



**INNOVATION-DRIVEN
DEVELOPMENT IN EDUCATION,
DIGITAL ECONOMY,
AND APPLIED TECHNOLOGIES**

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INNOVATION-DRIVEN DEVELOPMENT IN EDUCATION, DIGITAL ECONOMY, AND APPLIED TECHNOLOGIES

Monograph

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3.8. DEVELOPMENT OF MOTIVATION FOR CREATIVE ACTIVITY OF STUDENTS AS AN INNOVATIVE TECHNOLOGY IN PROFESSIONAL TRAINING

The role of creativity in modern society. The relevance of researching the motivation for students' creative activity is driven by the importance of creativity as a source of social progress, as well as the issues involved in actualizing the creative potential of youth during professionalization.

There is an urgent need for the widest possible engagement of people's creative potential in contemporary business and social life. When technology, information, and competence become commodities, creativity becomes paramount, claims E. de Bono (De Bono, 2004).

Intelligence and creativity are the focus of a record number of modern studies in the field of humanitarian innovations, strategies, and models of personal and societal development. Fundamental and applied research is being conducted where psychological and pedagogical approaches are developed for fostering creative thinking, teaching methods, and stimulating creativity (Максименко, 2023; Моляко, 2008; Роменець, 2001; Lubart, et al., 2003; De Bono, 1991; Vasylkevych, et al., 2020). Practical manuals offer reproducible systems that facilitate the development of creativity as the ability to solve problems creatively, form competencies for success in an unstable world, and overcome professional challenges using the power of creative thinking (Брабандер де & Айні, 2017; Гладуелл, 2017; Гріффітс & Кості, 2020; Міхалко, 2019; Млодінов, 2019; De Bono, 2004; et al.).

However, during university studies and after graduation, creatively gifted youth do not receive specialized institutional support during early professionalization.

Technologies for the development of intelligence and creativity. The recognition of the importance of intelligence and creativity in 21st-century society led to a shift from spontaneous development of intellectual and creative abilities to the development of technologies targeted at fostering intelligence and creativity and enhancing people's intellectual and creative capacities.

Active work in this direction was initiated by J. P. Guilford (Guilford, 1968) and E. P. Torrance (Torrance, 1962). Since the 1960s, technologies for working with gifted children have been developing worldwide. Initially, the strategy for giftedness was extensive. At the current state policy stage in the education field in the world's most developed countries, there is a transition from extensive to intensive systems of support for gifted youth.

The extensive approach is characterized by: 1) identifying the gifted based on high achievements (subject olympiads, competitions, selecting high-achieving students); 2) using alternative educational pathways involving instruction in various disciplines at a higher professional level. This approach faces two primary problems: relying on achievements for identification causes loss of a large group with high potential who do not show notable accomplishments in averaged school conditions (both secondary and higher education); higher-level teaching is not suitable for all since not all are adequately motivated. Effective work with gifted individuals necessitates a differentiated approach to motivational and need-based spheres.

Therefore, the most developed countries, aiming to preserve potential talents, shift from an extensive to an intensive system, emphasizing: 1) detection of giftedness by potential, not achievement; 2) working with the motivational-need sphere of gifted youth. The intensive strategy enables the fullest realization of gifted potential, fitting the needs of innovative economies demanding extensive intellect and creativity. Implementation of an intensive system requires advanced humanitarian technologies for both identifying and nurturing creative giftedness.

In parallel, educational technologies are evolving to form thinking skills for all students, not just the most gifted. Educational standards now define competencies – not knowledge – as the key outcome, encompassing the qualitative realization of knowledge, general strategies, cognitive and practical skills, and attitudes representing the person's capacity and readiness for active, creative use of education to tackle personal and socially significant challenges, and life goals. Thus, new standards acknowledge as a primary result the ability to apply knowledge and skills creatively.

Psychological technologies allow adaptation to the individual and supplement with necessary personal development of the gifted, their motivation, etc.

Motivational shortfalls can thus become the stumbling block to the creative productivity of youth.

Motivation of creative activity. Motivation for creative activity is a complex construct, including a system of factors that stimulate, direct, and regulate creative behavior. There are theories and models which consider various aspects, components, and their predictors (T. M. Amabile (Amabile, 1983; Amabile, 1995), T. Lubart, C. Mouchiroud, S. Tordjman, F. Zenasni (Lubart, et al., 2003), I. Pufal-Struzik (Pufal-Struzik, 2018), et al.). Most contemporary psychologists recognize intrinsic motivation as a key condition for creative activity (R. J. Sternberg (Sternberg, 1999), T. M. Amabile, H. Gardner, M. Csikszentmihalyi (Csikszentmihalyi, 1996), et al.).

