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CREATIVE COMPONENT OF EDUCATIONAL PROCESS: ONE STEP AHEAD, ONE STEP BACK

Summary.

The article begins with the clarification of the essence of creativity, namely, the following components are taken into account: application, analogy, combination and abstraction. It also indicates the role of memory in the process of creativity.

Researchers of creativity, undoubtedly, are interested in the neuromechanisms of the origin and development of creative thought. The article also examines the problem of general and specific in creativity, epistemic faith in the creative process. Actual problem is the connection of cognitive abilities and personal qualities concerning the effectiveness of the creative activity of the individual. The article discusses the problem of the relationship between cognitive control and the productive and evaluative aspects of creativity.

The contradiction between the introduction of creativity in education and the regulated nature of the educational process is relevant. It takes into account the fact that educational systems grow out of cultural expectations and ideology. The consequence of traditional educational practice is the attitude of teachers towards the development of students' creative abilities. Future teachers who considered important support for student creativity were found to be significantly less satisfying when studying at school. One of the analyzed studies is a high-quality portrait of a creative teacher and his learning process. Another study found a link between creative learning and the growth of educational achievements of elementary school students.

There are also many facts that indicate the possibility of a positive influence on the creative abilities of individuals of various means, including pharmacological, psychological and pedagogical. The article states that Creative Problem Solving (CPS) offers a powerful and practical set of tools that are used by individuals of all ages.

The central place in the research of creativity is, of course, the phenomenon of insight. One study examined the activation hypothesis, according to which the incubation period helps to make more favorable individuals to the relevant idea in the process of solving the problem.

The article suggests that the fact that all individuals are endowed with the ability to creatively solve problems is beyond doubt. This leaves open the question of the potentially laid or developed level of creative abilities of individuals.

Finally, it is stated that in comparison with other psychological constructs, such as intellect, creativity is generally a less valid predictor of academic achievement. At the same time, in Asian countries, due to the growing interest in the development of the creative potential of the workforce, many universities have introduced courses through the educational system that are aimed at increasing the creativity of their students. The focus of the researchers is, of course, and the problems of collective creativity.

Key words: *creativity; creative potential; method; giftedness; individual approach.*

The essence of creative process, its mechanisms will interest researchers for a long time. Existing theories of creativity are connected with four mental operations: using, analogy, combining and. There is a work [1], where these operations are discussed, and the results of using these four operations in the context of understanding cultural movements such as surrealism and, and scientific revolutions as the theory of relativity are also explored. These operations form an ordinal scale of innovations, but they are not prerequisites of influence on the result of creativity or creative process success. This work pay special attention to the operation of abstraction that is neglected in literature of problems of recognizing creativity. Needless to say that scrupulous difference between these four operations can show sudden-gradual and specially-organized oppositions in the sphere of creativity.

Another publication [2] shows a model of creativity in the basis of which are ideas connected with memory processes. In this article the author also discusses imperfection of the used approach at different levels, starting with not adequate definition of an object of the research, insufficient accuracy of tasks explanation, and ending in an intuitive meter that is in the basis of the approach, and unjustified evidence, aimed at these ideas combining.

Theorists and practicians who explore and use creativity in scientific and industrial activity are definitely insterested in neuromechanisms that are in the basis of creative thought. The group of authors [3] suggested a neuromechanical model that positively effects on creative thought growth. The authors summarizes that this model coordinates with those that is known about solving creative problems. Althought some key forecasts of this model, for example, a role of visual images and basic cognitive images in creative process are still problematic.

