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Page No: - 231-235

Pedagogical strategies for developing systemic thinking in future teachers based on the competence approach

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Abstract

In the modern educational landscape, the competence-based approach plays a crucial role in shaping the professional and cognitive skills of future teachers. One of the essential components of professional competence is systemic thinking, which enables teachers to perceive pedagogical phenomena in an interconnected and holistic manner. This article explores pedagogical strategies aimed at developing systemic thinking in future teachers through the competence approach. The research highlights the importance of integrating interdisciplinary learning, problem-based teaching methods, reflective practices, and digital technologies in teacher education. It emphasizes that systemic thinking is not only a mental skill but also a methodological foundation that allows teachers to plan, analyze, and evaluate educational processes more effectively. The article also proposes a model of competence-oriented pedagogical strategies that support the formation of systemic thinking by linking theoretical knowledge with practical experience. The results of the study demonstrate that the competence-based approach significantly enhances the ability of future teachers to think critically, identify cause-effect relationships, and apply holistic perspectives in solving pedagogical problems. The findings contribute to improving the quality of teacher training programs and fostering innovative, reflective, and system-oriented educators for the 21st century.

Keywords: - Competence-based approach, systemic thinking, pedagogical strategies, teacher education, professional competence, reflective learning, interdisciplinary integration, innovative teaching methods.

Introduction

In the era of rapid technological progress and global educational transformations, the preparation of competent and systematically thinking teachers has become one of the key challenges of higher education. The dynamic development of science and information technologies requires educators who can not only master subject knowledge but also analyze complex pedagogical situations, identify interconnections between phenomena, and design effective solutions based on a holistic view of the learning process. In this regard, the development of systemic thinking among future teachers becomes a central task of modern pedagogical training.

The competence-based approach serves as a methodological foundation for achieving this goal. It focuses on the formation of integral competencies that unite knowledge, skills, personal qualities, and value orientations necessary for professional activity. Within this framework, systemic thinking is considered as a core intellectual and methodological competence that

enables teachers to comprehend educational processes in their entirety, establish interdisciplinary connections, and make informed pedagogical decisions[1].

Modern pedagogical theory and practice emphasize that the formation of systemic thinking requires specific educational strategies that go beyond traditional teaching methods. These include problem-based and project-based learning, reflective teaching, interdisciplinary integration, and the use of digital and interactive technologies. Such strategies help learners not only acquire knowledge but also understand its internal logic, structure, and interdependence with other areas of knowledge[2].

Therefore, studying pedagogical strategies for developing systemic thinking in future teachers based on the competence approach is of great theoretical and practical significance. It allows for a deeper understanding of how educational environments can foster analytical, critical, and holistic thinking in teacher candidates. Moreover, it contributes to the modernization of teacher education curricula and supports the preparation of highly qualified educators capable of responding creatively and effectively to the challenges of contemporary education.

Main Part

1. The Concept of Systemic Thinking in Teacher Education

Systemic thinking is an intellectual ability that allows individuals to perceive, analyze, and interpret phenomena as interconnected components of a larger system. In teacher education, systemic thinking enables future educators to understand the relationships between curriculum content, pedagogical methods, student needs, and educational outcomes. It goes beyond simple knowledge acquisition, fostering critical analysis, reflective judgment, and problem-solving skills. According to contemporary research, systemic thinking is a key component of professional competence, as it allows teachers to anticipate consequences, identify patterns, and implement effective interventions in educational practice[3].

2. Competence-Based Approach as a Framework for Developing Systemic Thinking

The competence-based approach emphasizes the integration of knowledge, skills, personal attributes, and values required for professional activity. Within this framework, systemic thinking is developed not as an isolated skill but as part of a comprehensive set of competencies. Key principles of the competence-based approach include learner-centered education, active engagement, practical orientation, and continuous assessment. By designing educational experiences that promote analysis, synthesis, and evaluation, teacher training programs can cultivate systemic thinking effectively. The approach also encourages reflective practices, where students critically assess their actions, learn from mistakes, and continuously improve their professional decision-making[4].

3. Pedagogical Strategies for Enhancing Systemic Thinking

Several pedagogical strategies have proven effective in fostering systemic thinking among future teachers:

Problem-Based Learning (PBL): PBL challenges students to solve real-life educational problems, requiring them to analyze complex situations, identify interrelationships, and develop evidence-based solutions.

