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PEDAGOGICAL AND PSYCHOLOGICAL FOUNDATIONS OF USING INTERDISCIPLINARY INTEGRATION IN EDUCATION

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Annotation. This article discusses the pedagogical and psychological foundations of using interdisciplinary integration in the educational process. The role of an integrative approach in enhancing students' deep understanding of knowledge, logical thinking, and creative abilities is analyzed. In addition, the importance of integration in improving the effectiveness of education is substantiated.

Keywords: Integration, education, integration in education, interdisciplinary integration, pedagogy, psychology, educational effectiveness, integrative lesson, cognitive process, integrative approach.

Аннотация. В данной статье раскрываются педагогические и психологические основы использования межпредметной интеграции в образовательном процессе. Проанализирована роль интегративного подхода в глубоком усвоении знаний учащимися, развитии логического мышления и творческих способностей. Также обосновано значение интеграции в повышении эффективности обучения.

Ключевые слова. Интеграция, образование, интеграция в образовании, межпредметная интеграция, педагогика, психология, эффективность обучения, интегративный урок, познавательный процесс, интегративный подход.

Annotatsiya. Mazkur maqolada ta'lim jarayonida fanlararo integratsiyadan foydalanishning pedagogik va psixologik asoslari asoslari yoritilgan. Integrativ yondashuvning talabalarning bilimlarni chuqur o'zlashtirish, mantiqiy fikrlash va ijodiy qobilyatlarini rivojlantirishdagi o'rni tahlil qilingan. Shuningdek, integratsiyaning ta'lim samaradorligini oshirishdagi ahamiyati asoslab berilgan.

Ka'lit so'zlar. Integratsiya, ta'lim, ta'limda integratsiya, fanlararo integratsiya, pedagogika, psixologiya, ta'lim samaradorligi, integrativ dars, bilish jarayoni, integrativ yondashuv.

Introduction. Although the word "integration" consists of a single term, its meaning and essence are exceptionally broad and profound. It appears simple from the outside, yet its core embodies numerous concepts, processes, and interconnectedness. When we look at nature, integration manifests at every step. The harmony between heaven and earth, the merging of water and soil, creates the miracle called life. Human intellect operates similarly—when different spheres of knowledge converge, thought deepens, perspective expands, and creativity intensifies.

Under the current conditions of globalization, rapid scientific and technological progress, and accelerated information exchange, general integration is becoming an essential and inseparable factor in societal development. In the modern world, the interconnectedness between nature, society, and human activity is continuously strengthening, necessitating that they be viewed as a unified system. From this perspective, general integration manifests today not merely as a theoretical concept, but as a practical necessity ensuring sustainable development.

To discover what integration truly is, we look at its etymology. The word "integration" originates from the Latin 'integratio', meaning restoration or renewal, and 'integer', meaning whole. From this, we derive two primary definitions:

1. A concept representing the state of interconnectedness among separate, differentiated parts and functions of a system or organism, as well as the process leading to this state.

2. The process of bringing disciplines closer together, carried out in tandem with the process of differentiation.[1]

The concept of integration can be explained more precisely and completely. First, it is characterized by development—namely, the emergence of new aspects, properties, and qualities within an object. Second, it is characterized by the preservation of developed elements, aspects, and traditions of the old within the new.[2]

Today, the education system is directly linked to social progress, science, and technological advancement. The 21st century is the age of information, digital technologies, and innovation; therefore, a modern individual is required not only to master a single field but also to harmoniously combine knowledge from various directions. Education is the most critical social process that shapes a person as a well-rounded individual, enriching their consciousness, intellect, and worldview. Through education, a person acquires not only knowledge but also life experience, moral values, and professional skills. Education is the foundation of societal development. A strong educational system lies at the core of any developed nation. For instance, UNESCO recognizes education as one of the fundamental human rights and prioritizes the provision of quality education worldwide.

