WAYS TO DEVELOP 21st CENTURY SKILLS AND LEARNING TO ASSESS THINKING

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https://doi.org/10.5281/zenodo.17663753

ARTICLE INFO

Received: 18th November 2025
Accepted: 19th November 2025
Online: 20th November 2025

KEYWORDS

21st century skills, taxonomy, knowledge, analysis, literacy, standards for success in the 21st century, context, 4C principle, critical thinking, collaboration, creativity (creativity), communication

ABSTRACT

The article provides information on the formation of 21st century skills in students and its assessment, Bloom's taxonomy and its use in assessment, standards for success in the 21st century, several information on the formation of 21st century skills in students recommendations have been made. In addition, an innovative approach and the use of "4C" skills, which is one of the most optimal ways to develop natural and scientific literacy in students in the process of modern education, were considered..

Introduction

From the path of historical development of any state, it is known that the rapid development of the country, the achievement of certain achievements, the prosperity of the people depend on the level of attention paid to the education and future of young peoplentroduction.

From the path of historical development of any state, it is known that the rapid development of the country, the achievement of certain achievements, the prosperity of the people depend on the level of attention paid to the education and future of young people in that state. In this sense, the issue of youth in Uzbekistan is one of the most priority areas of state policy.

The main task of education is to form in the student the skills that will be needed today and in the future in order for him to live a successful life in society. For this, creative thinking is an important skill that today's youth should have. This skill helps them adapt to a world that is constantly changing and rapidly, dictating workers with "21st century" skills beyond ordinary literacy.he main task of education is to form in the student the skills that will be needed today and in the future in order for him to live a successful life in society. For this, creative thinking is an important skill that today's youth should have. This skill helps them adapt to a world that is constantly changing and rapidly, dictating workers with "21st century" skills beyond ordinary literacy. In general, today's reader is expected to work in areas that are not even available now in the future, solving new problems through new technologies.

In order to establish the priorities for the systematic reform of general secondary and extracurricular education in the Republic of Uzbekistan, to qualitatively raise the spiritual and

moral and intellectual development of the growing young generation to a new level in terms of quality, to introduce innovative forms and methods of education in the educational process in the Republic of Uzbekistan, also in accordance with the decree of the president of the Republic of Uzbekistan PF-5538 “on additional measures to improve the management of Public Education”dated September 5, 2018:

The following arealso in accordance with the decree of the president of the Republic of Uzbekistan PF-5538 “on additional measures to improve the management of Public Education”dated September 5, 2018:

The following are

a) the concept of development of the public education system of the Republic of Uzbekistan until 2030 (next-the concept) shall be approved in accordance with Appendix 1 and shall provide for the following:

The programme for International Student Assessment (the programme for International Student Assessment) is ranked among the world's top 30 advanced countries in terms of Student Assessment Programme internationally by 2030; key issues such as have been considered, from which it appears that issues such as preparation for the PISA international assessment system have been placed at the forefront. Based on this, the training of students of grades 7-11 of Secondary Education under the requirements of the PISA international program of education remains one of the most kata tasks for teachers of general secondary education and educators on this day. In this article, taking into account the above, we will discuss the result of the research carried out on the preparation of upperclassmen of general secondary schools for PISA tests and the solution of some tests.

Literature analysis

In his scientific paper, M.Oripova described” natural-scientific literacy is the ability to use natural-scientific knowledge in its verification and resolution using scientific methods to obtain observations and conclusions based on experiments, to be able to think about current problems, to have solving skills in the face of personal, social, global problems, to be tested in the ability to observe."

