

THE PEDAGOGICAL AND DIDACTIC CONDITIONS FOR DEVELOPING SYSTEMATIC THINKING IN FUTURE BIOLOGY TEACHERS

Dildora Ismatullayevna Mustafaqulova

JDPU named after Abdulla Qodiriy

Department of Biology and its Teaching Methodology Lecturer

Annotatsiya: Ushbu tadqiqotda, talabalarda tizimli tafakkurni shakllantirishning ahamiyati va pedagogik shart-sharoitlari ko'rib chiqiladi. Tizimli tafakkur, hodisalar va jarayonlarning o'zaro bog'liqligini va ularning o'zgarishini anglash qobiliyati bo'lib, zamonaviy ta'limda talabalarning mustaqil fikrlash va tahlil qilish ko'nikmalarini rivojlantirishda muhim o'rin tutadi. Ayniqsa, biologiya fanida bu tafakkurni shakllantirish o'quvchilarning tizimli fikrlashini o'stirish, kasbiy faoliyatga tayyorlashda katta ahamiyatga ega. Maqsadli pedagogik shart-sharoitlar va maxsus o'quv-muhit yordamida talabalarga turli fanlar o'rtasidagi o'zaro bog'liqliklarni tushuntirish, amaliy mashg'ulotlar va hayotiy vaziyatlar orqali ularning bilimlarni tahlil qilish va qo'llash qobiliyatini kuchaytirish zarur. Tadqiqotda biologiya fanining o'ziga xos xususiyatlari va tizimli tafakkurni rivojlantirishga xizmat qiluvchi metodologik va didaktik yondashuvlar yoritiladi, shuningdek, bunday yondashuvlarning amaliyotga samarali tatbiq etilishi tahlil qilinadi.

Kalit o'zlar: tizimli tafakkur, pedagogik shart-sharoitlar, biologiya fani, mustaqil fikrlash, tahlil qilish, o'quv jarayoni, o'qituvchi, metodologik yondashuv, amaliy mashg'ulotlar, o'quv muhit, integratsiyalashgan ta'lim, didaktik sharoitlar, muammoli vaziyatlar, izlanish, hayotiy vaziyatlar, tizimli fikrlash, bilimlar tizimi, o'quv faoliyati, kasbiy faoliyat, o'quv maqsadlari

Annotatsiya: Данное исследование рассматривает важность формирования системного мышления у студентов и педагогические условия, способствующие этому процессу. Системное мышление — это способность понимать взаимосвязь и изменения явлений и процессов, и оно играет ключевую роль в развитии навыков самостоятельного мышления и анализа у студентов в рамках современного образования. Особенно важно развивать системное мышление в преподавании биологии, поскольку эта дисциплина требует высокого уровня системного восприятия взаимосвязанных биологических процессов. Использование целенаправленных педагогических условий и специально организованной учебной среды способствует пониманию взаимосвязей между различными предметами, улучшая способность студентов анализировать и применять знания через практические занятия и реальные жизненные ситуации. В исследовании освещаются особенности преподавания биологии, а также методологические и дидактические подходы, направленные на развитие системного мышления, и анализируется их эффективное применение в практике.

Ключевые слова: системное мышление, педагогические условия, биология, самостоятельное мышление, анализ, учебный процесс, учитель, методологический подход, практические занятия, учебная среда, интегрированное обучение, дидактические условия, проблемные ситуации, исследования, жизненные ситуации, системное восприятие, система знаний, учебная деятельность, профессиональная деятельность, учебные цели.

Annotation: This study explores the importance of developing systematic thinking in students and the pedagogical conditions that contribute to this process. Systematic thinking is the ability to understand the interconnection and transformation of phenomena and processes, and it plays a key role in developing students' independent thinking and analytical skills within the context of modern education. In particular, developing systematic thinking in biology teaching is of great importance, as this subject requires a high level of understanding of interrelated biological processes. The use of purposeful pedagogical conditions and a specially organized learning environment helps students understand the interconnections between different subjects, enhancing their ability to analyze and apply knowledge through practical exercises and real-life situations. The study highlights the specific characteristics of teaching biology, as well as the methodological and didactic approaches aimed at developing systematic thinking, and analyzes their effective application in practice.