In pedagogical science, education is interpreted not only as the transmission of information but also as a process of nurturing, shaping a worldview, and developing independent thinking. For example, Abu Nasr al-Farabi viewed education as the primary means to lead a human to perfection, while Avicenna (Abu Ali ibn Sina) emphasized the importance of harmony between intellect and experience in the learning process. Such ideas put forward by Eastern scholars serve as a spiritual foundation for today's modern educational system.[3] Their views on education align with the competence-based approach, integrative teaching, and student-centered learning principles.

The primary goal of education is to raise a well-rounded, independently thinking individual who possesses modern knowledge and skills. In this process, cooperation between the teacher and the student is of great importance. The teacher should act as a guide and an inspiration, while the student should be an active participant striving for exploration. Since independence, the education system in Uzbekistan has undergone fundamental changes and currently contributes greatly to the social and economic development of the nation—aiming not just to impart knowledge, but to prepare the future generation for the modern world.

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[1] Nishonova K.SH. INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE " ACTUAL ISSUES OF PRIMARY EDUCATION: PROBLEMS, SOLUTIONS AND DEVELOPMENT PROSPECTS" April 26, 2024, 662-bet.

[2] Siddiqova S. G'. "Educational Research in Universal Sciences ISSN: 2181-3515" 276-bet

[3] Jumayev N.P. Sharq mutaffakkirlarining ta'lim- tarbiyaga oid ma'naviy va axloqiy qarashlari. "Oreantal Art and Culture" Scientific-Methodical Journal ISSN 2181-063X 2021" 529-bet

To improve the quality and efficiency of education, the state has adopted strategic documents such as the "Concept for the Development of the Public Education System until 2030". This envisions the modernization of schools, curricula, teacher training, and many other areas.[4]

The essence of integration in education is primarily explained by ensuring the consolidation of knowledge. The student perceives the studied topic in connection with other disciplines; as a result, the theoretical and practical aspects of knowledge complement each other. Interdisciplinary integration reveals the interconnectedness of instructional materials, helping students understand common regularities, concepts, and methods among them. Integration increases the vitality and practicality of educational content because, in real life, processes do not occur within the boundaries of a single subject but take place in direct connection with numerous fields. An integrated approach serves to form students' systematic, logical, and comprehensive thinking skills, which in turn develops their problem-solving abilities and creative thinking qualities.

The primary goal of integrating education at the elementary school level is to lay the foundations of a proper understanding of nature and society and to shape students' attitude toward the laws of their development. [5]

Teaching knowledge within separate disciplines in the educational system creates certain difficulties for students in terms of holistic perception of reality, applying knowledge in practical activities, and realizing interdisciplinary connections. Therefore, the necessity of utilizing interdisciplinary integration in the educational process is steadily increasing.

Main Part. An analysis of literature regarding the historical emergence of the problem of integration in education shows that this problem arises in pedagogy in connection with the need to transmit social experience accumulated by previous generations through customs, traditions, ethical norms of behavior, rules of life, and so forth. Such educational integration manifests at three distinct levels:

- Intradisciplinary content integration:
- Interdisciplinary integration;
- Integration between subjects of different types of education.[6]

Interdisciplinary integration serves to develop logical and systematic thinking in students, forming skills to transfer knowledge from the scope of one subject into the field of another. Along with increasing the pedagogical efficiency of the educational process, this positively influences the psychological development of students, particularly their cognitive processes, creative thinking, and educational motivation. Furthermore, under modern competence-based approach conditions, interdisciplinary integration develops students' capacity to solve real-life problems through a comprehensive approach. From this perspective, scientifically elucidating the pedagogical and psychological foundations of using interdisciplinary integration holds significant importance in enhancing educational quality. In addition, active learning methods in interdisciplinary integration ensure students' active participation in the learning process. Through these methods, the student

[4] https://gov.uz/oz/uzedu

[5] Marhabo Q. X. Ta'lim tarbiya jarayoniga integratsion yondashuvning mazmuni. "Academic Research in Educational Sciences" ISSN: 2181-1385, 2021.

[6] Siddiqova S.G'. Ta'lim jarayoniga integrative yondashuvning falsafiy va psixologik jihatlari. "Edu

does not acquire ready-made knowledge but independently attains it by comprehending the connections between subjects.