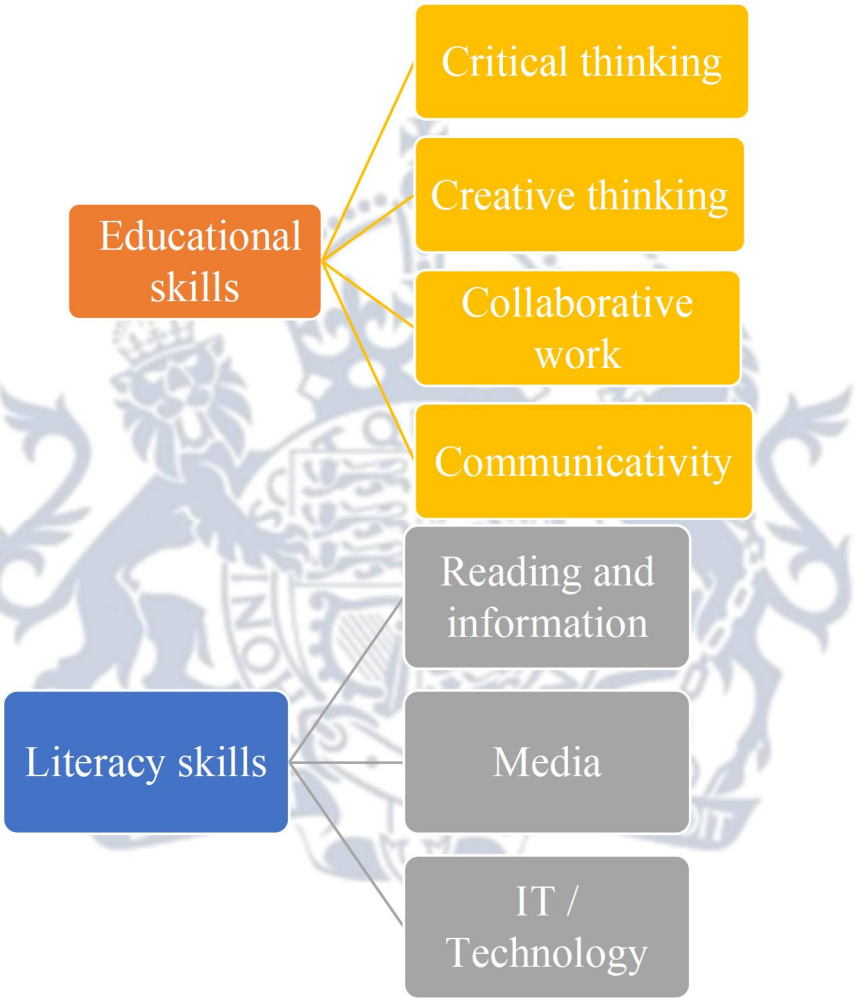
A.A.Schleicher has defined the concept of education as: “education is not only a process of teaching students something, but also providing them with the necessary opportunities to help them navigate an increasingly complex and changing world, with self-confidence”. From this, the functional function of both general education schools and educators is changing according.

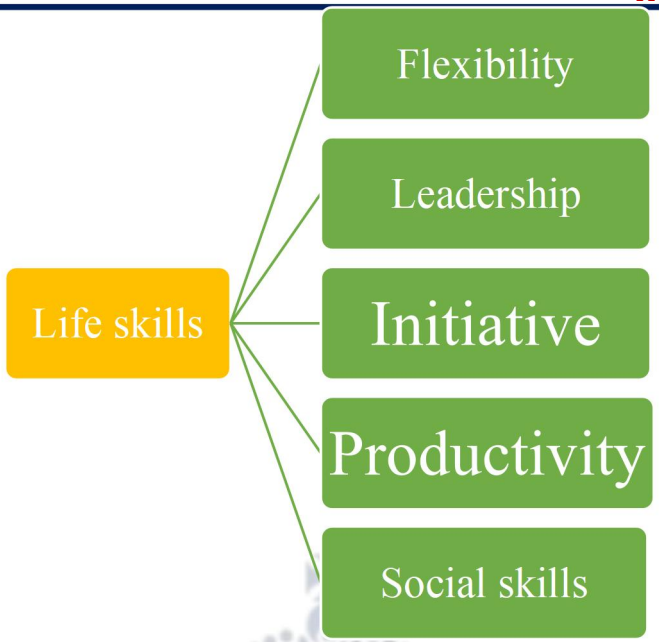
Methodology

21st century skills (21centurty Skills) are now firmly established as educational goals in educational systems around the world, but their practical use in teaching and assessment practice is lagging. These learning goals, which prioritize how to get answers rather than answer correctly, are putting new challenges before educational systems and looking for new solutions to it.

