



# Colophon

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## Ukraine: Development of pharmacy students' information competence in a biological chemistry course

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### Summary

This case study looks at pharmacy students' information competence in a biological chemistry course. It is based on a report of an anonymous survey of third-year students of the Faculty of Pharmacy that monitored their skills and abilities in searching for scientific and educational information on the internet, and its analysis and use. Students showed a high self-evaluation of computer literacy (85%), the use of video lectures (80%), electronic textbooks and online resources (75%) for self-preparation and self-assessment, and dissatisfaction with information found on the internet (50%). The authors conclude that it is necessary to include in the biological chemistry curriculum a component that ensures that future specialists in the pharmaceutical industry can competently navigate information, and apply it to solve emerging professional problems and enhance self-education.

### Background and context

A modern development in pharmaceutical education is ensuring the use of information and communication technologies is part of future pharmacists' professional competencies. In modern times, pharmacy students are required not only to have knowledge of fundamental sciences, such as organic chemistry, biochemistry and pharmacology, but also to have the ability to constantly replenish their intellectual expertise with new information, continuously engage in self-education and use information sources as efficiently as possible to solve professional and social problems. The ability to select the necessary information, systematise it, assimilate it at a high level, and navigate the ever-increasing information flow are important components of a student's information competence.<sup>1</sup> Computer technologies are at the heart of distance learning, which has moved to a new level of development as a result of the COVID-19 pandemic.<sup>2</sup> In the context of the ever-expanding use of digital means of communication (mobile phones, smartphones, tablets, computers and laptops, e-books, and the internet as a means of learning), students' independent work becomes particularly important, because it is the main means of assimilating educational material in a class-free time. The aim of this case study was to analyse the level of information competence of third-year pharmacy students at the Bogomolets National Medical University of the Ministry of Health of Ukraine and to determine how to improve the information competence of students studying the biological chemistry component.

### Educational description

The working programme of the biological chemistry component for second and third year students of the pharmaceutical faculty provides six credits (180 hours), among which face-to-face classes amount to 100 hours (30 hours of lectures and 70 hours of practical training), and students' independent work amounts to 80 hours. The content of student's independent work in the biological chemistry discipline is determined by the working curriculum, teaching materials, and test tasks of the Unified State Qualifying Exam, stage 1. The aim of students' independent work is to master the methods of obtaining new knowledge, acquiring the skills of independent analysis of biochemical processes in the body, and to reinforce the scientific foundations of practical activities with the aim of understanding drug effects on the body. To assess the level of students' information competence, we conducted an anonymous survey among third-year pharmacy students at the Bogomolets National Medical University of the Ministry of Health of Ukraine. Seventy-eight students, aged 19 to 21 years, participated in the survey. Sixty of the students (77%) were women. Students answered a questionnaire, which contained nine questions on the topic: "Sources of information for students' independent work to prepare for practical training and self-control in the biological chemistry discipline". Pharmacy students' self-evaluation of their knowledge in the field of computer literacy was high (85%). Most students (70%) spend one to two hours on self-preparation for a practical class in biological chemistry. Of students surveyed, 75% use electronic textbooks and online resources to prepare for a practical class in biological chemistry and 90% preferred the Google search engine and YouTube channels. To find information, 50% of students use sites with the domains gov.ua, edu.ua, nmu.ua. When searching for information on the biological chemistry discipline topics, 50% of students prefer illustrations, and 20% of students choose

websites that are presented first in the list of proposed sources. It should be noted that 50% of the surveyed students were not satisfied with the information found. The reason, in our opinion, is the dominant principle behind which students choose a reliable source of information, namely, text understanding. Among respondents, 35% considered scientific sources of information useful for self-preparation, but 2% noted the difficulty of comprehending the texts in scientific publications. To prepare for classes in biochemistry, 80% of students used didactic materials such as video lectures, lecture slide-decks, and assignments for self-study that are posted on the web-page of the department of pharmaceutical, biological and toxicological chemistry on the educational information platform NEURON<sup>3</sup> for distance learning. Only 5% of respondents believed that internet resources are not practical and useful for self-preparation for practical classes and self-assessment in biological chemistry, and 98% indicated that they wanted to use internet resources to prepare for a practical class in biological chemistry.

### Outcomes, lessons learned and recommendations

Experience shows that about 30% of first to third year students are able to independently work with internet sources of information. However, 85% of students, during self-preparation for practical classes and self-assessment in biological chemistry, felt the need to consult with a teacher. The role of pedagogical support for students' independent work is significantly increasing in the context of the expanding use of digital communication and information transfer as a means of distance learning. Information and communication technologies today are a necessary tool for the development and implementation of information competence. Developing information competence requires teachers to make appropriate changes in the educational process associated with the revision of traditional methods, technologies and teaching aids. The improvement of the efficiency of students' independent work is facilitated by teachers' preparation of educational and methodological literature using information technologies (electronic textbooks, computer training programs, video workshops, etc.), which: (i) allows students to independently master biological chemistry knowledge; (ii) facilitates the creation of computer classes, laboratories and special classrooms for students' independent work; (iii) allows online consultations between students and teachers; and (iv) makes combining education with other activities possible. Correctly organised students' independent work forms stable positive motivation in students for self-education and self-improvement. Information competence will help students to expand the range of their knowledge, and will allow them to quickly and efficiently adapt to changing professional requirements in the context of informatisation of all spheres of pharmacists' professional activities.

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