It is well known to us that interdisciplinary integration in the educational process is considered an important didactic principle from a pedagogical standpoint, serving to unify educational content, increase educational effectiveness, and shape comprehensive thinking in students. The pedagogical basis of interdisciplinary integration relies primarily on the idea of ensuring an inseparable link among the goal, content, methods, and outcomes of education. This approach ensures that knowledge is mastered not in a fragmented manner, but as a whole, because real-world problems are solved not within the framework of a single discipline, but at the intersection of several fields of knowledge. For this reason, interdisciplinary integration is regarded as one of the key directions of modern education.

The essence of interdisciplinary integration lies in the student's ability to connect a topic under study with knowledge acquired in other subjects. For instance, physical and mathematical knowledge are applied together in explaining natural phenomena, while a connection with literature, geography, and cultural studies arises during the analysis of historical processes. Consequently, the student forms skills for a multi-faceted perception of reality and the ability to view a problem from various angles. Below, we examine integration between specific subjects.

Integration of History and Literature. Integrating history and literature is one of the important methods to convey knowledge to students in a deeper, more meaningful, and impactful manner during the educational process. These two disciplines are intrinsically linked: one elucidates events based on facts and evidence, while the other reveals the reflection of those events in human life, psychological experiences, and artistic expression. History teaches past events, dates, and facts, whereas literature highlights the spirit of the era, human emotions, dreams, and struggles through artistic characters. Therefore, these two subjects complement each other.

For example, by studying the era of Amir Temur (Tamerlane) in history, students gain knowledge about his state administration, military campaigns, and political activities. Concurrently, through the works of Alisher Navoiy in literature, the spiritual environment, linguistic wealth, and human values of that period are revealed. As a result, the student understands the Timurid era not only from a historical standpoint but also from artistic and spiritual perspectives.

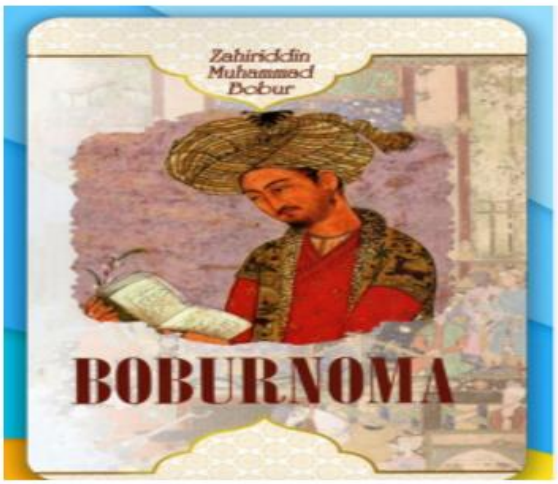




Furthermore, Zahiriddin Muhammad Babur holds a special place in both history and literature. In history, Babur is studied as a statesman and military commander. He founded the Mughal Empire in India, engaged in complex political struggles, and participated in the key historical events of his

time. In literature, Babur manifests as a talented poet and writer. His famous work, "Baburnoma" (The Baburnama), is considered highly valuable not only as a historical source but also from an artistic viewpoint. In it, the author sincerely narrates his life, campaigns, descriptions of nature, and human experiences. In this respect, Babur serves as a bridge uniting the disciplines of history and literature.

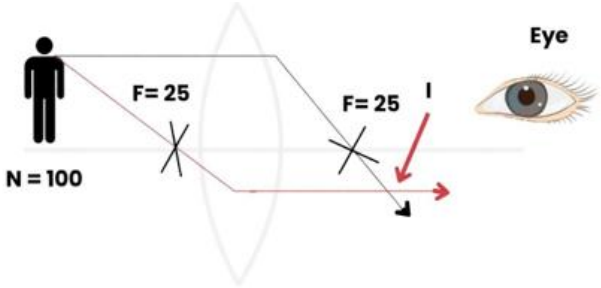




Integration of Physics and Astronomy. Physics and astronomy are tightly interconnected in nature. Astronomy is the science that studies the structure of the universe, stars, planets, galaxies, and their motions. Physics, on the other hand, studies the laws of natural phenomena, including motion, energy, light, heat, and other processes. For instance, planetary motion is explained through the force of gravity. While this is a law of physics, astronomy studies planetary orbits precisely on the basis of this law. Similarly, the light and temperature of stars are explained in connection with energy and thermal processes in physics. Furthermore, the operation of telescopes is a combined result of physics (laws of optics) and astronomy (the observation process). While physics teaches how light refracts and reflects, astronomy observes celestial bodies utilizing this knowledge.