The next generation will work in the future even in professions that do not exist today. Preparing them to teach students how to think, not what to think, is the requirement of today, which is in front of Education. Because of this, the focus on 21cs has increased as education systems increasingly focus on the need for students to apply their knowledge. In education,

students had a relatively low assessment of the formation of 21CS.he next generation will work in the future even in professions that do not exist today. Preparing them to teach students how to think, not what to think, is the requirement of today, which is in front of Education. Because of this, the focus on 21cs has increased as education systems increasingly focus on the need for students to apply their knowledge. In education, students had a relatively low assessment of the formation of 21CS. To what extent are we currently achieving this assessment? The answer is simple: we hardly achieve it. What are the skills of the XXI century? They are important life skills necessary to achieve success in the 21st century. 21st century skills are the most sought after skills in knowledge economics. They include: [4]

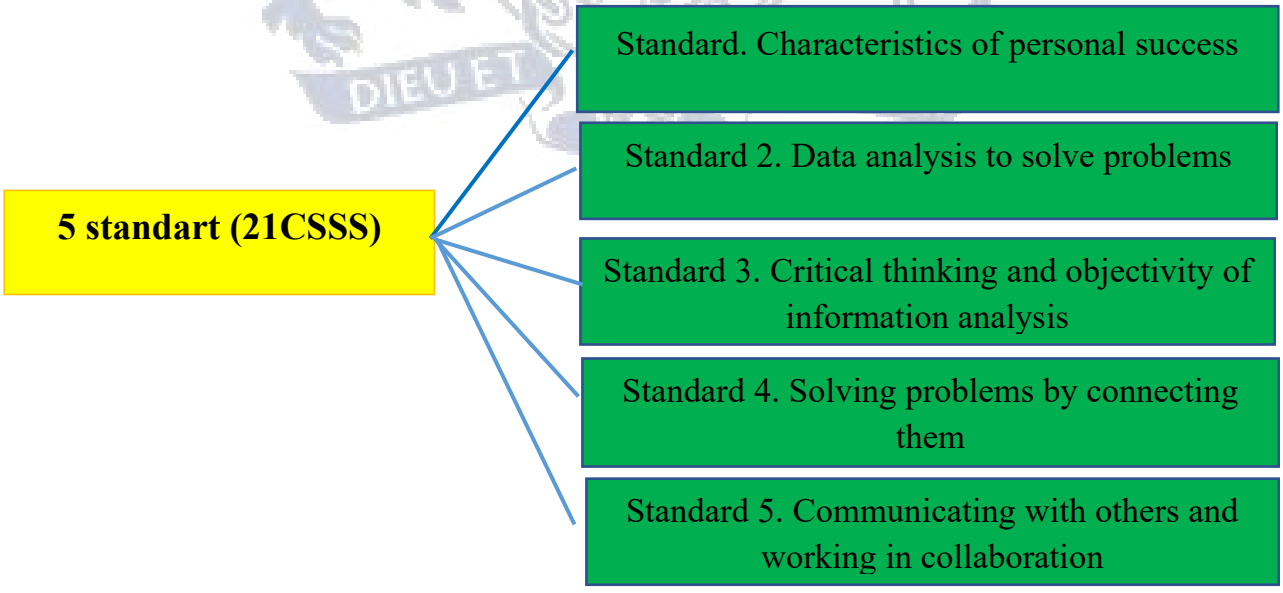




21st century essential skills.

All these skills are based on a high level of thinking. How to master these skills and, most importantly, how to assess whether these skills have been achieved? To do this, we must consider the qualification standards (21st Century Success Skills standards, 21csss) that exist to succeed in the 21st century, since these qualification standards can be used to clarify the norms for evaluation.

These standards focus on the basic personal qualities, knowledge and skills required for students to successfully transition from school to work (work). There are five standards for success in the 21st century, which are:



Each standard includes key goals that students must achieve in order to be deemed successful.[3]

A global shift towards a complex set of skills in education means that existing problems can be solved cooperatively. The problem of evaluating such skills was even before the development of how skills should be taught.

