

Developing Future Teachers' Creativity as a Crucial Element of Systemic Work in the Neuropedagogical Environment

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Abstract: *The article highlights the crucial role of creativity as a fundamental trait for today's educators. It is vital for devising innovative solutions, developing new educational technologies and engaging students in meaningful learning experiences. As the world evolves rapidly, teachers must be responsive to these changes. Creativity helps teachers address challenges during the educational process and foster student participation. Today's students are more independent and seek involvement rather than passively receiving information. Creative teachers are, therefore, better equipped to create environments that promote independent work and innovation. Creativity is a critical success factor, enabling individuals to generate ideas and solve problems. Teachers should focus on enhancing students' creative skills to help them thrive in the future. Simultaneously, a structured approach within the neuropedagogical environment can help nurture creative skills in future teachers. This process must be holistic, incorporating a range of methods and techniques. Such an approach will equip future teachers to teach effectively and mentor students in today's world. Thus, the article defines creativity as a vital aspect of pedagogical practice and examines strategies for enhancing creative skills among future teachers within the neuropedagogical environment.*

Keywords: *creativity; pedagogical activity; developing creative skills in future teachers; methods and techniques of developing creativity; the neuropedagogical environment.*

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Introduction

In today's society, teachers are seen as influential figures with a significant role in shaping students' personalities. They avoid conforming to standards and stereotypes in their interactions with students, approach problem-solving creatively and innovate in the content, methods and forms of learning. They are ready to undertake diverse risks and engage in creativity and teamwork. Creativity, a crucial aspect of professional development, involves recognizing and overcoming obstacles to professional growth and finding constructive solutions to professional crises, thus facilitating a transition to higher professionalism. The dynamic nature of economic innovation requires future professionals to possess systemic, reflective, self-organizational, creative and moral competencies to excel in their roles.

Many scholars have extensively researched creativity in teaching. Hrynenko (2008) emphasizes the high social significance of creativity, describing it as the process of shaping a student's personality in all its richness. Dunaieva (2008) highlights that the teaching process, based on teacher-student interaction, does not accommodate standardization or templates. The scope of a teacher's creative tasks can range from implementing fundamental innovations in educational content, forms and methods to addressing specific issues arising in particular situations involving student activity and communication. As stated by Feingold (1983), a teacher's professionalism is evident in how they structure and compose their lessons, organize students' independent work, engage them in solving educational and cognitive tasks and find the appropriate tone for communication in various school situations. According to Simonton (2000), a neuropedagogical environment, i.e., an educational space designed with brain functioning in mind, uses methods and techniques that stimulate neural activity and foster the development of creative skills in future teachers.

This article aims to define creativity as an essential aspect of pedagogical activity and describe effective methods for fostering creativity in future teachers within the neuropedagogical environment.

The concept of creativity as a prerequisite of pedagogical activity

Dubaseniuk (2011) proves that creativity is not one facet of a future teacher's personality but is, in fact, its most essential and irreplaceable attribute. Creativity is a crucial element in teaching and an inherent professional necessity for teachers.

Creativity acts as the potential and internal resource for a future teacher, highlighting their capacity for innovative and unconventional thinking and their ability to reflect on and develop their personal experiences. Equally important are the individual and behavioural aspects of creativity. It is crucial to see creativity as a resource for personal development, demonstrating positive dynamics within a future teacher's professional activities and growth (Getzels & Csikszentmihalyi, 1967).

Creativity provides a future teacher with a constructive approach to overcoming professional crises and smoothly transitioning to professionalism and self-realization. It involves adaptive, heuristic and creative forms of development. Creativity is demonstrated through shaping a student's personality, making independent decisions in unexpected situations and expressing one's individuality as a creative act (Taylor, 1988).

Thus, research into how creativity impacts overcoming external and internal barriers to teacher professional development underscores the necessity for specialized technologies. These technologies should incorporate techniques that stimulate creative activity in the context of professional growth, facilitate adaptation to both external and internal changes and enable proactive problem-solving beyond current experience. They should also foster resilience and minimize risks while encouraging everyday creativity in producing original ideas, products and behaviours in both professional and personal settings. Such approaches are expected to help adapt to evolving conditions and serve as a catalyst for ongoing growth and personal development among future educators.

