THE EFFECTIVENESS OF THE STEAM LEARNING APPROACH ON LEARNING AUTCOMES IN CLASS VII MATHEMATICS LEARNING AT MTs NURUL AZIS DDI BAROBBO

Jeranah[1*], Suradi Tahmir[2], Awi Dassa[3], Asdar[4]

[1] Prodi Pendidikan Matematika/STKIP YPUP Makassar Email: jeranahku@gmail.com
[2] Prodi Pendidikan Matematika/Universitas Negeri Makassar Email: radita_unm@yahoo.com
[3] Prodi Pendidikan Matematika/Universitas Negeri Makassar Email: awi.dassa@unm.ac.id
[4] Prodi Pendidikan Matematika/Universitas Negeri Makassar Email: asdarku@gmail.com

ABSTRACT

This study aims to determine the effectiveness of the STEAM (Science, Technology, Engineering, Art and Mathematics) learning in mathematics learning class VII MTs Nurul Azis DDI Barobbo with 4 indicators, namely the completeness of student learning outcomes, student activities, student responses and learning implementation. This type of research is pre-experimental and the type of research design is pre-experimental the one group pretest-posttest. The sample in this study was class VII.A MTs nurul Azis DDI Barobbo students of 15 people. The results showed that in the individual and classical pretests 100% none of the students had a score above KKM or were incomplete. While classically on the posttest of 15 100% students who met the minimum completion criteria (KKM). The positive student response of students is in the good category with a percentage of 84.6%, student activities in learning using the STEAM (science, Technology, Engineering, Art and Mathematics) approach are in the good category with a percentage of 86% and steam learning implementation is in the very good category with a percentage of 91.9%. Based on the results of this study, it can be concluded that the mathematics learning process using the STEAM (Science, Technology, Engineering, Art and Mathematics) approach in class VII MTs Nurul Azis DDI Barobbo students is effectively applied in terms of the achievement of learning outcomes, student responses, student activities and learning implementation.

Keywords: STEAM (Science, Engineering Technology, Art and Mathematics)

1. Introduction

The development of science and technology has brought mankind into the era of globalization (Winda and Arita, 2022). Education in the era of globalization has an important role because education is the main factor in the formation of human personality and affects the quality of human resources. Mathematics is a universal science that underlies modern technological developments. Mathematics has an important role in various sciences and advances human thought. The development of information and communication technology is based on development of mathematics. So that, to be able to create new technologies, of course, it is necessary early mastery of mathematics. This shows the role of mathematics is very important. With Thus mathematics is used as one of the subjects that

must be mastered by students. Here comes the challenge a teacher to optimize the potential of students in achieving learning objectives so as to improve students' mathematics learning outcomes.

In mathematics learning, students do not only memorize formulas, as well as teachers should not present direct secar concepts but students are expected to find themselves the concepts of knowledge that are understood. Mathematics is one of the disciplines that can improve the ability to think and argument, contribute to solving daily problems and in the world of work, and provide support in science and technology (Dewi and Agustika, 2020).

Student learning outcomes are a performance that is indicated as an ability that has been obtained after receiving their learning experience (Meri, 2018). The activities and efforts

made to achieve behavioral changes are themselves the result of learning, therefore teachers who provide facilities must be able to attract the attention of students so that they remain enthusiastic in the learning process. The low learning outcomes are not only felt by a teaching system that is less efficient, effective and less responsive to students, with the application of the STEAM learning approach will motivate students to be more active in the learning process so that student learning outcomes increase.

One of the learning alternatives that can be used to overcome the above problems is the STEAM (Science, Technology, Engineering, Art and Mathematics) learning approach. STEAM creates an active learning system because all five aspects are needed at the same time to solve problems, the solution also shows that students can unite abstract concepts from all aspects. STEAM learning is an indisciplinary approach to learning concepts juxtaposed with the real world (Amelia and Arita, 2022). Through the STEAM learning approach, it is hoped that students can build and develop their knowledge so that they not only learn to memorize concepts but are also guided to be able to integrate science, technology, engineering, art and mathematics so that they can improve student learning outcomes.

2. Literature Review

The effectiveness of learning is the results obtained by students after the implementation of the teaching and learning process. The indicators of a learning are said to be effective if they meet the effectiveness criteria, namely: minimum completion criteria (KKM), student activities, student responses and learning implementation. Mathematics learning is a series of activities designed for the occurrence of an interaction between teachers and students in solving problems both related to daily life, mathematics learning is also a field of knowledge that talks about organized structures ranging from undefined insur to defined elements. Learning outcomes are a benchmark or benchmark that determines the level of student success in cognitive, affective and psychomotor aspects in knowing and understanding a subject matter after experiencing a learning experience.

According to Ninit (2020) the complexity of the 21st century demands abilities from various fields and STEAM-based learning can be a preparation and practice for everything. The implementation of STEAM in learning in

Indonesian schools is intended to prepare students to be able to solve problems and make decisions and be able to communicate and collaborate. According to Mufidah (2019) STEAM learning provides considerable benefits for students, namely making students become problem solvers, inventors, innovators, independent, logical thinkers, technologically literate, connecting historical culture with Education and connecting STEAM Education.