One of the most controversial problems in contemporary researches of creativity is the uncertainty of the individual's creativity affiliation to the specific or general sphere. In one of the experiments, the problem was explored with the involvement of 109 pupils of the second form [4]. The experiment foresaw: to give an empirical support for the theory of specific creativity; to show connections among children's creative achievements, measured by three instruments in three spheres (storytelling, making collages, mathematical verbal tasks); to explore the relation between children's creative achievements and their general creative abilities, measured by Wallach-Kogan Creative Thinking Test and Real-World Divergent Thinking Test. The received results support the principle of specific creativity. Children demonstrated a prolonged manifestation of creative abilities in different spheres to a greater extent than the monotony of creative abilities in divergent spheres. It confirms the fact that there is a significant interindividual variation of creative abilities caused by the sphere of manifestation. There is a significant circumstance that indicators of divergent thinking did not foresee creative achievements in at least two out of three, if not all, spheres that were evaluated in the research.

In the published research [5] the first steps made for the development of the epistemic faith model. This model is conceptually set up on the process of studying, the development of convergent and divergent thinking. In the researches, made in the spheres of Math and Physics, the searching method was used for confirmation evidence of model's usefulness. The main conclusions of the research were those: an instrument for measure of epistemic faith can be made; factor validity of such instrument can be confirmed; epistemic faith correlates with various variables in the constructive manner; epistemic faith proved its better prognosticity as for academic achievements in comparison with IQ.

At one time, efforts were made to integrate an individual approach and cognitive abilities for understanding sources of creativity. It was suggested that individual features and cognitive abilities have a different power of prediction for different types (spheres) of creativity in their nature. Moreover, it was explored that cognitive abilities at least partly mediate individual influences on creativity and individual features and cognitive abilities can interact in order to raise creativity to a higher level. Measurement of individual features and divergent thinking were done for 41 pupils who learned a course of creativity, to predict three types of creativity – problem-solving, artistic creativity and social novelties – among. The results of the two-dimentional correlation, the analysis of variance, regressive analyses partly support the ideas that: different types of creativity are in a certain way independent from each other, individual features and divergent thinking are connected with types of creativity in a different way. Originality of thinking partly mediates relations between individual features with creativity in different spheres; individual features and divergent thinking have as interactive so key influences on creativity [6].

The next article [7] shows the data of two experiments, where relations between cognitive and productive control and also evaluating aspects of creativity. Cognitive control is accessed by interference effects of tasks of Navon and Stroop methods. The productive and evaluating aspects of creativity are explored by using the method called "generating and evaluation" (GenEva). Each participant of the research generated a certain number of decisions to the set of divergent problems, and then he or she evaluated decisions given by others participants chosen accidentally. The received data allowed to make a conclusion that participants who get high points in Test for Creative Thinking– Drawing Production, demonstrated better indexes of cognitive control in comparison with participants of lower indicators. The analogical connection was set as for products originality, but not for their quantity and

flexibility. These results can be interpreted in the sphere of basic cognitive processes that are probably in charge of ideas producing. Moreover, it was explored that cognitive control allows more exact evaluation of others individual's ideas, but only in the case of participants with global cognitive style of information elaboration.

Next to the mentioned scientific results a range of cardinal questions that indicate dilemmas aspects of the modern education state can be singled out. Almost rhetorical is a question how can creativity and education based on the standards coexist. What influence do educational technologies undergo when testing results mainly define school, teacher and pupil progress? Is there a conflict between gifted pupils' needs and gradual, based on skills studying system? How could standards be removed from the shadowing of creativity and still balance the need for knowledge with the ability to think creatively? Can the reconstruction of linear studying lead to the development of creativity in our "light" heads? The attempts to answer these questions we can find in the following research [8].

Educational systems grow from cultural hopes and ideology. Eastern and western educational systems are so different as cultures from which they have grown, and demonstrate strong and weak sides of these cultures. In the article [9], first of all, advantages and restrictions of education in East Asia are discussed. Then advantages and restrictions of the educational system in the USA are discussed. In the end, some proposals as for both educational systems are stated, and the conclusion that the systems can be improved is made. In general, it is concluded that a view on these two systems together with planned and unplanned consequences of cultural ideals, expressed through educational systems, can add more understanding of successes and restrictions of each system and culture.

