https://www.sworldjournal.com/index.php/swj/article/view/swj28-00-037
DOI: 10.30888/2663-5712.2024-28-00-037

METHODS OF TEACHING THE COURSE "FOOD MICROBIOLOGY" AND THE FORMATION OF GENERAL SUBJECT COMPETENCIES FOR HIGHER EDUCATION STUDENTS MAJORING IN "FOOD TECHNOLOGY"

МЕТОДИ ВИКЛАДАННЯ КУРСУ «МІКРОБІОЛОГІЯ ХАРЧОВИХ ПРОДУКТІВ» І ФОРМУВАННЯ ЗАГАЛЬНОПРЕДМЕТНИХ КОМПЕТЕНТНОСТЕЙ ДЛЯ ЗДОБУВАЧІВ ВИЩОЇ ОСВІТИ СПЕЦІАЛЬНОСТІ « ХАРЧОВІ ТЕХНОЛОГІЇ»

Prylipko T.M. / Приліпко Т.М.,
d.a.s., prof. / д.с.н.. проф.
ORCID: 0000-0002-8178-207X
Publons: AAF-5445-2019
Rusnak L.V. / Руснак Л.В.
PhD in Law/ доктор філософії в галузі 08
Право зі спеціальності 081 Право
ORCID:0000-0002-5165-1079
Заклад вищої освіти «Подільський державний університет»
Higher education institution « Podolsk State University»,
Kamianets-Podilskyi, Shevchenko,13,32300

Abstract. *An important task of modern education is to ensure a high level of general scientific and professional training of specialists who possess a system of knowledge and skills, can think logically and problem-oriented, are able to combine theoretical and practical knowledge. Therefore, when studying the course "Microbiology of Food Products", it is necessary to organize the educational process in such a way as to combine the normative fundamental part with skills and abilities that have a professional orientation. One of the important approaches that transforms the higher education system is the competency-based approach, which involves the formation of skills to create conditions for mastering a set of competencies. The competency-based approach is aimed at forming a personality capable of obtaining further professional education, social and professional mobility. The mandatory components of any competence are the relevant knowledge and skills. Publications of scientific and methodological publications, methods of pedagogical research, as well as practical material of the Department of Food Technologies of Production and Standardization of Food Products of the Higher Education Institution "Podilsky State University" were used. This article substantiates the importance of the correct use and combination of various forms and methods of teaching when studying the course "Microbiology of Food Products" for applicants for higher education in specialty 181 "Food Technologies". The formation of general subject competencies is based on the content of the subject, associated with the use of various pedagogical techniques and teaching methods. This article proposes methods, forms and means of forming general subject competencies when studying the course "Microbiology of Food Products" for students of technical specialties as a necessary condition for the high-quality training of future specialists. The result of their implementation is active learning, the use of new forms of interaction between the teacher and the student, which improves the quality of learning.*

Keywords*: microbiology, educational process, teaching methods, practical orientation of the course, interdisciplinary connections, experiment, independent work, professional training.*

The relevance of this topic is determined by the need for proper organization of the educational process of studying the course "Food Microbiology", which will ensure that students master various methods of cognitive and practical activity, which will contribute to their assimilation of the necessary knowledge, and prepare them for future professional activity in the chosen field.

In recent years, a competency-based approach to training specialists has been

widely used in higher education, the main idea of which is that the main result of education is not individual knowledge, skills and abilities, but the ability and readiness of the future employee for effective and productive professional activity (competence). A competency-based approach in the modern education system is possible if two interdependent links are combined - a competent teacher, a competent student. A competent teacher is a teacher with a high level of professional, pedagogical, psychological, social qualities. The system of student competencies includes: the ability to learn, general cultural (communicative), social and labor, informational.

To successfully acquire knowledge, skills and abilities, the teacher needs to organize the educational process in accordance with modern principles of motivation and personal needs. The main factors that motivate students to highly productive educational and creative activities are: the importance of the subject for professional training and awareness of the theoretical and practical significance of the subject of classes; the student's awareness of the immediate and ultimate goals of study; high pedagogical skill in teaching the discipline, personal relationships with the teacher of the given subject, etc [6, 7].

Modern teaching methods have become the object of research by both foreign and Ukrainian scientists. Scientific research is devoted to general theoretical, scientific and practical problems in higher education, individual progressive forms and technologies of teaching, experience and prospects of their use in educational practice. In particular, the authors link innovations in teaching with the need for: improving the traditional pedagogical process (modernization, modification, rationalization); transformation of the existing traditional educational process, i.e. radical transformations and complex modifications [2, 7].

