Original Article

# Transdisciplinary integration through the study of the history of medicine

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## ABSTRACT

The article discusses the meaning, forms, place, and features of the subject "History of Medicine" when studying at a medical university and analyses the role of the historical approach to natural science and medicine in the formation of basic pre-professional competencies while implementing higher medical education. The subject reflects the historical development of medicine and the professional paths of the most prominent scientists in natural and medical sciences, studying which helps students to define their professional future more clearly, avoiding the deep disappointment of spontaneous and erroneous self-determination.

The course "History of Medicine" allows the successful formation of interdisciplinary ties linking the subjects of humanitarian and natural science to those of clinical fields. This contributes to the development of students' self-educational competence and a holistic view of their future professional activity. Studying "History of Medicine" allows comprehensive examination of science, generates awareness of the existence of different points of view on the same problem, which promotes students' fundamental understanding of the development of human thought. Thus, the subject facilitates the development of intellectual and behavioral flexibility in young people, forms interaction skills and critical thinking, as well as reveals the role and significance of experimental research.

**Keywords:** History of medicine, Medical education, Motivation, Pre-professional competencies, Specialized education

## Introduction

Education plays a key role in the development of a personality, capable of taking the initiative in the development of scientific and technical knowledge, developing critical thinking and ways of applying the acquired knowledge in their social and profile formation, and awareness of the moral values of society [1]. Continuity and coherence of the components of all educational levels should ensure effective, progressive, and successful training at each stage of education. Education is an ongoing learning process that has common and specific goals for each of its periods. Moreover, the transition from one level to another should be consistent, with a gradual change in content, forms, and technologies. It is quite obvious that students' desires and aspirations, the structure of their motives and needs are formed already at senior school age. Also, the formation of motivation to achieve high academic performance at the university, and then – high results in a professional activity also occurs at the senior level of general education, during the period of specialized preparation. For future medical specialists, not only a deeper study of the natural sciences is important, but also a study, through the prism of history, of the laws of development of biomedical, chemical, and clinical disciplines. This will ensure a deeper understanding and perception of trends in the development of humans, life, and social sciences. To reach this goal, it is advisable to discuss the capabilities of educational subjects in the natural scientific and historical fields, from the standpoint of students' knowledge of the essence and historical laws of the development of medical and natural sciences [2].

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This work aims to study the opportunities provided by the integrated use of an overview subject, using the example of the course of History of Medicine, which could be applied to form natural scientific thinking among students, integrate knowledge and create prerequisites for the development of professional competencies in first-year medical students.

Practical significance. This paper analyzes the possibility of an integrated approach in teaching natural sciences, clinical disciplines, and the history of science. The article reveals the role of the History of Medicine in the development of important future professional competencies and the formation of natural-scientific systemic and discursive thinking among students studying the History of Medicine.

## Materials and Methods

A future profession, the medical one in our case, acts as a desired goal of most students. For this goal to be understood correctly and become consciously desirable, the description of the historical and future development of medicine as a result of the work of outstanding scientists could be propaedeutically used [3, 4]. Clear examples show that self-improvement, self-affirmation, and achievement of a certain social status are possible only through deep mastery of professional skills and the development of creative abilities, etc [5]. Thus, the motivation of the students could be channeled in the right direction from the very beginning of the training [6].

When entering a medical university, most applicants, as a rule, do not have a clear idea of medical specialties. In such a situation, the role of awareness of the historical formation of sciences related to the future profession, the laws of the development of subjects of the chosen profile (natural science in our case), in the historical aspect, increases. The historical and medical training of future students of medical universities is also gaining importance in the formation of a high level of natural scientific thinking. The course of History of Medicine, being of an overview nature and integrating subjects of a natural science field, is included in the curriculum of the “History” subject in the first year of a medical university. Even though the course of History of Medicine is included in the content of the “History” subject, it is a different, higher level of familiarity with science as a subject of study [5].

The emergence of the history of medicine as a science is dictated by the need for people to accumulate experience of fighting deadly diseases, to maintain health, and to prolong life. Studying history makes it possible to apply the experience of many generations at present [7]. Familiarity with the history of medicine as part of the culture and history of mankind helps to understand the stages of formation and patterns of development of the healthcare system [7]. History of Medicine, being a part of the subject "History", concretizes the students' understanding of their future specialty, of professional medical culture, and forms moral and ethical principles that are necessary for their future medical activity. In the vast expanse of modern culture, it is important to create value guidelines for the self-determination of young people, the formation of their moral qualities, and professional socialization. The most significant aspect for the orientation of youth, the preservation and development of moral values that exist in society, is the world's historical experience. In addition to the influence of the family, the actions of students are largely determined by their little life experience and the limited amount of information that they managed to get. History of Medicine is a significant subject that helps to increase the scientific literacy of students, contributing to the development of a harmonious and comprehensive personality. The formation of students' moral qualities necessary for a future medical professional is important for their subsequent actualization in professional activity [8].

