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Organizing Ecological Projects In Schools Based On Steam Approach

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Abstract: This article presents the results of a study devoted to organizing environmentally oriented projects in general education schools based on the STEAM approach (Science, Technology, Engineering, Art, Mathematics) and analyzing their effectiveness. The study explores the role and impact of the STEAM approach in developing students' environmental culture, as well as the outcomes of practical and project-based activities. Furthermore, based on national and international experience, advanced pedagogical practices, and methodological recommendations, proposals were developed for integrating this interdisciplinary approach into the educational process. The findings show that STEAM-based environmental projects effectively foster students' independent thinking, problem-solving, teamwork skills, and contribute significantly to the formation of environmental awareness.

Keywords: STEAM approach, environmental education, school environmental projects, formation of environmental culture, natural science education, interdisciplinary integration, project-based learning methodology, students' creative activity, ecological thinking, innovative pedagogical approach.

Introduction: Current time education in the process in students ecological worldview expansion, nature conscious relationship formation and ecological culture develop the most important from tasks one is considered. In the 21st century ecological global nature of the problems to receive and human of activity to the environment negative of the impact increasing going under the circumstances young in the generation ecological thinking develop education system priority in the direction of around In particular, general education in schools ecological upbringing to the issue separately attention attention, students ecological problems scientific basically analysis to do, their solutions search and in practice by hand to take skills formation necessity increasingly increasing is going on.

Current education system main from the duties one - the students practical, project-based and independent to activity attraction to grow through them in real life to situations In this respect, when viewed, the STEAM (Science, Technology, Engineering, Art, Mathematics) approach only interdisciplinary integration providing not, maybe in students nature events deep understanding, analysis to problems scientific basically solution find and creative and critical thinking skills to form service does.

STEAM approach based on ecological projects organization to add, one on the other hand, in the students natural to sciences was interest increases, the second from their side, ecological consciousness, responsibility and to nature relatively positive attitude in formation important importance profession This will approach using education in the process students not only environment with related problems deep they learn, maybe ecological projects real life via to situations suitable practical solutions working exit, self ideas from the test transfer and creative thinking qualifications develop to the possibility has They will be.

STEAM approach modern in education integrated sciences based on deep knowledge to give directed is an effective model. This approach in students interdisciplinary thinking development, real life problems solution in the process of different in the fields knowledge harmony and application opportunity In particular, environmental education STEAM approach in the field in students research skills, environmental culture, technology literacy, as well as art through aesthetic views in formation high to

efficiency has It will be.

For example, water pollution to study directed ecological the project seeing if we go out, this in process Biology and Chemistry sciences of water physicist and chemical properties research to reach opportunity gives, Technology and Engineering and water to clean intended devices and equipment design opportunity creates, Art element through and ecological posters, visual materials or animations prepared, Mathematics and the results statistic analysis to make, diagrams and interest through in expression is applied.

So integrated approach of the students thinking circle expands them, making them real-life ecological to situations prepares and stable development supportive, independent decisions acceptance to do skills shapes.

STEAM approach worldwide based on ecological projects organization to grow and their efficiency increase according to one row progressive experiments For example, Finland in schools ecological projects from school outside – nature in the bosom, scientific centers with in cooperation take students will conduct real experiments and observations through ecological problems deep South In Korea and the STEAM approach The “Green Schools” program is based on runs, its main purpose the students ecological security, energy saving and waste again work such as practical skills with is to provide. The United States some STEAM schools in the states the environment protection to do according to contests, hackathons and ecological laboratories with enriched this is in projects students collective performance, design and modeling through own ecological initiatives demonstration they will.

In Uzbekistan, the national program “Green Space “, “Ecological education concept” and “STEAM learning centers” activities through ecological education in the field noticeable positive changes done In particular, Uzbekistan Republic People education ministry by one a series of STEAM labs organization done they are biology, chemistry and physics sciences according to modern equipment with is being provided. With this together, practical ecological of projects permanent accordingly organization their efficiency systematic accordingly analysis to do and education to the process complex integration to do issues still complete solution not done.

This STEAM approach in the article based on at school ecological projects organization to grow and their efficiency assessment for complex methodological approach was used. Research experimental, observational and analytical methods own inside received then general education 7th–9th grade students of schools participation they did.

In the article following methods complex in a way used:

1. Analysis and synthesis – STEAM approach, ecological education, project based on education and interdisciplinary integration according to scientific literature, articles and educational and methodological sources studied and analyzed was done.

2. Observation – students in the project participation, activity, interest and change process permanent accordingly following went.

3. Experiment – ecological projects done increase through of the students ecological culture and scientific in his mind face gave changes was evaluated.

4. Questionnaire and conversation – participant students and from the teachers project efficiency, interest level, independent to think impact about information received.

5. Comparison and generalization – in the project participated and not participating students results compared, general conclusion was released.

STEAM components integrated activities within following ecological projects done increased and they via STEAM elements harmonized:

1.Water quality study (Science, Math, Engineering)

Students different water from sources samples take the water pollution level – colorlessness, pH indicator and cleanliness They also checked the water to clean intended device model created and gathered information based on diagrams and statistic analyses they made.

