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Article

Implementation of the STAD Model with Smart Envelope Quiz Media on Number Patterns in Improving Student's Critical Thinking on Number Pattern Material

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A B S T R A C T

This study aims to determine the implementation of the STAD Model with the Smart Envelope Quiz Media Number Pattern in improving students' critical thinking on number pattern material. In this study, the tools and materials used were origami paper, scissors, glue, and buffalo paper. Learning media has a very important role. With learning media, teachers can use it as a tool to provide learning materials so that learning in the classroom becomes active, interesting and fun. The learning model used is the STAD Model, a learning model that emphasizes students to work together in groups. The researcher used a qualitative method with a descriptive approach. Data collection obtained in this study were interviews, observations, and documentation. This research was conducted at SMA Plus Bustanul Ulum Puger, Mlokorejo Jember. The location of the research is Jl. Kh Abdullah yaqien no. 1-5 puger, jember. the subjects of this study were female students of class 11 SMA Plus Bustanul Ulum Mlokorejo, Jember with a sample of 1 student Nur Fitria (S1).

Keywords: *STAD; Mathematics Learning; Number Patterns.*
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INTRODUCTION

Mathematics is very important in everyday life and for the world of science. In every aspect of life, mathematics cannot be separated. According to (Susanto, 2016), increasing students' creative thinking, the ability to construct new knowledge, good mastery of mathematical material needs to be realized by teachers when learning, namely mathematics learning. The process of teaching and learning mathematics for grade 11 at SMA Plus Mlokorejo, Puger Jember is carried out 3 times a week, in 1 meeting the time is 1 - 2 hours. According to (Nurdin, 2022) a series of activities aimed at realizing the program is called implementation. the implementation of teaching and learning usually depends on the teacher in determining the learning model, or how to teach. Teachers more often use conventional learning which is considered by students to get bored quickly, lack enthusiasm, and lack of student thinking. In this study, the learning model used by researchers is the STAD (Student Team Archviement Division) learning model.

According to (I. Wulandari, 2022) the STAD learning model is a learning model with students working together and learning in small groups collaboratively with a heterogeneous group structure of 4-5 people. This learning model is simple and able to provide students with knowledge of difficult material concepts. This study uses learning media as a tool to provide learning materials.

In achieving educational and learning goals in schools, an important part of the teaching process is needed, namely Media. Tools or sources for the teaching and learning process can also be called Learning Media. the importance of media in carrying out the task of teaching students in schools is the basis for the use of media (Jennah, 2009). The media used is the Smart Envelope Quiz Number Pattern. The tools and materials are origami paper, scissors, glue, and buffalo paper. Making Smart Envelopes Number Patterns from origami paper in which the envelope contains questions or Quizzes that will later be answered by students. This study uses

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number pattern material as student teaching materials. Number patterns are one of the chapters studied in Mathematics. According to (Syarief, et al. 2023) the arrangement of numbers with the criteria for the form of writing a, b, c ... where a, b, c are numbers, and the next term has not been predicted/determined is called a number pattern. In other cases, number patterns have various different forms. Students' difficulties in solving number pattern problems such as focusing on formulas, formulating generalizations from the regularity of number patterns, and determining patterns.

Critical thinking is focused on determining what is done and believed (Kuswana, 2014). Someone can think critically if they ask something or look for information correctly. Furthermore, the information is used to solve problems and manage them logically, efficiently, and creatively, so that conclusions can be drawn that are acceptable to reason. After that, the analysis of information and knowledge obtained from the information is used to solve the problems faced appropriately. According to Susanto in (Sulistiani et al., 2016) students are sensitive to the problem of solving problems, to knowing and applying ideas are critical thinking skills that students need to improve. Research on the Implementation of the STAD model with the Smart Envelope Quiz media Number Patterns in improving students' critical thinking on Number Pattern material is motivated by the lack of teacher teaching variation skills that affect students' critical thinking. When teaching and learning mathematics in schools, students rarely use learning media, either teaching aids or others because they still use the lecture method. This was obtained by researchers from interviews with the principal and mathematics teacher of SMA Plus Mlokorejo, Puger Jember. So that a more innovative teacher strategy is needed in developing learning media in the classroom.

STAD (Student Team Archviement Division) Model.