Researchers can determine the nature of these”21st century skills (21cs) " and how teaching methods unrelated to curricula move from simple to complex forms. As the work done in the 1900s in assessment methods helps to identify knowledge and personality, current approaches to assessment should help to identify these skills of the 21st century.[3]

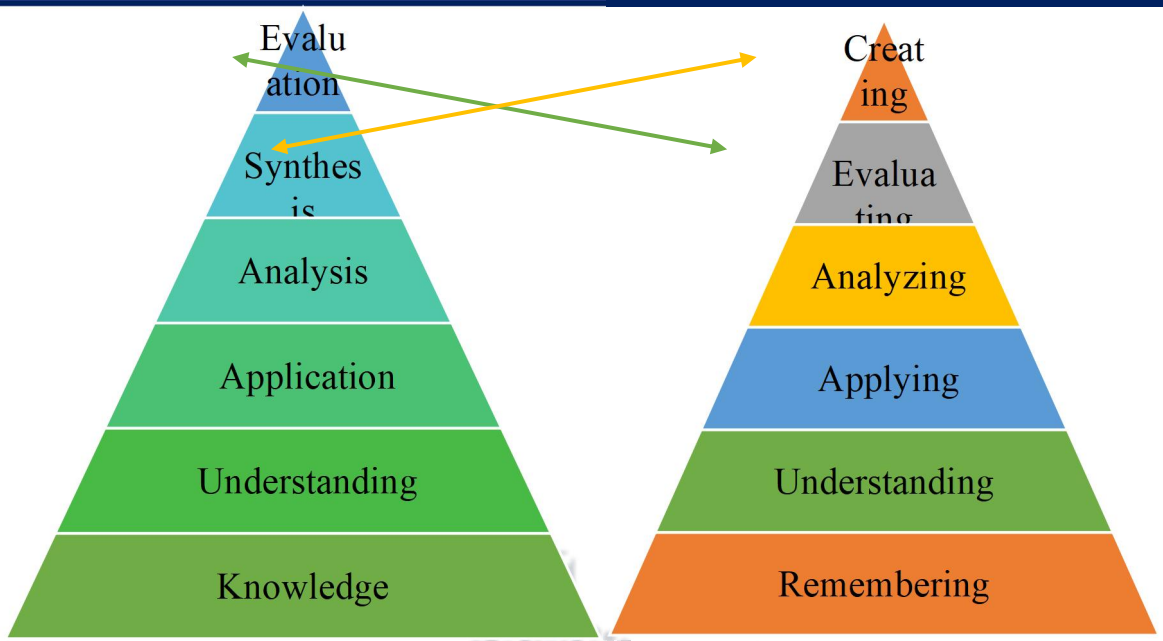
But this does not happen without specific difficulties. First is the identification of a skill or “construct”. The identification of the necessary learning skills not only determines the assessment approach, but can also have a significant impact on the teaching methodology and educational results.But this does not happen without specific difficulties. First is the identification of a skill or “construct”. The identification of the necessary learning skills not only determines the assessment approach, but can also have a significant impact on the teaching methodology and educational results.

The taxonomy of Blum, proposed by Benjamin Blum in the 50s and 60s of the last century and refined by 2001, is now widely used in the direction of assessment.

Blum argues that the goal of developing taxonomy is to classify student behavior. Purposeful behavior manifests itself as action, thought, or emotion during the training process. Therefore, the purpose of Blum's taxonomy is to objectively reveal the difference between the target behavior of students and their actual behavior after a given teaching process.[5]

The taxonomy developed by Blum and his students survived into the 1990s. However, over the past time, there has been a need to adapt to the rapid development and transformation of technology and other industries. Anderson and Kratvol identified aspects of the taxonomy that needed to be updated after reviewing the taxonomy. In the age of new technologies, the elimination of the shortcomings of Blum taxonomy was achieved by introducing necessary updates to the taxonomy.

The revised version of the taxonomy consists of six basic cognitive processes, as in the original taxonomy. Application of Blum taxonomy (application), Analysis (analysis) and evaluation (evaluation) the functions and scope of the steps have been preserved and these have been changed to practice, analyze and evaluate (apply, analyze, evaluate). That is, nouns were changed to verbsevised version of the taxonomy consists of six basic cognitive processes, as in the original taxonomy.



Original and updated interpretation of Bloom's taxonomy

The recall stage involves basic subcognitive processes such as knowing the signs of specific information, remembering the references associated with them, recognizing easily learned materials, remembering simple terms and uncomplicated simple forms and common meanings of technological information. The recall stage is also the stage in which cognitive processes associated with the recall, identification, and recall of information occur in long-term memory.The recall stage involves basic subcognitive processes such as knowing the signs of specific information, remembering the references associated with them, recognizing easily learned materials, remembering simple terms and uncomplicated simple forms and common meanings of technological information. The recall stage is also the stage in which cognitive processes associated with the recall, identification, and recall of information occur in long-term memory.[7]

At the stage of understanding, information is interpreted and transmitted. At this stage, processes such as understanding concepts such as metaphor, symbol, irony, which are among the verbal competencies, the transfer of mathematical actions to symbolic language occur. Understanding is the ability to interpret the knowledge gained and predict new knowledge based on what they have learned. In addition to talking about the knowledge gained at this stage, mental processes occur, such as interpreting, exemplifying, classifying, generalizing, drawing conclusions, comparing and explaining messages given in written or graphic language.

