DIDACTICAL ASPECTS OF PROFESSIONAL TRAINING OF FUTURE MASTERS OF PHARMACY STUDENTS

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Abstract: This article highlights the main problems in the national healthcare system of Ukraine that have an impact on its higher pharmaceutical education as well as examines the challenges the system of professional pharmaceutical training faces today. This paper deals with the didactical aspects of professional training of future Masters of Pharmacy students that ensure acquisition of professional competencies in the context of the course of pharmaceutical chemistry. The study delivers evidence that the outlined didactical aspects realized through the modern teaching technologies and proper forms of the learning process organization improve the academic performance of future Masters of Pharmacy students and contribute to an increase in their general motivation to study professionally-oriented disciplines.

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Introduction

An appropriate professional training of modern specialists for the pharmaceutical sector can't be ensured without taking into consideration such factors as public demand for high-quality health services and disease prevention.

The identification of the contemporary methodological, theoretical and feasible approaches to the solution of the urgent problems associated with public health protection is based on strong belief in the necessity of the development and improvement of the available scientific and research infrastructure as well as existing legal framework (Law of Ukraine: Fundamentals of the Legislation of Ukraine on Healthcare, 1993, revised 10.06.2018). Currently, the policy of Ukraine in the pharmaceutical sector is oriented towards the priority of social interests in terms of pharmaceutical services and products, development of affordable and effective pharmacotherapy and disease prevention. Public needs and the realities of the development of higher pharmaceutical education in Ukraine predetermine the didactical aspects in professional training of future Masters of Pharmacy students (Reva, 2016).

Some issues connected with the Ukrainian pharmaceutical education were studied by the researchers and include training of professionals for the pharmaceutical sector (Chernykh et al., 2002; Chernykh et al., 2015; Mnushko, 2006) and for systems of accounting and economics for pharmaceutical management (Bulakh et al., 2003; Bulakh et al., 2007). However, the analysis of the available scientific literature sources suggests a lack of attention to the problem of professional training of future Masters of Pharmacy students in terms of contemporary challenges faced by the national system of higher pharmaceutical education.

In the current study, we are addressing the didactical aspects of professional training of future Masters of Pharmacy students that ensure acquisition of professional competencies in the context of the course of pharmaceutical chemistry amidst the existing realities of the formation of higher pharmaceutical education in Ukraine.

Outline of the Didactical Aspects of Teaching Pharmaceutical Chemistry to Future Masters of Pharmacy Students

The development of higher pharmaceutical education in Ukraine is influenced by political, social and economic processes that are taking place in the country. Analysis of the real state of the pharmaceutical sector in Ukraine (online article, 2016) provides evidence enough to identify the existing problems in the national healthcare system that have an impact on the Ukrainian higher pharmaceutical education.

Firstly, limited state financing of the healthcare system. In 2014 total (public and private) health expenditures in Ukraine accounted for 7.4% of gross domestic product. This is lower than the average in the Member States of the European Union (9.5% of GDP in 2013), but about the same and even slightly higher than in neighboring Poland and Romania (6.7% and 5.3% of gross domestic product in 2013, respectively). However, if on average in 2013 in the Member States of the European Union, the share of public expenditure in the structure of total healthcare expenditures was 76% (in Poland and

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Romania, nearly 70% and 80%, respectively), in Ukraine, the situation with the burden sharing of healthcare financing between citizens and the state was much more difficult for the population. In 2014, according to the data published in the statistical bulletin "National Health Accounts of Ukraine", public expenditures in this area amounted to only 51.7%. Very small additional payments were covered by private health insurance and international donors. Therefore, nearly 46% of expenses (or over UAH 54.1 billion) were paid directly by patients from their own pockets at the time of receiving medical services or purchasing medicines. Ukrainians, who have much lower levels of income and social standards than their European counterparts, are at the same time less protected in the event of illness - they have to devote a large portion of their income to the healthcare system (The Concept of the Healthcare Financing Reform, 2016). As a result, about 3.8% of households in Ukraine (or 640,000 families) suffer from catastrophic medical expenses, and 92% of the population fears financial hardship in the event of illness. The inefficient model of financing became one of the pre-conditions for the adoption of the Concept of the Healthcare Financing Reform in Ukraine for 2017-2020. However, its realization is highly disputable due to the existing political and economic influences in the country.

Secondly, improper mechanisms for the implementation of the legal standards in the national education system (Fedorchenko, 2016).