Motivation for creative activity is a complex, dynamic system. Each creative person has a “motivational profile” or hierarchy of motives, reflecting different sets and intensities underpinning their creativity. A significant aspect is the ratio of intrinsic to extrinsic motivation. Intrinsic motivation is linked to interest in creativity itself and the satisfaction it brings, while extrinsic motivation is driven by external requirements, rewards, and praise. Three basic needs underlie intrinsic motivation: cognition, achievement, and self-actualization. Intrinsic motivation is present when creative endeavors are performed for their own sake, for the satisfaction of creating something new, solving complex problems, achieving excellence, and feelings of competence and self-realization.

The optimal functioning of creative motivation is when intrinsic motivation outweighs extrinsic – a creative process arouses genuine interest, enabling feelings of competence and fulfillment. Less productive is predominance of interest in extrinsic rewards, unrelated to the activity's essence: power, fame, and external recognition.

Motivation for creative activity is a system of motives and value orientations that initiate creativity, goals and intentions for their realization, and ways of responding to difficulties and setbacks that arise in the creative process. Key predictors for these components are openness to new experience, perseverance, self-regulation ability, self-confidence, and belief in one's efficacy, as well as relevant beliefs about strategies for success, causes of outcomes, and the role of effort and ability.

Creativity, as asserted by K. Rogers and A. Maslow, can occur only in the absence of external regulation. Creativity is closely linked to self-actualization: it is fueled by the individual's need for actualizing their potential. Cognitive theorists consider deep love and joy from activity the most important creative component. E. P. Torrance (Torrance, 1962, p. 120) argued that for creative individuals, exercising their creative capabilities is the main reward.

Among other personality traits associated with creativity are sensitivity, problem sensitivity, cognitive and behavioral flexibility, risk-taking, and a well-developed sense of humor (Sternberg, 1999). Many researchers agree that creativity involves tension and conflict, as the creative individual strives to solve seemingly unsolvable problems.

Modern perspectives assert that intelligence only partially ensures a high level of creativity and achievement. It is also essential to consider a specific combination of qualities: curiosity, perseverance, confidence, planning/monitoring/evaluating strategies. Motivation does not compensate for insufficient skills but allows individuals to realize their potential and create their best possible work.

Creativity today is recognized equally as a personal and intellectual phenomenon. Researchers have found that creative personalities are independent, nonconformist, unconventional, broad in interests, highly open to experience, and possess notable cognitive and behavioral flexibility with a high propensity for risk-taking in complex problem-solving.

T. M. Amabile (Amabile, 1983) summarized these qualities in her componential model of creativity, reducing them to three core characteristics: expertise in their selected field; cognitive and personal traits manifesting in creative thinking; and a high level of intrinsic motivation.

Creative individuals, besides intense interest in their field and willingness to work hard and long, are open to new experiences, demonstrate independence and thinking flexibility, and show tolerance for uncertainty and frustration (Sternberg, 1999).

Thus, the motivation for creative activity is a complex dynamic system. Four factors are considered to be important for understanding the motivational sphere of a creative personality and directly influence the results of creative activity: 1) the specificity of internal motives and values underlying creative activity; 2) the characteristics of external motivation that stimulates creative activity, as well as internal and external factors influencing it (in particular, the impact of rewards on motivation and creativity); 3) the features of achieving creative goals and specific intentions, focus on the task, readiness to complete the work, which manifest in purposefulness, perseverance, and diligence; 4) belief in one's abilities, potential, and success, which affect responses to situations of failure and various difficulties encountered during creative activity.

The main driving needs for creative activity are the need for creativity itself, cognitive interest, and the striving for self-affirmation. The striving for self-affirmation (especially in the form of striving for excellence) increases with the professional growth of the creative personality.

Thus, the leading motivation for creativity is personal, independent motivation (motivation for development), based on the need for creativity and accompanied by cognitive motivation and the striving for self-affirmation (through continuous improvement in the quality of achievements).

Less significant for effective creative activity are instrumental motivation, protective motivation (where the therapeutic effect of creativity on personality is important), and social motivation, which directs creative activity toward other people. Instrumental motivation is externally oriented and facilitates the satisfaction of needs such as fame, success, and material benefits, allowing creative individuals to self-express and achieve recognition, appeal, and receive spiritual support. Protective motivation directs the individual toward seeking ways to cope with life's overloads and stresses. Social motivation is focused on people who become the main recipients and consumers of creative products both in the present and in the future. Creative activity enables a person to express themselves, convey their vision and aesthetic experience of the world through creative work, sharing it with others.

