



INTERDISCIPLINARY INTEGRATION IN INCREASING THE EFFICIENCY OF BIOLOGY LESSONS

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Annotation: The article discusses the development of natural and scientific literacy of students through the integration of biology lessons in general education schools, the factors of knowledge acquisition and self-control in students based on a competency-based approach, the formation of students' worldview, creativity in the formation of science-related compensations, and independent knowledge acquisition on their own.

Also, the stages of using interesting and historical information in educational practice and developing skills in organizing and teaching biology lessons were studied.

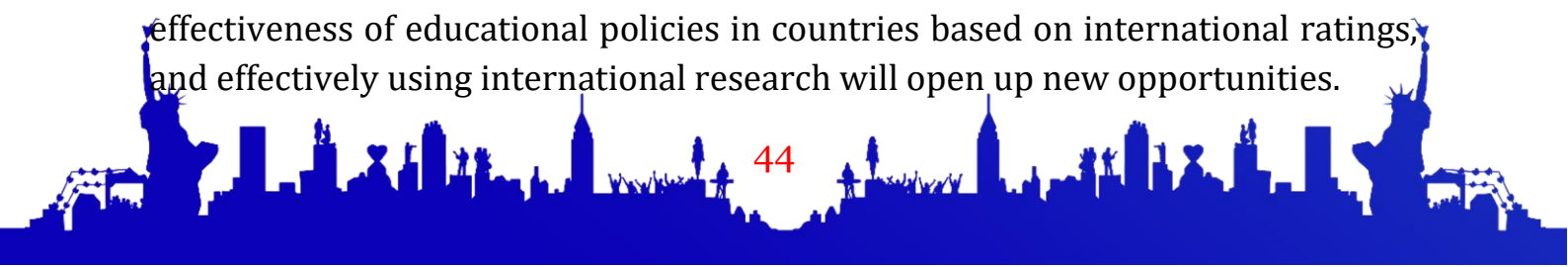
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Global socio-economic changes taking place in the world, including in the education system, have led to a special focus on scientific literacy in the practice of training intellectually competent, talented, and creatively thinking specialists, and in international assessment studies to increase the readiness of students and teachers.

Effective research is being conducted to ensure that quality changes in education meet international educational requirements, develop students' reading, mathematical, scientific literacy, and creative thinking, and achieve positive results by participating in international assessment programs. Therefore, it is recommended to conduct research aimed at introducing an educational environment that creates conditions for students to use their competencies, realize their abilities, creativity, and initiatives.

In the system of continuous education of our country, reforms are being carried out aimed at ensuring the development of modern competency-based approaches in the general secondary education system, which envisages the formation of educational and cognitive competencies in students based on advanced foreign experiences. "Fundamentally improving the quality of general secondary education, in-depth study of other important and highly demanded subjects such as chemistry and biology" have been identified as priority tasks.

Implementing reforms in all areas, monitoring results, determining the effectiveness of educational policies in countries based on international ratings, and effectively using international research will open up new opportunities.





Integration in education is achieved not by one-sided, but by comprehensive development of the student's knowledge and perception of the world.

Integration (from the Latin *integratio* - restoration, completion, integer - whole) is the process of convergence and interaction of disciplines, accompanied by differentiation.

Interdisciplinary communication (integration) is the basis for the formation of a scientific worldview, acquaints and teaches the student to correctly and fully understand nature, logical thinking, and the use of information technologies in practical activities for the purpose of scientific and technical development; [2;3-6]

Below are various examples of the use and connection of physical concepts to illustrate certain topics in biology.

For example, knowledge of the "Archimedes force" can be used to study the structure of fish and organisms adapted to living in an aquatic environment, and the effects of the environment on living organisms.