It is quite obvious that in the process of training for students it is necessary to form the behavioral patterns required for their future successful studying in senior years and during a residency at the university. The competency-based approach in teaching the course of History of Medicine makes it possible for students to develop the necessary competencies, and the high results obtained during active studying at the university should naturally lead to high achievements in future professional activities. In this case, there will be a discrepancy between academic performance and real values of professional activity.

Separate topics in such subjects as History of Biology, History of Chemistry, History of Physics, and a training course in History of Medicine serve as the basis for the formation of important professional competencies necessary to future medical specialists. Competencies can be considered from the standpoint of the personal approach or the standpoint of the behavioral approach [9], but mastery of competencies is always aimed at the result [10]. The subject of History of Medicine has a resource, rich in content, for the formation of professional competencies and meta-subject and general cultural competencies. When studying the History of Medicine, various, sometimes opposite, scientific views, theories, approaches, ideas of scientists, and scientific schools are considered, which makes it possible to form in students an important meta-subject competence - the skill of analyzing alternative points of view.

When studying the History of Medicine, students discover the stages of development of science, closely associated with specific scientists. The introduction of the course of History of Medicine as a compulsory subject allows them to understand that scientific knowledge is not static, it is characterized by dynamic changes under the influence of social, economic, and political factors. “Our ideas about physical reality can never be final, and we should always be ready to change these ideas” (A. Einstein). Realizing the truth of these words, associating themselves to some extent with outstanding people, involuntarily imitating authoritative scientists, students get interested in research activities and develop their research competence, which subsequently becomes an integral part of professional competence, ensuring its effectiveness. Research activities are carried out by students through their work on individual projects in specialized subjects. Working on an individual project in History of Medicine, students learn to determine the topic of their project work, to formulate project

goals and objectives which can ensure achieving the goal, to write literary reviews on the problem in focus, to conduct their observations, to collect and analyze information using the right research methods, to fulfill the planned experiments, to put forward hypotheses, to confirm and prove the correctness of facts on the topic of their research. These competencies contribute to the formation of a student's inner need for constant scientific research and self-improvement and their independent development in research activities. It is important that in the process of carrying out the study, students learn to compile scientific articles, select literary sources and correctly use bibliographic references from the very beginning. The results of project work are presented at the theses defense in groups, the best projects can be further presented in scientific journals, as reports, or at public defense at scientific-practical conferences. The research principle introduced to the educational process of the course contributes to the development of a creative approach to mastering the material, thus, the formation of the future doctor-researcher gradually takes place [11, 12].

It is important to familiarize students not only with global processes of development and formation of medicine but also with the history of the university in which they study, which demonstrates the uniqueness of the historical research method, arouses a sense of pride and belonging to the university's rich history and stimulates students' interest in the history of medicine in whole. The best way to introduce the history of medicine course to students is by visiting the Museum of the History of Medicine, the exhibits and expositions of which familiarize visitors with the history of the founding and development of their alma mater [13, 14].

While studying History of Medicine students get acquainted with the biographies of scientists and their scientific discoveries, realizing that as science develops, its laws get refined, covering wider areas of life. When organizing the educational process it is very important to apply a systematic approach, which enables understanding the logic of the development of related disciplines, the use of interdisciplinary connections makes it possible for young people to master knowledge much faster, and simplifies a teacher's task of transmitting the information. Promoting professional socialization, the subject of the History of Medicine is a necessary component in the study of clinical disciplines. In the study of natural sciences, awareness of the history of the development of natural sciences is an important aspect [15, 16]. This systemic historical approach develops a skill, which is very necessary for students' future careers, to study clinical disciplines using the knowledge of their historical evolution, taking into account the logical connections of the important stages in the formation of scientific thought. Also, this approach promotes a deeper understanding of the value and the role of experimental research. Thus, there arouses the awareness of the logic and patterns of development of the fundamental concepts of various science and clinical disciplines.

The course of History of Medicine is focused on the historical stages of the development of natural sciences and clinical disciplines. The historical chronological study of the formation of medicine and the natural sciences convincingly and objectively demonstrates to students the evolution of scientific thought and the process of cognition through specific events. In the process of studying the History of Medicine, the relationship between natural science subjects, experimental and practical processes, and medicine is fully revealed.

