

# Mathematics Learning Innovation with Ethno-Based Sttep-W (Structured Think-Talk-Evaluate-Presentation-Write) Model: Efforts to Improve Students' Mathematical Connection Skills

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## Abstract:

Having mathematical connection skills in learning mathematics is important, but students' mathematical connection skills are still relatively low. The results of modifying the development of the think-talk-write learning model, namely the Ethno-based STTEP-W learning model, are expected to influence students' mathematical connection skills positively. This study aims to describe the quality of the Ethno-based STTEP-W learning model and its developed devices that include valid, practical, and effective criteria for improving the mathematical connection ability of junior high school students. This research uses the research and development (R&D) method. The learning model development procedure used in this study is the development model, according to Nieveen and Plom, consists of three stages: preliminary research, prototyping phase, and assessment phase. The subjects in this study are junior high school students in grade VII and SMP Negeri 1 Tanara mathematics teachers. It is carried out in the even semester of the 2023-2024 academic year for triangular and quadrilateral subjects. The data in this development research are qualitative and quantitative. The analysis is carried out for validity, practicality, and effectiveness. The results of the study prove that the Ethno-based STTEP-W (Think-Talk-Evaluate-Presentation-Write) learning model developed is valid, practical, and effective in improving students' mathematical connection skills. The components of the STTEP-W learning model can improve students' mathematical connection skills during mathematics learning. Ethno-based mathematics learning mathematics applied in the Ethno-based STTEP-W model also shows that mathematics is not only limited to abstract concepts and formulas that are difficult to understand but also as a living and relevant tool in daily life.

**Keywords:** TTW (think-talk-write); STTEP-W (think-talk-evaluate-presentation-write); Ethnomatematics; Mathematical Connection Skills

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## 1. Introduction

Mathematics is a structured and interrelated science between one topic and another (Mainali, 2021). One material may be a prerequisite for another, or a particular concept is necessary to explain another. As an interrelated science, students must have adequate mathematical connection skills to solve a mathematical problem. Mathematical connection refers to a synergistic understanding between mathematical concepts, an understanding of the correlation between concepts and subconcepts, and their realization (Jawad, 2022). Jawad also mentioned that mathematical connection ability refers to

the process by which mathematics becomes relevant, and students can conduct investigations of mathematical concepts to establish relationships between mathematical knowledge and its application in real life.

According to Abassian *et al.* (2020), the ability of mathematical connections is the relationship between mathematical topics, mathematics, and other disciplines, and the relationship between mathematics and the real world or in daily life. In addition, mathematical connection ability is the ability to connect conceptual and procedural knowledge, use mathematics on other topics, use mathematics in life activities, and use intertopic connections in mathematics (García-García & Dolores-Flores, 2021a; Pambudi *et al.*, 2020). Meanwhile, according to (Noto *et al.*, 2016), Mathematical connection ability is the ability to connect between mathematical concepts, connect mathematical concepts with other subject concepts, apply mathematical thinking and modeling to solve problems that arise in other disciplines and connect mathematical concepts with daily life. In other words, the ability to make mathematical connections involves several main aspects, and overall the ability to make mathematical connections is the ability to make connections between mathematical concepts, other disciplines, and real-life situations.

However, based on the results of previous research, it is known that students' mathematical connection skills are still relatively low. Research Aprilia *et al.* (2018) mentioned that the facts in the field show that students' mathematical connection skills related to circle materials are still weak. Furthermore, it is known that the conditions in the field show that mathematical connection skills tend to be below average, and the achievement of mathematical connection skills of high school students is not enough to meet them, which is less than 60% (Khairunisa *et al.*, 2018). Furthermore, a preliminary analysis was carried out to determine the students' mathematical connection skills and how the learning process at school took place. The initial analysis was carried out to grade IX students at SMP Negeri 1 Tanara by providing a test of mathematical connection ability, observation of the learning process, interviews with students regarding their connection ability and the learning process experienced so far, as well as interviews with teachers regarding the student's connection ability and the learning process that has been carried out so far. The researcher's conclusion on data analysis on students' initial mathematical connections is still relatively lacking. Students have difficulty with long story problems and are not used to writing story problems using mathematical symbols. Students stated that the tendency of the learning process so far has been formal and procedural, so they often forget the next day. Students admitted that they could never solve math problems and found them difficult. Furthermore, the learning process at school is still conventional by providing routine questions and rarely contextual.