Developing creativity in future teachers

Fostering creativity in future teachers is vital for their self-improvement and personal growth. Therefore, the educational process aims to help students acquire pedagogical knowledge, recognize original creative ideas, develop the ability to formulate creative tasks, generate ideas and discover innovative solutions. It also emphasizes evaluating, synthesizing and analyzing facts, phenomena, theories and pedagogical experiences. Additionally, it encourages participation in university research and supports independent work aligned with their scientific interests. From the first year of study, students create portfolios that reflect their personal abilities, talents and unique approaches to pedagogical problem-solving and anticipated situations, ensuring a high degree of quasi-independence with significant market responsibility (Posner, 2005).

In pedagogical lectures, seminars, and teaching practice, it is crucial to consistently nurture students' internal motivation for studying pedagogical

subjects. This includes teaching students how to work with information (searching, analyzing, structuring), engage in classroom activities (listening to and understanding others, asking questions and responding with well-reasoned answers) and critically reflect on and demonstrate the outcomes of their creativity.

Developing creativity in future teachers involves exposing students to innovative practices, monitoring the positive and negative impacts of these innovations and emphasizing self-development, self-realization and self-discovery. This process involves evaluating selected innovations, recognizing potential challenges future teachers might face during implementation, adapting existing experiences and reflecting on the originality of approaches to complex and pressing pedagogical issues. It also includes refining the criteria for evaluating innovations, assessing their practical application and identifying associated risks (Torrance, 1986).

When designing professional education outcomes, it is crucial to consider the intellectual abilities of future teachers. This approach allows them to adapt to technical, economic and cultural changes, display initiative and creativity and thrive in today's educational settings. It also fosters the development of cognitive skills, encompassing knowledge, motivation and emotional resilience, which are necessary for their success in pedagogical roles. Creative students are distinguished by their eagerness to experiment, explore new solutions and address problems in innovative ways. They strive to organize their activities according to their abilities and needs and are open to taking risks. These students exhibit intellectual activity and initiative and can solve pedagogical challenges creatively. It follows that intelligence and creativity act as the indicators of professional growth, development and well-being of future teachers (Poliakova, 2011).

Future teachers learn to approach problems creatively, both consciously and unconsciously, seeing creativity as an active process that generates new ideas and innovative solutions in everyday situations. To achieve this, one should employ relevant methods to modify familiar conditions, encouraging creative thinking and fostering creativity. These methods involve developing cognitive attitudes through contrasting principles designed to tackle creative challenges. Students are encouraged to identify connections between seemingly unrelated objects, describe the interactions of different systems and explore unfamiliar concepts. Applying heuristics in creative problem-solving helps future teachers examine subject matter with greater focus and from multiple angles, drawing on a wide range of social information and personal research skills (Amabile, 1983).

Thus, research into cognitive creativity within education has deepened future teachers' understanding of how creative self-expression and personal growth emerge. It has revealed the main aspects of the learning environment and shown how to cultivate their competence as educators, systematically developing and preparing them to lead innovative projects across various fields.

The development of creativity involves both creative consciousness and creative interaction. Creativity is defined by its focus on innovative activities, a scale of novelty and consistent (but not excessive) motivation, along with creative needs and ideas (Simonton, 1994).

Creative interaction begins with immersing oneself in someone else's "self", exploring their values, core communicative aspects and emotional and intellectual world. It then fosters a personal interest in effective learning and a desire for self-expression. Additionally, it introduces creative models that depict different levels and types of personal expression among participants in educational settings. These models help unlock the creative potential of future teachers, enhance their creative self-expression and provide various ways to express their identities concerning others.

The basis of creative interaction between the teacher and students is a system of goals and motivations that guide the teacher's approach through open dialogue and feedback.