The result of the traditional educational practice is the teachers' attitude to the problem of the development of pupils' creative abilities. 95 teachers-beginners and 116 experienced teachers evaluated a measure of usefulness of activities for the development of creativity using Likert scale from 5 items (1 = "not very useful", 5 = very "useful") [10]. as for the results of received answers three clasters (C) were singled out. The first one (C1) had medium and high ratings among all studying methods. The second one (C2) was mainly characterized by collective studying methods. The third one (C3) was brightly characterized by child-centered independent studying methods.

The future teachers (117 persons) registered on the introductory course of pedagogical psychology, answered the questions for measuring of their reception of the practice of previous studying, modern views on the importance of encouraging pupils' creativity and realized their own opportunities for creativity support [11]. Statistically important differences were found between groups of low and high importance. The future teachers who considered pupils' creativity support as the important factor, were those who got much less pleasure during studying at school. Moreover, the future teachers of the group of high importance showed much lower level in the experience of the studying process at school and much less pleasure of their abilities to be successful at school. Thoughts as for perspectives, given at school, found mixed. The perspectives helped those future teachers, who pointed on less importance of pupils' creativity encouraging. The future teachers who considered pupils' creativity encouraging as an important factor, found those, who had an ability for pupils' creativity encouraging. These results confirm the hypothesis of creative justice. Is says that individuals who need creativity encouragement, take it from their previous experience in surroundings with unfavourable conditions for creativity.

The next study [12] is a qualitative portrait of a creative teacher and his learning process. During the six-month period, five interviews with the teacher were conducted in the beginning, during and after the university's course for preparing students for schooling. Additional interviews were conducted with six students at the beginning and end of the course and with the teacher's husband after completing her course. An additional set of data included tracking in the class, recorded in the worksheets, memos and materials of the course. The general themes represented constructs, which included intensive and thorough course preparation, teacher-student communication and reflexive learning. In the process of managing the process of creative learning, there were sub-themes that contained restrictions on training and reflexive learning, the actual awareness and awareness of students in the process of preparation, feedback from colleagues and students, as well as the values and goals that emerged from personal experience and philosophy of life.

Nobody will deny the influence of creative studying on pupils' studying achievements. In the research [13] the connection between creative studying and the growth of studying achievements of primary school pupils was discussed. 45 teachers of senior classes of primary school who were marked at eight different lessons for a studying year. For each teacher during every lesson as a frequency of creative studying use and as evaluation of the quality of his activity was taken into consideration. Than these marks were used as prognostic variables in a model of a structural equation to measure the connection between creative studying and the growth of school achievements in reading, language and maths. The results proved the following:

– most of teachers do not implement any studying strategies that develop pupils' creativity;

– teachers who provoke pupils' creativity, demotivate pupils who have significant achievements in the sphere of academic achievements;

– classes of a great number of pupils with low achievements almost do not receive creative studying in the educational process.

There are also many facts that indicate the possibility of a positive impact on the creative abilities of individuals through the use of various means, including pharmacological, psychological and pedagogical. The study [14] aimed to determine whether the effect of ritalin (methylphenidate, MPH) on cognitive flexibility and creativity of children with hyperactivity disorder (ADHD) syndrome. The used toolkit contained tests for Wisconsin Card Sorting Test-Revised (WCST−R), Test of Divergent Thinking (TDT) and ADHD rating scale (Conners) in terms of application and non-use of MPH. Comparison of the data obtained in these two cases has shown that the use of MPH reduces the symptoms of ADHD (according to parents rating using a rating scale). However, no significant differences were found in the results obtained using WCST−R. The scale of the Elaboration subscale of the TDT was the only one that showed a significant decline in performance in terms of MPH usage.

There is a range of researches that prove the effectiveness of creativity practice. In the research [15] the content-analysis of 156 training programs is used with the aim of their evaluation according to:

– cognitive processes;
– training techniques;
– media technologies (mass media);
– types of creative exercises.

