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Organizing Students' Creative Work in Teaching the Topic "Linear Function"

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Abstract: This article explores methods for fostering students' creative activity in teaching the topic "Linear Function" to 7th-grade students, based on the National Curriculum for Mathematics approved by the Ministry of Preschool and School Education of the Republic of Uzbekistan. The study examines the effectiveness of organizing creative tasks, applying the STEM approach, and integrating project-based learning using lapbook technology into the educational process. This approach supports the development of students' independent thinking, problem-solving abilities, as well as design and presentation skills.

Keywords: Linear function, lapbook technology, National Curriculum, STEAM approach, creative thinking, competence.

INTRODUCTION

Educational reforms currently underway in Uzbekistan, particularly the "Strategy for the Development of General Secondary Education for 2023–2025," the "National Curriculum," and the "New Generation Textbooks" concept, emphasize the development of students' personal activity, creative thinking, and independent analytical skills as key objectives in the teaching process.

Today, the level of development of any nation, state, or society is primarily measured by the attention it pays to human capital and human development, as well as the steps it takes in this direction. At present, teaching mathematics in connection with practical exercises occupies an important place in Uzbekistan, as it serves as a primary tool for developing students' logical, systematic, and creative thinking. From this perspective, organizing creative tasks in teaching the topic "Linear Function" allows students to move beyond merely memorizing knowledge, enabling them to analyze, apply in practice, and generate new ideas.

Regular use of various technologies in studying different forms of functions helps students fully understand and master the topic. For this reason, we organized students' creative work using lapbook technology during the study of functions.

Lapbook technology emerged in the United States at the end of the 20th century. Initially, this method was used in home education to engage students with a topic and encourage independent exploration. The concept was introduced by Dinah Zike, who created the first methodological guidelines for visually and actively learning subjects through "foldable books" (Weatherford City Government; Brantley, M)

By the 2000s, lapbook technology began to be widely applied not only in foreign language teaching but also in natural sciences, history, mathematics, and the arts. During this period, Russian educators and researchers such as (Alkina, T.N. 2021; Narimbetova Z.A. 2019; Brelavseva E.B. 2020; Vladikina E.A. 2022). analyzed the didactic potential of the lapbook method and assessed it as a technology for fostering creative thinking in classroom practice.

In the Uzbek education system, initial scientific and methodological studies on the adoption and localization of this technology began to appear in 2020. In particular, Rakhimova N.X. (2024), in her article "Developing Creative Activity in Mathematics Lessons Using Lapbook Technology," examined this approach as a method for enhancing students' creativity in algebra and geometry. Similarly, Nishonov S.N. and Qodirova M.S. (2022), in their article "STEAM Approach in Modern Education: Theory and Practice," studied lapbooks as an integrative technology within the STEAM framework.

A lapbook is a folded, creative, and educational notebook containing drawings, notes, tests, interactive foldables, and diagrams. Each topic in a lapbook is presented using colored papers, adhesive graphics, and envelopes. Students can create lapbooks using colored papers, markers, rulers, movable graphics; electronic versions can be produced with software such as PowerPoint, Canva, and GeoGebra; video explanations can be integrated via QR codes (Figure 1).

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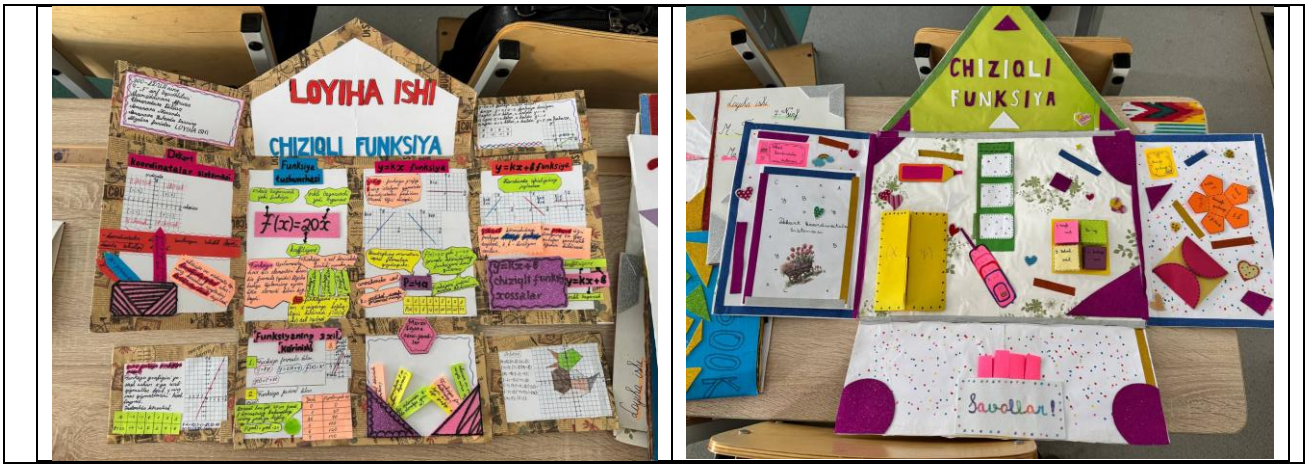