According to Sternberg & Lubart (1995), the main pedagogical conditions for fostering creative interaction include:

- Enhancing interactive communication, where dialogic engagement aids in achieving mutual understanding, effective interaction and personal expression, shaping a reflexive and active nature of the interaction.
- Encouraging future teachers to explore self-disclosure and self-awareness through role-playing, spontaneous imitation games and micro-teaching experiences.
- Structuring pedagogical design to facilitate exploration of self-determination, promote independent work and compare problem-solving approaches.

Essential pedagogical prerequisites for successful creative interaction include the teacher's professional competence, knowledge and intelligence, as well as the trust of students in the teacher and positive interpersonal relationships among students.

The main creative methods and techniques

The outcome of a future teacher's professional growth is their capacity to exceed routine teaching tasks and gain a broader perspective on their role. This enhanced insight enables them to strategically design a self-development plan. Essential creative methods and techniques include crossover creativity, mind maps, innovative uses, a collective notebook, oral translation, a relevance tree and a cause-and-effect diagram.

One of the effective visual tools for building and presenting knowledge in pedagogy is a creative map. This technique supports the development of creativity by helping individuals accumulate experience and creative skills, as well as analyze and visually organize the relationships between theories, categories, concepts, facts, laws and principles. The creative map also serves as a distinctive way to present educational content, outlining the future teacher's procedural approach. Using creative maps enhances interaction between students and teachers, facilitates knowledge structuring, identifies connections among theoretical elements, as well as aids in encoding, organizing and integrating knowledge (Winner, 2000).

Changes in students' cognitive development, both quantitative and qualitative, depend on the complexity of cognitive tasks involved when using subject-specific, subject-integrated and integrated maps at different levels of accessibility.

The first level (thematic maps) focuses on generating logical links, such as analysis and synthesis, among pedagogical categories, concepts, processes, forms, tools and conditions. This level addresses specific pedagogical situations, using creative maps based on problems or scenarios to foster pedagogical intuition, reflection and critical thinking. This approach aids in reinterpreting existing pedagogical knowledge and supports the future teacher's creative development (Poliakova, 2011).

The second level (thematic-integrated maps) aims to uncover cause-and-effect relationships, identify contradictions and solve problems. At this level, working with creative maps helps individuals process and present information as a cohesive whole or in meaningful segments.

The third level (integrated maps) involves generalizing, classifying and systematizing facts, phenomena and events, while choosing optimal scientific methods, principles and tools for addressing pedagogical tasks based on interdisciplinary knowledge. Achieving this level ensures a comprehensive understanding of psycho-pedagogical concepts, enhancing skills and creative competencies. It results in an organized process of

analyzing, systematizing and evaluating information through reflective practice.

Additionally, tools for emotional influence, including language, play, reflective emotional regulation, emotional leadership and teacher creativity, are vital in preparing future teachers to develop their emotional world, including aspects such as self-assessment, curiosity, care, kindness, appreciation of beauty and patriotism (Barron, 1988).

A teacher's creative potential is fully realized when their work is valued, they are encouraged to innovate, resources are provided to support their ideas, and there is receptiveness to small changes and new ideas on a larger scale.

Directions for developing creative skills in future teachers within the neuropedagogical environment

Cultivating cognition in future teachers can be achieved through a structured approach within the neuropedagogical environment. Neuropedagogy is the science that examines how brain activity affects learning and development. The main areas of focus for developing creative skills in future teachers within the neuropedagogical environment are as follows:

- Developing cognitive skills is fundamental to creative thinking. Cognitive skills include memory (the ability to store, retain and recall information), attention (the ability to focus on a specific object or task), thinking (the ability to analyze, synthesize, draw conclusions and solve problems) and speech (the ability to perceive, understand and use language). Developing cognitive skills in future teachers involves understanding their essence, including how they function, the factors that affect their development, as well as methods for enhancing them. Methods and techniques for developing cognitive skills in future teachers may include game-based methods, problem-based learning and practical exercises. The training process should be systematic and goal-oriented, carried out throughout the entire period of teacher training. Enhancing cognitive skills is a significant contribution to a teacher's professional growth, helping them become more effective in their work and better able to understand and assist their students (Nerubasska et al., 2020).