In this research claster analysis is used to define the main kinds of trainings that are indicated in these variables, and also meta-analytical data are used to mark each kind of training. In general eleven kinds of valuable exercises were defined. Although, some kinds of trainings like ideas production and cognitive training found effective, while some traditional studying strategies like imagination training found less effective.

Creative problem-solving (CPS) proposes a powerful and practical set of instruments that are learned and used for individuals of all age categories. In educational establishments CPS is valuable for adults and pupils, because it develops opportunities of individuals and groups for creative and critical thinking. CPS is also important in the process of talent recognition and its development. D. Treffinger [16] desctibes the bases of understanding the CPS-system and causes of its educational importance, summarizes the main influences on CPS development and evolution for more than 50 years, generalizes modern educational introductions and describes a set of tendencies and problems for the research, development and practice.

In the D. Treffinger's and S. Isaksen's article [17], a generalization of researches on the development and use of CPS in educational establishments and, in particular, in the teaching of gifted individuals is presented. CPS is a well-known and verified gifted teaching approach that supports initiatives for thinking development in a broad context of general education. This article traces the fifty-year history and evolution of the CPS structure, its development and practical use. The authors analyze the specific changes in the model during this time, explain them and the preconditions of their appearance. They also describe the hidden content of the impact of changes in the CPS structure on the educational process without the purpose of comparing or opposing CPS with another vision of creativity in psychology, cognitive science, or management.

The central place in the research of creativity takes, of course, the phenomenon of insight. A break in concentrated activity devoted to the problem may, under certain circumstances, help the process of solving. This phenomenon is known as incubation. The next study [18] proposes a new assumption as for the incubation mechanism. This hypothesis is based on the analysis of the insight structure, the problem and the process of its solving. According to this hypothesis, during the break there is no activity. The only function of the break is to head off individual's attention from the problem, thus freeing the mind from the "clamping in a vic" of the mistakenly formulated assumption. It is done with the aim the individual uses a new assumption according to the components of the problem after returning to its solving. The number of experimental studies confirming the hypothesis of the existence of an incubation period, as well as the number of those that do not confirm it, is approximately the same. Thus, the experimental purpose of this study is an improvement of the break manipulation methodology. It was realized by positioning the break instantly after reaching a hopeless state. The results showed that the break improves the achievements in the insight of the problem, but its duration is not important. And it supports the proposed assumption and does not support the hypothesis of the unconscious continuation of the process of problem-solving during the break.

An experimental study of other scientists [19] tested the activation hypothesis, according to which the incubation period helps to make individuals more favourable to the relevant idea in the process of problem-solving. The study also tested a partially forgotten hypothesis, according to which the incubation period helps to weaken the sensitivity of individuals to the perception of irrelevant ideas. In this study, Chinese chess players, 28 experts and 29 newcomers passed Remote Associates Test (RAT) and Lexical Decision Task (LDT) in urgent, relaxation and incubation conditions. After each RAT, there was a set of LDT that are connected with the tests by solving and the irrelevant idea. Tasks for logical solutions were presented either immediately, or after a two-minute delay, or after a two-minute delay, were filled with incubation tasks. It turned out that the results of

the research support the activation hypothesis. But it allows to state that activation appears only in the fixed mind. At the same time, no support was found for the partly forgotten hypothesis.

Attempts to teach individuals to be more insightful in the process of problem-solving are characterized by variable success. One of the articles [20] highlights the results of the research of such teaching. The teaching consisted of ten minutes of theory and practice, which was accompanied by an effort to avoid deadlock situations that arose in the process of solving. All participants were then checked as for problem solving. At the same time, half of them got problems in an artificial puzzle-like format, and the other half got problems of the same type, but more realistic context. The results improved the previous data, indicating the impact of preparation for solving puzzle-like problems, but not on more realistic problems, where achievements irrespective of preparation were as high as during solving puzzle-like problems after preparation.

