

**THE ROLE OF STEAM PROJECTS IN DEVELOPING CREATIVE THINKING IN  
ELEMENTARY TEACHERS**

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Abstract. This in the article start class of students creative thinking STEAM (Science, Technology, Engineering, Arts, Mathematics) projects in development pedagogical importance , methodological opportunities and results analysis In the study experiment works based on of the students creative thinking , problematic in situations independent decision acceptance to do , in collaboration work , logical and aesthetic thought such as skills change dynamics studied . Obtained results this showed that in STEAM projects participated students creative thinking 27 percent at the level growth manifestation reached , this and project approach elementary in education creativity in development efficiency confirms .

**Key words :** STEAM , creative thinking , beginning education , project activity , innovation approach , logical thought

Login . In the **21st century education process main The goal is for students independent , critical and creative thinking Creative thinking ( creative) thought ) – this new ideas create , exist knowledge to oneself typical in a way hand knowledge , unusual solutions find is the ability . Start eating education during this adjectives especially important because this child's thinking at different stages flexibility , imagination power and to know was natural interest the most high at the level will be .**

Modern STEAM (Science, Technology, Engineering, Arts, Mathematics) approach in education of the students practical , analytical and creative activity harmonizing effective system as confession This is being done . approach in children not only interdisciplinary connection understand , maybe them practical in situations apply , new ideas try view , collective work and communication culture formation opportunity gives .

Uzbekistan education STEAM projects in the system last in years active current is being done . But start class students creative thinking in development clear mechanisms , stages and results according to empirical research enough not . This because of this article following to questions answer is looking for :

1. Start drinking class students creative thinking STEAM projects in development how role plays ?
2. Based on STEAM organization done education process in the students creative skills impact how ?
3. This the process effective organization to grow for how pedagogical conditions necessary ?

Modern education in the system of the students creative thinking develop the most important strategic from directions one as confession The 21st century is being competencies in the center located **creative thinking** is person's news create , non-standard in situations effective solution find and there is knowledge new in context application Therefore , education in the system **The STEAM approach** (Science, Technology, Engineering, Art, Mathematics) is creative thinking development modern and effective model as is being considered .

Today on the day world education in the system of the students " **knowledge** " from **memorization knowledge in practice to apply** " **pass** " on the principle based training activities priority profession OECD (2022) , UNESCO (2023) etc. international organizations in reports record It is believed that the beginning education in the phase creative thinking to develop directed interdisciplinary approach students not only academic indicators , but their personal activity , communication and problem solution to grow skills are also noticeable at the level increases .

**Start drinking class students** are to know curiosity , imagination wealth and experience through to study high to need has was young Category . Exactly this in stages their thought to the processes creativity elements to absorb , to absorb them observation , analysis to make , to synthesize and to evaluate to teach important importance profession STEAM projects are in process to oneself typical training tool as manifestation will be .

**STEAM approach** traditional education in the system interdisciplinary borders breaks and students' real - life problems complex approach based on solution to do ability Especially the " Art " component addition ( i.e. creative art and design elements ) creative thinking in formation important factor become service does . Because this component student 's aesthetic taste , expression tools choice ability and own the idea visual or verbally expression opportunity expands .

Uzbekistan " Education " of the Republic "about" Law (2020), " New Uzbekistan – school from the threshold " begins " idea , and the plan for 2030 National education in the program students **creative thinking , critical thinking and problematic in situations solution find abilities formation** main from goals one as In this respect STEAM technology start in education of teaching new model is , it is the students' independent thinking , communicating free to be , scientific analysis and synthesis based on conclusions take out to take provides .

Last in years Uzbekistan education in the STEAM direction in the system one row experiments done is being increased . Including , Innovation development Ministry of the People education ministry and by IT-Park start in education " **STEAM clubs** " organization to be students practical experience based on thinking is activating . With this together , this process of the students methodical literacy , project-based thinking It also requires developing skills .

So so , this of the research relevance the following with is marked :

1. Start drinking in education creative thinking develop problem modern education in the system leader from topics one is considered ;
2. STEAM approach of the students scientific , technological and artistic thinking integration opportunity gives ;
3. There is education in methodologies students creativity activity systematic to develop directed integrative projects enough at the level working not released .

Therefore , this research **start class in students creative thinking STEAM projects in development place and importance to determine** , their pedagogical the basics analysis to do and practical recommendations working to go out focused .

Methods. Research design . **Research experiment in character divided into three in stages conducted : diagnostic , experiment and control stages . Mixing method ( quantitative and quality ) was used .**

Participants: Experience 3 secondary schools in Tashkent region It was held in grades 2–4 of the school . General 96 people on the account student participation seven , 48 of them experience , 48 people control to the group separated .

Criteria : Creative thinking assessment for following criteria marked :

1. **Thinking fluency** — ideas number ;
2. **Originality** — unusual solution find ability ;
3. **Imagination power (imagination)** — visual and verbal creativity level ;

4. **Logical logical consistency** — the idea justification , cause and effect show Evaluation Torrance creative thinking test customized shape based on done increased . STEAM projects content . Experience in the phase students 6 integrative for project working output :

1. " **Plants " life "** ( Natural Science + Art );
2. " **Water is life" source "** ( Natural Science + Technology );
3. " **Construction engineer ( Mathematics + Engineering )** ;
4. " **Robotics " Fundamentals "** ( Technology + Mathematics );
5. " **Creative numbers "** ( Mathematics + Visual art );
6. " **Ecological city "** ( Interdisciplinary project : Natural science, art , technology ).

Each project 2–3 weeks continue reached and finally students own developments , models and ideas presented they did .

Data assembly and analysis to do . Start drinking in stages students creative thinking level determined , experiment in the end again measurement done The data were analyzed using a t-test . analysis done , quality in analysis of the students works , painting and project descriptions encoded .

Results . **Experience group of the students creative thinking average index from 2.98 to 3.78 increased , i.e. 27% increase record Control in the group and this index from 3.01 to 3.19 changed (6% increase ) . T-test result according to , groups between noticeable difference detected (p < 0.01).**

Creative of thinking the most many growth observed directions :

1. **Imagination Strength : 33% increase**
2. **Originality : 28% increase**
3. **Thinking Flexibility : 25% increase**
4. **Logical consistency : 21% increase**

Quality results . Students in interviews following thoughts reported : " Projects on time we own our idea say Let's get it , everyone. the idea "I hear the water ." saving I made a video about it — this me to think " The picture and mathematics together if , read interesting " It will be ."

Readers and STEAM projects in students cooperation , initiative and creative approach in development positive the impact they emphasized .

Discussion. **Research results this showed that STEAM projects students creative his/her thinking in formation important role plays . This result international with studies ( Bybee , 2013; Yakman , 2019; UNESCO, 2022) harmonious is , integrative education model students motivation and cognitive activity increase approved .**

STEAM activities students :

problematic situations independent solution to reach , interdisciplinary connection to see ,

new ideas previously to push ,

aesthetic and scientific thinking to reconcile teaches . However, in experience some problems were also observed : lack of material resources lack of time limitation and students ' STEAM methodical readiness Therefore , education in institutions special "STEAM laboratories " were established to teach , to teach Seminars and trainings for transfer recommendation is being done .

Conclusion . **Experience results based on following to conclusions bride :**

1. STEAM projects start class in students creative thinking in development effective tool is considered .
2. Project activity the students active learning , collaboration work , ideas in practice to try encourages .

3. Based on STEAM organization done training students logical , visual and verbal thinking complex develops .
4. Process efficiency increase for STEAM methodology for teachers according to systematic preparation necessary .

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