ORGANIZING SCHOOL PROJECTS ON WATER RESOURCE MANAGEMENT BASED ON THE STEAM APPROACH

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Abstract: This article examines the issue of teaching water resource management in secondary schools through project-based activities using the STEAM approach. The problems of water scarcity and rational water use are interpreted not only as theoretical knowledge for students, but also as educational and practical issues encountered in everyday life. The article reveals the possibilities of integrating the topic of water with geography, biology, technology, engineering, art, and mathematics, and proposes a compact project model that can be implemented in school settings.

Keywords: STEAM, water resources, geography education, ecological culture, school project, water conservation, interdisciplinary integration.

Today, the rational use of water resources has become an issue directly linked to environmental security, economic stability, and public welfare. Population growth, the expansion of agricultural and industrial needs, and climate change are increasing the demand for water. Under such conditions, it is important to develop a culture of valuing, conserving, and responsibly using water among the younger generation from the school years onward.

In the context of Uzbekistan, water resources have strategic importance. The development of water management systems, water accounting, the introduction of digital technologies, and improving the efficiency of water use are among the priority directions of state policy. Therefore, these processes should also be reflected in educational content. Students should perceive water not only as a topic related to rivers, lakes, or groundwater, but also as a vital resource connected with their own lives, schools, and communities.

In traditional lessons, water resources are often explained through theoretical information. Certainly, knowledge about river basins, precipitation levels, irrigation networks, and drinking water sources is necessary. However, if knowledge is not connected with students' personal observations and practical actions, environmental education cannot achieve the expected level of effectiveness. For example, when students personally observe leaking taps, excessive irrigation, or unnecessary water waste at school, the issue of water becomes not an abstract concept, but a real-life problem.

From this perspective, the STEAM approach helps connect the topic with real life. It transforms students from passive learners who memorize ready-made answers into active participants who identify problems, collect information, calculate, compare, and propose solutions.

The topic of water resources is inherently interdisciplinary in nature. Geography explains water sources, territorial differences, and water distribution; biology reveals the importance of water for living organisms; technology ensures the use of observation and digital tools; and engineering contributes to the development of practical water-saving solutions. The art component is reflected in environmental campaigns, infographics, and map design, while mathematics is used to calculate water consumption, compare data, and draw evidence-based conclusions.

There is no need to artificially combine these disciplines in the teaching process. The topic of water itself naturally encourages students to turn to different subjects: Where does water come from? How is it consumed? How much is wasted? How can it be conserved? How can these ideas be communicated effectively to others? These questions define the practical essence of the STEAM approach.

School projects on water resource management should correspond to students' age, school opportunities, and local environmental conditions. Topics such as "Reducing Water Consumption at School," "The Condition of Irrigation Channels in Our Neighborhood," "Efficient Irrigation of the School Garden," or "Monitoring Water Waste for One Week" are understandable and relevant for students. Through such topics, students perceive water not as a distant natural resource, but as a value directly connected with their daily lives.

The project begins with problem identification. Students observe drinking water taps, handwashing areas, irrigation systems, or moisture conditions in the school garden. Then, the observation results are summarized in the form of tables, diagrams, or simple maps. At the final stage, groups develop practical proposals for water conservation and present them before classmates, school administration, or environmental clubs.

In this process, the teacher acts not as a provider of ready-made answers, but as a facilitator and organizer. Students become observers, analysts, calculators, and problem-solvers. Lessons organized in this way do not merely provide information; they encourage responsible decision-making. Thus, the project model contributes not only to knowledge acquisition, but also to the development of environmentally responsible behavior.

As a practical example, the topic "Reducing Water Consumption at School and Developing a Culture of Rational Water Use" can be implemented with students in grades 7–9 over a period of two to three weeks. During the first week, students identify water-use areas at school and complete observation sheets. In the second week, the collected information is analyzed: the number of taps, the condition of functioning and leaking taps, the times when water consumption is highest, and the shortcomings in irrigation processes are identified.

At the next stage, the mathematical component is introduced. Students perform simple calculations. For example, if a tap wastes a certain amount of water per minute and continues leaking for several minutes each day, students calculate how much water is lost in a week or a month. Such calculations clearly demonstrate the consequences of water waste through real numbers and significantly influence students' attitudes toward the issue.

At the engineering and technological stage, students propose simple water-saving solutions such as preparing lists for repairing leaking taps, placing reminder signs near handwashing areas, developing efficient irrigation schedules for the school garden, or creating simple drip-irrigation models. The art component is reflected in infographics and awareness materials with slogans such as "Every Drop Matters" and "Save Water — Save Life."

At the end of the project, assessment should not be based only on the final poster or presentation. It should also consider students' understanding of the problem, the quality of data collection, the accuracy of calculations, the practicality of proposed solutions within school conditions, and the level of environmental responsibility reflected in their work. Such assessment covers both students' knowledge and their practical activities.

STEAM-based water projects strengthen the connection between geography education and real life. Students do not only read about water resources in textbooks; they observe the actual situation in their own schools. This process is especially important in developing environmental responsibility. Indeed, calculating how much water is wasted through a single leaking tap has a much stronger impact on students than general discussions about water conservation.

Several methodological conditions are necessary for the effective organization of project activities. First, the topic should correspond to students' age and school opportunities. Second, tasks should end not only with presentations but also with practical proposals, even if they are

small-scale. Third, interdisciplinary integration should arise naturally from the content of the topic rather than being artificially imposed. Only then does the STEAM approach become not an external decoration, but the meaningful foundation of the lesson itself.

The educational value of this approach lies in developing students' personal sense of responsibility toward water resources. Students begin to understand that protecting water resources is not only the responsibility of the state, specialists, or adults, but also depends on their own daily habits. In this way, the methodological model combines geographical knowledge, environmental culture, and civic responsibility within a single learning activity.

In conclusion, organizing school projects on water resource management based on the STEAM approach strengthens the practical orientation of geography education. Such projects enable students to understand the natural, economic, technological, and social significance of water in an integrated way. Most importantly, students perceive water not simply as a topic to be studied, but as a valuable life resource that must be protected and conserved.

Teaching water resources through the STEAM approach develops students' skills in observation, measurement, calculation, analysis, mapping, project design, and environmental advocacy. It is advisable to organize such projects in schools using local examples, demonstrate water consumption and waste through simple calculations, and conclude project results with practical recommendations.

Thus, school projects on water resource management connect students' theoretical knowledge with real-life experience, develop their environmental culture, and contribute to the formation of a responsible attitude toward valuing, conserving, and protecting water resources among the younger generation.

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