The stage of application involves abstracting a general rule or a generalized method and concentrating on a certain knowledge. In other words, the program is to perform or perform an action.

Analysis is understood as the ability to divide information made up of a whole into its parts. This category also includes mental processes such as predicting how information accumulates and determining how information is managed.

The relationship between Bloom's Taxonomy and 21st century skills

Evaluation is the ability to draw conclusions about the value of the material or method given for the purpose. During the assessment phase, the individual will have the skills to support, defend, judge and criticize the information they receive in terms of standards and standards. At the same time, he will have the ability to express opinions on logical ambiguity and shortcomings in claims.

Creation is the stage of creating a new product or idea using parts generated from previous knowledge. What is important at this stage is the ability to create an original product/idea or combine the parts that make up a whole. At this stage, a person will have the ability to design and create a new and original product.[7]

Developing "4C" skills

The result of the new innovation approach can be seen in the reader's worldview, logical thinking, correctness, honesty, search, initiative and invention he result of the new innovation approach can be seen in the reader's worldview, logical thinking, correctness, honesty, search, initiative and invention. The main goal of applying the innovativhe result of the new innovation approach can be seen in the reader's worldview, logical thinking, correctness, honesty, search, initiative and invention. The main goal of applying the innovative approach is the development of "4K" skills in the formation of natural-scientific literacy in the portrait of a 21st century student period requirement. In this, the main goal of education is to teach students not only to give knowledge, but also to be able to apply the knowledge gained in life.

The most important stage for the student to understand the universe, expand his imagination and build the foundation of knowledge is the period of primary education.he most important stage for the student to understand the universe, expand his imagination and build the foundation of knowledge is the period of primary education. During this period, the child forms their "learner identity," develops an interest in school and learning, begins to freely and clearly express their own thoughts and feelings, creatively solves unfamiliar problems, and starts to build internal motivation for future plans. This, in turn, requires teachers to apply innovative approaches and conduct instruction based on modern pedagogy.

In the Concept for the Development of the Public Education System until 2030, the task of improving teaching methodology is defined. Accordingly, it is advisable for primary education teachers to focus on developing students' scientific literacy by teaching the 4K skills using advanced foreign experiences and modern approaches. [6]

The introduction of modern pedagogical and innovative methods in educating students within the system of continuous education creates a foundation for the country's economy to join the ranks of the world's developed nations. To achieve this, it is necessary—based on contemporary requirements—to approach the development of students' scientific literacy by treating the subject as a fundamental, theoretical, and experimental science, as well as to develop philosophical and methodological perspectives, the content of education, and effective methods of instruction.[8]

In developing students' scientific literacy, greater importance is placed on their critical thinking and ability to express their own ideas freely. Modern school textbooks used in

current practice present an innovative approach. This methodology is aimed at the comprehensive development of children and incorporates four key skills.

Communication (the skill of interaction) – Students learn to express their thoughts clearly and accurately, listen to and understand the interlocutor, and effectively use language tools to convey information.

Creative thinking (a creative approach) – Students learn to apply new approaches to achieve their goals, develop innovative solutions, and acquire skills in solving creative problems.

Critical thinking – This methodology involves developing students' abilities to critically evaluate information and form their own opinions and ideas. Students learn to approach problems from an analytical perspective and form their viewpoints based on logical reasoning.