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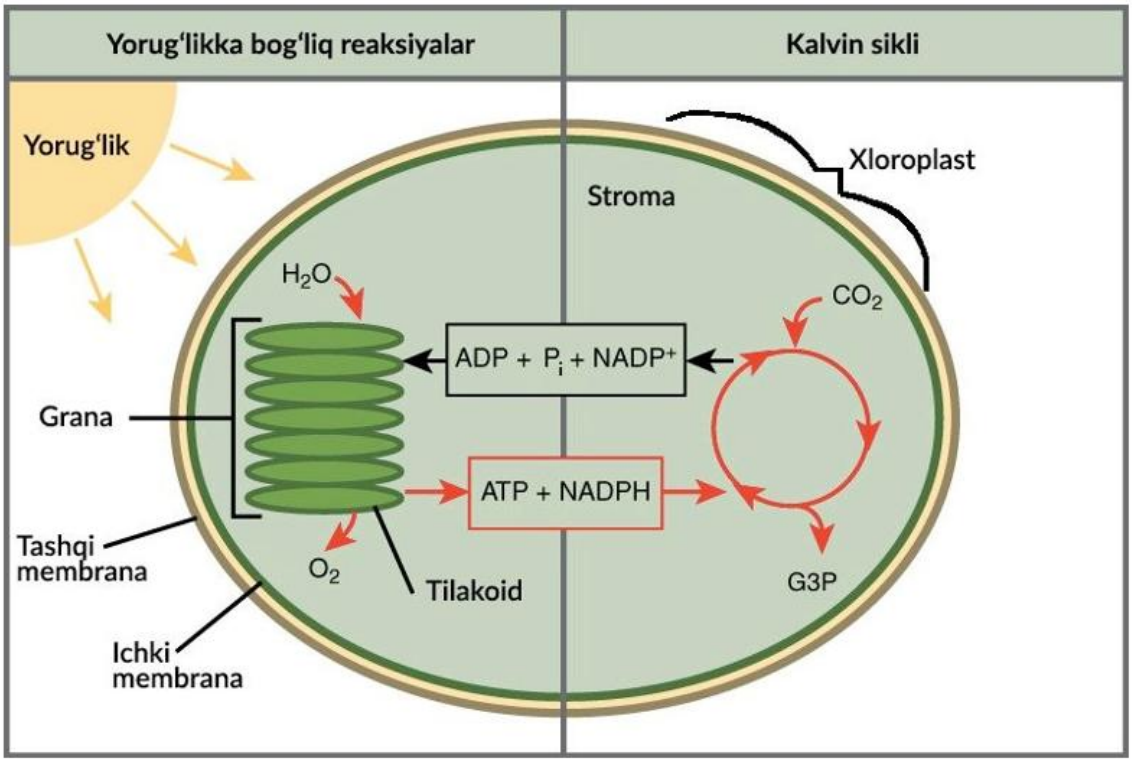






Integration of Biology and Chemistry. Unifying these fields helps students acquire a deeper understanding of the processes occurring within living organisms. These two sciences are interrelated; biology studies living nature, while chemistry explains the substances and reactions within it. It is precisely through this harmony that complex vital processes are explained on a scientific basis. For example, the process of photosynthesis occurring in plants serves as a vivid example of the integration of biology and chemistry. Biology studies this process as a vital activity related to plant nutrition and oxygen release. Chemistry explains the chemical reactions taking place during photosynthesis—specifically, the formation of glucose and oxygen from carbon dioxide and water.

