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DEVELOPMENT OF AN EFFICIENT BENEFICIATION SCHEME FOR COPPER-PORPHYRY ORES USING NEW COLLECTOR REAGENTS

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Abstract

The article presents the results of technological research on the beneficiation of copper-porphyry ore from the "Yoshlik-1" deposit. The results of the study of the material composition are presented. It was established that the analyzed sample is represented mainly by sulfide copper ore. The ore texture is disseminated, vein-disseminated, and spotted. The copper content in the sample is 0.35%. Flotation schemes for copper-porphyry ore using local collectors of various types were tested. As a result of the research, it was determined that the new reagent YaN-1 is an effective and inexpensive collector, allowing for the production of a rough concentrate with a copper content of 4.2–10.82%. At the same time, copper recovery into the rough concentrate ranges from 87.21% to 93.17%.

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Introduction

After our country gained its independence, the task of nurturing a comprehensively mature and well-rounded generation - one that thinks freely, possesses self-awareness, and understands the goals and interests of society - was established as a priority of state policy. Its implementation, first and foremost, necessitates enriching the inner spiritual world of young people and fostering an independent worldview.

Today, the goals and objectives of shaping the younger generation are to ensure their physical and mental development, to fulfill their psychological needs, personal abilities, and aspirations, and to guarantee they are raised with loyalty to national and universal values and the ideals of independence.

Currently, educational institutions are faced with the tasks of studying the abilities and talents of students on a scientific and practical basis through the positive experience achieved in the educational sphere, further developing their psychological abilities, educating and improving their spiritual world in the spirit of the national idea and the ideology of independence, and improving the abilities of student youth to the level that meets the requirements of world educational standards. This, in turn, creates opportunities for building a comprehensive education system in educational institutions, further deepening educational reforms, developing new pedagogical technologies, introducing them to form the abilities and talents of student youth, and fully utilizing the scientific potential of the pedagogical team and each teacher in education.

The development of abilities largely depends on the social character of society, its spiritual system. Educational institutions in our republic are fulfilling the tasks set forth in the quality stage of the "National Program for Personnel Training" by nurturing the abilities and talents of young students, applying modern pedagogical technologies for the development of this field, and improving the educational system.

Creativity in children plays a crucial role in developing the seeds of their talent, particularly in cultivating their creative abilities, and necessitates integrating their

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cognitive interest with practical activities. Indeed, actively involving students in practical activities helps foster their cognitive interest and creative abilities.

Such a crucial task necessitates the formation of skills and practical abilities aimed at enhancing students' mental activity and thinking, and improving their capacity for independent work. This is because the essence of an interest in knowledge lies in the drive towards cognitive activity, which in turn unlocks a student's creative potential. In an individual's psychological development, the primary school years are a period of rapid qualitative growth, during which children widely demonstrate their capabilities. Their interest in creativity increases, and the desire to make full use of their intellectual abilities develops.

A.F. Esaulov notes that problems which serve as a sufficiently powerful source and stimulus for thinking, and which direct knowledge toward independent activity, are creative problems. According to G.A. Golitsin, a problem can be considered creative only if its ultimate solution lies within the boundless realms of human imagination. S.L. Rubinstein was one of the first to give a precise definition of the characterological (typical originality) features of inventive creativity, stating: "The specific aspect of creativity (discovery), as distinct from other forms of creative intellectual activity, is that it must create real mechanisms or methods that solve a particular problem." This reveals the unique facets of a discovery within its creative context. An inventor must introduce some form of novelty into an activity. In this process, existence becomes historically linked to human activity and technology. Therefore, the process of discovery must arise from the essence of things and phenomena in the world. This requires the introduction of novelty and the consideration of scientific principles. In this regard, L.S. Vygotsky offers the following thoughts: Creative activity is an activity inherent to humans that consists of creating something new. It does not matter whether the discovery made in this process is an important aspect of the external world or of the mind and emotions. Any such activity is not merely the result of a person's past experience, but rather the product of an activity that involves creating new images and actions related to creative behavior. (21.10) According to I.Y. Lerner and M.N. Skatkina, the importance of creative activity in school can be highly valued. It is such a complex form of consciousness and purposeful labor that, in this process, new regularities of the real world are reflected in the human mind, or new transformations of objects and phenomena

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are predicted. V.A. Khutorskoy argues that a person's educational process and development are linked to their creativity. Furthermore, only a person who possesses the ability for creation and creativity (for oneself and for others) and expands the potential of their inner capabilities will develop. In the view of representatives from the field of pedagogical psychology, information becomes knowledge only when it interacts with a person's prior experiences. J. Godefroy states that the emergence of the need to know one's surroundings is an innate characteristic that underlies various forms of behavior.

