



THE SCIENTIFIC AND THEORETICAL FOUNDATIONS FOR THE FORMATION OF CRITICAL THINKING IN TEACHERS

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ABSTRACT

In the context of global educational reforms and the increasing demand for high-quality teaching, the development of creative and critical thinking skills has become a crucial objective in teacher education programs. This paper examines the theoretical and methodological foundations for cultivating creative and critical thinking competencies among pre-service primary school teachers. It argues that these skills are not only essential for personal intellectual growth but are also vital for fostering active, learner-centered pedagogical practices in future classrooms. The study explores various theoretical frameworks, including constructivist learning theory, Bloom's taxonomy, and 21st-century skills paradigms, which support the integration of creative and critical thinking into teacher training curricula. From a methodological perspective, the paper analyzes effective instructional strategies such as problem-based learning, inquiry-based approaches, reflective teaching, and digital pedagogical tools that can enhance student engagement and cognitive development.

Furthermore, the paper highlights the challenges faced in embedding these competencies within current teacher education programs, particularly in post-Soviet educational contexts like Uzbekistan. It emphasizes the need for well-structured methodological support, including curriculum redesign, teacher educator training, and the incorporation of innovative didactic resources — such as artificial intelligence-based tools and interactive learning platforms. The findings underscore the



importance of a comprehensive and systemic approach to teacher preparation, where creativity and critical thinking are positioned as foundational competencies. The paper concludes by offering practical recommendations for educational policymakers, curriculum developers, and teacher educators to strengthen the methodological support systems that promote these essential skills in future primary school teachers.

Theoretical background

In today's rapidly evolving educational landscape, the ability to think creatively and critically is recognized as indispensable for both teachers and learners. The primary education stage is foundational in shaping students' cognitive and metacognitive skills, which necessitates that future primary school teachers themselves possess well-developed creative and critical thinking competencies. These competencies enable educators to not only impart knowledge effectively but also to inspire innovative problem-solving, adaptability, and reflective decision-making among their pupils.

The theoretical underpinnings of developing such competencies lie chiefly within the frameworks of constructivist learning theory, cognitive development theory, and contemporary educational psychology. Vygotsky's socio-cultural theory highlights the significance of social interaction and cultural tools in cognitive development, implying that creative and critical thinking skills emerge through mediated learning experiences. Similarly, Piaget's stages of cognitive development underscore the progressive nature of thinking skills, suggesting that teacher training should align with cognitive readiness and scaffold higher-order thinking.

Bloom's taxonomy, especially its revised version, remains a cornerstone for understanding and categorizing cognitive skills. The hierarchy from remembering and understanding to analyzing, evaluating, and creating illustrates the gradual acquisition of complex thinking abilities, which teacher education curricula must integrate intentionally. Creative thinking is linked closely with the 'creating' level — the ability to generate new ideas, hypotheses, and alternative solutions — while critical thinking aligns with 'analyzing' and 'evaluating' levels, focusing on logical reasoning, judgment, and problem identification.

Moreover, the paradigm of 21st-century skills expands this framework by situating creative and critical thinking as part of a broader set of competencies including collaboration, communication, and digital literacy. The Organisation for Economic Co-operation and Development (OECD) and other international bodies emphasize that educators must be prepared to nurture these skills in their students to meet future societal and economic demands.

Importantly, the competency-based education (CBE) approach calls for a shift from traditional content delivery towards outcome-based, skills-oriented training. Within CBE, creative and critical thinking are meta-competencies that not only enhance subject



mastery but also promote lifelong learning, adaptability to change, and professional growth. Thus, the theoretical framework for fostering these competencies is multifaceted, integrating cognitive, social, and practical dimensions of learning.

Methodological approaches to developing thinking skills

The effective development of creative and critical thinking among pre-service primary school teachers requires deliberate methodological strategies that foster active engagement, reflection, and problem-solving. The selection and application of appropriate teaching methods and learning activities are central to this goal.

One widely advocated approach is Problem-Based Learning (PBL), which situates learners in real-world or simulated problem scenarios. Through collaborative inquiry and exploration, teacher candidates develop their ability to analyze complex issues, synthesize information, and propose innovative solutions. PBL nurtures not only critical reasoning but also creativity by encouraging divergent thinking and openness to multiple perspectives.

Complementing PBL, Inquiry-Based Learning (IBL) emphasizes questioning, investigation, and knowledge construction. By formulating research questions, gathering and evaluating evidence, and reflecting on findings, pre-service teachers actively engage in cognitive processes that mirror scientific thinking and intellectual curiosity. IBL also fosters a learner-centered environment, where students take ownership of their learning trajectory, an essential aspect of adult learning and professional development.

Reflective practice is another crucial methodological component. Drawing on Schön's concept of the reflective practitioner, teacher candidates are encouraged to critically assess their instructional decisions, classroom interactions, and underlying assumptions. Structured reflection—via journals, peer discussions, and supervised micro-teaching sessions—cultivates metacognitive awareness, self-regulation, and ethical sensitivity, all integral to critical thinking.

Incorporating educational technology further enhances the methodological framework. Modern AI-driven tools, virtual simulations, and gamified learning platforms provide immersive and adaptive learning experiences that challenge pre-service teachers to think flexibly and innovatively. These technologies enable personalized feedback, scenario-based problem solving, and collaborative learning beyond traditional classroom constraints.