Knowledge is an important element of competence. They must be scientific, deep, strong, systematic, and versatile. Subject-specific competences are defined for each subject and develop throughout the entire period of its study.

In view of this, during their studies at a higher education institution, higher education students must develop relevant competencies at a high level, which primarily relate to their future professional activities. [3].

The purpose of the article is to reveal the content, tasks, methodological approaches to the implementation of the study of the subject "Food Microbiology" for higher education applicants in the specialty 181 "Food Technologies". The subject of this study is the means and methods of teaching used in studying the course "Food Microbiology" for higher education applicants in the specialty "Food Technologies". The object of the study is the professional training of future engineers - technologists of the food industry. The methodological basis of the work is the research of scientists in the study of microbiology, as well as the latest teaching technologies. In the process of writing the article, methods of analysis, systematization of scientific and methodological literary sources, and generalization of theoretical data were used.

Microbiological indicators are the main ones in the complex of organoleptic, physicochemical and biochemical characteristics of the quality and safety of food products. Violation of technological standards for the storage of raw materials, semi-finished products and finished products can cause the development of microorganisms and, as a rule, microbial spoilage. In order to produce high-quality products that meet

the established standards, it is necessary to carry out microbiological control in a timely and qualified manner. In addition, it is quite important to ensure the production of high-quality and safe products to ensure the proper state of sanitation and hygiene at the enterprise.

The main task facing the technologist of every food production is to provide the population with high-quality products, which is impossible without constant and strict control over the course of the technological process, control at each of its stages, control of the sanitary and hygienic condition of equipment, shops, inventory, raw materials, auxiliary materials , semi-finished and finished products.

The course "Food Microbiology" has an integrating role, where all previously studied facts subject to the basic laws of the organic world are systematized. The teacher must take into account the knowledge of higher education students about organic substances obtained during the study of biological courses, skillfully select information about the chemistry of biologically important substances with specific examples, and consider the mechanism of their action.

Modern teaching methods require a combination of the theory of generally accepted methods of microbiological analysis and the characteristics and significance of each of the indicators of microbiological safety of food products, including sanitary indicator microorganisms, as well as the characteristics and methods of control of some auxiliary materials. Laboratory work is aimed at acquiring skills for independent work in a microbiological laboratory by higher education students to analyze the quality of food products, determine the type of microorganisms, isolate them from food products and the environment, as well as study the factors of environmental influence on the development of microorganisms. Since "Food Microbiology" is an experimental science that requires constant visualization in lectures and laboratory classes.

General subject competencies consist in the fact that students become familiar with the systematization of knowledge in the field of food microbiology, the study of the patterns of microbiological transformations of the main components of food raw materials during technological processing. Another important task is the formation of special competencies - to perform microbiological experiments, that is, experimental and practical skills necessary for work.

The structure and content of the course are subordinated to achieving the outlined goal, therefore the educational material is constructed in such a way that in theoretical terms it allows us to consider the statics and dynamics of processes in unity, and in practical terms it reveals the significance of the knowledge gained for its use in the food industry.

In the process of studying the course "Microbiology of Food Products" for the formation of general subject competencies, the following methods are used: verbal, visual and practical. Using verbal methods, the teacher transmits knowledge through lectures, stories, conversations. The main source of knowledge is the teacher's word. Verbal methods play an important integrating role in relation to the educational material.

By using visual methods – demonstration and observation – the teacher directs and clarifies the students' perception. The main source of knowledge is observation of the demonstrated objects, experiments, images, and not the teacher's words, although

he always has a leading role in the entire cognitive process.

The third group of methods is practical. Here, the main source of knowledge is the results obtained by students during laboratory work. All methods, when used correctly in accordance with the content of the material, enrich knowledge, develop a scientific outlook, thinking, and practical skills.

Knowledge in the learning process is acquired as a result of the student's active practical activity. Performing laboratory work is one of the most important forms of such activity, a significant number of which can be organized in the form of scientific research. At the same time, the student learns to clearly formulate tasks and choose ways to solve them, acquires the ability to conduct an experiment and summarize its results.