The benefits and positive impacts of the STAD learning model for students include the ability of each student to motivate and help one another to be more enthusiastic about learning, minimizing knowledge gaps through peer-to-peer knowledge sharing, building reciprocal communication through discussion, and fostering positive traits such as discipline, critical thinking, responsibility, mutual respect, and cooperation. Class presentations, teams, quizzes, individual progress scores, and team recognition are the main components of the STAD learning model (Johariah, 2018).

Smart Envelope Quiz Media Number Pattern

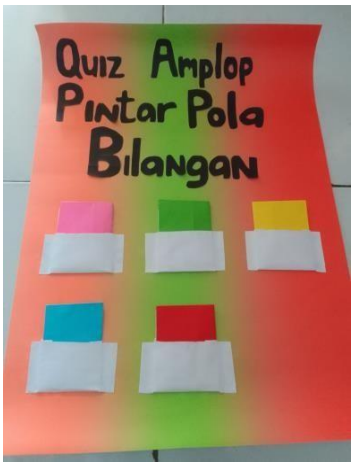

Figure 1. Quiz

Smart Envelope Quiz Media Number Pattern is a creative learning media using colored buffalo paper with a smart envelope on the front and a place to put the smart envelope made of origami paper, inside the envelope there are questions or quizzes about number pattern material that will later be answered by the subject.

How to make a Smart Envelope Quiz Media Number Pattern, namely: Prepare the tools and materials used, namely: (1) Origami paper, scissors, Double Tape, and buffalo paper. (2) Make and Cut the black Buffalo paper into Several Numbers then stick it with Double Tape on top of the colored Buffalo. (3) Then make an envelope using origami paper and its place then stick it with Double Tape on top of the colored Buffalo (4) After that, give the required questions

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or Quiz into the Envelope and give double tape on the back of the media. (5) Smart Envelope Quiz Media is ready to use.

How to use this media is by attaching it to the board, then during the Quiz step, the researcher distributes the questions in the envelope to the subjects which will later be answered per group and one group representative presents the results in front of the class using this media.

Critical Thinking

According to (Rasiman et al., 2016) Critical thinking is the ability of students to think by distinguishing two or more knowledge that is obtained and possessed. According to (W. Wulandari, 2020) personal mental activity in making decisions in overcoming problems experienced is called critical thinking. The indicators of critical thinking that will be adapted by researchers according to (Karim & Normaya, 2015) are:

Tabel 1 Critical Thinking Indicators

General Indicators	**Sub Indicators**
Interpretation	Listing known and asked questions appropriately in understanding the problem.
Analysis	Writing mathematical models and explanations accurately, Identifying the links between statements, questions and ideas.
Evaluation	perform calculations by completing the questions completely and correctly and applying the right strategy
Inference	State the conclusion appropriately.

Tabel 2 Categories of students' critical thinking skills

Very High	Students are able to interpret, analyze, evaluate, and draw conclusions very well. They can think deeply, critically, and creatively in solving problems.
High	Students are able to interpret, analyze, evaluate, and draw conclusions well, but there is still room for further development. They have good critical thinking skills, but may still need more guidance in more complex situations.
Currently	Students are able to interpret, analyze, evaluate, and draw conclusions quite well. They have adequate critical thinking skills, but still need to improve their abilities in various aspects, such as deeper analysis or drawing more precise conclusions.
Low	Students have difficulty in interpreting, analyzing, evaluating, and drawing conclusions. They need more guidance and support to improve their critical thinking skills.
Very Low	Students have great difficulty in interpreting, analyzing, evaluating

A number pattern is a sequence of mathematical numbers or a series of numbers that have a certain fixed structure. This means that, by forming a specific pattern that does not change, the pattern can be simplified using a mathematical formula. There are many types of number patterns, such as odd patterns, even patterns, triangular number patterns, square number patterns, rectangular number patterns, Pascal number patterns, arithmetic number patterns, Fibonacci number patterns, and geometric number patterns.

METHOD

This study uses a qualitative method with a descriptive approach. According to Bogdan and Biklen in Sugiyono (2016), descriptive qualitative research methods involve data collection in the form of words or pictures, so they do not emphasize numbers. The data collected is then analyzed and described to make it easier for others to understand. This research was conducted at SMA Plus Bustanul Ulum Puger, Mlokorejo, Jember. The research location is Jl. KH Abdullah Yaqien No. 1–5, Puger, Jember. The subject of this study was a female student in grade 11 of SMA Plus Bustanul Ulum Mlokorejo, Jember, with a sample of one student, Nur Fitria (S1).

