GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 12, Issue 8 August (2024)

"SCIENTIFIC COGNITION" AND "BIG IDEAS" IN THE CONTENT OF THE SUBJECT "NATURAL SCIENCES" (SCIENCE)

Avazov Sh.
Oriental University, Professor of the Department of Pedagogy of Continuing Education, Candidate of Pedagogical Sciences

Egamberdieva F. O.
Oriental University, Head of the Department of Pedagogy of Continuing Education, Candidate of Pedagogical Sciences

Saidamatov F.
Oriental University, Associate Professor of the Department of Pedagogy of Continuing Education, Doctor of Philosophy in Pedagogical Sciences (PhD)

ABSTRACT

It is now widely believed that the "big ideas of science education" are very useful, and therefore all teachers should work with these ideas in the educational process. The article examines and analyzes the possibilities of scientific cognition and the application of big ideas in the content of the subject "Natural Sciences" (Science) in primary school.

Keywords: primary school, scientific learning, natural sciences (science), cognition, understanding, application, skill, procedure, moral and personal qualities, scientific cognition, "big ideas", PISA.

INTRODUCTION

It is well-known that in the education system of a number of developed foreign countries, "Natural Sciences" (Science) is traditionally taught in elementary schools. In general secondary schools of Uzbekistan, the main subjects of "The World Around Us" (grades 1-2) and "Natural Sciences" (grades 3-4) were also taught traditionally before the 2021-2022 academic year, as well as the new "Natural Sciences" (Science) education, which integrates the initial concepts of geography, biology, physics (grades 5-6) and chemistry (7th grade)the quality of compulsory education has been introduced. The introduction of a system of knowledge and skills that must be integrated into this textbook in a spiral form from simple to complex allows students to develop the virtue of natural and scientific literacy and to scientifically understand the whole universe.

The main idea of the "Natural Sciences" program in primary education is to encompass students with a spirit of scientific research, or scientific knowledge of the universe. At the same time, scientific knowledge covers three aspects of the same importance that [2], which can be grouped and described as follows (see fig. 1):

1) knowledge, understanding, application;
2) skills and procedures;
3) Moral and personal qualities.

Figure 1 analysis reveals that the three listed aspects of scientific knowledge are central ideas, that is, science is reflected as a way of knowing the world. At the same time, the links of "Natural Sciences and the Environment", "Natural Sciences and Society" and "Natural Sciences and Daily Life" determine the practicality of the content of the teaching of "Natural Sciences" (Science) and students take on the role of researcher under the guidance of the teacher. This structure will help elementary school students to develop the virtue of natural and scientific literacy and to ensure that the requirements of PISA international evaluation programs are met [1; 4], i.e. the following skills are developed:

1) the ability to distinguish and put scientific issues from others, to master new knowledge, to explain their natural and scientific events, to develop conclusions based on scientific evidence, and to develop and use natural and scientific knowledge in practical activities;

