

THE USE OF STEAM TECHNOLOGY IN LABORATORY CLASSES IN PHYSICS AND ASTRONOMY

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Abstract. *STEM - helps the student to take an active civic position in society, developing personal qualities and ensuring the formation of the student's skills of the XXI century. As a result of such classes, the student learns to experiment and conduct research, be able to ask questions, think creatively and be responsible. In addition, they offer various ways of conducting joint research, explore the layers and begin scientific research. STEM-helps the student to take an active civic position in society, developing personal qualities and ensuring the formation of the student's skills of the XXI century.*

Keywords: *laboratory, physics, astronomy, competence, creative thinking, competence, integration*

In our higher education institutions, there is not enough physical and astronomical observation equipment. In this case, integrating STEM education with astronomy can work well. At this point, it is worth saying that given the interaction of students with the media that affects their worldview and ideas, we think that it is necessary to expand these requirements that students receive fundamental theoretical knowledge mainly at school, but every day information about new discoveries, new opportunities, new devices, new achievements in the field of modern technologies is distributed through the media. This significantly affects the system of knowledge formed in the school. Along the way, the role of the teacher is to help students understand extracurricular information, that is, to put it in the context of General basic education. Media messages of physical and astronomical content cannot be understood without acquiring basic knowledge

The worldview of students is formed in the process of studying the topic, but at the same time as the formation of a worldview, it is important to teach the student to apply the acquired knowledge in practice. This means that the inclusion of extracurricular information in the context of general primary education inevitably leads to other goals of STEM education, such as the perception and processing of information, critical thinking and the formation of the ability to understand the hidden meaning of messages.

The development of the ability to direct the information presented in the media to educational purposes and use it for students' own purposes is gaining relevance today. The development of cognitive interests, intellectual and creative abilities of students in the process of generating knowledge, skills and competencies in the science of astronomy using various sources of information, including media education, involves the use of media in itself in the educational process. The use of only textbooks and popular science literature to achieve this goal in the study of astronomy may not have sufficient effect on the quality of Education.

If we describe this part of the curriculum from the point of view of STEM and media education, the study of astronomy should be aimed at developing the skills of perception and processing of information, search, preparation, transmission, acquisition of Information, its critical

interpretation. This goal is set in part in the form of an independent assessment of media data, Internet resources and Popular Science articles. This requirement almost in the real sense corresponds to the goals of STEM and mediata education. The goals associated with the development of students' creativity, communicative abilities are one of the important goals for STEM and mediation.

The organization of classes on the basis of the STEM education program also has a positive effect on the economic efficiency of our country. We have calculated below the total value of laboratory equipment that we will need to complete laboratory training from the astronomy course in higher education institutions, as we can see, the total cost of these equipment does not exceed ten million rubles-that is, 6542926,9304 is approximately equal to 6543000 rubles.

Stem Astronomy Learning Kit Children Educational Toys of Amazing Universe 50695,63 sum

Earth Science & Astronomy for the Grammar Stage experiment Kit 537571,19 sum

Earth Science & Astronomy for the Grammar Stage Printed Combo (3 rd edition) 383948,07 sum

Planet Activities for Kids 164486,47 sum

Star map Levenchuk M20 mobile, large 75343,36 sum

Solar system planetarium 191482 sum

Wonders of the Solar System Space Chart 265329,07 sum

13.6 x 10.2 x 6.6 in. GeoSafari Motorized Solar System 551726,46 sum

Discovery #Mindblown 2-In-1 Reversible Planetarium Space Projector, 360-

Degree Rotation, Moving Stars and Stationary Viewfinder Modes 219132,41 sum

Smithsonian 30X telescope/Monocular Kit 207830,14 sum

pcs 3D Solar System Ball Toy Set Educational Learning Toy Outer Space Planets Kits 87565,18 sum

Brainstorm The Original Glowstars Company Glow Solar System 295724,51 sum

Celestron AstroMaster 70AZ LT Refractor Telescope Kit with Smartphone Adapter and Bluetooth Remote, Ideal Telescope for Beginners, Capture Your Own Images, Tripod plus Bonus Accessories Included 894306,02 sum

Model "Celestial Sphere" 508,379,485

Physico-political globe Globen, 25cm, illuminated on a round stand 150,000 sum

Globe of the Moon with backlight, 299444.5 so'm Globe "Night and Day" with backlight 560, 251 sum

STEM-set Telluriy ArTeC (model Solnse-Zemlya-Luna) 1281736,5696 sum STEAM- constructor 4M Model of the Earth with Lunou 00-03241 118864,1088 sum

STEAM-set 4M Garland of the Solar System 00-04905 170527.68 sum

STEM- set ArTeC Sputnik 150948,576 so'm

STEM- constructor ArTeC Teleskor 204759.5328 sum

Astronomical atlas 125185,89 sum

Astronomical calendar for 2022-2033 77468,43 sum

The rapid development of technology, the innovative approach to the development of all aspects of the life of society is capable of ensuring the technologically advanced standard of living

of the developed state to which we strive, necessitates the development of STEM education for the training of highly qualified personnel. And in our country, the existence of all the resources necessary for such progress has been proven in the process of our research.