- Enhancing creative thinking is critical. It is the ability to generate new ideas and solutions that allow future teachers to devise unconventional approaches, develop new educational technologies and actively engage students in their learning. To cultivate creative thinking among future teachers, a systematic approach within the neuropedagogical environment is

essential. This environment is designed to align with brain function and employs techniques that stimulate neural activity. In particular, developmental games and exercises can be employed to boost cognitive skills, including creative thinking. The examples of such activities are the following: a) associations, where participants generate numerous associations with a given word; b) new names, where participants invent new names for everyday objects; c) unusual Tasks, which present challenges requiring non-traditional solutions. Project-based methods encourage students to independently design and implement creative projects, fostering creative thinking, independence and critical analysis. Creative self-expression methods enable students to convey their ideas through various forms of creativity, such as music (a powerful medium for enhancing creative thinking), artistic activities (allowing expression through drawing, painting, sculpture and other visual arts), literature (developing imagination and creativity). Additionally, effective creative analysis methods help students evaluate creative works, uncover underlying meanings and draw insights. A structured neuropedagogical environment supports the development of creative thinking in future teachers, enhancing neural activity and cognitive skills (Berbets et al., 2021; Honchar et al., 2021).

According to Nerubasska et al. (2020), effective strategies for nurturing creative skills in future teachers within the neuropedagogical environment involve a) memory exercises (activities focused on recalling words, numbers, images and visual patterns); b) attention exercises (techniques to improve attention distribution, focus shifting and concentration); c) thinking exercises (tasks such as solving puzzles, problems and engaging in creative challenges); d) speech exercise (exercises that involve creating new words, descriptions and narratives); e) creative thinking exercises (methods such as brainstorming, synectics and using focal objects to stimulate creativity); f) creativity training (specialized programmes designed to boost creative skills); g) creative tasks (assignments that encourage the generation of new ideas and solutions); h) project-based activities (tasks that address specific problems, fostering creative thinking and enhancing professional skills).

A systematic approach to developing creative skills in neuropedagogical settings helps build essential professional traits such as innovative teaching, idea generation, unconventional problem-solving and multi-perspective analysis. Creative teachers foster a dynamic learning environment, motivating students to think independently and explore new solutions, which is vital for thriving in today's ever-evolving society.

Conclusion

Therefore, the article proves the importance of creativity as a key quality for today's teachers. It underscores how creativity enables them to develop innovative solutions, create new educational technologies and engage students in meaningful intellectual activities. To cultivate creativity in future teachers, a range of techniques can be applied, such as problem-based learning, project-based research, teamwork, interactive learning, creative self-expression and critical thinking. These methods help students evaluate ideas, pinpoint weaknesses and generate new concepts through critical analysis. Techniques such as analysis and synthesis, comparison and contrast, interpretation and evaluation are especially effective. The selection of methods and techniques for developing creativity depends on the learning goals, the student's readiness and their traits.

The article also emphasizes that fostering creative skills in future educators can be most effectively achieved through systematic efforts within the neuropedagogical environment.

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Author 1 highlighted the importance of creativity as a key trait of today's teachers. Author 2 examined creativity as a fundamental requirement for pedagogical activity. Authors 3 and 4 showed that cultivating creative skills among future teachers can be effectively accomplished through a systematic approach within the neuropedagogical environment. Authors 5 and 6 investigated areas of developing creative skills among future teachers within the neuropedagogical environment.

References

- Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357–376. <https://doi.org/10.1037/0022-3514.45.2.357>
- Barron, F. (1988). Putting creativity to work. In R. J. Sternberg (Ed.), *The Nature of Creativity: Contemporary Psychological Perspectives* (pp. 76–98). Cambridge University Press. <https://psycnet.apa.org/record/1988-98009-003>
- Berbets, T., Berbets, V., Babii, I., Chyrva, O., Malykhin, A., Sushentseva, L., Medynskii, S., Riaboshapka, O., Matviichuk, T., Solovyov, V., Maksymchuk, I., & Maksymchuk, B. (2021). Developing independent creativity in pupils: Neuroscientific discourse and Ukraine's experience. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 12(4), 314-328. <https://doi.org/10.18662/brain/12.4/252>