Figure 1. Lapbook

According to our observations and research, the use of lapbook technology serves as a modern pedagogical tool that organizes students' interactive, visual, and creative learning activities. It enriches the educational process with elements of play, inquiry, and design, as highlighted in previous studies (Yu.Q. Jumaniyozova. 2024; Yu.Q. Jumaniyozova. 2024; Yu.Q. Jumaniyozova. 2025)

In teaching linear functions, organizing creative tasks can be one of the methods to make mathematics more engaging for students. According to the students, this approach facilitates understanding of the topic, makes learning enjoyable, allows students to work at their own pace, and differs from traditional lessons.

RESEARCH METHODOLOGY

Object and Sample of the Study

The study of functions typically begins in the 7th grade (A. Akmalov *et al.*, 2022; Annual plan for Grade 7, 2025; A. Akmalov *et al.*, 2022). The aim of this research was to examine how organizing creative tasks while teaching linear functions to 7th-grade students affects their learning outcomes and attitudes toward mathematics. To achieve this goal, the following research questions were formulated:

- How does the use of creative tasks affect students' learning outcomes?
- How does the use of creative tasks influence students' attitudes toward mathematics?

Currently, the STEM (Science, Technology, Engineering, Art, and Mathematics) approach is gaining significant relevance in school education. The STEAM approach integrates all subjects into a unified teaching system based on real-life applications. During STEAM-based learning, students actively use both their minds and hands to successfully study various topics. This new approach represents the logical outcome of integrating theory and practice in education.

To identify and develop students' creative activity while teaching the topic "Linear Function" to 7th-grade students, we conducted a study which we symbolically called the lapbook project "Let's Create!" The experiment was conducted at School No. 300, Sergeli District, Tashkent. The 7th-grade "B" class served as the control group and was taught using traditional methods, while the 7th-grade "F" class served as the experimental group and was taught using lapbook technology.

Lessons were conducted based on the 7th-grade Algebra textbook (A. Akmalov *et al.*, 2022). In the 7th-grade Algebra curriculum, the topic "Linear Function" corresponds to lessons 34, 35, 36, 39, 40, and 41 in the third quarter of the Mathematics course (A. Akmalov *et al.*, 2022). Linear functions are described in Chapter 5, Sections 1–4 of the textbook (A. Akmalov *et al.*, 2022). The topic consists of the following sub-sections:

- Cartesian coordinate system (p.112)
- Concept of function (p.115)
- Linear function (p.120)
  Function y = kx (pp.120–121)
  Function y = kx + b (pp.122–127)
- Project work (p.128)

During the experiment, the following were conducted:

- Initial test
- Creative project (Lapbook)
- Questionnaire
- Final test

Research Procedure

The study was carried out using lapbook technology while teaching the topic "Linear

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Functions" to 7th-grade students. To compare learning outcomes, initial and final tests were administered, and to compare students' attitudes, questionnaires were given to both experimental and control groups.

Before the research, all participating teachers were briefed about the procedure. It was decided that the topic of functions would be taught according to the curriculum, which was approved by all teachers. The first two lessons served as preparatory exercises for the topic, with practice exercises prepared by the researcher. Following these lessons, an initial test on the topic was conducted.

In the control group, the topic was taught traditionally, without the lapbook project. In the experimental group, the lapbook project was used as a supplement to traditional teaching. According to the plan, students in this group prepared creative work over four lessons, following instructions provided by the researcher.

Through the lapbook project "Let's Create!"**,** we developed a project that helped students better understand the topic "Linear Function" (Yu.Q. Jumaniyozova. 2024; Yu.Q. Jumaniyozova. 2024; Yu.Q. Jumaniyozova. 2025) Students consolidated information from (A. Akmalov *et al.*, 2022; Yu.Q. Jumaniyozova. 2023; A. Akmalov *et al.*, 2022) and expressed their own creative ideas within a single project. In the project, students of the 7th-grade "F" class worked in groups to complete tasks corresponding to each sub-topic. Each group mastered the content and represented it in the form of a lapbook.