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Project-Based Learning: By engaging in interdisciplinary projects, students develop the ability to integrate knowledge from different subjects, apply theoretical concepts in practical contexts, and view educational phenomena holistically.
Reflective Practices: Journals, portfolios, and peer feedback encourage self-analysis, allowing students to critically evaluate their decisions and improve their professional judgment.
Case Method: Examining real or simulated classroom scenarios helps students identify causal relationships and understand the broader impact of pedagogical choices[5].
Digital and Interactive Technologies: Simulation tools, educational platforms, and digital modeling enable learners to experiment with complex systems in a controlled environment, enhancing analytical and systemic skills.

4. Model of Competence-Oriented Pedagogical Strategies

A systematic model for developing systemic thinking in future teachers involves the following stages:
Knowledge Acquisition: Building foundational theoretical knowledge in pedagogy, psychology, and subject content.
Integration and Application: Engaging in projects, case studies, and interdisciplinary tasks to apply knowledge in practical contexts.
Reflection and Evaluation: Continuous self-assessment and peer evaluation to consolidate learning outcomes and enhance decision-making skills.
Innovation and Adaptation: Encouraging students to propose creative solutions to educational challenges, integrating new technologies and methods.
This model demonstrates that systemic thinking develops most effectively when theory and practice are closely linked, learners are actively engaged, and reflective and problem-solving activities are embedded throughout the training process[6].

5. Impact and Effectiveness of Pedagogical Strategies

Empirical studies show that implementing competence-oriented pedagogical strategies significantly improves the ability of future teachers to think systemically. Students trained under such programs demonstrate higher levels of analytical reasoning, critical reflection, and holistic problem-solving. Moreover, they are better equipped to handle complex classroom situations, design integrated lesson plans, and adapt flexibly to changing educational demands. The development of systemic thinking also enhances collaborative skills, as teachers learn to consider multiple perspectives, coordinate with colleagues, and evaluate educational outcomes comprehensively[7].
In conclusion, competence-based pedagogical strategies are essential for nurturing systemic thinking in future teachers. By combining problem-solving, project-based learning, reflection, and digital tools, teacher education programs can prepare highly competent educators capable of responding effectively to the multifaceted challenges of modern education.
Discussion and Results.The implementation of competence-based pedagogical strategies in teacher education has demonstrated a significant positive impact on the development of systemic thinking among future educators. Analysis of empirical studies indicates that students engaged in problem-based and project-based learning, reflective practices, and

interdisciplinary tasks show improved analytical abilities and a deeper understanding of complex educational systems[8].

One key finding is that systemic thinking is enhanced when theoretical knowledge is directly linked to practical application. For example, when students work on case studies or classroom simulations, they learn to identify patterns, predict outcomes, and evaluate the consequences of pedagogical decisions. Additionally, reflective activities such as journals, portfolios, and peer feedback allow students to critically assess their approaches, internalize lessons learned, and adjust strategies accordingly.

Digital tools and interactive technologies further contribute to the development of systemic thinking. Simulations, educational modeling, and collaborative online platforms enable students to experiment with complex scenarios, visualize interconnections, and test alternative solutions without real-world risks. These strategies collectively foster not only cognitive skills but also the professional and personal competencies necessary for effective teaching[9].

The results of applying these strategies reveal that future teachers trained within a competence-based framework demonstrate higher levels of critical thinking, problem-solving, and adaptability. They are better prepared to design integrated lesson plans, respond to diverse student needs, and implement innovative pedagogical methods in dynamic educational environments.

Conclusion

In conclusion, the development of systemic thinking in future teachers is a critical objective of modern teacher education. A competence-based approach provides an effective framework for achieving this goal by integrating knowledge, skills, personal qualities, and reflective practices. Pedagogical strategies such as problem-based learning, project-based learning, case studies, reflective activities, and the use of digital tools play a pivotal role in fostering systemic thinking. The findings of this study suggest that when these strategies are systematically applied, future teachers acquire the ability to perceive educational phenomena holistically, analyze complex situations, and make informed pedagogical decisions. This enhances their professional competence, prepares them to meet contemporary educational challenges, and promotes the cultivation of innovative, reflective, and system-oriented educators for the 21st century.

Overall, competence-oriented pedagogical strategies not only strengthen cognitive and analytical abilities but also contribute to the comprehensive development of future teachers, ensuring they are equipped to foster effective learning environments and promote educational excellence.

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