In this study, data collection was carried out using three techniques. (1) Interviews, which are commonly used to gather information or data from individuals or groups. Interviews can be conducted verbally or in writing; in this study, researchers conducted verbal interviews

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with grade 11 mathematics teachers and written interviews with female grade 11 students of SMA Plus Bustanul Ulum Puger, Mlokorejo, Jember. (2) Observation, which involves systematic and directed observation and recording of the research subject's behavior. Researchers recorded interactions between the researcher and the subject during the learning process. (3) Documentation, which refers to a systematic activity or process of searching for, using, investigating, collecting, and providing documents to obtain knowledge, information, and evidence. Researchers took pictures/photos while creating learning media and during the learning implementation.

The researcher divided the group into 4 groups, namely the orange, yellow, red, and blue groups. The delivery of the material was carried out by the researcher so that students better understand the material on number patterns, discussions per group, giving Quizzes from Envelopes in the media (posttest), conclusions were made by one of the group members to come to the front of the class, namely the blue group presented the Quiz results and the researcher made a re-conclusion about the Quiz results, after that awards were given to active students during learning, and students who met the increase in critical thinking skills.

FINDINGS AND DISCUSSION

Pre-implementation stage, the researcher created the Smart Envelope Quiz media Number Pattern as a learning media for the number pattern material for class XI SMA Plus Bustanul Ulum, Mlokorejo Puger Jember. Then the researcher obtained permission from the principal. After that, the implementation stage, the researcher collected data, namely interviews, observations, and documentation. Then the application of the STAD Smart Envelope Quiz Number Pattern model according to the steps.

The steps for implementing the STAD-type cooperative learning model applied in this study (Wibowo et al., 2016) consist of six stages, namely: (1) dividing students into several groups, (2) presenting the material, (3) facilitating group discussions, (4) conducting quizzes or question sessions, (5) concluding the material, and (6) giving awards.

The pretest and posttest grids for students' critical thinking skills are shown in the following table:

Table 3. The pretest and posttest grids for students' critical thinking skills

Basic Competencies	Competency Achievement	Sub Indicators	Question No	Question Form
1.1Solve problems related to the form of number pattern questions	- completes the next term of the number sequence - complete the nth number pattern dots	Interpretation Analysis Evaluation Inference	1,2	Description
1.2 Explain and describe rectangular number patterns	- complete the explanation and depiction of rectangular number patterns		3	

Pretest

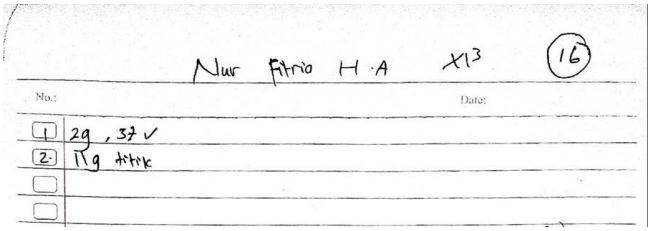

Figure 2. Pretest

Pretest sheet from S1, it can be seen that S1 can complete the question well for question no. 1, but S1 has not been able to write what is known and asked in the question, then S1 does not explain how to work on the question, then S1 can complete the question well but does not

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include a conclusion In question no. 2, S1 has not been able to work on the question well, namely in the interpretation, analysis, evaluation and inference sections. In question no. 3, S1 did not answer the question