This project aimed to develop the following skills in students:

- Critical and creative thinking
- Practical problem-solving
- Design and presentation skills
- Team collaboration

Overall, this project was designed to facilitate creative mastery of the topic and allow students to freely express their ideas.

Content and Stages of the Project "Let's Create!"

The project "Let's Create!" was structured in the following stages:

- **Preparation** – defining the topic and objectives, introducing the concept of lapbook technology;
- **Creative Stage** – representing the topic visually and graphically, creating the lapbook;
- **Presentation** – showcasing the results of group work, conducting Q&A sessions;
- **Reflection** – analyzing and evaluating the outcomes.

In 7th grade, students' creative abilities during the "Let's Create!" lapbook project on linear functions and their practical applications were assessed according to criteria developed based on (Sh.M. Mirziyoyev, 20124; The Minister of Preschool and School Education of the Republic of Uzbekistan, 2024). The assessment rubric is presented in Table 1.

Table 1. Assessment Criteria

Assessment Criteria	Maximum Score	Description
Complete coverage of the topic	10	Theoretical content and examples are accurately presented
Graphs and diagrams	10	Accuracy of graphs and correctness of coordinates
Design and aesthetics	5	Creativity and color coordination
Collaboration	5	Group activity and participation
Presentation quality	10	Clear and logical expression of ideas
Total	**40**	

The project was implemented with 7th-grade "F" students at School No. 300, Sergeli District, Tashkent. Initially, students were provided with general information about lapbooks and the process of creating them. Subsequently, students were divided into groups and given the opportunity to discuss the assigned topic, express their opinions independently, and present their ideas.

Working in groups, students engaged in practical project tasks to reinforce their understanding and skills for each sub-topic. Their mastery of the topics was assessed through the creation of the "Let's Create!" lapbook (Figure 2).

"Let's Create!" Lapbook Project

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Figure 2. Lapbook Creation Process

During the project, students developed their own ideas while completing tasks and solving problems related to the topic "Linear Function". The teacher monitored students' activity and provided guidance when necessary. Students independently analyzed and evaluated the extent to which they had mastered each sub-topic.

In doing so, they integrated information from sources Yu.Q. Jumaniyozova. 2023; Annual plan for Grade 7, 2025 ; A. Akmalov *et al.*, 2022; Yu.Q. Jumaniyozova. 2025; GeoGebra; Mathematics Syllabuses, 2020). along with their own creative ideas into a single project outcome.

While creating the lapbook, students combined their theoretical knowledge with the STEAM-based integrated teaching approach. Working in groups, they shared ideas and supported one another, which helped consolidate their knowledge.

This approach transformed our method of teaching mathematics, promoting deeper understanding and enhancing students' critical and creative thinking skills (Figure 3).

Presentation of the "Let's Create!" Lapbook Project

Figure 3. Presentation of the "Let's Create!" Lapbook Project

Through this project, we aimed to enhance students' learning pace. By completing creative tasks, students:

- Approached the topic with genuine interest;
- Attempted to model their ideas mathematically;
- Integrated knowledge across subjects using the STEAM approach;

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- At the conclusion of the "Let's Create!" project, were able to express their ideas independently and confidently through presentations.

Within the framework of the project, students not only used various technological tools but also engaged in model creation, design, and color work, while understanding the relevance and importance of the topic in everyday life. The project was organized in alignment with the curriculum and lesson plans, combining several pedagogical methods. Students worked in small groups, developing creativity, critical thinking skills during the process, and collaborative abilities.

At the end of the creative project, students' activities were assessed according to the criteria presented in Table 1. The evaluation results are summarized in Table 2.

Table 2. Assessment Results

Assessment Criteria	**Maximum Score**	**Average Score (7th "F" class)**	**Description**
Accurate and complete coverage of the topic	10	8.7	Key concepts clearly presented
Accuracy of graphs and diagrams	10	9.2	Most graphs were drawn correctly
Design and aesthetics	5	4.6	High creativity
Participation and collaboration in groups	5	4.8	Students actively participated
Presentation style and quality	10	8.9	Ideas expressed fluently
Total	40	36.2	The project work was highly evaluated

At the conclusion of the experiment, the average score of students in the 7th "F" class was 36.2 points, while the control group scored 27.4 points. This creative approach demonstrated a positive impact on students' motivation and level of understanding.

Analysis of the Assessment Results of the "Let's Create!" Lapbook Project

The experimental study was conducted at School No. 300, Sergeli District, Tashkent, with 7th-grade classes 7-"B" (control group) and 7-"F" (experimental group). Each class included 30 students, totaling 60 participants. The experiment was carried out over four weeks during the second semester of the 2024–2025 academic year.