In a person, these needs lead to a sharp increase in the need to know, which manifests as the need to obtain information and knowledge. The satisfaction of such needs is linked to the development of a sense of self-respect.

Proceeding from A. Maslow's hierarchy of needs, creativity allows for a high level of satisfaction of cognitive, aesthetic, and self-actualization needs.

Activity is a process as a result of which a person produces a specific product. Activity can be pattern-based or creative. In pattern-based activity, the product is created based on a pre-developed algorithm. This type of production possesses no novelty. Although a general algorithm has been created for various forms of creative activity, the smaller, more detailed algorithms for its implementation in each specific type of creative activity have not been created, nor will they be. (19.56)

According to E. Torrance's theory, creativity is a factor independent of intelligence. This relationship is described by the "intelligence threshold" concept: if IQ is below 115-120, intelligence and creativity are part of a single factor. Conversely, if IQ is above 115-120, creativity becomes a variable independent of intelligence. From this, it follows that low-intelligence creativity does not exist, but low-creativity intellectuals do.

Based on the ideas above, a person's creative characteristics can be described by the following criteria:

- Identifying and understanding a creative problem. Perception. Attentiveness and mindfulness.
- Recognizing and comprehending the main facets and connections of the problem. Versatility of thought.
- Rejecting traditional perspectives and advancing new ideas.

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- Striving to avoid uniformity in problem-solving and to deviate from group opinions. Realistic thinking.
- The ability to regroup numerous ideas and connections. Divergent thinking.
- The ability to systematically, clearly, and lucidly analyze a problem that requires creativity.
- The ability to artificially and abstractly systematize problems requiring a high IQ.
- The ability to sense the integrity of an idea and its structure.
- The ability to embrace all new and unusual situations.
- The ability for constructive activity in ambiguous situations.

In psychology, creativity was first scientifically studied in 1950. That same year, the renowned American psychologist J.P. Guilford drew the attention of scientists to this field by delivering a speech on creative thinking and the creative process at the convention of the American Psychological Association. J.P. Guilford conducted in-depth research in this area and, in 1967, developed a battery of tests that shape and identify creative thinking.

Creative thinking is a key characteristic of human mental activity, defining the individuality of thought. According to J.P. Guilford's hypothesis, an analysis of his "Structure of Intellect" model explains this process. Guilford's model of intellect is a rectangular geometric figure with three-dimensional variability, where all mental abilities and operations are organized according to three dimensions. These are: a) mental operations; b) mental content; c) mental products.

F. Galton conducted a series of experimental studies and attempted to substantiate the existence of differential characteristics inherent to each individual using the "twin method." Table 1 presents the results identified by Galton regarding the relationship between hereditary and acquired qualities.

The Role of Heredity in Musical Ability 1- table

Children / Parents	Musically Inclined	Not Musically Inclined
Musically Inclined	85%	7%
Not Musically Inclined	25%	58%

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The correlation coefficient for musical aptitude in twins is also high (= 0.7), differing significantly from that of non-twins (= 0.3-0.4).

Studies following Galton's work have found that musical ability is influenced by the nature of one's native language: whether it is a soft, tonal language or a sharp, non-tonal one. For example, the musical perception of children who speak Russian, which is considered a sharper language, was found to be significantly lower than that of Vietnamese children, who speak a soft, tonal language.

However, the reason for the emergence of the aforementioned ideas and debates should be clear: they arise from the need to understand the true essence of human beings and to manage their behavior. Therefore, as a member of society, a person submits to its norms, tries to meet its expectations, and strives to align their behavior with its requirements.

According to B.M. Teplov, the main manifestation of musicality is the ability to feel music, and the ability to perceive music emotionally is the core essence of musical aptitude. (28.323)

B.M. Teplov examines the structure of musicality and includes the following components: musical hearing, a sense of musical rhythm, and musical memory.

V.A. Krutetsky worked on mathematical abilities. Specifically, in his monograph "Psychology of Mathematical Abilities," he provided a comprehensive explanation of mathematical abilities and their structure. He identified the individual characteristics of perception, thinking, memory, and imagination, and studied their manifestation in mathematical activity (in mastering mathematics). He determined the importance of perception in the assimilation of mathematical material. V.A. Krutetsky believes that gifted students possess a specific ability for "internal" analytical-synthetic analysis and processing of material; they perceive the structure of a problem "on the spot" and uncover its fundamental relationships. Students with a special talent for mathematics are characterized by a unique "mathematical mind" - they are able to find the logical and mathematical content of reality, identify the logical and mathematical categories within it, and often perceive phenomena through the lens of mathematical relationships. (28.327).