Posttest

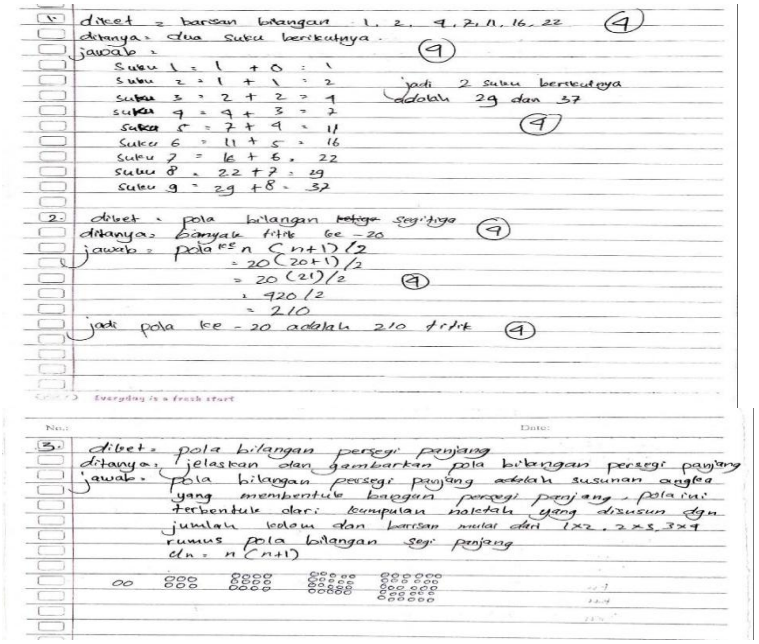

Figure 3. Students worksheet

Posttest sheet from S1, can be seen in question no. 1, S1 is able to complete the question well. This can be seen S1 lists what is known and asked, then S1 describes how to work on the question well, namely by finding terms 1 to 9, after that S1 writes the conclusion in his answer. In question no. 2, S1 is able to complete the question well. This can be seen S1 lists what is known and asked, then S1 lists the formula used n(n+1)/2, after that S1 can also write the conclusion in his answer. In question no. 3, S1 can work on the question well. This can be seen S1 is able to write what is known and asked in the question, then S1 can describe how to work on the question, both the explanation and the depiction of the square number pattern correctly.

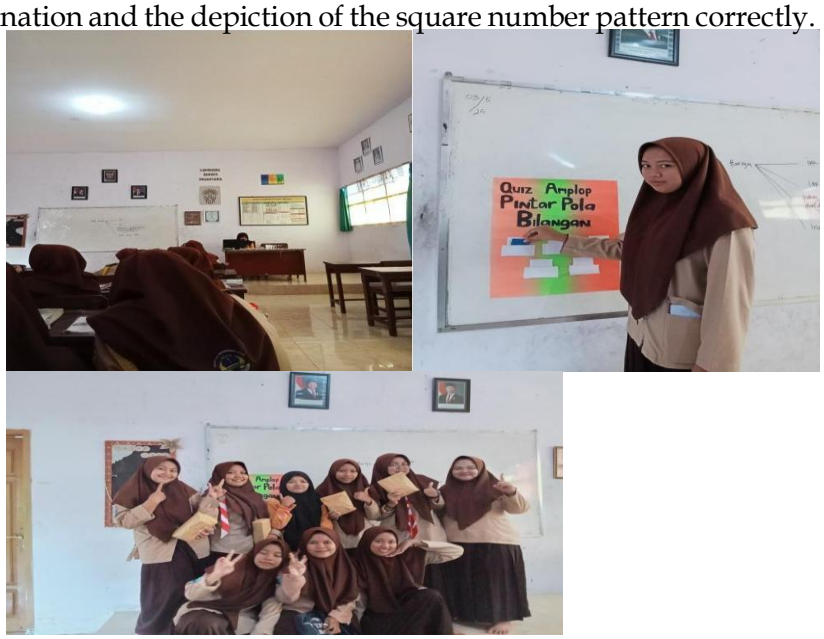

Figure 4. Students action

Data analysis

First, the researcher collected data from the subjects and homeroom teachers using the interview method. After that, the researcher conducted a pretest to test the extent of the subjects' understanding of the number pattern material. After knowing the problems faced by the subjects, the researcher created a smart envelope quiz media on number patterns as a learning

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aid. After that, the researcher collected data again with the subjects using the STAD model with the Smart Envelope Quiz media on Number Patterns to find out whether the media and learning model could help the subjects or not. In collecting this data, the researcher observed the subjects and conducted a post-test (From the Smart Envelope Quiz Media) to find out the results of learning the STAD model with the Smart Envelope Quiz media on Number Patterns. The researcher also took pictures/photos during the learning process with this media.

CONCLUSIONS

Based on the pretest before the STAD Model learning with the Smart Envelope Quiz Number Pattern media, S1's critical thinking ability is included in the very low category. At the inference stage, S1 can complete the answer correctly on answer sheet no. 1, but at the interpretation, analysis, evaluation, inference stage, S1 has not been able to write on answer sheets no. 2, 3. After the STAD Model learning with the Smart Envelope Quiz Number Pattern media, students can discuss with their group members, the results of the S1 posttest critical thinking ability are included in the very high category. At the interpretation, analysis, evaluation, inference stage, S1 can write on answer sheets no. 1, 2, and 3 correctly. Overall, it is concluded that students' critical thinking abilities can be improved by learning the STAD Model with the Smart Envelope Quiz Number Pattern media. For teachers, it is necessary to provide questions to students according to indicators of critical thinking skills so that students can apply them in everyday life.

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