However, successful implementation demands systemic support. Curricular integration should ensure that creative and critical thinking development is not fragmented but woven into the fabric of teacher education programs. This requires clear learning outcomes, aligned assessments, and professional development for teacher educators to proficiently employ these methodologies. Additionally, cultural and institutional contexts must be considered, as teaching styles, learner expectations, and resource availability can impact methodological effectiveness.

Implications and recommendations

The enhancement of creative and critical thinking competencies in pre-service primary school teachers has profound implications for educational quality, innovation, and societal progress. Teachers who model and foster these skills contribute to



developing students' higher-order thinking, creativity, and problem-solving abilities, which are vital in a knowledge-based global economy.

To realize these benefits, educational institutions and policymakers must undertake strategic initiatives:

Curriculum design and development

A well-designed curriculum serves as the backbone for effectively fostering creative and critical thinking skills among pre-service primary school teachers. It is essential that curricula explicitly define these skills as core competencies, clearly articulated within the learning objectives, content modules, and assessment frameworks. This clarity ensures that creative and critical thinking are not treated as peripheral or optional, but as integral elements of teacher preparation.

Moreover, the curriculum should embrace an interdisciplinary approach, bridging pedagogy with psychology, technology, and subject-specific knowledge. For example, integrating cognitive psychology principles helps future teachers understand how students process and apply knowledge creatively and critically. Likewise, technological literacy equips them with tools to facilitate innovative teaching methods. Subject-specific contexts allow pre-service teachers to practice these skills in concrete, relevant scenarios, promoting deeper understanding and application.

In addition, curricula should be dynamic and flexible, allowing adaptation to emerging educational trends and societal needs. This adaptability can be achieved through continuous feedback from students, educators, and stakeholders, as well as by incorporating recent research findings and technological advancements. Embedding project-based assignments, case studies, and reflective exercises further solidifies the development of higher-order thinking within the curricular framework.

Capacity building for teacher educators

Teacher educators are pivotal agents in nurturing creative and critical thinking skills in future teachers. Therefore, continuous professional development (CPD) programs are vital to equip these educators with advanced pedagogical knowledge and practical skills. CPD should emphasize active learning methodologies that encourage student participation, collaboration, and inquiry — essential conditions for stimulating creative and critical cognition.

Furthermore, reflective practices must be deeply embedded within CPD initiatives. Teacher educators should regularly engage in self-assessment and peer review to refine their teaching strategies and address their own cognitive biases or gaps. This modeling of reflective thinking creates a culture of continuous improvement and intellectual openness.

The integration of digital tools is another critical area of focus in capacity building. Educators must be proficient not only in using educational technologies but also in designing learning experiences that leverage these tools to promote creativity and critical thinking. Workshops, seminars, and collaborative research projects can foster innovation and experimentation in pedagogical approaches, enabling educators to stay abreast of evolving educational technologies and methodologies.

Practical experience and mentoring



Authentic, practice-oriented learning experiences are indispensable for translating theoretical knowledge of creative and critical thinking into effective classroom practice. Fieldwork and practicum placements must offer pre-service teachers opportunities to apply these cognitive skills in real educational settings, encountering the complexities and unpredictabilities of actual classrooms.

Guided supervision during these experiences is crucial. Experienced mentors provide scaffolding through constructive feedback, modeling reflective and innovative teaching behaviors, and supporting novice teachers in navigating challenges. This mentorship fosters professional growth and helps pre-service teachers internalize the processes of inquiry, problem-solving, and adaptive decision-making.

Moreover, practicum programs should encourage reflective dialogue, where student teachers critically evaluate their instructional choices and classroom interactions. Structured reflection sessions, portfolio development, and peer discussions contribute to deepening their understanding and sharpening their thinking competencies.

Research and innovation incentives

Institutions have a responsibility to cultivate a research culture that prioritizes pedagogical innovation and the advancement of thinking skills development. Funding and institutional support for research projects focused on creative and critical thinking can lead to the discovery of effective instructional techniques, novel assessment methods, and innovative use of technology in teacher education.

Encouraging faculty and students to disseminate their findings through academic conferences, journals, and workshops fosters knowledge exchange and collaborative advancement. This continual cycle of research and dissemination ensures that teacher education programs remain evidence-based, contextually relevant, and forward-looking.

Furthermore, partnerships between universities, schools, and educational technology developers can accelerate innovation and enable pilot programs that test and refine new approaches in authentic settings. Incentivizing such collaborations enhances the practical impact and sustainability of research outcomes.

Policy and funding alignment

For systemic and sustainable change, national education policies must prioritize the cultivation of 21st-century competencies, explicitly including creative and critical thinking in teacher education standards and accreditation criteria. Policymakers should provide clear guidelines, frameworks, and resource allocations to support curriculum reform, professional development, and research initiatives.

Effective policy implementation requires coordination between governmental bodies, teacher education institutions, schools, and international organizations. Collaborative frameworks can facilitate the sharing of best practices, benchmarking against international standards, and mobilizing resources efficiently.

Moreover, sustained funding mechanisms are essential to ensure long-term program viability. This includes financial support for curriculum development, faculty training, technology acquisition, and research activities. Policies should also promote equity, ensuring that all teacher education institutions, regardless of location or size, have access to quality resources for developing these competencies.



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