The learning process needed for improvement is cooperative learning, inviting students to group and discuss, getting used to facing non-routine problems related to experiences or the surrounding environment and getting students used to conveying their ideas and writing mathematical sentences or symbols to solve story problems. One of the suitable models is the model *Think Talk Write* (TTW). Huinker & Laughlin (1996) introduced the TTW model: learning through thinking, speaking, and writing. Model progression flow *Think Talk Write* (TTW) starts with students' involvement in thinking or dialogue with themselves, then speaking and sharing ideas (*Sharing*) with their friends before writing. *Think Talk Write* is a learning model that trains students to practice a language fluently by

developing and building thinking activities to write something related to a problem through small groups (Asnawati & Kenedi, 2021; Kusuma et al., 2020).

The Think Talk *Write learning model* begins with the *thinking stage*, which is to invite students to read and reflect on a text or mathematical problem. Then, in the *talk stage*, students are asked to discuss it; the final stage is to write down the discussion results (*write*). However, after the students do the *talking stage*, namely discussing, it is essential to confirm the correctness of the results discussed. Critically assess or evaluate the ideas and information discussed so that learners can assess the quality of their understanding and make necessary improvements. After the student gets confirmation of the truth of the discussion results, it is also essential for the teacher to evaluate whether the student has gotten the correct confirmation. So that students learn concepts that are based on the learning goals targeted by the teacher. In other words, evaluation activities are significant after the *talk stage*.

Evaluation for teachers is a tool to find out if what has been taught has been understood by students to monitor the achievement of students' understanding and progress as individuals and as a group to record what students have achieved, and to assist students in learning (Arikunto, 2021; Julaeha et al., 2022). Meanwhile, evaluation for students is feedback on their strengths and weaknesses so that they can encourage better learning and increase student achievement motivation (Alamer & Al Khateeb, 2023; Hiğde & Aktamış, 2022; Vu et al., 2022). According to Vu et al. (2022), evaluation assesses student growth in teaching and learning. Results Stroebe (2020) proves that the evaluation positively correlates with student Scores.

In other words, evaluation is an important stage in learning activities that cannot be separated. This study's evaluation stage was carried out after the talk stage. *Evaluate* is a learning stage where the teacher evaluates students by asking questions about the previous discussion material (in the *talking stage*), and students are also directed to evaluate between groups, namely critically evaluating ideas and information conveyed by other groups.

Furthermore, based on the problems that students experienced and the teacher conveyed, it was known that students had difficulty expressing their ideas when asked to speak and that most students also had difficulty solving story problems. This problem indicates that students must get used to conveying their ideas during learning in group discussions and in front of the class. Getting students into the habit of arguing during math learning is important because it can help them better understand concepts, solve problems more structured, build confidence, and facilitate reflection and clarification of their thinking. Presentation is a learning activity that facilitates students to convey their ideas and opinions in front of the class. This activity is an important step to delve deeper into the concept and confidently achieve a more substantial understanding. With presentations allowing students to share their knowledge and ideas, oral presentations are a part of communication that Helps students develop public speaking skills and convey their ideas clearly (Kunar, 2024; Putri et al., 2024; Seau, 2021). Further (Balbay, 2020; Waluyo & Rofiah, 2021) mentioned that providing opportunities to present their work results can increase students' confidence and motivate them to be more involved in the learning process.

This study's presentation stage (*presentation*) is carried out after the evaluation stage (*evaluate*). After the students confirm the correctness of their discussion's results at the stage (*evaluate*), they confidently convey the results of their discussion at the presentation stage (*presentation*). So, the modification of

the learning model *think-talk-write* becomes *think-talk-evaluate-presentation-write*. In the previous discussion, it was described that learning with Ethnomathematics makes learning more straightforward to understand. This is because ethnomathematics is relevant to their daily lives, and students can understand the culture around them in the context of mathematics, which causes students' love for their region to rise. Ethnomathematics-based mathematics learning is one of the alternatives in classroom learning that is interactive and associates cultural elements with mathematics so that students are expected to know, love, and preserve culture (Agusdianita *et al.*, 2021). Anonymous *et al.*, (2024) also wrote that Ethnomathematics-based learning means applying mathematical concepts in a culture and how to teach mathematical concepts that are adapted to local culture. According to Supriadi (2019) The Ethnomathematical approach explains the relationship between environmental culture and mathematics when teaching. So, the designed learning model will be developed based on Ethnomathematics.