Most creative individuals are characterized by multimotivation. Only those with the greatest creative achievements tend to have independent personal motivation as the dominant force. Clearly, only a small group of creative individuals can afford to ignore the need for approval, sympathy, acceptance, and recognition by others, focusing primarily on perfecting their creativity, personal growth, and strengthening their independence.

Intrinsic motivation is the primary condition underlying the achievement of creative results. People rarely create truly creative products in any field if they do not love what they do and focus not on the work itself but on potential rewards.

Our *empirical study of the peculiarities of youth's motivation for creative activity* revealed that 55.9% of male and 62% of female students consider themselves creative individuals, and only 22.6% and 18.2%, respectively, deny this. Through creativity, 53.5% of men and 62.9% of women feel more needed, better, and happier.

The empirical study yielded results regarding the structure of the leading motives for students' creative activity. The motivational profile of students' creative activity is represented in Fig. 1.

As seen in Figure 1, the most pronounced motives for creativity are the desire for self-realization and cognitive needs, which constitute intrinsic motivation. The least expressed are external motivations such as the desire for success, fame, recognition, and self-presentation.

The motives of striving for self-interest and self-realization comprise personal independent motivation, which is the most specific and conducive to successful creative activity. This kind of motivation internally activates the individual, whose goal is constant self-improvement and personal growth based on the realization of one's own interests and requests. The source of this motivation lies not in the external environment but within the individual, making it independent from external circumstances or adverse conditions. At the core of this motivation is the need

for creativity and the pursuit of excellence, competence growth, and cognitive needs (curiosity, innovation, search for novelty), which are aimed at mobilizing the individual for creative activity. Positive emotions accompanying creative activity, as well as the constant “hunger” for knowledge (unsatisfied curiosity), activate continued or new creative efforts. Thus, this motivation is autonomous and self-activating, with its main goal being the achievement of mastery in one’s “creative craft,” and the growth of professionalism and competence.

