International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 03 ISSUE 11 PAGES: 105-111
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 6. 676)
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY

Publisher: Oscar Publishing Services

Journal Website: https://theusajournals.com/index.php/ijp

Research Article

METHODOLOGY OF TEACHING SUBJECTS OF THE DEPARTMENT OF MOLECULAR BIOLOGY BASED ON AN INTEGRATIVE APPROACH

Submission Date: November 09, 2023, **Accepted Date:** November 14, 2023,
Published Date: November 19, 2023
Crossref doi: https://doi.org/10.37547/ijp/Volume03Issue11-21

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ABSTRACT

In this article, the teaching methodology based on the integrative approach to the teaching of topics from the department of molecular biology, as well as the types of synchronous and asynchronous integration and the methodical features of the implementation of integration are explained.

KEYWORDS

Integration, horizontal, diagonal, vertical, synchronous and asynchronous, interoection, synectics, coherence, molecular biology, physics, chemistry.

INTRODUCTION

Fundamentally reforming the content and quality of education at all stages of the continuous education system on a global scale, training competitive personnel on this basis, and raising a mature generation are defined as one of the important strategic directions. Attention to the education system is recognized as the foundation for the development of the economy of all developed countries.

In the concept of development of the public education system of the Republic of Uzbekistan until 2030, as a result of qualitatively updating the content of the continuous education system, as well as training professional personnel, improving the teaching methodology, and gradually applying individualized principles to the educational process, priority tasks are set for raising intellectually developed young generation, aligning the criteria for evaluating the quality of education in general secondary schools with international standards, in-depth study of all subjects, including biology. The team of pedagogues working in

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secondary schools and future teachers bear a great responsibility in performing these tasks.

THE MAIN RESULTS AND FINDINGS

It is known that if we take a look at the history of the development of biological science, like all sciences, by the 20th century, as a result of its differentiation according to its objects of investigation, new "Botany", "Zoology", "Human anatomy" and physiology", "Developmental biology", "Genetics", "Microbiology", "Molecular biology" and many other branches have been created. He began to study various aspects of his inspection objects. But in the 21st century, as a result of the study of objects at the molecular level, mastering the secrets of science in the literal sense, the power of only one science is not enough, that is, the need for integrated education has been significantly highlighted, and integrated education It has been found that lim performs important functions. Because it has been proven in educational practice that it is necessary to use the achievements of various sciences in order to thoroughly master the basics of science and fully understand the essence of biological processes occurring in living organisms.

In the process of fundamental reform of the education system based on the improvement of the quality of education in our country, the implementation of interdisciplinarity is even rising to the level of state policy. A number of laws and decisions are being adopted by our government in this regard. On August 12, 2020, President Sh.M. Mirziyoyev adopted the decision "On measures to increase the quality of continuous education and the effectiveness of science in the fields of chemistry and biology" is a practical proof of our above opinion. Also, according to paragraph 4 of the annex to the decision of the President of the Republic of Uzbekistan No. PQ-4884 of November 6, 2020 "On additional measures to further improve the education system" ra "Ensure the continuity of preschool, general secondary, professional and higher education curricula and subjects".

With the efforts of scientists, professors and teachers working in the continuous education system of our country to fulfill these tasks, the "National Curriculum of the Republic of Uzbekistan for Continuous Education" in Biology was prepared. The integrity of preschool, general secondary, academic lyceum, primary professional and higher education programs was ensured in this Ministry of Education. This is definitely one of the wide range of practical works and serves to train fully qualified personnel. Along with these works, ensuring the integration of the sciences that must be studied at the molecular level with the sciences that have the same object of study is one of the urgent problems of today.

To solve this problem, the future biology teacher should first of all have knowledge and skills about integration and integrated knowledge. Secondly, it is necessary to have planned a work oriented to this goal, methodically based, and having a scientific orientation. Thirdly, it is important to be able to choose integrative materials that justify the scientific significance of educational materials, and be able to apply them in practice.

Future teachers should form their own understanding of integration with subjects. From this point of view, it is appropriate to dwell on the methodological features of the integration of sciences. In the process of teaching subjects, the process of forming integrative knowledge of future teachers is formed in pedagogical

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practice mainly in three directions: cognitive, conceptual, integrative model (Table 1).

Table 1

Directions of the integrative knowledge formation process

Cognitive	Conceptual	Integrative
Introjection is the student's acceptance of the acquired knowledge into his inner world with integrative motives based on his individual capabilities. Synectics is a generalization of the conceptual features of educational and cognitive activities carried out in various subjects. Coherence is a scientific-cognitive placement of integrative and flexible didactic processes in sequence with each other of all elementary principles in biological sciences.	Fanning conceptual historical aspects, evolutionary development stages, experiences modern development trends.	Horizontal - interdisciplinary (physics, chemistry, geography, technology) Diagonal - within science (botany, zoology, Man and his health) Vertical-technological: pedagogical information communication interdisciplinary: biotechnology, non-technology, cybernetics, biophysics, biochemistry, molecular biology

Interoection is the student's acceptance of the knowledge he is acquiring into his inner world with integrative motives based on his individual capabilities. Students' thinking plays an important role in this process. The thinking of the individual serves as an important basis for the formation of special competences related to the subject and the subject in the students.

Synectics is a generalization of the conceptual features of the educational activities carried out in various subjects. In some activities, this process is also called "integration". Synectics is the ability to synthesize knowledge of different plans (of different quality and different modalities) into a new quality. It is based on the thinking of human abilities in different processes that do not have any common connection (flow of rivers, flow of people, flow of information, etc.).