STEAM is an integrated learning between science, technology, engineering, art and mathematics as a forum to develop student investigation activities, communication skills and critical thinking in learning. STEAM is a combination of learning between since, technology, engineering, art and mathematics to develop the creativity of students in using technology so that it can be applied and solve problems faced in everyday life. On the other hand, STEAM is a form that we need to learn, because the STEAM approach is an approach in the development of the world of education.

3. Method

This type of research is Pre-Experimental research. The research design of The One-Group Pretest-Posttes, in this study will involve one group or class, namely an experimental class (experiment) that is taught by holding STEAM-based teacher stimulus variation skills. This research was conducted at MTs DDI Nurul Azis Barobbo, Bontoramba District, Jeneponto Regency. Precisely in the odd semester of the 2022/2023 school year.

Table 1 Research Design of One Group Pretest-Posttest Desaign

Pretest	Treatmen	Posttest
O_1	X	O_2

Table caption 1 :
O1 = Pretest value to measure the initial ability of students of grade VII MTs DDI Barobbo
X = Treatment in the form of teaching taught through steam approach learning
O2 = Posttest score to see the ability of class VII MTs DDI Barobbo students after being given treatment

In the study, it is necessary to determine the population and sample first, the population in this study is all students of class VII MTs DDI Barobbo, the 2021/2022 school year consisting of 2 classes and the sample in this study is class VII.A odd semester of the 2022/2023 school year

which is taught by applying STEAM learning to mathematics learning. In this study, there were 2 variables used, namely the free variable of the STEAM approach and the bound variable, namely learning outcomes.

Data collection techniques are a method used by researchers to obtain data from the research carried out. The data obtained from this study are in the form of learning outcomes data, the acceleration of student activities during the learning process, student responses related to the STEAM learning approach and the implementation of learning during the application of the STEAM learning approach. The forms of instruments used in this study are test and non-test forms. The test form includes a learning outcomes test while the non-test form includes a student activity observation sheet, a student response observation sheet and a learning implementation sheet.

The data analysis techniques used are descriptive statistics and gain tests. Descriptive statistics are statistics used to analyze data by describing or describing the collected data as it is without intending to make generally applicable conclusions or generalizations. Meanwhile, the gain test was carried out to determine students' mastery of concepts from the STEAM learning approach to learning outcomes in mathematics learning.

Table 2 Categories of Learning Outcomes Before and After Applying the STEAM Approach

Interval	Level	Pretest		Posttest	
		Freque ncy	Perce ntage	Freque ncy	Percen tage
80-100	Very high	0	0%	0	0%
66-79	high	0	0%	15	100%
56-65	curren tly	0	0%	0	0%
40-55	lowh	5	33,33 %	0	0%
0-39	Very low	10	66,67 %	0	0%

Based on Table 2 shows that before using the STEAM learning approach, 66.67% of mathematics learning outcomes were in the very low category and after applying the STEAM learning approach, student learning outcomes were in the high category with a percentage of 100% so that the range of the categories obtained increased.

Table 3 Descriptive Data Analysis of Student Activity Through the Application of STEAM Learning Approach

Meeting Score	Total score	Score Maxi mum	Percentage (%)	Category
32 36 36	104	120	86	Good

Based on the Table 3, student activities can be concluded that students during learning with the application of the STEAM learning approach are in the good category

Table 4 Descriptive Analysis of Student Responses By Applying STEAM learning approach

Res pon se	Total number of answer	Total answer of questions	Percentage (%)	Category
YES	127	10	84,6 %	Good
NO	23		15,4%	Very Low

Based on the student response data above, it can be concluded that students are very interested and interested and provide positive responses to the application of the STEAM learning approach used by researchers. This shows that students' responses to the learning process are in the good category.

Table 5 Learning Implementation Data

Meeting Score			Total scor e	Score Maxim um	Percen tage (%)	Category
1 0	1 1	1 2	33	36	91,6%	Very Good

Based on the learning implementation data above, it can be concluded that the implementation of learning during learning with the application of the STEAM learning approach is in the very good category.

The gain test is carried out to find out how much the increase in student learning outcomes before (pretest) and after (posttest) applies the STEAM learning approach using the gain test formula, obtaining a normalized gain value of 0.55. By referring to the gain value criteria, it can be concluded that the improvement of student learning outcomes before (pretest) and after (posttest) with the application of the STEAM learning approach is in the moderate category.