The development of the learning model carried out in this study is to develop a *think-talk-write* learning model into an *Ethno-based think-talk-evaluate-presentation-write*. This *think-talk-evaluate-presentation-write* learning model refers to an organized and systematic approach to carrying out each stage of the learning process. The naming of the *think-talk-evaluate-presentation-write* learning model is added with the word *structured* so that the learning stages are not carried out randomly or spontaneously but follow a framework or specific steps that are carefully designed. The results of modifying the development of the *think-talk-write* learning model called the Ethno-based STTEP-W learning model are expected to positively influence students' mathematical connection skills. This study aims to describe the quality of the Ethno-based STTEP-W learning model and its developed devices that include valid, practical, and effective criteria for improving the mathematical connection ability of junior high school students.

## 2. Methodology of the study

This research uses a method of research and development (research and development/R&D), also called "development," which is used to produce a specific product and test its effectiveness (Sugiyono, 2011). The learning model development procedure used in this study is the development model, according to Nieveen and Plom. According to (Plomp, 2013), the development design consists of three stages, including (1) *preliminary research*, (2) *prototyping phase*, (3) *assessment phase*. The subjects in this study are junior high school students in grade VII and SMP Negeri 1 Tanara mathematics teachers. It is carried out in the even semester of the 2023-2024 academic year for triangular and quadrilateral subjects. The data in this development research are qualitative and quantitative. The analysis is carried out for validity, practicality, and effectiveness.

## 3. Result and Findings

### Development Results

The learning model developed in this study is the mathematics learning of flat building materials (polygons, triangles and quadrilaterals). Referring to the prototyping development procedure, this development research begins with *preliminary research*, *prototyping*, and *assessment*.

Preliminary research is carried out with pre-field survey activities, namely conducting interviews, observing the learning process in the classroom, and preliminary analysis to find out the difficulties students face in solving math problems and what mistakes students tend to make. The results of the pre-survey found that: 1) most students found it difficult to understand abstract mathematical concepts such as algebra and geometry; 2) many students admit that they are not interested in mathematics lessons, find them boring, and prefer other subjects, 3) students need a more practical and applicable approach to be able to see the direct connection between mathematics and daily life, 4) students have difficulty solving story problems and the results of the math connection ability test are classified as very low.

The prototyping *phase* is:

- a. The STTEP-W learning model is based on Ethno.
- b. Learning support tools include lesson plans (learning implementation plans), student activity sheets, and connection ability tests.
- c. Assessment instruments. The draft I produced at the research instrument design stage included an Ethno-based STTEP-W learning model book and supporting devices and learning model quality assessment instruments. Draft a team of experts to review the development product to assess the instrument's validity. The results of the experts' review show that Draft I of the learning model and learning support devices have met the valid criteria and require several minor revisions. Furthermore, after revising Draft I, Draft II met the valid criteria used in field tests to determine practicality and effectiveness.

In the assessment stage, a trial of Draft II is conducted, which is obtained from the prototype stage. The pilot draft II includes flat building materials (triangles and rectangles). Based on the trial of the Ethno-based STTEP-W learning model and learning support tools, the results were obtained, and teachers and students stated that the developed learning model had met practical criteria and needed several minor revisions. Meanwhile, based on the mathematical connection ability test results, it has met the minimum completeness criteria. So, it can be said that the Ethno-based STTEP-W learning model that was developed met the effective criteria.

A summary of the research instrument's validation results is shown concisely in Table 1—the following.

**Table 1 Average Score of Research Instrument Validation Results**

It	Instrument Name	Actual Score			Average	Category
		V1	V2	V3		
1.	Validity assessment sheet of the STTEP-based learning model	93,35	82,57	93,6	89,84	Excellent
2.	Assessment sheet of the validity of the learning implementation plan (RPP)	86,57	83,66	86,82	85,68	Excellent
3.	Student worksheet validity assessment sheet (LKPD)	77,39	79,07	77,64	78,03	Good

4.	Connection ability test validity assessment sheet (TKK)	80,25	84,5	80,5	81,75	Excellent
5.	Interview guideline validity assessment sheet	87,75	88	88	87,92	Excellent
6.	Validation sheet of learning activity observation sheet	93,55	87,2	93,8	91,52	Excellent
7.	Teacher's practicality assessment sheet (teacher assessment questionnaire)	89,48	85,11	89,73	88,11	Excellent
8.	Practicality assessment sheet from students (student assessment questionnaire)	89,25	89,5	89,5	89,42	Excellent

Information: V1 = Validator 1, V2 = Validator 2, V3 = Validator 3

Based on Table 1. All instruments have met the minimum criteria of good, so the instrument can be used and said to be valid. The results of the feasibility assessment of the instrument generally show that the instrument is suitable for use with revision (LDR). Thus, the instrument can be used for data collection on validity and effectiveness in this study.

