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PEDAGOGICAL FEATURES OF THE COMPETENCY-BASED APPROACH IN INNOVATIVE TEACHING ENVIRONMENTS

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1. Introduction

Leading scientific centers and higher educational institutions worldwide are conducting extensive research on the principles of introducing a competency-based approach into the standards of vocational and general education. This research explores the impact of these standards on pedagogical systems, psychological and methodological foundations, and the concept of independent educational achievement. Furthermore, it examines the interpretation of the competency-based approach, focusing on competencies aimed at personal, social, and professional development. Scientific approaches aimed at improving the methodological support for teachers - such as the introduction of virtual practical training, competency-based teaching of professionally oriented subjects, and training that reflects interdisciplinary connections - serve to significantly enhance the quality and effectiveness of education.

2. Theoretical Foundations of Competence

How is a person’s competence determined? In the works of A.V. Khutorsky, the concepts of “competency” and “competence” are closely aligned, defined primarily as “a person having the necessary knowledge and skills that allow them to work in a certain field”. V.V. Serikov explains competence as “a set of concepts that allow one to express their personal identity, a way of being educated, knowledgeable, and skilled”.

Competence is fundamentally a sign of activity that leads to an expected result; it is the product of knowledge combined with a specialist's ability to apply it. The primary distinction between competence and mere knowledge is that competence cannot be identified or assessed outside of practical performance. Qualification, a crucial criterion of competence, manifests through repeated application in various situations, particularly in problem-solving. Practical competence is the ability to operationalize knowledge, while professional competence refers to the effective application of knowledge and skills to resolve issues specifically related to professional activity.

The classification of a teacher’s professional competence has been widely discussed since the 1990s. N.V. Kuzmina reveals professional and pedagogical competence through five elements:

Special and professional competence: Mastery of the subject being taught.

Methodological competence: The ability to form students' knowledge and skills.

Socio-pedagogical competence: Navigation of communication processes.

Differential-psychological competence: Understanding students’ motives, abilities, and directions.

Autopsychological competence: Awareness of the advantages and disadvantages of one's own activities and personality.

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A.V. Khutorsky distinguishes three hierarchical levels of competencies: basic (related to general education), general subject (related to a specific set of disciplines), and subject-specific (formed within individual disciplines). E.F. Zeer groups competencies into general cultural, social, educational-cognitive, organizational, and special domains. In the broader professional context, competencies are often divided into corporate (core values), managerial (leadership), and professional (technical skills for specific roles).

3. Professional Competencies of a Biology Teacher

An analysis of the professional tasks of a biology teacher highlights several independent functional activities:

Forming a system of scientific knowledge about wildlife and its developmental laws to expand students' functional literacy;

Teaching the use of scientific terminological apparatus to describe biological objects, processes, and evolution;

Developing skills in using biological methods for researching living objects, ecosystems, and environmental monitoring;

Cultivating the ability to explain experimental results and solve elementary biological problems;

Planning educational processes, modeling professional situations, and predicting outcomes;

Establishing environmental literacy: assessing human impact on nature, understanding health risk factors, and fostering a desire to preserve biodiversity;

Encouraging independent positioning regarding biological information and global environmental issues;

Motivating students toward professional pathways in medicine, veterinary science, agriculture, biotechnology, and environmental protection;

Popularizing biological knowledge through lectures, conferences, and digital platforms;

The goals of biological education in pedagogical higher institutions therefore include:

Mastering fundamental knowledge about the biological world;

Understanding the methodology of scientific knowledge;

Forming the biological component of the scientific worldview within a pedagogical framework;

Forming biological knowledge taking into account the ecological and regional aspects of the local area.

4. Structural Components of Biology Teaching Competence

The professional competence of a biology teacher comprises several interrelated components:

The Cognitive Component: Determines the theoretical preparation of the future teacher. This involves mastering fundamental laws of biology, understanding the science's current state and interdisciplinary links, and utilizing modern experimental methods. Knowledge serves as the foundation for a natural-scientific worldview and analytical thinking.

The Activity (Practical) Component: Represents the ability to apply theoretical knowledge to professional activities. Knowledge only becomes a tool for acquiring new knowledge when it is mastered through practical application.

The Motivational-Value Component: Motivation is a crucial link in educational activity. Defined by psychologists (e.g., A.Leontiev, A.Maslow, A.Markova) as the psychological reasoning justifying behavior, it acts as an internal regulator. This component includes the teacher's understanding of their professional significance, their intrinsic interest in teaching, and their readiness to achieve results.

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The Personal-Reflexive Component: Determines the teacher's ability to introspect, self-evaluate, and pursue continuous professional development. It involves essential personal qualities such as empathy, leadership, emotional stability, and tolerance for disappointment.

In the classroom, these structural elements help build diverse student competencies, including educational competence (defending viewpoints and managing independent research), cognitive competence (observation, experimentation, and modeling), information/communication competence (group work and correct use of biological terminology), general cultural competence (understanding biology's role in human life), and social/labor competence (functional literacy and professional self-determination).

5. Methodology for Developing Critical Thinking

Critical thinking is a complex mental process that begins with the assimilation of information and culminates in decision-making. Developing a lesson using critical thinking methodology generally involves three stages:

Stage 1: Recall (Evocation). Students actively recall known information on the topic, allowing them to assess their baseline knowledge. This immersion links the known to the unknown, activating student engagement. Common methods include brainstorming, pair work, and group work, moving students to a level of self-awareness where lesson objectives are collectively defined.

Stage 2: Understanding (Realization of Meaning). Students encounter new information via texts, documents, or videos. Methods like annotated reading (e.g., the "Help" tag system, marking texts with signs for known, new, surprising, or contradictory information) force students to compare new data with prior knowledge, fostering information competencies.

Stage 3: Reflection. Students synthesize new information by repeating concepts, creating diagrams or tables, and explaining material to the class. This stage expands vocabulary, encourages diverse approaches to problem-solving, and solidifies self-educational competencies.

This methodological system allows teachers to activate cognitive processes, stimulate productive activity, and develop a sense of teamwork. To stimulate critical thinking, teachers must act as facilitators rather than mere transmitters of knowledge, guiding students through inquiry-based learning.

6. Conclusion

Implementing a competency-based approach in biology education - including specific regional applications such as teaching about local ecology and medicinal plants in Uzbekistan - comes with unique challenges. As the educational landscape evolves, several promising directions and ongoing hurdles must be considered:

Keeping up with scientific advances: The rapid evolution of biological sciences requires continuous curriculum updates.

Technology integration: While digital tools and virtual labs enhance education, infrastructure disparities between schools hinder uniform integration.

Diverse learning styles: Managing varying cognitive styles and educational tools within a single classroom requires high pedagogical adaptability.

Engagement and realism: Maintaining student motivation and demonstrating the vital, real-world importance of biological concepts is an ongoing task.

Assessment and Feedback: Developing fair rubrics to measure practical competencies (rather than rote memorization) and providing timely feedback is highly time-consuming.

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Inclusive Education: Ensuring accessible and equitable education for students of diverse backgrounds, abilities, and learning needs remains a pressing priority.

In short, the ultimate challenge in modern biology education is integrating global perspectives into the curriculum while emphasizing the interconnectedness of biological systems on both a regional and global scale.

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