It is derived from the content of the subject studied in teaching biology

natural sciences: in the fields of physics, chemistry, biology, geography, interrelated natural-scientific ideas, laws and concepts, procedures and methods of scientific knowledge are used. For example, when studying the structure, structures, and classification of proteins in the cell, students use chemistry, and when studying its function, laws learned in physics are used. The use of the knowledge, skills and abilities of students in natural sciences in a new situation corresponds to the rules of synectics.

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Coherence, integrative and flexible didactic processes basically require that all elementary principles in biological sciences are scientifically and cognitively placed in a sequence with each other. In the teaching of molecular biology, an initial idea is formed about philosophical concepts such as singularity, specificity and generality. For example, biomolecules in the cell: carbohydrates, lipids, proteins, nucleic acids all perform the same general task, regardless of the fact that they are found in different amounts in different organisms. Also, in the study of protein biosynthesis, each gene has intron and exon parts, and only its parts that store information participate in the translation process after the splicing event and synthesize the protein needed by the organism. It is known that singularity, particularity and generality represent the individual, specific and general characteristics of biological objects and processes, as well as the connection and relationship between them.

Coherence is understood as the interaction of small systems in the process of creating durable and orderly structures of new systems. Coherent integration in teaching is currently the most common type of integration in the educational process. Coherent model in general secondary education: chemistry and biology, physics and biology, physics and chemistry; In higher education, molecular biology is taught in integrated courses such as organic chemistry and molecular physics. On the basis of such integration, on the one hand, the formation of integrated ideas about the world of nature, culture and science is achieved, on the other hand, study time is saved. Such integration allows not only interdisciplinary (vertical), but also interdisciplinary (horizontal) important natural-scientific learning, to intensify the pedagogical process at a high level, to establish meaningful interdisciplinary integration, and not to copy educational material.

The following technologies for implementing the coherent model are used: an integrated course is created according to the content of subjects that belong to one educational field. Therefore, the weight that falls on the content of one subject does not fall on the content of another subject and is distributed "equally". The analysis of integrative didactics showed that this integrative process exists in three directions in terms of organizational methodology, according to the nature of their didactic and methodical requirements. These are available as horizontal, diagonal and vertical integration.

In some sources, there are cases where the study of integrative methodology and integrative didactics is equated with the term "harmonization" in Uzbek, and conclusions are drawn based on them. The content and nature of the research conducted in developed countries on integrative didactics and integrative methodology is an important factor in the application of integrated technologies of education to the educational process, and the scientific analysis of these didactic and methodological integrative models is the basis of the scientific-methodical work conducted on the school biology course. it is planned to be implemented based on its goals and objectives.

Based on the above knowledge, we consider the methodology of implementing an integrative approach in teaching the science of "Molecular Biology", which is included in the curriculum of the 60110901 biology education. Molecular biology is an elective subject, and the curriculum allocates 4 credits, i.e. 120 hours, to study the basics of science. Of this, 28 hours of lectures, 32 hours of laboratory hours, and 60 hours of

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independent education are allocated. Molecular biology differs from other subjects included in the curriculum by its content complexity. It is natural that this will create a number of difficulties in mastering for future biology teachers. In particular, the rapid development of molecular biology and the intensive increase of information are on the one hand, and on the other hand, the formation of integrative knowledge in mastering the content of science and the methodology of its use in the pedagogical process are not fully formed.

"Human Anatomy and Physiology", "Methodology of Biology Teaching", "Immunology" included in the curriculum of the 60110900-biology education course in the course of horizontal integration in the course of teaching subjects from the science of molecular biology ", should have mastered the knowledge gained from the subjects of "Basics of Genomics".

Diagonal integration should master such subjects as "Biological chemistry", "Biotechnology", "Biometrics", "Bionics", "Radiobiology", "Biophysics". In order to implement vertical integration, it is necessary to thoroughly study such subjects as "Botany", "Zoology", "Developmental Biology", "Human Anatomy and Physiology", "Genetics and Breeding Basics", "Ecology and Environmental Protection", "Plant Physiology". they must have mastered.

In the process of implementing an integrative approach to teaching molecular biology, the above idea can be enriched with more specific ideas. Types of interdisciplinary integration are based on the teaching of molecular biology, which is considered a special field of knowledge or factual, research work, with natural sciences, in which synchronous and asynchronous integrations between general and specific biological concepts and chemical and physical concepts are envisaged. is caught. Synchronous integration means inter-course parallel connections (organic chemistry, general physics, higher mathematics, etc.) based on the program and curriculum. Asynchronous connection - topics of academic subjects are cross-curricular by using the knowledge acquired in previous courses based on the program and curriculum ("Botany", "Zoology", "Human anatomy and physiology", "Biochemistry, "Genetics and selection") is understood as the connection of academic subjects.

Pedagogical observation and experience - our test works, as well as existing methodical literature in this regard, it was determined that the selection of integrative materials in the process of teaching molecular biology should have the following didactic criteria and features:

the integrative knowledge chosen in the teaching of molecular biology should be appropriate to the subject, clearly cover its essence and characteristics; the selected integrative knowledge should allow students to comprehensively research the studied object and thereby help students to form a scientific outlook, understanding of the integrity of the universe, and interest in the basics of science; the selected integrative materials should have their own characteristics for each subject, the selected integrative materials in the teaching of molecular biology should have a prospective content that meets the requirements of today's knowledge.

CONCLUSION

In the process of teaching the topics of the molecular biology department, it is advisable to choose

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integrative knowledge based on the following principles:

appropriateness of teaching; taking into account the age, psychological and physiological characteristics of students; cover materials that are new to the student and increase their interest in research; be explained in a simple, simple language that the reader can understand; it should include the knowledge that serves the formation of scientific concepts in the minds of students.

Therefore, the future teacher must not only collect integrative materials related to the topics in the program, but also systematize them, find the necessary approaches and methods to use them in class and extracurricular activities..

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