The results of the questionnaire analysis of the practicality of the teaching model from teachers during eight meetings are summarized in the following table.

**Table 2. Scores and Criteria for Practical Assessment Results from Teachers**

Meeting	Score Each Aspect of Practicality		
	Ease of implementation	Accuracy of time allocation estimates with implementation	Possible achievement of learning objectives
I	87	79	95
II	92	82	86
III	96	78	87
IV	94	89	97
V	90	89	83
WE	91	89	94
VII	94	83	97
VIII	92	95	85
Average	92	85,5	90,5

Based on table 2. It is known that according to the teacher's assessment of the overall aspects in each meeting (learning model trial), the score obtained is above 80, which means that all aspects of practicality have met the minimum practical criteria. In other words, according to teachers, the learning model developed and implemented in the classroom has met the practical criteria for the three aspects mentioned. Furthermore, the results of the questionnaire analysis of the practicality of the distribution model from students are summarized in the following table.

**Table 3. Scores and Criteria for Practicality Assessment Results from Students**

Aspects	Shoes	Criterion
1. Ease of understanding the material	85	Excellent
2. Ease in the implementation/completion of tasks	81	Excellent
Average	83	Excellent

Based on Table 3, information was obtained that the average student gave a positive response with excellent minimum criteria to the Ethno-based STTEP-W learning model given, meaning that the Ethno-based STTEP-W learning model was said to be valid. Both individually and as a whole, these criteria are excellent. Based on the percentage of both aspects, more than 80% of students responded positively (yes) to implementing the Ethno-based STTEP-W learning model. In conclusion, based on teacher assessment and student responses, the Ethno-based STTEP-W learning model and learning support devices have met practical criteria and can be used.

The following table briefly presents the implementation of the social system, reaction principles, and learning support system of Ethno-based STTEP-W.

**Table 4. Percentage of Implementation of Social Systems, Reaction Principles, and Ethno-Based STTEP-W Learning Support Systems**

No	Item	Percentage (%) Implementation of each Meeting								Average
		I	II	III	IV	V	WE	VII	VIII	
1.	Social System	100	75	75	100	67	100	75	75	83,375
2.	Reaction Principle	75	100	67	75	100	100	67	100	85,5
3.	Support System	75	67	100	100	100	100	100	100	92,75

Table 4 shows that the principle of learning reactions with the Ethno-based STTEP-W model can be created at each meeting. The social system can be implemented well at every meeting. Several students did not carry out the problem-solving process at the seventh meeting. Furthermore, the supporting system of the Ethno-based STTEP-W model learning model began to be fulfilled at the second to last meeting.

Another criterion that shows the quality of the learning model developed in this study is the effectiveness of the learning model and its devices implemented in learning. The effectiveness of this learning model is seen through a test of students' mathematical connection ability after being given learning with the Ethno-based STTEP-W model. The Ethno-based STTEP-W learning model is said to be effective if the improvement of the mathematical connection ability of the experimental class students (students who are given Ethno-based STTEP-W model learning) is better than that of the control class (students who are given conventional learning). Descriptive statistical data on the results of the gain test of the mathematical connection ability test of the two classes are presented in the following table.

**Table 5. Descriptive Statistical Results of the Mathematical Connection Ability Test**

	Eksperimen			Control		
	Pretes	Posts	Gain	Pretes	Posts	Gain
Standard deviation	6,00	9,79	0,14	7,06	11,21	0,14

Average	21,41	83,82	0,71	18,18	64,50	0,56
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Table 5. It shows that the average score of the mathematical connection ability of the experimental class is better than that of the control class. The gain value of the mathematical connection ability of the two classes also showed that the experimental class improved its gain value better than the control class. The experimental class generally experienced a higher increase than the control class. A significant improvement difference test was carried out to strengthen information about the effectiveness of the Ethno-based STTEP-W learning model on students' mathematical connection skills. This study's prerequisite tests are the normality and homogeneity tests.