Research Design

Table 3.A randomized control group experimental design was applied in the study.

Group	**Type of Intervention (Teaching Method)**	**Designation**
R(E)	Teaching with creative tasks using lapbook technology	XE
R(K)	Traditional instruction (textbook-based explanatory and illustrative teaching)	XK

Note: E – Experimental group, K – Control group, XE – Teaching using lapbook technology, XK – Traditional teaching.

Data Collection Instruments

During the experiment, the following instruments were used to assess students' mathematical preparedness and creative thinking skills:

- **Initial Test** – to determine students' prior knowledge;
- **Final Test** – to evaluate the level of mastery of the topic;
- **Questionnaire** – to assess students' attitudes toward the lesson, motivation, and self-evaluation.

Table 4. The test tasks were designed according to Bloom's Taxonomy and divided into five levels:

Cognitive Level	**Number of Questions**	**Maximum Score**
Knowledge	4	8
Comprehension	4	8
Application	3	6
Analysis	2	6
Creation (Creative Task)	1	2
Total	14	40

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Data Processing Methods

The data collected during the experiment were analyzed using **SPSS 26.0** with the following statistical methods:

- **Descriptive Analysis** – mean (M), median (Md), standard deviation (SD);
- **Normality Test** – using the χ^2 criterion;
- **Homogeneity Test** – using Fisher's (F) criterion;
- **Test for Differences** – using the t-test.

Table 5. Descriptive Results

Group	Number of Students (n)	Mean Score (M)	Standard Deviation (SD)
Experimental Group (E)	30	36.2	2.15
Control Group (K)	30	27.4	2.82

The mean score of the experimental group was 8.8 points higher than that of the control group, indicating a significant effect of teaching based on creative tasks.

Normality and Homogeneity Tests

- **χ^2 test:** $\chi^2h = 6.77 < \chi^2t = 9.49$ - the data are normally distributed.
- **F test:** $Fh = 1.38 < Ft = 1.92$ - the variances are homogeneous.

Test for Differences (t-test Results)

Table 6. Thus, the statistical conditions for applying the t-test were met.

Indicator	Experimental Group (E)	Control Group (K)	t-calculated	t-critical
Final (Post-test)	36.2	27.4	6.55	2.00

RESULTS

The mean scores of the experimental and control groups showed a statistically significant difference ($t = 6.55 > 2.00$; $p < 0.05$). This indicates that teaching based on Lapbook technology significantly enhances students' mathematical creativity and problem-solving skills.

Analysis of Questionnaire Results

The students' self-assessment results revealed the following:

- 83% of students found the Lapbook lessons interesting;
- 76% noted an increased opportunity for independent work and expression of their ideas;
- 71% stated that they learned to relate the topic to practical, real-life situations.

Overall Conclusion

According to the statistical analysis, students in the experimental group achieved higher results in mastering the topic "Linear Function" compared to the control group. Additionally, an increase in students' motivation, self-confidence, and creative thinking was observed.

Thus, lessons based on creative tasks and Lapbook technology effectively promote students' personal engagement, analytical thinking, and creativity in mathematics education.

Using creative tasks increased students' interest in the subject and strengthened their motivation for independent learning. Students also gained an understanding of the practical applications of linear functions in everyday life.

Lessons organized based on the STEAM approach enabled students to integrate mathematical knowledge with technology, engineering, and the arts.

CONCLUSION AND RECOMMENDATIONS

The results of the experiment indicate that teaching the topic "Linear Function" using a creative approach:

- Enhances students' independent thinking;
- Promotes the integration of mathematical and visual reasoning;
- Provides students with opportunities to actively participate in their own learning process.

This project increased students' interest in the topic, enabling them to construct graphs, model real-life problems mathematically, and prepare independent presentations. The Lapbook project organized on the basis of the STEAM approach encouraged students not only to learn the topic but also to think creatively and independently. This confirms the necessity of innovative approaches in mathematics education.

The use of Lapbook technology facilitates a deeper understanding of linear functions, helps students relate them to real-life processes, and develops

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their creative and critical thinking skills. The interest, engagement, and quality of task performance of students in the experimental group were significantly higher than those in the control group.

Teaching "Linear Function" through a creative approach is a crucial factor in developing students' independent thinking, practical decision-making skills, and mathematical reasoning. Proper organization of creative tasks not only improves learning outcomes but also increases students' motivation and positive attitude toward the subject.

Recommendations:

- Develop a system of creative tasks for each topic.
- Apply Lapbook technology as a project-based and integrative teaching tool across all subjects.
- Improve assessment criteria based on a competency-based approach.
- Strengthen the connection between mathematics and real life through STEM projects.

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