Keywords: systematic thinking, pedagogical conditions, biology, independent thinking, analysis, learning process, teacher, methodological approach, practical exercises, learning environment, integrated learning, didactic conditions, problem situations, research, real-life situations, systematic perception, knowledge system, learning activity, professional activity, educational goals.

One of the urgent tasks of modern education is the development of systemic thinking in students. In today's rapid exchange of information and in a complex social and technological environment, individuals are required to independently process the knowledge they acquire, analyze it, generalize it, and create new knowledge. Systemic thinking is the ability to perceive complex phenomena, processes, and problems in a holistic manner, to understand their interconnection and transformation. The development of such thinking directly depends on the pedagogical conditions intentionally created in the educational process.

In 21st-century pedagogy, not only knowledge delivery but also the development of students' and teachers' reflective abilities, that is, their systemic thinking, is of paramount importance. Specifically, the distinctive nature of biology as a subject requires an understanding of processes in nature as being interrelated and organized in a hierarchical system. Therefore, the process of training biology teachers requires methodological and pedagogical solutions to shape systemic thinking.

The core idea of forming systemic thinking is the application of the systemic-activity approach as a form of the educational process, where students' active, independent learning activities take precedence. In such an educational process, the teacher plays a passive role, while the students' knowledge is considered the result of their independent inquiry. Therefore, organizing and managing such inquiries, as well as developing students' cognitive activities, logical and systemic thinking, is necessary. Teachers must address questions such as how to organize students' learning activities, how to shape lesson objectives and achieve them, how to select and didactically process educational materials, and what teaching methods and tools to choose. The key here is that the interaction of all these components should lead to the integration of a system of knowledge and values.

Systemic thinking is a deep and complex form of thinking based on understanding the interconnections between phenomena, facts, and ideas. To form this in future biology teachers, purposeful pedagogical conditions and specific learning environments are required.

In today's rapidly advancing globalization and informatization, the primary goal of education is not just to provide students with ready-made knowledge, but to develop their ability to think independently, deeply analyze problems, and make correct decisions in various situations. Especially given the complex, systematic nature of biology—such as the structure, functions, and interrelationships of living organisms—teaching this subject demands high-level systemic thinking from the teacher.

Therefore, the development of systemic thinking in future biology teachers not only enhances their individual thinking ability but is also an essential pedagogical task in preparing them for their professional careers. In this process, identifying, scientifically justifying, and implementing the pedagogical and didactic conditions that foster the development of systemic thinking are crucial issues in modern pedagogy.

Pedagogical conditions refer to a set of special learning environments, methods, tools, and organizational activities created to teach students systemic thinking. These conditions primarily require the integrated organization of educational materials. That is, the interconnections between different subjects and fields of knowledge are revealed, and the knowledge is presented based on sequentiality and cause-and-effect relationships. Moreover, creating problematic situations in the educational process, assigning tasks that encourage independent inquiry and analysis, plays a crucial role in developing systemic thinking. Through practical exercises and real-life situations, students learn to apply theoretical knowledge in real-world contexts, which strengthens their analytical and systemic thinking skills.

Pedagogical conditions include factors such as the content of education, methodological approaches, the structural composition of educational activities, and the clear definition of educational goals. These constitute the internal didactic basis necessary for shaping students' systemic thinking. Didactic conditions, on the other hand, are the real educational environments that support the educational process organizationally and technologically, utilizing modern information tools, laboratory settings, and interactive methods.

This research examines the theoretical and methodological foundations of pedagogical and didactic conditions that contribute to the formation of systemic thinking in future biology teachers, their content, significance, and role in the educational process. It also scientifically analyzes ways to effectively implement these conditions in practice.

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