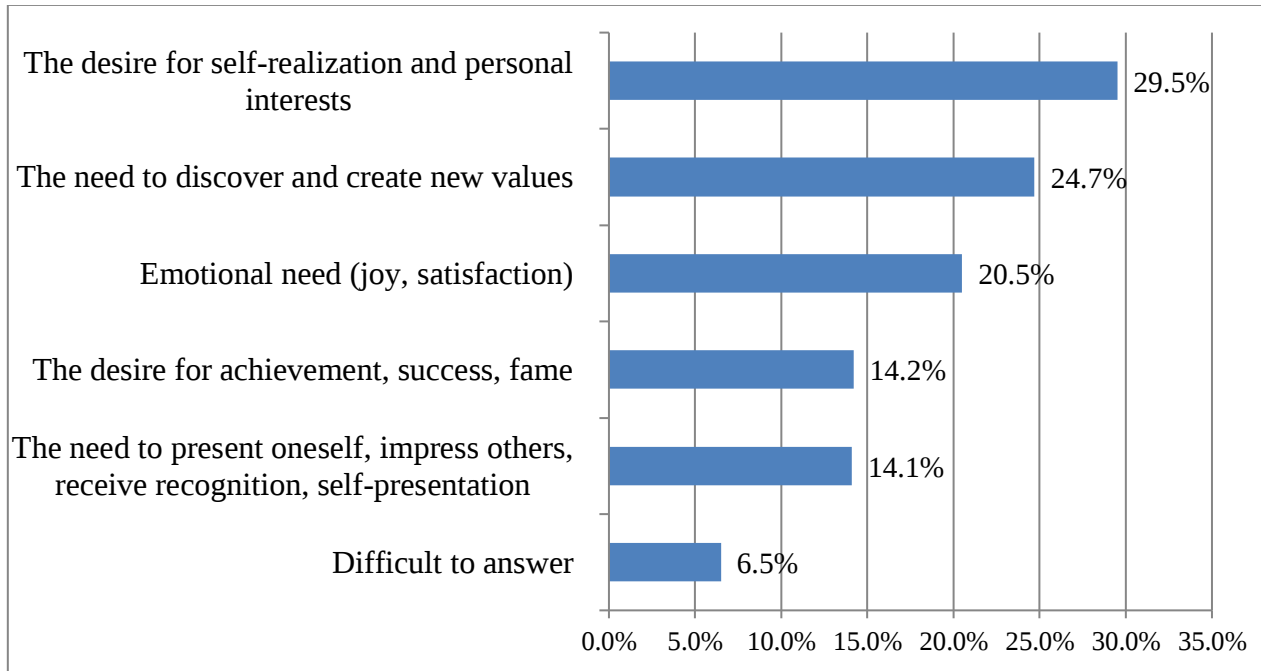


Fig. 1. Hierarchy of motives for students' creative activity

The motives of striving for achievements, success, fame, and the need to present oneself, impress others, and receive recognition comprise instrumental motivation. This motivation is competitive and externally oriented. Accordingly motivated individuals value materialities and, through creativity, seek success and fame; they want to be recognized and admired, to appeal to others, and to receive acknowledgment. Creativity becomes the means (instrument) for achieving these purposes.

Survey results show that 46% of students believe that the educational process at their university stimulates creativity, while 31% deny it (Fig. 2):

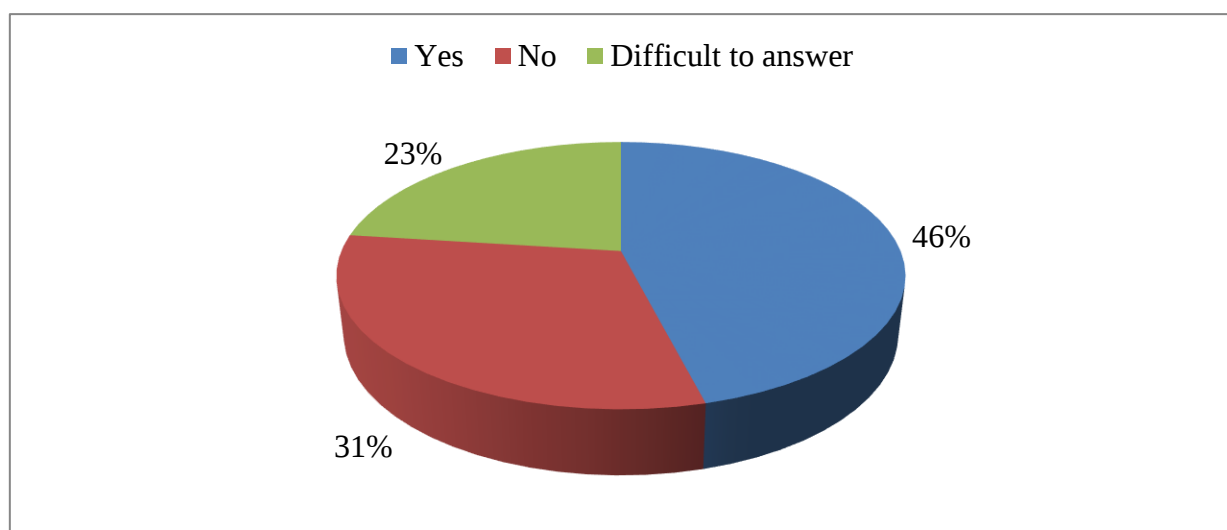


Fig. 2. Responses (%) to the question: “Does the educational process at your university stimulate creativity?”

Intrinsic motivation is the main condition for achieving creative results. T. M. Amabile (Amabile, 1995) listed major external “killers” of creativity: 1) expected evaluation – focusing on how the work will be assessed; 2) surveillance – being under observation while working; 3) “contractual linkage to rewards” – focusing on tangible external rewards; 4) competition – facing win-lose situations; 5) restricted choice – awareness of constraints; 6) an atmosphere emphasizing external stimuli.

Intrinsic motivation can be undermined by factors that weaken the subject's sense of competence and autonomy, such as anticipated material rewards, evaluative emphasis, supervision, strict deadlines, imposed goals, and competition. In such situations, individuals no longer feel like free subjects of creative activity who have chosen what to do; they sense external control over their behavior. In contrast, intrinsic motivation is not diminished by positive verbal feedback, praise, or evaluations that acknowledge the quality of work and recognize the individual's competence and creative achievements.

However, under certain circumstances, rewards may be perceived as control rather than positive feedback, leading to decreased intrinsic motivation and poorer performance. External rewards given in a controlling manner make the activity feel less voluntary and more externally imposed.