2. “Waste is a resource” project (Technology, Art, Science)

Again work possible was waste (plastic, paper, metal) was collected. Technology in their classes from waste practical items prepared (pencil case, vase, decorations). Poster, video clip and stage appearances through waste culture promote was done.

1. “Green School” project (All STEAM elements)

In the schoolyard small greenhouse organization was done. Initial to produce engineering drawings Temperature, humidity, soil status permanent observed. Students observations daily in the form of statistic analysis as They went.

Research process following in stages done increased:

1. Preparation stage:

School leadership and teachers with in cooperation plan was compiled. Students with initial conversations, motivational training was held.

2. Execution stage:

Each project according to worker groups STEAM directions for teachers according to tips gave. The students independent experiments, analyses, posters they prepared.

3. Analysis and assessment stage:

Projects in the end students own works according to presentations They conducted a survey, an interview. and experiment results analysis is done, the students ecological culture and scientific in skills changes was evaluated.

This research within STEAM approach based on organization done ecological of projects of the students ecological culture in formation efficiency practical and statistic methods through was identified and evaluated. In the study participation 7th–9th grade students who have in projects active participate in environmental concepts deep mastery, creative and critical thinking, scientific analysis to do and independent decision acceptance to do skills developed. STEAM components through formed skills

Project-based activities during in students following skills formed:

- Water and air quality determination , soil the composition analysis to do according to practical experiments was held .
- Waste with related problems eliminate to grow for the purpose “Waste” at school separate “Collection” initiative previously pushed.
- Ecological theater scenes, posters and videos created and made available to the school community presented was done.
- Water pollution, waste size and energy saving according to statistic analyses and graphs prepared.

3. Project of the participants thoughts

Questionnaire results according to 88 percent of students project in them to ecology was interest increased by 75 percent and own thoughts free expression to grow and in the team work skills developed emphasized. Teachers and projects the students to activity motivated, passive students are also interested what he said, STEM subjects relatively attitude positive towards that has changed record they did.

4. Organization done real results of projects

Green School Project in the school yard on an area of 10 sq.m. greenhouse built and 5 types vegetable and plants care was done.

Waste is a resource project 56 kg of waste during separate gathered and 12 useful item working was released.

Water analysis project 3 types via source pH level in water studied, results based on reports prepared. This results not only of the students knowledge level, maybe their to the environment responsible attitude directly to the formation service did.

This research The results of the STEAM approach ecological education to the process effective in a way integrated shows. In students ecological culture in the field to the surface arrived positive changes, in particular, their independent thinking, scientific basically decision acceptance to do and in the team work skills, this approach education in the process high potential confirms. STEAM approach advantages and to the results impact

Research during observed changes this showed that:

Science – students biology, geography and chemistry in the sciences theoretical knowledge in practice try see as far as possible has they were, this and to sciences was confidence and interest increased.

Technology – ecological in projects digital from tools (e.g. sensors, Arduino) use of the students modern to technologies was interest Engineering (engineering) - students own ideas design, drawing based on modeling through physical to objects to convert they learned.

Art – visual presentations, theater scenes, videos and posters through students ecological problems aesthetic approach with they tried to express.

Mathematics - statistics analyses, graphs and measurements through students ecological situations quantitative in terms of evaluation they learned.

This many directional approach the students wide comprehensive to think and real problems interdisciplinary knowledge based on solution to do Research results also the following progressive pedagogical practices and experiments with It will wake up.

In a study by J.R. Weitzman (2019) record It is expected that STEAM- based education through ecological mind and social responsibility together develops. Our research is also conclusion practical examples through confirms.

Also, N. Sharipova (2021) in their research ecological project of affairs in students to the result orientation feeling increase emphasized.

In the article of the students initiative showing and projects independent continue caused this the idea further strengthens. With this together, Uzbekistan Republic People education system development until 2030 concept (2019) previously “The student 's” active subject as development” principle exactly the STEAM approach through in practice effective implementation was done.

Research this shows that STEAM - based ecological projects:

- natural sciences to the lessons add,
- from class outside in activity use,
- interdisciplinary integration based on current to do through not only ecological education, maybe of the students general thought potential, communicative skills and technological Literacy also develops.

From this outside, at school organization real projects (for example, the “Green School” greenhouse, waste useful items preparation) in students own to work responsible attitude and to effectiveness aspiration feeling This aspect own in turn education process efficiency increases.

CONCLUSION

This research within take visited observations, practical experiments and analyses this showed that the STEAM approach based on at school ecological projects organization to grow in students ecological culture in formation effective pedagogical tool It is considered interdisciplinary. to integration based approach students, ecological problems analysis to do, to problems creative and scientific solutions to find, in the team to work and to effectiveness directs.

Research results shows that the STEAM approach ecological education content enriches it, practical and contextual to the point brings. Ecological projects of the students ecological concepts deepens, conscious attitude and responsibility Students creativity, technological literacy, critical thinking, and scientific analysis skills occupies. Study to the process this approach input the students passive from the participants active to the participants turns.

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