Thirdly, low-quality education of the professionals for the pharmaceutical field that is evidenced by a growing dissatisfaction of the general public and employers. Our pilot study that enrolled 56 practicing pharmacists and 173 pharmacy customers revealed the primary challenges faced by the system of professional training of future Masters of Pharmacy students (Reva, 2017). These major challenges include:

1. The need for the creation of effective educational standards that would ensure adequate professional training of pharmacists in order to satisfy a social demand for an effective national system of pharmacotherapy.
2. Implementation of the requirements for each line of the drug development process (chemical and pharmaceutical, technological, etc.). Ukraine's Pharmaceutical Sector Development Concept (2010) puts emphasis on the necessity for the urgent creation and introduction of the informational and economic doctrine of the efficient use of pharmaceutical products. The Concept also tackles the problem of polypragmasy that is induced by the aggressive marketing policy of the pharmaceutical companies and uncontrolled advertisement of pharmaceutical products. It also requires the provision of the medication quality control according to efficient standards, regulations and norms conforming to widely recognized and successfully implemented international practices in the organization and functioning of pharmacotherapy (Ukraine's Pharmaceutical Sector Development Concept, 2010).

In the framework of our study, we focused our attention on the problem of the professional training of pharmacists and approached it from the point of the didactical aspects of teaching professionally-oriented disciplines to future Masters of Pharmacy students. The experiment was carried out to find out the effectiveness of the outlined didactical aspects in the context of the course of pharmaceutical chemistry. According to the goals of this academic discipline, after graduation, Masters of Pharmacy students must demonstrate appropriate knowledge of the chemical composition and properties of medicinal substances in accordance with the provisions of the relevant international practices (GMP, GCP, GDP, GPP). To achieve this primary goal, professional training should be realized through a combination of the didactical aspects: flexibility of the learning process; professionally-oriented selection of the content of the discipline that is also based on psychologization; technologization of the educational process; and integration of the academic curriculum. The integrated approach to teaching pharmaceutical chemistry, in our opinion, promotes the formation of the scientific picture of the world, which reflects the contemporary paradigms of natural sciences and scientific research, as well as promotes understanding of the need in learning both humanitarian and natural sciences for the improvement of professional culture and problem-solving skills. The integrated approach to teaching chemistry-related disciplines allows the students to develop their professional thinking and integrated learning. Additionally, there should be a local modular structuring of the content of the academic discipline. Pharmaceutical chemistry is commonly referred to as applied science, but it has its own object of the fundamental research that does not coincide with the academic disciplines of other sciences. At a time when other chemical sciences are mainly focused on typical (general) properties of substances that are referred to some classes or groups, pharmaceutical chemistry deals with the specific properties of

medicinal substances. It should be noted that this science is closely interrelated with the sciences that are involved in measurements and their errors, that is, with metrology. As a result, physics, mathematics, biology, metrology, and some other non-chemical sciences appear to be extremely important in defining the content area for pharmaceutical chemistry. There is a risk of underestimation of some information blocks during the design of the content area for pharmaceutical chemistry and, as a result, their removal from the academic training programs.

The effectiveness of the implementation of the defined didactical aspects into the learning process was studied during the experiment that enrolled 75 fifth-year students of the Pharmaceutical Faculty of O.Bohomolets National Medical University. The control group included 30 students. The experimental group included 45 students who were taught the course of pharmaceutical chemistry according to the outlined didactical aspects that were realized through problem-based learning, contextual learning, interactive learning, cooperative learning, developmental and modular learning. The modern teaching technologies were applied to organize:

1. Lectures: problem-based lectures, lectures - press-conferences, lecture sessions, specialized lectures.
2. Practice sessions: laboratory experiments, oral and written exercises to perform chemical tasks, laboratory chemical experiments with the interpretation of the results in a virtual laboratory.
3. Individual training with a teacher before oral and written examinations, instruction on filling the research protocols.
4. Counseling.
5. Self-study work.
6. Group research and project work including group work, discussions, analysis and discussion of the content of websites, group research work, group discussions, debates, implementation of e-communication, discussion of written works, cooperation between teachers / students; application of specialized programs and packages for solving certain chemical problems. In the framework of the experiment, multilevel questions, tests, situational tasks were created and offered to the students in the experimental group.

The following knowledge parameters were taken into account when evaluating the academic performance of the students of the control and experimental groups:

1. Completeness of presentation.
2. Responsiveness and awareness.
3. Depth and thoroughness.
4. Specification (concretization) and generalization.
5. Systematization and integration.

