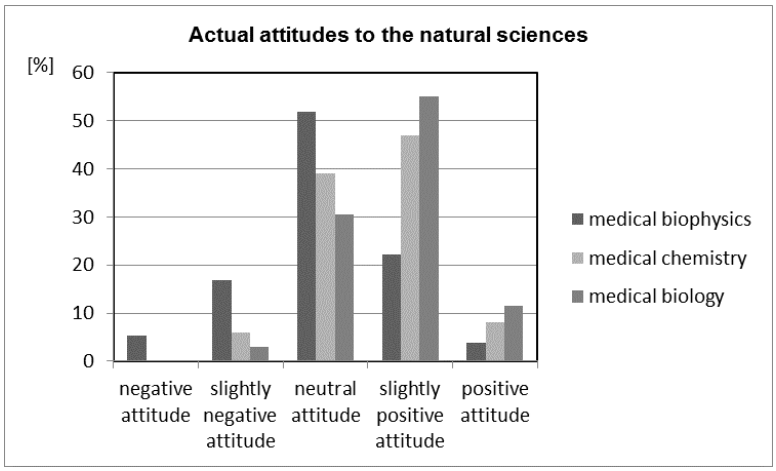

Figure 3. Actual attitudes to the natural sciences (Kralova, 2017)

The lowest level of motivation to study medical biophysics and the higher level of motivation to study medical chemistry and medical biology were found at the end of the first semester of the medical study (negative and slightly negative – 26.0%, 6.0%, 3.0%; neutral – 51.9%, 30.9%, 30.5%; slightly positive – 22.1%, 47.0%, 55.0%; positive – 3.8%, 8.0%, 11.5%, respectively) were found at the end of the first semester of the medical study (Figure 4).

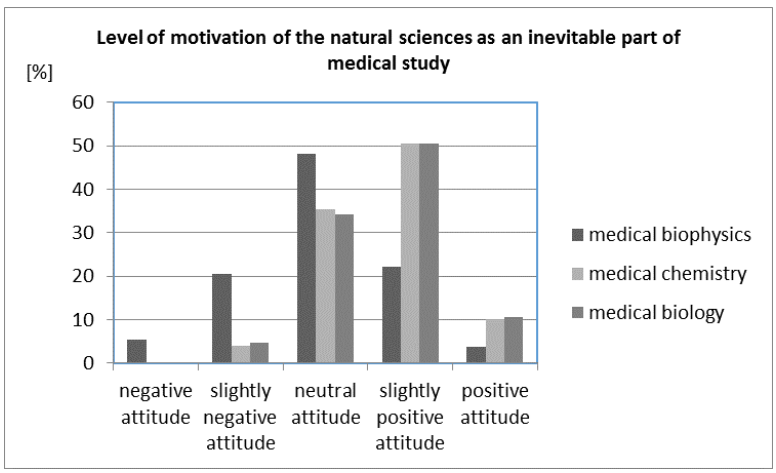

Figure 4. The level of motivation towards natural sciences as an inevitable part of the medical study

What are the main motivating and demotivating factors in the teaching and learning of the sciences that have been formulated by respondents?

Motivating factors: positive approach and professionalism of teachers (28.4%) and better continuity with medical practice (13.2%).

Demotivating factors: high time and content demands of the study 15.6% and a lack of continuity to the medical practice (15.9%).

5. Conclusions and recommendations

The motivation of medical students to study the natural sciences is created by the mutual relationship between needs and external motives (external and internal motivation).

The success of learning originates from internal motivation, i.e., interest, need to know, solve some problem and do something. The external motivation is based on the tendency to receive a reward or to avoid negative consequences. There are not just marks or credits, but the whole range of ongoing verbal evaluations or commentary on activities, including non-verbal evaluations.

Natural sciences – medical biology and human genetics, medical physics and biophysics, medical chemistry and biochemistry – represent an integral part of the curriculum at medical faculties. However, among the medical students and the medical community, they are also less popular. The negative attitudes (prejudices) of medical students towards natural science teaching subjects are deep and long-term rooted. In order to achieve quality results in the teaching and learning process, it is important for a teacher to seek and make full use of effective motivational approaches. This goal requires the lifelong learning of natural science teachers in the pedagogical field as well.

The university teacher, especially a teacher of natural sciences at the medical faculty, should therefore master the full range of approaches, strategies and resources that motivate students to study natural sciences. They should also know their students and know what patterns are significant in a given group or individuals.

Teaching and learning of the natural sciences at medical faculties should support the improvement at the educational level. It is required to optimise teaching techniques and methods to improve the educational quality and international competitiveness of graduates.

The most difficult situation in the teaching of physics and medical biophysics was indicated in our research. There was revealed negative and very negative attitudes and motivation of the medical students to physics and medical biophysics.

The role of the teacher is to overcome these barriers in the educational process. The fulfilment of this goal requires to increase student's motivation, communication of university teachers of natural sciences with both clinicians and medical students and to provide further training of university teachers in the teaching of pedagogy and psychology (Black & Howard-Jones, 2000).

It is also necessary to find motivating approaches and strategies in teaching the process of the natural sciences and apply them to improve the motivation of medical students.

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