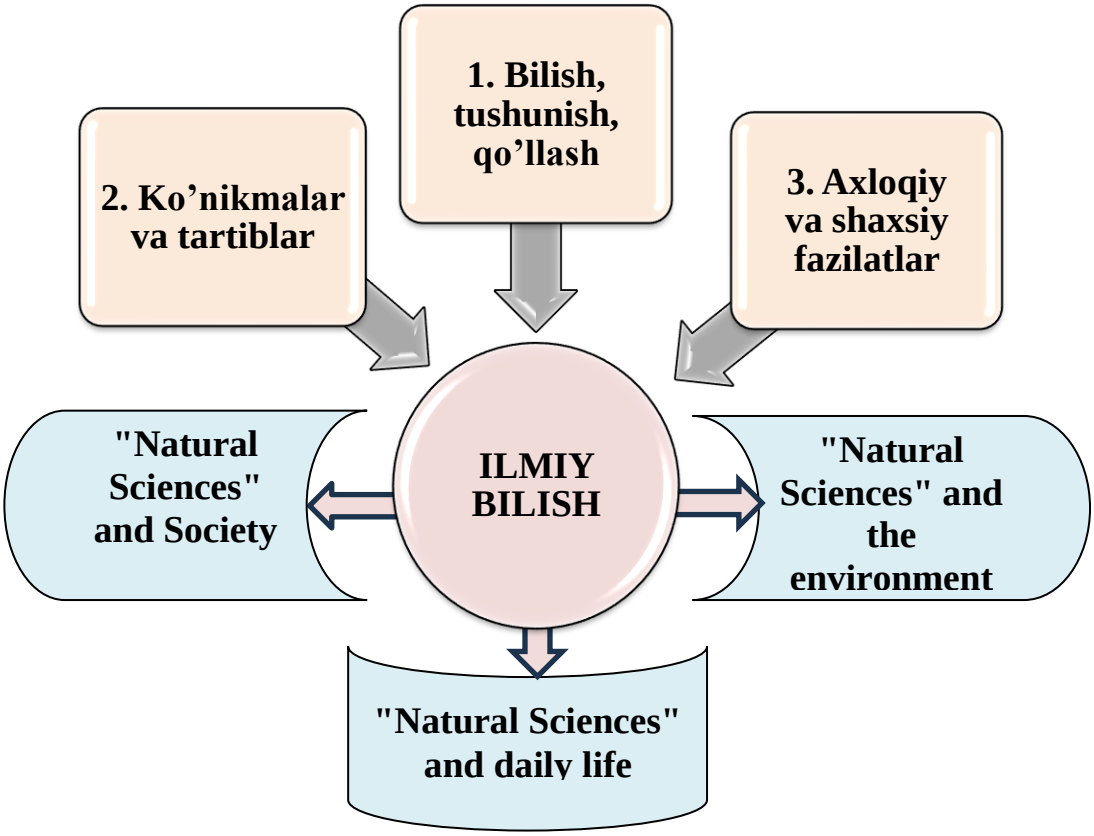

Figure 1. **Scientific knowledge and aspects** of "Natural Sciences"

2) understanding the most basic characteristics of natural phenomena and laws as a form of human knowledge;

3) demonstrate awareness of the influence of natural science and technology on the material, intellectual (spiritual) and cultural spheres of society;

4) to show an active civic perspective when considering problems with natural science.

It _ is noteworthy that in 2022, the results of the International Program for The Evaluation of Students' Education (PISA) were published by the Organization for Economic Cooperation and Development (IHTT) [3], According to him, 15-year-old U.S. schoolchildren who participated in this evaluation for the first time ranked 80th among students from 81 countries

in the natural literacy index and occupied almost the last place. These results show that it is extremely relevant to update primary education programs based on international standards based on three aspects of global scientific knowledge [2], to develop students' natural and scientific knowledge, analytical, critical and creative thinking skills, and ability to apply them in practice, according to the "Natural Sciences" (Science) being introduced into the primary education system. (See chart 1) Jehovah's Witnesses would be pleased to discuss these answers with you.

The importance and advantages of "Natural Sciences" (Science) education in elementary schools are that through this subject, the student understands the whole universe, develops a scientific worldview, and develops research skills. However, "Natural Sciences" education, i.e. teaching (teaching) and learning (studying) it, is one of the most complex and challenging tasks from the point of view of primary school teachers and students. Because in elementary schools, a variety of content and large-scale knowledge will be studied in these curriculums, which will not only study simple natural and scientific concepts (facts, events, or processes) in each class and exercise section but also require the development of skills (competencies) or basic ideas based on interdisciplinary affiliation. At the same time, if this curriculum is presented to the teacher in a strict, predetermined form in classrooms and requires its full implementation, the teacher will lose a sense of personal dishonor in the content of this subject and have the opportunity to teach it creatively in his or her own way.