Collaboration (working cooperatively) – Designed to help students develop the ability to work in a team. It assists learners in mastering cooperation, effective exchange of ideas, and mutual support. [9]

Analysis and Results

The main objectives of a multi-stage questioning system are to help students develop critical thinking skills related to 21st-century competencies, foster creativity, build communication skills, enhance the ability to work collaboratively, as well as develop problem-solving abilities and the capacity to find targeted, objective solutions. These goals can be achieved when the teacher consistently encourages the student's deep thinking process step by step. For this reason, Bloom systematized the thinking process and developed a tiered questioning framework. [9]

These 4C skills play an important role in children's healthy lifestyle, in improving an inclusive educational environment, and in supporting both their physical and mental development. Engaging in art, science, sports, or exploring the natural world broadens children's worldview and strengthens their self-confidence. Every lesson at school aims not only at helping students master subject content, but also at developing independent learning, analytical thinking, problem-solving, and overcoming challenges. Primary school textbooks are designed to shape the competencies necessary for the comprehensive development of the younger generation and to prepare them as competent members of society.

Discussion

Based on the interrelation described above, each level of Bloom's taxonomy can be used to assess the relevant elements of 21st-century skills. Thus, assessment is carried out in several ways: first, through formative assessment conducted during daily lessons, and then through broader-scale summative assessments (tests, educational quality monitoring, examinations). For this reason, the content of the assessment materials developed for these processes must be enriched with tasks aimed at evaluating 21st-century skills according to levels of thinking (Bloom's taxonomy).

In solving problem situations, students are required to demonstrate scientific literacy and 4K competencies in the natural sciences. Students' cognitive attitudes (interest in natural sciences, scientific approach to the subject being studied, awareness of environmental issues) and subject-related knowledge define their level of literacy in natural sciences. Throughout

the study of natural sciences, students become familiar with real-life contexts and global issues. [10]

Conclusion

In conclusion, assessment is "the driving force of education," and it governs the quality of learning. If we establish the learning objectives of lessons based on Bloom's taxonomy, design learning tasks aligned with these objectives, and organize assessment procedures accordingly, we will be able to successfully develop 21st-century skills in our students. Indeed, these competencies are among the most essential life skills needed to achieve success in the 21st century. Moreover, the natural-scientific foundations of a person's worldview are shaped by knowledge of nature. As young learners begin to understand initial concepts about the world around them, they sense that their knowledge base is not yet sufficiently structured. Integrated natural sciences provide an opportunity to address this issue. Implementing an integrated approach in teaching helps develop students' scientific literacy in exploring the world and supports their ability to apply these skills throughout their social lives.

List of used literature:

1. Sh.M. Mirziyoyev "Kimyo va biologiya yo'nalishlarida uzluksiz ta'lim sifatini va ilm-fan natijadorligini oshirish chora-tadbirlari to'g' risida" PQ – 4805 – sonli qarori (2020-yil 12-avgust Toshkent)
2. Sh.M. Mirziyoyev "Xalq ta'limini boshqarish tizimini takomillashtirish bo'yicha qo'shimcha chora-tadbirlar to'g'risida"gi PF-5538-son Farmoni (2018-yil 5-sentabr)
3. Oripova M.Q. PISA – o'quvchilarni ta'limiy yutuqlarini baholash xalqaro dasturining ahamiyati // Konferentsiya materiallari. – Toshkent, 2022. 166-169 B.
4. Schleicher A. Shlyaxer Iqtisodiy hamkorlik va taraqqiyot tashkiloti. Ta'lim va ko'nikmalar departamenti direktori, PISA dasturi asoschisi.
5. Ari A. Finding acceptance of Bloom's revised cognitive taxonomy on the ınternational stage and in Turkey. Kuram ve Uygulamada Eğitim Bilimleri, 2011. 11(2): 767-772
6. Bloom B.S. Taxonomy of educational objectives – The classification of educational goals – Handbook 1: Cognitive domain. London: Longmans, Green & Co. Ltd. 1956
7. Bloom's Taxonomy of Measurable Verbs, Bloom's Taxonomy Verbs For Critical Thinking
8. Razumovskiy V.G. O'quvchilarda ijodiy qobiliyatlarni o'stirish. –Toshkent, "O'qituvchi", 1978.
9. Ochilov F.I. Boshlang'ich sinf o'quvchilariga tabiiy-ilmiy bilimlarni kompetensiyaviy yondashuv asosida o'rgatish metodikasi. Ped. fan. bo'yicha falsafa dokt. dis. avtoreferati. Chirchiq. CHDPI, 2021.
10. Pardayev M., Sangirova Z va boshq. Maktab o'quvchilarida hayotiy ko'nikmalarni rivojlantirish. Tabiiy fanlar O'qituvchilar uchun metodik qo'llanma. Toshkent, Baktria press, 2021. – 160 b.