4.Discussion

The results of the study showed that learning mathematics taught using the STEAM learning approach in terms of student learning outcomes was in the high category with classical completion reaching 100% and student knowledge showing a significant increase after learning by applying the STEAM learning approach, this is evidenced by a normalized gain value of 0.55 which is in the moderate category, this shows that using the STEAM learning approach can improve the learning outcomes of class VII.A MTs nurul Azis DDI Barobbo students.
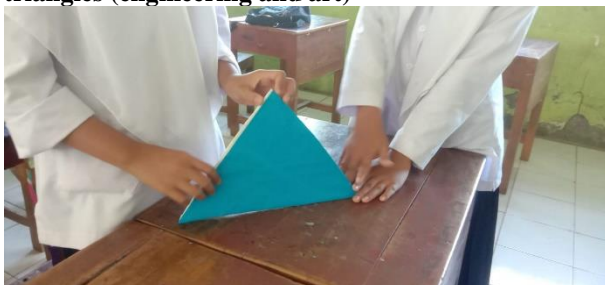
Description of the activities of applying the STEAM approach to mathematics learning quadrilateral and triangular materials.

Learning Process Activities Showing Learning Videos (Science and Technology)

Student activities to make quadrilaterals and triangles (engineering and art)

Student Activities Calculate the Area and Circumference of Quadrilaterals and Triangles (Mathematics)

The Work of a Quadrilateral and Triangular Seiswa

5. Conclusions And Suggestions

Based on data from the application of the STEAM learning approach to learning outcomes in mathematics learning class VII.A MTs Nurul Azis DDI Barobbo who became a research sample after applying the STEAM learning approach 100% is in the high category with an average of 72.47, the percentage of student activity 86% is in the good category, the percentage of student responses is 84.6% brada in the good category and the implementation of learning 91.6% is in the very good category. Nilai rata-rata hasil belajar adalah 72,47 melebihi nilai KKM yaitu 70 dengan ketuntasan klasikal 100%.

The STEAM approach provides an opportunity to innovate and solve problems through planning, teamwork, design and communication for learners. According to Mulyani (2019) STEAM shows students how concepts, principles, science, technology, engineering, art and mathematics are used in an integrated manner to develop products, processes, and systems that are beneficial to human life.

This research has proven that the STEAM learning approach is able to improve student mathematics learning outcomes so that it can be used as an alternative in learning.

6. References

Arifin, N. (2020). Efektivitas Pembelajaram STEAM Problem Based Learning Ditinjau Dari Daya Juang Dan Kemampuan Pemecahan Masalah Matematis Mahasiswa PGSD. Jurnal Pendidikan Matematika Indonesia, 5 (1). 31-38.

Faisal, F. A & Mohammad, A. (2022). Kelayakan Bahan Ajar Inovatif Berbasis STEAM Pada Materi Segiempat Dan Segitiga. Prisma, Prosiding Seminar Nasional Matematika Journal Unnes, 5 (2), 512-519.

Fitri. A, dkk. (2022). Pembelajaran Matematika Polynomial STEAM PjBL Menumbuhkan

Kreativitas Peserta Didik. Jurnal Basicedu. 6 (5), 8175-8187.

Haderiah, dkk. (2022). Penerapan Pendekatan STEAM Dalam Meningkatkan Hasil Belajar IPA Siswa Kelas V Sekolah Dasar. Pinisi Journal PGSD. 2 (1), 165-172.

Ismail. I, dkk. (2016). Efektivitas Virtual Lab STEAM Dalam Meningkatan Literasi Sains Siswa Dengan Perbedaan Gender. Jurnal Inovasi Pendidikan. 2 (2), 190-201.

Kurnia, E. L & Mokhammad, R. Y. 2018. Penelitian Pendidikan Matematika. Bandung: PT Refika Aditama.

Ninit, P. S. (2020). Implementasi Pembelajaran Matematika Realistik Berbasis STEAM Di Sekolah Dasar. Journal Pendidikan Dasar. 1 (2). 1-13.

Nirmala, S, dkk. (2021). Penerapan Model Pembelajaran Steam (Science. Technology, Engineering, Art And Mathematics) Untuk Penguatan Literasi-Numerasi Siswa. Jurnal Abdinas Indonesia. 1 (2), 89-96.

Ni. P. P. D & Gusti, N. S A. (2020). Efektivitas Pembelajaran Matematika Melalui Pendekatan PMRI Terhadap Kompetensi Pengetahuan Matematika. Jurnal Penelitian Dan Pengembangan Pendidikan. 4 (2). 204-214.

Muhammad, S. H, dkk. (2021). Efektivitas Pendekatan Pembelajaran Science Technology Engineering Mathematic (STEAM) Terhadap Kemampuan Komunikasi Matematis. Jurnal Program Studi Pendidikan Matematika. 10 (2). 1053-1062.

Mohamad, R. M. A & Neni, M. (2022). Integrasi Pembeajaran STEAM "Mathematic's Meal" Kelas V Sekolah Dasar Sebagai Implementasi Merdeka Belajar. Journal PGSD. 10 (5). 959-972.

Winda, A & Arita, M. (2022). Urgensi Model Pembelajaran Science, Technology, Engineering, Arts And Math (STEAM) Untuk Siswa Sekolah Dasar. Jurnal Cakrawala Pendas. 8 (1). 291-298.

Yanni, H. M. (2018). "Meningkatkan aktivitas dan hasil belajar matematika melalui strategi pembelajaran tapps berbasis pendekatan (STEAM)". Jurnal Pendidikan Matematika. 1 (2). Hal 117-125.