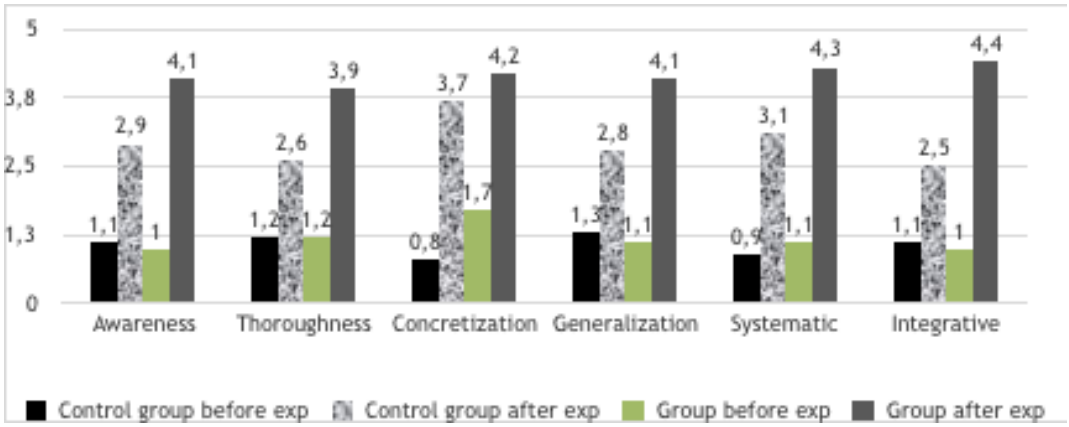
Completeness of presentation was determined by the ratio of the number of chemical concepts to the required response. Responsiveness and awareness were measured, first, by the ratio of the number of cases of correct application of knowledge of the discipline over a certain period of time to the required number, and, second, by the degree of understanding of the nature of the connections (significant and insignificant; temporary and lasting) between different kinds of knowledge and ways to use them. The students' ability to specify and generalize knowledge was tested using a scale that had the following levels of the formation of the given parameters: 1) thematic; 2) final; 3) interdisciplinary; 4) problematic. Depth and thoroughness were determined by the ratio of the number of the connections that were comprehended by the students to the required one. Systematization and integration were determined by the degree of the student's ability to provide a gnostic level of regulation of the optimal variant of learning.

Changes in the levels of the knowledge parameters were evaluated on a five-point scale (excellent - 5; good - 4; satisfactory - 3; unsatisfactory - 2 and 1). The findings of the study showed that the students of the control and experimental groups had different levels of knowledge parameters after the experiment (Figure 1).

The students of the control and experimental groups did not have any significant difference in their academic performance before the experiment. After the course of pharmaceutical chemistry, the students in the control group had on average a lower level in the knowledge parameters: awareness - 2.9 points;

thoroughness - 2.6 points; concretization - 3.7 points; generalization - 2.8 points; systematization - 3.1 points; integration - 2.5 points. In general, the students demonstrated a basic level of knowledge. They often had difficulty in distinguishing logical connections between particular topics of the discipline. The interdisciplinary connections were perceived as unclear or insignificant. The students of the control group achieved the best results while performing reproductive and constructive tasks.

Figure 1: Levels of the knowledge parameters in the control and experimental groups before and after the experiment



Source: Reva (2017)

The comparative analysis of the academic performance showed a higher ability of the students in the experimental group to identify and differentiate relationships (formal and cause-effect) both in the subject and interdisciplinary area. The students demonstrated a higher awareness of the relation between chemistry disciplines and their future professional activity. Therefore, the students in the experimental group had on average a higher level in the knowledge parameters: awareness - 4.1 points; thoroughness - 3.9 points; concretization - 4.2 points; generalization - 4.1 points; systematization - 4.3 points; integration - 4.4 points.

The survey of the students in the experimental group revealed their high awareness of the major role that pharmaceutical chemistry plays in their professional development. At the same time, due to their ambiguous attitude to pharmaceutical chemistry, the students in the control group believed that their professional self-realization completely depends on the appropriate level of theoretical knowledge.

It can be concluded that the outlined didactical aspects are successfully realized through the introduction of innovative (competency-oriented) teaching technologies.

Conclusion

Taking into consideration the policy of Ukraine in the pharmaceutical sector, public needs, existing challenges and problems of the formation of higher pharmaceutical education in Ukraine, the following didactical aspects of professional training of future Masters of Pharmacy students were defined within the study: flexibility of the learning process, professionally-oriented selection of the content of the discipline, psychologization and technologization of the educational process, and integration of the academic curriculum.

The findings of the study showed that the implementation of the outlined didactical aspects improved the academic performance of the students. It created a real basis for effective learning that contributed to the acquisition of substantial professional knowledge and skills necessary for the successful fulfillment of professional responsibilities in the pharmaceutical field.

It should be noted that effective realization of the defined didactical aspects in teaching professionally-oriented disciplines was achieved through the application of the modern teaching technologies and proper forms of the learning process organization.

The study demonstrated that the application of the outlined didactical aspects contributed to an increase in the general motivation of the students to study as they became more aware of the role of academic disciplines in their future career.

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