

SIGNIFICANCE OF INQUIRY-BASED LEARNING IN TEACHING SCIENCES**Otamirzaeva Mokhigul Khakimjon kizi**

University of Business and Science Senior Lecturer in the Department of Preschool/Primary Education and Sports Activities, Doctor of Philosophy (PhD) (PhD)

+998773592988

<https://doi.org/10.5281/zenodo.20200018>

Abstract: This article examines the effectiveness of teaching natural sciences based on the Inquiry-Based Learning method. The article analyzes the theoretical foundations of the Inquiry-Based Learning method and its use in teaching natural sciences based on examples. The results show that Inquiry-Based Learning technology contributes to a deeper understanding of the natural sciences, the development of scientific research competencies, and increased academic achievement.

Keywords: Research-based learning, types of research-based learning, structured research, confirmatory research

Education is the process of preparing a person for life. In modern times, science and technology remain one of the primary factors in the development of society. Therefore, school education should prepare students for a life in which science and technology play an important role. To do this, it is necessary to form in children the knowledge and skills that help them understand the natural phenomena around them and the technological world created by man.

Inquiry-Based Learning (IBL) is one of the modern pedagogical approaches that serves to form essential competencies in students and develop innovative thinking. While the content of the concept of "knowledge" in traditional interpretation consisted of memorizing and repeating information, today it is characterized by the ability to search for, analyze, and effectively use information.

In the educational process, primary attention should be focused on developing practical research skills. In particular, organizing education based on experience, as well as linking educational materials with daily life, serves to increase students' motivation and ensure effective knowledge acquisition. This approach develops students' ability to think independently, solve problems, and apply knowledge in real-life situations.

Research-based learning (IRL) is an educational approach where students actively participate in their learning process, ask questions, seek solutions, and independently develop new knowledge. This method serves to develop deep understanding, critical thinking, creativity, and problem-solving skills.

John Dewey emphasized that education should be based on students' experience and interests. He believes that learning through research allows students to gain a deeper understanding of knowledge and relate it to real-life situations [2]. Jerome Bruner has argued that learners learn more effectively when they discover information on their own.[1] The main idea of research-based learning is rooted in the process of personal discovery of knowledge by students. In this process, students (as researchers) are directed to formulate important questions, analyze them, and find reasonable answers based on critical thinking. This approach also fosters students' ability to respect their own interests and the interests of others.

"Inquiry-Based Learning (IBL) " is a comprehensive concept that encompasses various teaching methods, such as field research, problem-based tasks, scientific projects, and practical exercises [3]. These methods encourage students to conduct independent research, observe, and discover knowledge. Furthermore, research-based teaching once again demonstrates the creation and transfer of knowledge to students, as well as the contribution of all participants in this process—specialists, teachers, parents, and society.

The role of the teacher in a research-based classroom is fundamentally different from that in a traditional classroom. While in the traditional approach, the teacher acts as a conveyor of ready-made knowledge, in the IBL environment, they assist students in independently forming questions on the topic and act as a facilitator guiding their further research activities. Teachers who apply a research-based approach pay great attention to creating a rich educational environment that stimulates students' thinking processes and interest. They carefully plan a system of questions, manage the research activities of several students at the same time, regularly evaluate each student's process of achieving a solution or final result, and respond quickly to new questions and discoveries that arise in students.

Research-based learning

Inquiry-Based Learning (IBL) involves various approaches, which vary depending on the level of guidance provided by the teacher and the level of students' independence [4]. Below are the main types of research-based learning:

1. Structured Inquiry. In a structured study, the teacher presents students with a clear question and a detailed procedure to follow. Students, following these instructions, collect, analyze, and draw conclusions. In primary grades, structural research is highly oriented by the teacher. The teacher presents a clear question and ready-made experimental steps, while students perform practical work based on instructions. In a science lesson, for example, a question such as "under what conditions does a plant grow faster?" is asked, and the stages of conducting the experiment by changing the soil, water, and light conditions are clearly defined. This type of approach focuses primarily on developing basic skills, namely observation, measurement, and recording of basic information. In this case, the teacher determines the question and the order of execution, and the student follows the provided instructions. The level of independence is low, and determining the sequence of processes and developing technical skills are of primary importance.

2. Guided Inquiry . In a guided study, the teacher presents a research question, but the students themselves develop the sequence of actions necessary to study this question. For example, primary school students conduct experiments under various conditions (hot, cold, open container, closed container) based on the question "What affects the evaporation rate of water?" and analyze the results themselves. This approach develops students' independent thinking and scientific research skills. The key aspects are that the teacher's role is to ask and guide the research question. The student independently develops the research procedure. The level of independence is moderate and focused on developing skills in conducting experiments and analyzing data.

3. Open Inquiry. In this approach, students independently formulate their own research questions, develop research or experimental methods, implement them, and draw final conclusions. The teacher acts primarily as a facilitator and provides minimal guidance. For example, students will self-identify with questions such as "how can we keep the environment clean?" and implement small research projects. Key aspects The role of the teacher: Acting as a facilitator. Student's role: Independently formulates research questions and methods. Level of independence: High and based on the development of creativity, independence, and self-management skills.

4. Confirmatory Inquiry . In a confirmatory study, students are given a previously known result and a corresponding question. Students confirm this result through experimentation. For example, to test the idea that a magnet attracts only iron objects, experiments are conducted with various materials.). This type of research fosters students' ability to gain a deeper understanding of scientific patterns and processes. Key aspects The role of the teacher: presents the question and the expected outcome. Student's role: confirms the given result through experience. Level of independence: From low to medium, focused on developing problem-solving skills, collaborative work, and the reinforcement of scientific concepts.

In conclusion, Inquiry-Based Learning fosters a generation where learners acquire the life skills necessary for success by prioritizing independence, critical thinking, and solving real-world problems. Inquiry-Based Learning types are applied in stages according to the age characteristics of students. While structured and confirmatory research develops initial skills, focused and open research develops independent thinking, creativity, and scientific inquiry competencies. As a result, students will have the opportunity to master natural sciences not only theoretically, but also in a practical and life context.

References

1. Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review*, 31 (1), 21-32.
2. Dewey, J. (1938). *Experience and Education*. New York, NY: Kappa Delta Pi.
3. Hutchings, W. (2007). *Enquiry-Based Learning: Definitions and Rationale*. Manchester: University of Manchester. Retrieved from [http://www.ceeb1.manchester.ac.uk/resources/papers/hutchings2007_definingebl.pdf] (http://www.ceeb1.manchester.ac.uk/resources/papers/hutchings2007_definingebl.pdf).
4. Sunita. *Inquiry-Based Learning: Fostering Critical Competencies and Innovation // International Journal of Innovative Research in Technology*. - 2019. Vol. 5, Issue 8. – P. 318. - ISSN 2349-6002.