To sum up, it can be noted that the study of the nature of the process of creative problems solving (CPS), as well as the cognitive and personal qualities and achievements of individuals who solve creative problems, are focused primarily on divergent thinking and attributes of persons inclined to divergent thinking. The corresponding theory emphasizes that tasks vary widely within where they require different types of thought and primary knowledge, and individuals differ widely in inclinations and resources; while different persons, groups and organizations can solve different types of problems more effectively [21].

The fact that all individuals have the gifts to creative problem-solving is undoubted. At the same time, the question of the potentially based or developed level of creative gifts of individuals is still open. The purpose of the pilot study [22] is to explore problem-solving gifts of preschool children. The study was done within the summer camp program at Howard Public School, Etobicoke, Ontario. The study involved 15 children (6 boys, 9 girls) with middle age of 5,1 years at the time of testing. The problem with a known solution was presented in the form of a children's story. The children were asked to solve the problem by ending the story. Such answer that proposed the flow-oriented toolkit was considered as successful. The results showed that among 15 children who read the story, 4 of them suggested methodologies in the same direction. At the same time, a number of non-practical but creative solutions was also proposed.

The article [23] reviews the debates between Darwinian and neo-Darwinian explanations of creativity as for small (everyday) creativity. Specifically, the basic proofs, found in two positions, are distinguished by the collision of the empirical analysis (Simonton) with the analysis (Weisberg and Hass) of the sketches of Picasso Guernica. The article focuses on the development of the proof how these problems could be solved by the spread of empirical studies of large (professional) creativity in order to include the levels of small creativity in the range of creativity.

In comparison with other psychological constructs, such as intelligence, creativity is predominantly a less valid predictor of academic achievements. Most of the studies from which these results follow use the Ordinary Least Squares (OLS) method, which admits the random respondents formation, but does not take into account the possibility of interclass dispersion conditioned by cluster structuring. The study [24] analyzed the data using a standardized sample for Berlin Structure of Intelligence Test for Youth: Assessment of Talent and Giftedness (BIS−HB), using a multilevel modeling technique. To check the hypothesis that the influence of creativity on GPA can vary between different classes, a multilevel model that contains explanatory variables at two levels (level 1: students and level 2: classes) has been selected. The value of the ability to think studied too. The results allowed a more detailed interpretation of the role of different variables in the context of predicting academic achievements. More specifically, it can be shown that the prognostic power of creativity varies from class to class, confirming the fact that some teachers value creativity in their pupils more than others.

In the research [25], the authors explored the percentage of academically talented pupils participation in 9 areas: dances, solo instruments, choral music, band, physical culture, pupils management, academic clubs, ethno-cultural clubs and other activities. The participants of the research formed two independent cohorts (cohort 1, $N = 842$; cohort 2, $N = 290$) attending the summer program. The results showed that physical culture was the activity in which male and female pointed on the greatest participation within their cohorts. The significant difference was found as for participation in physical culture, choral music and dances in the direction of sexually expected stereotypes. The differences were also observed among ethnic groups and age levels for certain activities. On the basis of this the authors conclude that the results, in general, do not contradict the physical culture stereotype, sometimes associated with pupils who are academically talented.

Based on the responses of 230 pupils enrolled in the university summer program for gifted, the study [26] describes the participation of gifted pupils in extra-curricular activity at school and out of school. The results show that gifted pupils are more often involved in competitions, clubs or other extra-curricular activity in math than in other subject areas, and are rarely involved in the sphere of computer science activity. Sport, game and computer work were the most frequent out-of-school extra-curricular activity. The received data also reveal several sexually-stereotyped tendencies as for participation in school and out-of-school activity and

sexually-typical models of parents support. In general, the contribution of this study should be assessed on the subject of the consonance of pupils participation in out-of-school activity and extra-curricular activity in the sphere of their talents, as well as documenting of the empirical involvement of parents and independent home-schooling of gifted teenagers.