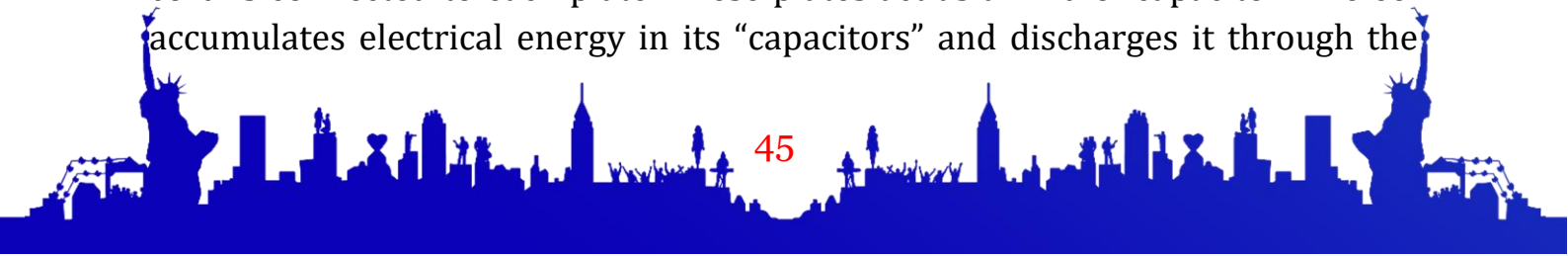
Students are asked the following questions.

1. Why is the skeleton of fish loose and flexible compared to the skeletons of other land animals?
2. Why is the thallus of algae not rigid?
3. Why do whales and dolphins die in shallow water?

The density of living organisms living in water is very little different from the density of water. Therefore, their weight is completely balanced by the Archimedean force. For this reason, aquatic animals do not have a skeleton as complex as those living on land.

The swim bladder in fish is of great importance in their life. It is the only organ in fish that has the property of contraction. With the help of the chest and abdominal muscles, the bladder contracts, changing its size and average density. As a result, it controls the depth at which the fish can dive under water.

Some fish are called living power plants. The most famous of these are electric eel fish. These fish have special organs that store electrical energy. Small electrical voltages generated in ordinary muscle fibers are combined into batteries consisting of many individual elements consisting of conductors - nerves. It has been determined that they have up to 8,000 such plates, which are separated from each other by a thin substance. A nerve coming from the spinal cord is connected to each plate. These plates act as a kind of capacitor. The eel accumulates electrical energy in its "capacitors" and discharges it through the





object it touches. These discharges are fatal for small animals. The voltage in the shock of large eel, which has not been discharged for a long time, can reach 800 V.

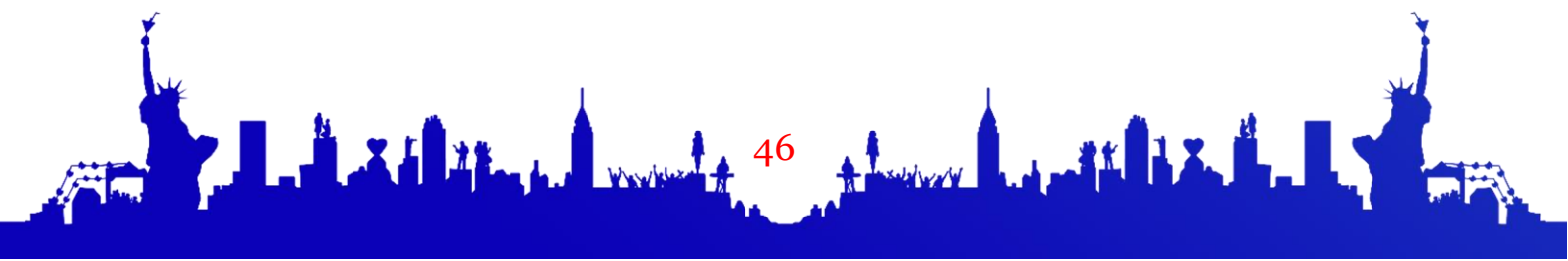
The most powerful eel lives in the rivers of northeastern South America. These fish are two meters long and can deflect the voltmeter needle to 550 V. Therefore, people cross these rivers only on horseback.



Electric eel discharges its “battery” on the legs of horses and does not have time to re-electrify their weapons, people cross the river unharmed. When checking the serviceability of flashlight batteries, sometimes they touch their tongue to their

terminals. If a bitter taste is felt, the battery is considered serviceable. Human saliva contains a small amount of various salts. When current passes through saliva, electrolysis occurs, and the components of the solution are separated on the battery electrodes and a bitter taste is felt.