Table 1 Three aspects of studying the content of "Natural Sciences" (Science) as a method of scientific knowledge of the universe

Knowledge, Understanding, Application	Skills and procedures (processes)	Moral and Personal Qualities
1. Scientific events, facts, concepts and principles. 2. Scientific concepts, terms, and conditional signs. 3. Scientific tools and equipment (along with security equipment). 4. Application of Science and Technology	Skills: 1. Ask questions (put the issue in the middle). 2. Formation of hypotheses (hypotheses or assumptions). 3. Defining the task. 4. Consideration of various possibilities. 5. Forecasting. 6. Tracking. 7. Use of tools and equipment. 8. Comparison. 9. Tasniflash. 10. Clear expression of conclusions. 11. Analysis. 12. Baholash. 13. Check. 14. Information (information) apple-swelling. Layouts (processes): 1. Creative solution to problems (tasks). 2. Plan a study (study or review). 3. Making decisions.	1. The pursuit of curiosity (knowledge or knowledge). 2. Creativity (creativity). 3. Objectivity (integrity, innocence). 4. Honesty (integrity, purity). 5. The breadth of views (points of view, reasoning, or thought). 6. Rigidity (diligence. 7. Responsibility (responsibility).

Psychological research shows that the accumulation of student attention on facts or certain events can distract them from feeling the beauty of science or knowledge. (Matthew 24:14; 28:19, 20) In that sense, a decrease in the positive attitude toward science, or interpretation of science as simple events that include the movement of material particles, can ultimately overlook the "general landscape of the universe." For example, the pleasure and content of life lies behind the knowledge of the world that surrounds us; will be an unsung impression or uplifting mood behind scientific discoveries in science. After all, knowledge is a system rich in enthuastic events, change, which includes a certain attractive factor called beauty. In practice, beauty will be associated with the perception of the world created within the framework of knowledge. The needs and motivations of schoolchildren for education are not only related to the facts, but to their understanding of what knowledge is, why they are relevant or other reasons for it.

To solve these problems , efforts are intensifying among foreign authors of the "Natural Sciences" curriculum in primary education to consider "great ideas" in scientific education as ideas capable of explaining a wide range of scientific facts and events and to be included in the content of the science program. These ideas "allow readers to see the connection between different scientific ideas, which means that if they are interconnected, it is easier to use them in new scenarios than other, unconnected ideas."[5]. In such a situation, how a Natural Sciences (Science) teacher can use these recommendations in his or her classes or how he or she can make these changes to the learning process becomes the most important issue.

In other words, how "Natural Science" (Science) teachers work with "big ideas" in each class, depending on their knowledge, attitudes toward science, type of school they work in, student needs, savings, and so on, how they create or redesign their "big ideas-based curriculum" becomes the most important methodological problem.

The first step toward solving this problem is to understand the essence of the concept of "big ideas" in scientific education.

Current changes in the "Natural Sciences" (Science) curriculum in primary education in a number of countries are taking place in connection with major ideas in scientific education. However, various definitions and experiments have been formed that serve to explain what these ideas are. The origin of this term or concept lies in the fact that under Vinn Harlen a group of science teachers, including representatives of different countries, develop a number of important (sticky) ideas to help students understand the world of nature. Two reports were prepared by this group:

1. "Principles and great ideas of scientific education" [5].
2. "Work with great ideas of scientific education" [6].

The report "Principles and Big Ideas of Scientific Education" provides ten principles of scientific education and fourteen big ideas, why it is "big ideas," the principles that underpin basic scientific education, the choice of great ideas in science, the transition from small ideas to big ideas, and working with big ideas in every way.

Ten principles of scientific education include:

1. Through their academic years of compulsory education, schools should regularly seek to develop and support students' interest in the world around them, enjoy scientific activities, and how to explain natural phenomena.