An important task of the laboratory practicum is to familiarize the student with research methods in microbiology and develop practical skills in microbiological research. In this regard, the teacher faces a number of problems related to the restructuring of the educational process. One of them is to organize effective forms and use innovative technologies most suitable for this academic discipline. Depending on the topic, goal and content, we use certain forms of organizing lectures and practical classes. An important role is played by the implementation of didactic principles and innovative approaches to learning, including personality-oriented, developmental, differentiated, competency-based, which not only form knowledge, skills and abilities, but also create conditions for the development of future specialists' ability to make independent decisions, solve atypical tasks of high professionalism, that is, aimed at the formation of subject competence.

In the educational process, interdisciplinary tasks should be used. They can be of a problem-search nature and include problematic issues. When composing these tasks, the level of cognitive activity and the ability of students to work independently should be taken into account. All types of tasks should be formed in such a way that they develop a creative approach to the topic being studied, contribute to the development of skills and abilities, and rationally solve the tasks set. [1, 6].

The structure of the classes is determined by the content of the course, which should cover the most important problems of modern science. The methodology for preparing for a problem lecture involves careful selection of the topic, since not every topic of the discipline can be problematic. It is advisable to carefully study the theoretical, practical, illustrative and other educational material, structure it and determine the components of the problematic nature [2, 4].

The problematic structure of the lesson does not mean, however, that it should be built deductively. Lessons can be different: some of them are built deductively, others - inductively, others - with a combination of deduction and induction, regardless of the order of presentation of the material in the methodological materials and should not adhere to any standard scheme: questioning, explanation of new material, consolidation of the explained. In this case, questioning can be included in the process of explanation, and sometimes it is carried out at the end of the lesson. Consolidation of new material is often carried out during the explanation, generalizing parts of the lesson content and summarizing it at the end.

When conducting classes, preference should be given to various types of

independent work [5, 8]: solving problematic issues in the form of situational tasks of a practical orientation; creating metabolic schemes of individual microbiological processes; filling in specially developed tables; using the project method, etc. The indicated forms of independent work are effective, as they include problematic and professional orientation, activating students' creative abilities, the presence of a logical sequence of all stages of work and mandatory reporting on the results and the use of modern information technologies.

Knowledge can be checked and recorded using various forms, but the main role belongs to the teacher's questions. Thanks to them, the student compares, compares, connects phenomena, looks for causal relationships, draws conclusions, and summarizes the material. With the help of skillfully posed questions, the teacher not only checks what the student's memory has retained from what was learned from the textbook, but also penetrates into the very process of mastering knowledge, which takes place in the student's mind.

In order to activate cognitive interest, it is necessary to systematically use applied scientific information, which should be selected not only by the teacher, but also by students. A factor stimulating students' cognitive interest in studying the course is reliance on their life experience. Considering the above-mentioned types of general subject and subject competencies that should be formed in students during the study of "Food Microbiology", and the fact that the object of assessment is knowledge, skills, abilities, experience of activity, emotional and value attitude to the subject, a system for diagnosing the level of their formation has been developed [9] according to the following criteria and indicators: level of mastery of subject knowledge: knowledge of theoretical material, correctness of performing various types of tasks; ability to apply acquired knowledge in practice: ability to analyze, generalize, systematize theoretical material, find the necessary information and use it in practice; technique of performing an experiment and preparing reporting documentation, skills and abilities in working with chemical reagents and biochemical equipment, ability to observe the course of processes and their results, make correct reasoned conclusions, perform appropriate calculations, ability to properly prepare reporting documentation (laboratory lesson protocols); personal qualities: preparedness for the lesson, timeliness of task completion, independence, organization, responsibility, communication skills and abilities (ability to work in a pair or group, oral and written communication skills, ability to use biochemical language as a means of communication) and others.

Conclusions

1. The course content allows the use of various forms of teaching organization: lectures, seminars, educational research, laboratory classes.

2. The course content should be professionally oriented in order to form the appropriate competencies. Each topic should combine information and tasks of fundamental content in parallel with professionally oriented material.

3. The competency-based approach to the organization of teaching orients the pedagogical process towards the productive development of the student, increasing the opportunities for the formation of personality, its adaptation in a modern dynamic society, provides the opportunity to perceive a person as a holistic and unique personality, to lay the initial foundations of the strategy for achieving the peaks of

individual development of the personality in the intellectual, cognitive, emotional spheres. The product of such an organization of the learning process is a developed personality, prepared for the appropriate professional activity.

4. A feature of the teaching methodology of the course "Food Microbiology" is the use of problem-based learning, the organization of students' research activities. In order to intensify learning, it is advisable to hold discussions that develop the skills of practical analysis, well-founded argumentation and scientific proof of the proposed positions, contribute to penetrating the essence of processes and phenomena, and create an emotionally charged atmosphere in classes.