Birds have sharp vision compared to other animals. Their eyeballs are very large and have a unique structure. Due to this, the field of vision is large. The eyes of chickens and owls have a unique feature. As is known, the back of the eye is covered with a very complex retina. The retina consists of a branched optic nerve, which are rod and cone receptors that detect light. Cones provide daytime vision, and rods provide night vision. Since the retina in the eyes of chickens consists only of cones, they cannot see at night. The eye of an owl consists only of rods. Therefore, they see well at night.





Plants such as wheat, barley, oats, and rye are green during development, but change color as they mature. They initially reflect the green part of the spectrum and absorb the red part. Red light has the greatest thermal effect and is responsible for the formation of chlorophyll. As plants mature, their need for organic matter gradually decreases,



and they change color. Plants with this color absorb less red light.



The rainbow colors in some seashells can be interpreted as the result of interference, as can the transparent colored stripes have observed between the feathers of birds. The colorful glow of butterfly wings is also due to interference. If a butterfly wing is observed through a microscope, it can be seen that it consists of a large number of elements. The size of each element corresponds to a unit

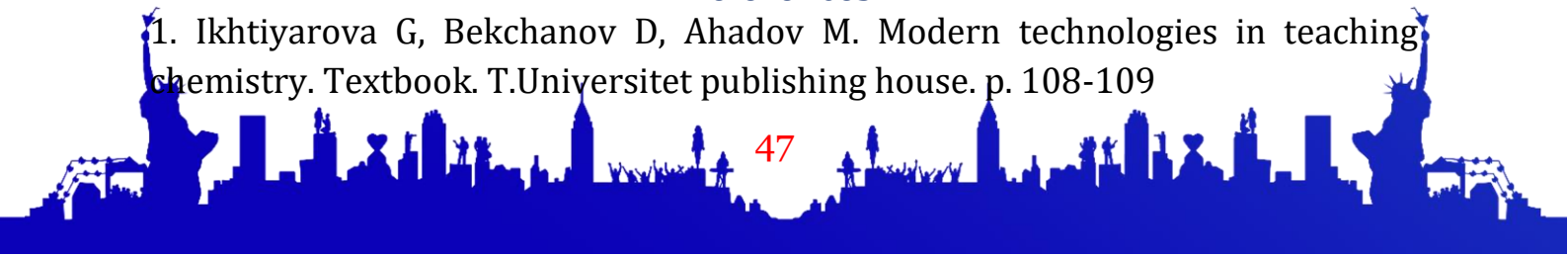
wavelength of visible light. Thus, the butterfly wing acts as a kind of diffraction grating. Rainbow colored stripes are also observed in the eyes of insects such as dragonflies. This is because their complex eyes consist of a large number of individual "eyelets" - facets, that is, they are also "living" diffraction gratings.

Therefore, the above recommendations are based on the theoretical and practical knowledge students have acquired in biology lessons, and they will develop creative abilities in students, develop skills in working with information, self-assessment, and increase their readiness for international assessment studies.

Students will also develop skills in independent learning, connections with other subjects, and in organizing the learning process and improving the quality of education in this environment. If the learning process is organized using interesting information, life problem situations, and biological facts presented in the PISA tasks, students' deep mastery of biology will contribute to an increase in the quality and efficiency of education.

References:

1. Ikhtiyarova G, Bekchanov D, Ahadov M. Modern technologies in teaching chemistry. Textbook. T.Universitet publishing house. p. 108-109





2. Ismoilov A.A., Kh.J. Daminov Z.A. Kosimova G.A. Primov "Assessment of creative thinking". Tashkent— 2021.
3. Ahadov M.Sh. Methodology for improving coherence and continuity in chemistry education. Monograph. T.: "Imperss Media" 2023.–B.207.
4. Ahadov M.Sh. Modern technologies in teaching chemistry. Textbook. Navoi.: "Navoi" publishing house, 2022.–B.350.
5. Abdukodirov A.A., Pardaev A.Kh. Theory and methodology of technologization of the educational process. -T.: Science and technology.- 102 p.