**Table 6. Normality Test Results Test of Normality**

	Factor	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Mr.	Statistic	df	Sif.
Mathematical Connection Ability Test	N-Gain	.107	30	.200*	.951	30	.177
	Experiment						
	N-gain Control	.125	30	.200*	.966	30	.424

Source: SPSS Output

Based on Table 6. The results of the normality test showed that the significance value of the Experimental and control classes' N-gain data was more than 0.05 each. This means that the experimental and control classes' data are declared to be normally distributed. Furthermore, because the data of the two classes are typically distributed, a homogeneity test can be carried out. The homogeneity test in this study helps determine whether the data obtained from this study is homogeneous or vice versa, in the sense that the data obtained has a level of similarity or difference. The homogeneity test of the research data was carried out as a condition test for the following hypothesis test. The results of the homogeneity test calculation obtained from SPSS processing are presented in the following table.

**Table 7. ANOVA Homogeneity Test Results Test of Homogeneity of Variance**

	Sum of Squares	df	Mean Square	F	Mr.
Between Groups	277.350	1	277.350	1.106	.297
Within Groups	14538.300	58	250.660		
Total	14815.650	59			

Source: SPSS Output

Table 7, namely the homogeneity test results, shows the results of the SPSS test, and the significance value is more than 0.05. This means that the data processed is homogeneous. Because the data is typically distributed and homogeneous, the average difference hypothesis test uses the T-test. The results of the T-test calculation with SPSS are presented in the following table.

**Table 8. Uji Paired *t*-test Paired Samples Test**

		Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	N-gain Experiment – N-gain Control	-15.600	17.915	3.271	-22.289	-8.911	-4.770	29	0.000

Source: SPSS Output

Based on Table 8., the result of *the t-test*, it is known that the Sig. The value is 0.000, which is less than 0.05. This means that the hypothesis ( $H_a$ ) is accepted, namely, the improvement of the mathematical connection ability of students in the experimental class (students who are given Ethno-based STTEP-W model learning) is better than in the control class (students who are given conventional learning). This information explains that using the Ethno-based STTEP-W learning model has a better influence on improving students' mathematical connection skills than conventional learning.

#### 4. Discussions & Implications

The Etno-based STTEP-W (Think-Talk-Evaluate-Presentation-Write) learning model is a modified result of the Think-Talk-Write model designed to improve students' mathematical connection skills. The learning model developed has proven valid, practical, and effective in students' mathematical connection skills. This model integrates an ethnographic approach or the study of local culture (in this case, Banten culture) to enrich the context of mathematics learning, making it more relevant and meaningful for students. The learning process with the STTEP-W model consists of several interrelated stages designed to stimulate students' active involvement in building a comprehensive understanding of mathematics. The following are the stages in the STTEP-W model.

##### 1. Think

At this stage, students are asked to reflect and think deeply about the topic or problem of mathematics to be studied. They were allowed to relate the material taught to their previous knowledge or experience, including relevant cultural elements of the Banten community. This thought process also includes personal reflection on how mathematics can be used in everyday life. In the "think" stage, students are invited to think about the properties of triangles and quadrilaterals and the relationship between the two, such as the similarities and differences in shapes, the properties of angles, and the formula of their area. For example, students may be asked to consider whether a triangle can be transformed into a quadrilateral or how the shape of a triangle can form a quadrilateral in various applications, such as in art or building.

Furthermore, ethnomathematics-based learning will enrich this stage by associating the mathematics material with local cultural aspects. For example, in Banten culture, students can be invited to think about geometric patterns in traditional arts or crafts, such as patterns formed in weaving, carving, or batik. In this craft, triangular and rectangular shapes often appear as the main design elements. Students

who associate these mathematical concepts with the local culture will find it easier to relate abstract mathematical concepts, such as angular relationships, extents, and shapes, to elements that are real and familiar to them from their surroundings (Kersey & Voigt, 2021; OShaughnessy, 2024; Zizka et al., 2021).

Ethnomathematics-based learning provides an additional dimension that is very important in the thinking stage because it connects mathematical concepts with local cultural knowledge. In this case, by integrating Banten culture, students learn about triangles and quadrilaterals in the context of mathematical theory and how their culture uses these forms in everyday life. Thus, the Think stage not only improves the understanding of mathematical concepts theoretically but also connects that knowledge with practical applications that are more contextual and meaningful for students. By thinking deeply about the application of triangles and quadrilaterals in their cultural life, students can expand their mathematical connections, from relationships between geometric concepts to practical applications in their culture. This ethnomathematics-based learning builds a sense of relevance and a deeper understanding of mathematical concepts and helps students realize that mathematics is a universal language used in different cultures to solve problems and create aesthetic and functional designs (D'Ambrosio & Rosa, 2017).