Students, focusing on the solution of the priority task of passing a final certification successfully often develop intuitive thinking skills. A final certification, as a rule, is a system of centralized testing of students' knowledge of the material learned throughout the entire period of studying at school. Having become a university student, it is important to be able to reason and establish a causal relationship between certain arguments and stages of the process to be successful in educational and research activities. That is, a student must have and actively apply in his work discursive thinking skills. The tutorial methods used at the lessons of History of Medicine stimulate interest in the subject, increase the activity of students, prompting them not only to memorize material but also to analyze and logically comprehend it and draw independent conclusions [17].

Studying the History of Medicine is not limited to organizing thematic classes. Active forms of training, such as classes, discussions, round tables, lectures, and master-classes are widely used during the course. Furthermore, there are presentations organized for students, at which they can discuss the matter in focus and express their opinions about a particular scientist or a historical stage in the evolution of science. Such activities train discussion skills and the ability to speak before the audience and form independence in judgments.

## Results and Discussion

The value of the subject of the History of Medicine is very significant. All medical specialties are interconnected through the history of medicine as a whole. In a methodically thorough study of History of Medicine science is examined from different points of view, the possibility of different opinions regarding the solution of the same problem is recognized, scientific concepts are re-evaluated, which stimulates students to a fundamental awareness of the history of the development of human thought, to consideration of phenomena from different perspectives and develops their ability to see the details. Due to the acquisition of these skills, intellectual and behavioral flexibility among young people develops, as well as the ability to interact with the interlocutor, the role and importance of experimental research reveals and critical thinking starts to form, which involves the rejection of a directive approach to assessing the situation.

The course of History of Medicine enables a successful formation of both "vertical" and "horizontal" interdisciplinary connections in the hierarchy of scientific concepts. Acquaintance with the history of subjects of the compulsory subject field of "natural sciences" or "clinical disciplines", as a rule, goes beyond the scope of specific subjects, and establishes

intersubject connections. Working with certain facts and specific material, students apply their knowledge of the history of the development of medicine in their work, creating a transdisciplinary integration of information into a logical unity [18]. When implementing this approach to learning, we can observe the transition and application of knowledge and skills in the field of one discipline into another discipline by students themselves.

Our task was to show that in the format of the course of History of Medicine it is possible to influence the formation of personality traits of potential specialists and competencies useful in their future professional activities. Another task was to draw attention to this area of pedagogical activity. And now we are facing another task - to introduce this subject into the educational process and improve educational and research activity of students, which, as one of the main ways of building competencies, is aimed at forming a creatively active student who has the skill of scientific thinking.

The possibilities of the subject of History of Medicine studied in this article familiarize students with various examples of research activities, contribute to the formation of their desire for independent research work, and promote the development of abilities and interest in obtaining fundamental knowledge in the natural sciences and medicine. The course of History of Medicine has a positive impact on the formation of students' personalities and motivates them to obtain a medical specialty. History of Medicine plays a special role in the formation of a sense of inclusion into science in future specialists [19]. This is possible due to a special focus of the course on providing students with extensive information about such great scientists as a great geneticist Thomas Hunt Morgan, physiologists Ivan Sechenov, Archibald Hill, Charles Louis Alfonse Laveran, Ivan Pavlov, doctors Ronald Ross, Emil Adolf von Bering, Nils Ryberg Finzen, Nikolai Pirogov, Robert Koch, Nikolay Sklifosovsky, Sergey Botkin, and many others, whose examples inspire future scientists to new achievements in science [20].

## Conclusion

The existing interdisciplinary connections in the course of History of Medicine, linking subjects of the humanitarian field to the subjects of the natural sciences, can stimulate students' formation of self-educational competencies and form their holistic understanding of their future professional activity. The analysis of the possibilities of the "History of Medicine" training course and of individual educational topics that imply a historical approach to the study of subjects showed that the subject of review allows:

- to form the personal qualities of future students of medical universities and their pre-professional competencies; apply an integrated intersubject approach, getting meta-subject results;
- to develop students' scientific divergent and discursive scientific thinking, instilling the skill of a creative approach to the study of the subject and using historical and problem-chronological methods.
- to stimulate the formation of horizontal and vertical communications and intersubject communications.
- to activate cognitive processes and focusing on results,
- to develop a susceptibility to alternative points of view and flexibility of thinking.

The important techniques of the formation of natural-scientific views during training are a systematic approach, the use of the historical method, and the personification of scientific knowledge. In the study of disciplines of biomedical, medical, and historical nature it is important to apply the principles of analysis and synthesis relying on historical and dialectical materialistic approaches.

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