The pedagogical foundations of utilizing integration represent a scientific-pedagogical approach aimed at effectively organizing the educational process and shaping deep, stable knowledge in students. According to this approach, educational content should not be fragmented within individual subjects but should be organized as an interconnected, logically consistent, and unified system. Integration pedagogically serves to enhance interdisciplinary links, thereby helping students perceive reality as a whole and connect theoretical knowledge with real-life situations. The primary essence of pedagogical integration consists of ensuring harmony among the educational objective, content, methods, tools, and outcomes. In this context, the student unifies concepts, regularities, and practical skills belonging to different disciplines under a single pedagogical idea. Consequently, students develop critical competencies such as analyzing problem situations, utilizing interdisciplinary knowledge, and creative and critical thinking, rather than just a mere collection of facts.



Moreover, from a pedagogical perspective, integration manifests in several forms. First, intradisciplinary integration exists, where topics within a single subject are interconnected. Second, interdisciplinary integration is applied, meaning that topics from two or more subjects are combined under a single theme. Third, the integration of theory and practice exists, where the student applies learned knowledge in life. This particular form ensures the vitality of education. As indicated in pedagogical dictionaries, integration represents the sequential, coherent, and systematic arrangement of educational content, relying on existing knowledge when mastering a new topic, applying instructional material to a certain extent in subsequent stages, and ensuring the continuity and integrity of the educational-experimental process. Another critical pedagogical basis of interdisciplinary integration is linking education with practice. In integrated lessons, students master knowledge not only theoretically but also through real-life examples, practical exercises, and problem situations. Furthermore, interdisciplinary integration pedagogically ensures the consistency and continuity of knowledge. Concepts and skills acquired through one subject are reinforced and expanded in other subjects. According to G.T. Soldatova, implementing integration mechanisms between various levels of education demonstrates how the necessity of ensuring continuity and integrity in the pedagogical process collides with the discrete nature of teaching, serving as an example of integration emerging from the law of the unity and struggle of opposites. Indeed, for pedagogical purposes, the subject system of education breaks down the objective and multifaceted interconnectedness of technical objects and natural knowledge into separate pieces. Pedagogical methods are the main tools for conducting the educational process effectively. Based on integration, pedagogical methods help organize students' learning process to make it more interesting, meaningful, and practical.

The psychological foundations of using integration dictate that the human psyche perceives knowledge not in isolation, but as an interconnected system. Therefore, harmonizing the content of

various subjects in the educational process serves the holistic development of students' intellect. In this context, interdisciplinary integration psychologically enhances motivation as well. When a student sees the real-life significance of knowledge, internal interest is formed, which increases the effectiveness of educational activity. Comprehending the connections between spheres of knowledge develops students' independent thinking, analysis, and generalization skills. Furthermore, integrated education allows for the consideration of individual psychological characteristics. Each student perceives information differently: some master it better through images, some through logical analysis, and others through practical activity. Unifying elements of different subjects creates conditions suitable for each learning style. In psychology, integration is considered within the framework of studying complex psychological development regularities, age-related changes, the step-by-step acquisition of knowledge, and shifts in leading types of activity.

Interdisciplinary integration psychologically strengthens motivation. A student's internal interest in learning activities, self-confidence, and striving for success determine the effectiveness of education. Therefore, it is necessary to use methods aimed at increasing motivation when organizing integrated lessons. From a psychological standpoint, for stable motivation to form, a student must feel like an active subject—that is, they must have confidence in their ability to perform the given task. In this regard, when a student is given a task that matches their capability level but is slightly complex, they test their strength and develop. Moreover, if an individual believes they can achieve success, their internal motivation increases, and their activity becomes effective. Such an approach serves not only the conscious acquisition of knowledge but also the psychological development of the individual. Another important aspect is that integrated education develops independence, creativity, and a sense of responsibility in the student.

Conclusion. The pedagogical foundations of utilizing interdisciplinary integration in the educational process demonstrate that this approach serves to help students perceive knowledge holistically, apply it in various situations, and develop their independent thinking abilities. Through integration, an inseparable link between disciplines is ensured, making educational materials realistic and comprehensible. At the same time, effectively organizing interdisciplinary integration demands high professional skill, meticulous planning, and methodical preparation from teachers.

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