In Asian countries, due to the growing interest in developing the creative potential of the workforce, many universities have introduced the courses through the educational system that are aimed at increasing creativity of their students. Students are also aware of the need to raise their creative potential to a higher level. However, there are debates, if short practice in creativity is effective at the university level. The study [27] explores the impact of a short (one semester) course that contains elements of theoretical and practical preparation in creativity at the University of Hong Kong. Practice in the technique of creativity, taken outside the students class during a part of the semester, led to the growth of two key aspects of creative abilities measured by standard tests of creativity. Namely, in comparison with the standard group, verbal creativity and creativity in drawing grew to a higher level. Students liked the course, considering it useful, they also considered themselves more creative after listening to the course. It is worthy of note that short-term courses in creative thinking have other benefits, first of all it concerns educational strategies in addition to the growth of creative abilities.

The following study [28] is an review of the courses in creativity and programs suggested at universities in Europe, North America, Japan and China. Courses in creativity and programs are in different disciplines, but most often they can be found in such areas as business, education and psychology, engineering, science and technologies.

The problems of collective creativity are, of course, in the focus of researchers attention. The authors of the investigation [29] study the impact of cyclic project teams using Nominal Group Technique (NGT – a systematic approach to incitement of individual contributions to the planning and development of group projects) on the project quality, in particular, on doing the project with a significant creative component. The effects of intercession of social inactivity on the quality of the project are also explored. Sixteen project groups (N = 62) participated in the research of social psychology, sixteen project groups (N = 78) participated in the research of psychology of the environment. Half of the project groups was randomly chosen for doing the predicted in each class project. Social inactivity was measured both independently and by classmates on the basis of fixing the tense efforts aimed at achieving success in the project. The results state that NGT has a significant impact on social inactivity, the average levels of inactivity within the groups are significantly connected with the rating of the order quality. Due to the fact that NGT was done, direct NGT connections with the project quality can not be tested. However, NGT affects both the levels of inactivity and the rating of the order quality, while social inactivity seemed to be as an intermediary in the impact of NGT on the project quality.

Conclusions. Despite the profound awareness of the necessity to develop the creative potential of pupils, the use of appropriate organizational forms and methods in the educational process of secondary education institutions is far from the exhaustive use of available reserves. Among the many reasons, the conflict between the regulated norms of the educational process and the necessity to deviate from them for the creative development of pupils can be the dominant factor.

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Волощук І.С., Шуленок О.С. Творчий складник освітнього процесу: крок вперед, крок назад.

Анотація.

Стаття починається зі з'ясування сутності творчості, а саме: до уваги беруться такі її компоненти, як застосування, аналогія, комбінування і абстрагування. Вказується також роль пам'яті в процесі творчості.

Дослідники творчості, безперечно, цікавляться нейромеханізмами зародження та розвитку творчої думки. Визначено проблему загального та специфічного у творчому потенціалі, епістимічної віри у творчому процесі. Актуальною є проблема зв'язку когнітивних здібностей та особистісних якостей стосовно ефективності творчої діяльності особистості. Обговорюється проблема зв'язку когнітивного контролю та продуктивним і оцінювальним аспектами творчості, а також інші проблеми.

Ключові слова: *творчість; творчий потенціал; метод; обдарованість; індивідуальний підхід.*

Волощук И.С., Шуленок А.С. Творческая составляющая образовательного процесса: шаг вперед, шаг назад.

Аннотация.

Статья начинается с выяснения сущности творчества, а именно: во внимание принимаются такие ее компоненты, как применение, аналогия, комбинирование и абстрагирование. Указывается также роль памяти в процессе творчества.

Исследователи творчества, безусловно, интересуются нейромеханизмами зарождения и развития творческой мысли. Рассматривается проблема общего и специфического в творческом потенциале, епистимичности веры в творческом процессе. Актуальной является проблема связи когнитивных способностей и личностных качеств относительно эффективности творческой деятельности индивида. Обсуждается также проблема связи когнитивного контроля и продуктивного и оценочного аспектов творчества, а также ряд других проблем.

Ключевые слова: *творчество; творческий потенциал; метод; одаренность; индивидуальный подход.*

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