To practically study the characteristics of creative abilities in the primary school age and the psychological factors of their formation, we conducted research with 30 3rd-grade students from general education school No. 20 in the Kirguli district

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of Fergana city, under the jurisdiction of the Fergana City Department of Methodology and Organization of Public Education, and their parents.

In order to study the characteristics of a child's creative abilities, we tried to cover several areas and fields, taking into account their comprehensive nature. We conducted our research in two stages. In the first stage, we administered the "Questionnaire for Determining Abilities" by L. Matveyeva and I. Viborshik to 30 parents to identify their children's abilities.

In the second stage, we utilized the "Children on a Walk" methodology, developed by L.A. Venger and O.M. Dyachenko, to study the level of creative thinking and creativity; the "Learning Creativity" psychodiagnostic game to study the level of creativity; and the "Weave a Fairy Tale" psychodiagnostic game by L. Matveyeva and I. Viborshik to study creative abilities.

In selecting the methodology for our research, we considered that a child's creative abilities are linked to the processes of creative thinking, creative imagination, cognition, and perception of the surrounding world.

The "Questionnaire for Determining Abilities" (Appendix 1) by L. Matveyeva and I. Viborshik, designed to identify creative abilities, covers 5 areas where these abilities are manifested:

1- I. Intellectual Abilities - 12 points
2- II. Artistic and Visual Abilities - 8 points
3- III. Musical Ability - 8 points
4- VI. Literary Ability - 7 points
5- V. Artistic Skill - 8 points.
6- The results of the children who scored highest in each area of the "Abilities Assessment Questionnaire," which is used to identify children's creative talents, are presented in the table below.

7- Table

		Intellectual Abilities	Artistic and Visual Abilities	Musical Ability	Literary Ability	Artistic Skill
		12b	8b	8b	7b	8b
1	Nodirbek	8	5	4	3	3
2	Gulshanoy	6	7	4	6	4
3	Karomatkhon	9	6	4	6	4
4	Mashhurakhon	6	7	3	6	5
5	Ulugbek	9	6	4	5	5

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6	Islomjon	5	4	7	4	5
7	Adolatkhon	6	7	5	5	4
8	Yorqinoy	5	7	5	5	4

Based on the results, it was determined that Nodirbek and Ulugbek have well-developed intellectual abilities, Gulshanoy, Mashhurakhon, Adolatkhon, and Yorkinoy have artistic-visual abilities, Islomjon has musical ability, and Gulshanoy, Karomatkhon, and Mashhurakhon have well-developed literary abilities.

Based on parents' observations of creative actions, attempts, and behaviors in their children, we organized our research to study and compare their levels of creative thinking, creativity, and creative abilities with those of other children. We also aimed to investigate how these children's creativity manifests across different domains and whether creativity in one area influences success in others. To this end, our research was conducted using four different methodologies within specific time intervals.

In the "Children on a Walk" methodology, developed by L.A. Venger and O.M. Dyachenko to determine the level of creative thinking and creativity, cards depicting five children are prepared. In each picture, a child is shown holding a part of an incompletely drawn object (Appendix 2). Each image is shown to a child one at a time. The child is told they are looking at someone going for a walk and is then asked what object is in that person's hand. The assessment is conducted individually with each child, ensuring that one child's answers are not overheard by others. One point is awarded for each correct answer, and the number of errors is counted. Each child's responses are recorded. Additionally, attention is paid to the child's ability to liken a single drawing to several different objects - that is, the diversity and richness of their imagination - as well as to the number of prompts given by the experimenter. The number of errors is also calculated. Each child's responses are recorded. Additionally, attention is paid to how many missing objects the child can identify in an image - reflecting the diversity and richness of their imagination - as well as the number of instructions given by the experimenter. The number of errors and corrected answers is also recorded. Each child's responses are documented. Furthermore, consideration is given to the child's ability to liken a single image to multiple objects, which indicates the diversity and richness of their imagination, creativity, and accuracy, along with the amount of guidance provided by the experimenter. If the child can

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name several incompletely drawn objects in the image, an additional point is awarded, and this is noted separately.

In conclusion, an analysis of all the results shows that creativity and creative abilities are manifested in a child's creative thinking, imaginative processes, and across cognitive, educational, artistic, and motor activities. It became apparent that creative abilities are characterized by their uniqueness, broad scope across various fields, and individuality. Creativity helps realize an individual's inner potential and reserves. In every child, creative abilities are expressed in different directions and areas.

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