2. The main purpose of scientific education should be to allow everyone to consciously participate in the making of decisions and appropriate actions that affect their happiness, the well-being of society and the cleanliness of the environment.
3. Scientific education aims for several purposes. It should focus on the development of:
• development of an understanding of the collection of "great ideas" in science, encompassing ideas, science and its role in society;
• development of scientific opportunities related to the collection and use of evidence;
• development of scientific views.
4. A thorough analysis of concepts, as well as an understanding of how current research and learning occur, should be a clear progress towards scientific educational objectives that demonstrate ideas that need to be achieved at various stages.
5. Moving forward with big ideas should be the result of studying topics that are interesting to students and important in their lives.
6. The experience of teaching (teaching, learning) should reflect a view of scientific knowledge and scientific research that is consistent with accurate and modern scientific and educational thinking.
7. Any behavior (or activity) in the curriculum in science should deepen the understanding of scientific ideas and pursue other possible goals, such as the development of views and abilities.
8. Student education and initial teacher training and vocational development programs must comply with the teaching and learning methods required to achieve the goals set out in Article 3.
9. Evaluation plays a key role in scientific education. A formative assessment of students' learning and a summary assessment of its rise should apply to all goals.
10. In achieving these goals, school academic programs should provide opportunities for cooperation among teachers and for public participation, including the involvement of scientists.
Foureen big ideas in science include fan ideas and notions of science.
Fan ideas:
1. All substances in the universe are made up of very small, small particles.
2. Objects can affect other objects remotely (remotely).
3. Changing the movement of an object requires that it be affected by a specific force.
4. The total amount of energy in the universe is limited and the same, but energy can change when a substance changes or occurs.
5. The composition of the earth and atmosphere, the processes that take place in them, form the earth and its climate.
6. The solar system is a very small part of one of the millions of galaxies in the world.
7. Organisms (except viruses) are made up of cells.
8. Organisms require a reservoir of energy and substances - flow; organisms often compete for these resources.
9. Organisms transmit hereditary information from one generation to another.
10. The diversity of living and extinct organisms is the result of evolution.
Perceptions of science:
11. Science assumes that there are one or more reasons for each consequence.

12. Scientific comments, theories and models are the ones most relevant to the facts known at a given time.
13. The knowledge gained by science is used in some technologies to create products that serve human purposes.
14. The use of science often has moral, social, economic, and political consequences.

While academic education has been recognized as the most important for everyone during compulsory primary school education, abandoning the traditional way remains a difficult issue. Therefore, it is not surprising that the "Natural Sciences" (Science) in primary education does not distinguish students from the point of view of developing broad scientific ideas. (Matthew 24:14; 28:19, 20) In fact, this course is a means of forming a student who is now becoming increasingly important in science and technology, who can actively participate in the life of a scientifically literate, technological society, and adapt to the environment in a variety of ways.

Large ideas are ideas that relate to all topics in the content of the curriculum and are holistic and will help you find the opportunity to establish inter-themed and new relationships. The main advantage of applying big ideas is that they allow students to establish a link between mainstream academic views or opinions. Therefore, big ideas can be viewed in elementary schools as an important mold that allows you to combine knowledge consisting of certain pieces or fragments in the content of "Natural Science."

Observations revealed that in the process of transitioning from traditional "The World Around Us" and "Natural Science" education in elementary schools to a new "Natural Science" (Science), most elementary school teachers do not have a full understanding of the great ideas in scientific education and their importance. From this point of view, providing "Natural Science" (Science) teachers with methodological assistance to improve the level of natural and scientific literacy of elementary school students based on great ideas of scientific education and to address their negative perceptions of natural sciences will help improve the quality of education.

REFERENCES

1. Исмаилов А.А. Ўқувчиларнинг таълимдаги ютуқларини баҳолаш тизимини халқаро талаблар асосида такомиллаштиришнинг назарий ва институционал асослари // Таълим ва инновацион тадқиқотлар, 2022 йил, № 2. – Б. 92-103.
2. Pentin A.Y. Features of the Educational Program for Natural Science of the Republic of Singapore: Primary and Basic School // Problems of Modern Education, No 6, 2015. - P. 48-58.
3. Ўзбекистон ўқувчилар кўникмасини баҳолаш халқаро дастурида илк бор қатнашиб, охирги ўнталикдан жой олди // gazeta.uz/uz/2023/12/06/pisa/
4. PISA: Science Literacy. – Minsk: RIKZ, 2020. – 168 p.
5. Harlen, W. 2010. “Principles and Big Ideas of Science Education.” *Duns*. https://www.ase.org.uk/bigideas
6. Harlen, W. 2015b. “Working with Big Ideas of Science Education.” Trieste: InterAcademy Partnership. https://www.ase.org.uk/bigideas.