5. The predicted results of using various forms and methods of learning are the formation of a system of knowledge, skills and abilities of students, as well as the achievement of planned learning outcomes.

References

1. Adamova I.Z. Peculiarities of organizing independent work of students in the process of revealing their creative potential [Text] / I.Z. Adamova, K.L. Bagriy // Problems of education and teaching methods in higher education. – 2015. – 2 (58). – P.241.

2. Babenko O.M. Biochemical knowledge in the system of natural knowledge of students [Text] / O.M. Babenko // Theoretical issues of culture, education and upbringing: collection of scientific works. Issue 43. / KNLU . – 2011. – P.157-158.

3. Bystrova Y.V. Innovative teaching methods in higher education of Ukraine [Text] / Y.V. Bystrova // Law and innovative society. – 2015. – 1(4). – P.27-28.

4. Gladka N.I. Current issues of teaching bioorganic and biological chemistry in higher education [Text] / N.I. Gladka, V.O. Prikhodchenko, O.M. Denisova, T.I. Yakymenko, G.F. Zhegunov // Scientific Bulletin of the S.Z. Gzhytsky National University of Biochemistry and Biochemistry. – 2014. – Vol. 16. No. 2 (59). Part 5. – P. 239-242.

5. Grebenyk L.I. Forms and approaches to organizing classroom independent work of students in practical classes in biological chemistry [Text] / L.I. Grebenyk, L.A. Primova // World of Medicine and Biology. – 2010. – Issue No. 4. Vol. 6. – P. 177-180.

6. Microbiology of food products: a textbook / T.M. Prylipko, T.V. Koval, V.B. Kostash. – Kamianets-Podilskyi: Higher education institution "Podilsky State University", 2024. – 412 p.

7. Nagaev V.M. Teaching methods in higher education [Text] / V.M. Nagaev. – K.: Higher school, 2007. – 222 p.

8. Stepanova T. M. Methodical preparation of master's students for teaching professional disciplines [Text] / T.M. Stepanova // Scientific Bulletin of V.O. Sukhomlynskyi Moscow State University. Pedagogical sciences. – 2014. – Issue 1.45 (106). – P.129-130.

9. Shmygol I.V. Formation of general subject competencies in the process of teaching biochemistry: methodological recommendations. Cherkasy: Bohdan Khmelnytskyi National University of Ukraine, 2013. 40 p.

Анотація. *Важливим завданням сучасної освіти є забезпечення високого рівня загальнонаукової і професійної підготовки фахівців, які володіють системою знань і вмінь, можуть мислити логічно і проблемно, здатні до поєднання теоретичних і практичних знань. Тому при вивченні курсу «Мікробіологія харчових продуктів» необхідно організовувати навчальний процес таким чином, щоб поєднувати нормативну фундаментальну частину із вміннями і навичками, які мають професійну орієнтованість. Одним із важливих підходів, що трансформує систему вищої освіти, є компетентнісний підхід, який передбачає формування навичок на створення умов для оволодіння комплексом компетенцій. Компетентнісний підхід спрямований на формування особистості, здатної до здобуття подальшої професійної освіти, соціальної та професійної мобільності. Обов'язковими компонентами будь-якої компетенції є відповідні знання і уміння. Використані публікації наукових та методичних видань, методи педагогічних досліджень, а також практичний матеріал кафедри харчових технологій виробництва й стандартизації харчових продуктів Закладу вищої освіти «Подільський державний університет». В даній статті обґрунтовується важливість правильного використання та поєднання різних форм та методів навчання при вивченні курсу «Мікробіологія харчових продуктів» для для здобувачів вищої освіти спеціальності 181 «Харчові технології» . Формування загальнопредметних компетентностей ґрунтується на змісті предмета, пов'язане з використанням різноманітних педагогічних прийомів та методів навчання. В даній статті пропонуються методи, форми та засоби формування загальнопредметних компетентностей при вивченні курсу «Мікробіологія харчових продуктів» для студентів технічних спеціальностей як необхідної умови якісної підготовки майбутніх фахівців. Результатом їх впровадження є активне навчання, використання нових форм взаємодії викладача і студента, що покращує якість навчання.*

Ключові слова: *мікробіологія навчальний процес, методи навчання, практична спрямованість курсу, міжпредметні зв'язки, експеримент, самостійна робота, професійна підготовка.*