Thus, to enhance creativity in education, it is necessary to reduce evaluative reactions from those implementing the educational process, increase choice opportunities, and strengthen the sense of autonomy. Supporting initiative, the absence of control and coercion by teachers, are also crucial for enhancing autonomy – which lies at the heart of intrinsic motivation. All procedures that bolster self-determination and consciously provide opportunities for free (independent) choice strengthen intrinsic motivation.

Conclusions. In the hierarchy of motives for students' creative activity, intrinsic motivation prevails over extrinsic. The main drivers of creative activity are the striving for self-affirmation and cognitive need. The striving for self-affirmation (especially as a drive for excellence) increases with professional growth in creative individuals. Thus, the leading motivation for creativity is personal, independent motivation (motivation for development). Externally oriented instrumental motivation proves less significant for effective creative activity. It facilitates the needs for fame, success, and material benefit, allowing creative expression, recognition, and self-presentation.

To support intrinsic motivation conducive to creative activity, it is extremely important to provide choice and independence, reduce control, and supply the necessary information for decision-making and task performance. Autonomy support, meaning the subject experiences themselves as the initiator of activity, is crucial for the manifestation of intrinsic motivation.

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3.5. Oleksandr Ovcharov. INTEGRATION OF DIAGNOSTIC DATA INTO THE TURBOGENERATOR TECHNICAL CONDITION MANAGEMENT SYSTEM

The article presents a model of an integrated system for managing the technical condition of a turbogenerator, combining the functions of monitoring, diagnostics, forecasting and strategic management of the operation of power equipment at a nuclear power plant. Particular attention is paid to integration with maintenance and repair systems, which allows a transition from a scheduled approach to the concept of condition-based maintenance. The proposed model provides automated transfer of collected data to forecasting and management modules, taking into account data from other systems and existing reserves (stocks), and creates a unified information space that includes repair history, data from spare parts catalogues and maintenance schedules.

3.6. Yevhen Prokofiev. MODERN INFORMATION TECHNOLOGIES IN THE VOCATIONAL TRAINING SYSTEM: AN INNOVATIVE APPROACH TO THE ORGANIZATION OF THE EDUCATIONAL PROCESS

The article examines the features of the introduction of modern information technologies into the system of professional training of specialists, focusing on their role as a key factor in the innovative transformation of the educational process. The importance of information and communication technologies for the formation of digital and professional competencies of students, the development of their independence, critical thinking and the ability to continuous learning is emphasized. The need to design an integrated educational environment that combines traditional pedagogical methods with modern digital tools to ensure adaptability and flexibility of professional training in the digital economy is substantiated.

3.7. Iryna Stepanova, Svitlana Nykyporets, Halyna Kukharchuk. INTEGRATING ARTIFICIAL INTELLIGENCE TOOLS INTO PROJECT-BASED ENGLISH LANGUAGE INSTRUCTION FOR TECHNICAL STUDENTS: A FRAMEWORK FOR FOSTERING CRITICAL AND CREATIVE THINKING

This article presents a pedagogical framework for integrating artificial intelligence (AI) tools into project-based English language instruction for technical students in Ukraine. Against the backdrop of war-related disruptions, the study explores how platforms such as ChatGPT and Grammarly can support the development of critical and creative thinking within English for Specific Purposes (ESP) courses. Using a mixed-methods approach, the research demonstrates that AI-enhanced project-based learning significantly improves higher-order cognitive skills, increases student motivation, and fosters ethical awareness. The proposed framework responds to both academic and psychological needs of learners during wartime, offering flexible, real-world language tasks that promote autonomy and engagement. The study concludes with practical recommendations for educators and curriculum designers seeking to modernize ESP instruction in technical disciplines while preparing students for professional challenges in uncertain times.

3.8. Yaroslava Vasylykevych, Mykola Ryk, Oksana Kikinezhdi. DEVELOPMENT OF MOTIVATION FOR CREATIVE ACTIVITY OF STUDENTS AS AN INNOVATIVE TECHNOLOGY IN PROFESSIONAL TRAINING

The article provides theoretical justification and empirical research into the features of students' motivation for creative activity. The obtained results reflect the motivational profile and structure of the leading motives of creativity. In the hierarchy of motives for creative activity among students, intrinsic motivation prevails over extrinsic motivation. The most significant factors encouraging creative activity are the desire for self-affirmation and the cognitive need. The leading motivation for creativity is personal independent motivation (developmental motivation). Less significant for effective creative activity turned out to be externally oriented instrumental

Chapter 3. APPLIED AND SPECIALIZED TECHNOLOGY SOLUTIONS

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