The theoretical aspects of the application of astronomical experiments to independent development of students in the study of the astronomy course, widely promoted in the teaching of Exact and Natural Sciences in the 21st century, in order to promote student competence by introducing integrated education into laboratory training, have also been studied in research. The educational system defines the implementation of the following tasks through the organization of training laboratory classes using the STEM program:

- to increase students' interest in studying technical and communicative changes in the world around them;

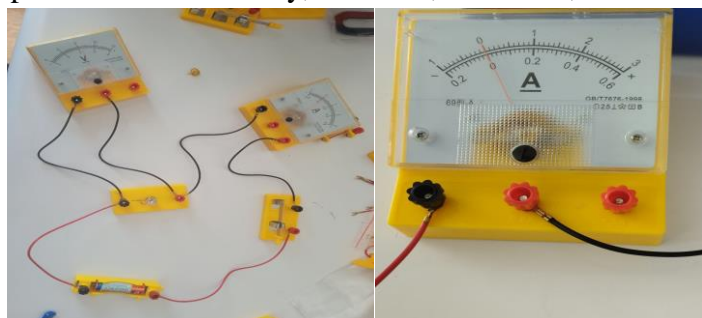
- formation of inventive and structural abilities in students by teaching the progress of Science and technology;

- in the matter of monitoring and analyzing the surrounding phenomena of students, the dependence of the phenomenon to be studied on other phenomena, the development of methods of experimental verification of phenomena and laws, the practical implementation of the knowledge gained, the orientation to the choice of profession, work outside the audience occupies a special place.

We have listed below some examples of performing laboratory exercises from physics and astronomy using STEAM technology:

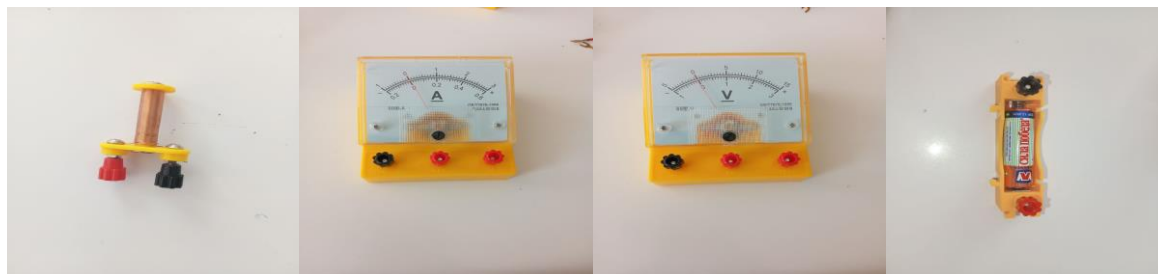
Learning to measure current strength and voltage in different parts of the chain.

Required equipment: 1.5 volt battery, ammeter, voltmeter, connecting wires, switch, bulb



Assembling an electric bell and launching it

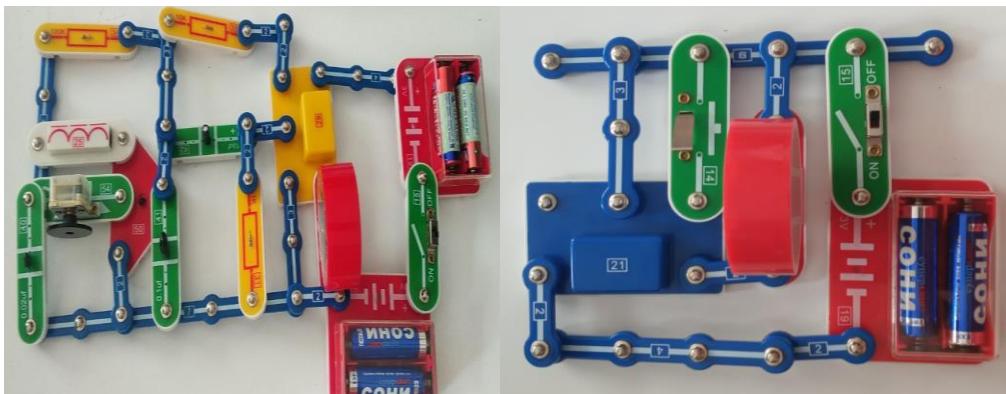
Necessary equipment: current source (batteries), switch, ammeter, voltmeter, coupler wires, electric hook and reel





Assembly of the simplest radio

Necessary tools and devices: power amplifier, connecting wires, battery, microphone, capacitor, resistor.



Making a vacuum cleaner

Necessary equipment: fabric buckle, flash box, pliers, pliers, connecting wires, 20 cm hose.



Making a model of the celestial sphere

Necessary equipment: 3 list, scissors, clay, scoop, ruler, pencil, circle



The STEM-educational system is considered as an important factor in the emergence and development of experimental skills of schoolchildren in physics. Research and scientific research on the development of knowledge and interests and creative abilities of students in the teaching of astronomy, the formation of physical concepts, skills and skills, the development of cognitive activity of students are being used in this area.

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