- Dubaseniuk, O. A. (2011). Kreatyvnyi pidkhdid do profesiino-pedahohichnoi pidhotovky maibutnikh uchyteliv [A creative approach to professional-pedagogical training of future teachers]. *Kreatyvna pedahohika [Creative Pedagogy]*, 4, 23-28. <http://eprints.zu.edu.ua/12838/1/23.pdf>
- Dunaieva, O. M. (2008). *Formuvannia pedahohichnoi kreatyvnosti maibutnikh uchyteliv u protsesi profesiinoi pidhotovky [Developing pedagogical creativity during professional teacher training]* [Unpublished doctoral dissertation]. Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University. https://www.pedagogic-master.com.ua/public/school_semen/Dunaeva.pdf
- Feingold, A. (1983). Measuring humor ability: Revision and construct validation of the humor perceptiveness test. *Perceptual and Motor Skills*, 56(1), 159-166. <https://doi.org/10.2466/pms.1983.56.1.159>
- Getzels, J., & Csikszentmihalyi, M. (1967). Scientific creativity. *Science Journal*, 3, 80-84. <http://psycnet.apa.org/record/1967-16699-001>
- Honchar, L., Derkachova, O., Shakhrai, V., Saienko, V., Hladoshchuk, O., & Voropayeva, T. (2021). Formation of psychological readiness of the teacher to implement information and communication technologies in professional activities. *International Journal of Education and Information Technologies*, 15(38), 364-371. <https://doi.org/10.46300/9109.2021.15.38>
- Hrynenko, I. V. (2008). *Pedahohichni umovy rozvytku kreatyvnosti maibutnikh uchyteliv humanitarnoho profilu u protsesi fakhovoi pidhotovky [Pedagogical conditions for developing creativity among future humanities teachers during professional training]* [Unpublished doctoral dissertation]. Ternopil Volodymyr Hnatiuk National Pedagogical University. <http://www.disslib.org/pedahohichni-umovy-rozvytku-kreatyvnosti-majbutnikh-uchyteliv-humanitarnoho-profilju.html>
- Nerubasska, A., Palshkov, K., & Maksymchuk, B. (2020). A systemic philosophical analysis of the contemporary society and the human: New potential. *Postmodern Openings*, 11(4), 275-292. <https://doi.org/10.18662/po/11.4/235>
- Poliakova, I. V. (2011). Podolannia barrieriv rozvytku kreatyvnosti u protsesi profesiinoho navchannia maibutnikh uchyteliv pochatkovoi shkoly [Overcoming obstacles to cultivating creativity in professional training of future primary school teachers]. *Nauka i osvita [Science and Education]*, 4, 317-320. https://scienceandeducation.pdpu.edu.ua/doc/2011/4_2011/13.pdf
- Posner, G. J. (2005). *Field experience: A guide to reflective teaching*. Pearson.
- Simonton, D. K. (1994). Individual differences, developmental changes, and social context. *The Behavioral and Brain Sciences*, 17(3), 552-553. <https://doi.org/10.1017/S0140525X00035925>
- Simonton, D. K. (2000). Creativity: Cognitive, personal, developmental, and social aspects. *American Psychologist*, 55(1), 151-158. <https://doi.org/10.1037/0003-066X.55.1.151>

- Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. Free Press. <https://psycnet.apa.org/record/1995-97404-000>
- Taylor, C. W. (1988). Various approaches to and definitions of creativity. In R. J. Sternberg (Ed.), *The Nature of Creativity: Contemporary Psychological Perspectives* (pp. 99–121). Cambridge University Press. <https://psycnet.apa.org/record/1988-98009-004>
- Torrance, E. P. (1986). Teaching gifted and creative learners. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching* (pp. 630-647). Macmillan. <https://dokumen.pub/handbook-of-research-on-teaching-third-edition.html>
- Winner, E. (2000). The origins and ends of giftedness. *American Psychologist*, 55(1), 159–169. <https://doi.org/10.1037/0003-066X.55.1.159>