## 2. Talk

Students are then invited to talk or discuss with their friends about the ideas or solutions they have in mind. This stage aims to strengthen understanding through collaboration and communication. Discussions allow students to clarify and convey their understanding of mathematical concepts and hear and evaluate ideas from classmates. This speaking component is essential to help students develop their mathematical connection skills, as discussions provide opportunities to clarify understanding, share ideas, and listen to different perspectives from classmates. In the context of triangle and quadrilateral materials, the Talk stage allows students to relate mathematical concepts in a more in-depth and applicable way and enrich learning with local cultural contexts through ethnomathematical approaches. In Ethnomathematics, students can also talk about how triangles and quadrilaterals are found in architectural design or traditional Banten art, for example, in the roof pattern of a traditional house or woven bamboo. This kind of discussion strengthens the connection between the geometric concepts taught and the local culture they are familiar with. In the context of Ethnomathematics, this discussion also opens up opportunities for students to talk about how their local culture can influence how they understand and use geometric shapes such as triangles and quadrilaterals. Students can talk about how Banten culture uses triangles and squares in their lives and how this enriches their understanding of the mathematical concepts they are learning. Ethnomathematics-based learning improves their understanding of mathematical concepts and provides a richer and more applicative experience (Zhang & Zhang, 2023).

## 3. Evaluated

After discussion, students evaluate the solution or understanding that has been discussed. Here, they can re-examine errors or strengths in understanding the material while exploring alternative ways of solving mathematical problems. At this stage, students are encouraged to think critically and revise their understanding as needed. Students are allowed to assess their understanding of the material they have learned, namely triangles and quadrilaterals, and identify the extent to which they have

successfully connected mathematical concepts to real-world applications. The evaluation in this stage also invites students to reflect on their learning outcomes, strengthen their understanding, and identify the relationship between the mathematical concepts they have learned and local cultural experiences through an ethnomathematical approach.

Through this evaluation, students can develop stronger mathematical connection skills by relating mathematical theories to the social and cultural contexts they are familiar with. Ethnomath-based evaluations also enrich students' understanding of how mathematics is applied in their daily lives and enhance their ability to solve contextual problems relevant to their culture. An evaluation that links mathematics to the local culture will help students to realize that mathematics is not only abstract material but also applied in their cultural context, which enriches their understanding and mathematical connections (Fries et al., 2021; García-García & Dolores-Flores, 2021b; Palinussa et al., 2021).

#### 4. Presentation

Students are asked to present the results of their thoughts and discussions in front of the class. This stage hones their ability to convey ideas and knowledge clearly and logically. The presentation also allows students to understand better how mathematical concepts can be applied practically and culturally, such as in the use of symbols or methods often encountered in the life of the people of Banten. Students are allowed to present the results of their thinking, individually and in groups, regarding the concepts they have learned. In the context of triangular and quadrilateral materials, this stage not only involves a presentation on the mathematical aspects of both geometric shapes but also provides an opportunity for students to relate their mathematical understanding to the cultural context through an ethnomathematical approach. This presentation encourages students to think innovatively about how to apply mathematics in real-life situations and introduces them to new ways to combine mathematical knowledge with cultural practicality (Balbay, 2020; Waluyo & Rofiah, 2021). This improves their contextual problem-solving skills, strengthening their mathematical connection with the world around them.

#### 5. Write

In the final stage, students are asked to write a summary or report of what they have learned and discussed during the learning process. Writing allows students to organize and construct their knowledge systematically. This writing activity serves as a more profound reflection on how they can relate mathematical concepts to culture and daily life. Integrating language and mathematics is important to help students develop a deeper understanding of mathematical concepts (Erath et al., 2021; Vanluydt et al., 2021). Students are asked to write down the results of their thinking and understanding after going through the stages of thinking, speaking, and presenting their ideas. This stage allows students to organize and formulate their mathematical ideas in writing and deepen their understanding of the relationships between the mathematical concepts that have been learned, such as triangles and quadrilaterals. In ethnomathematics-based learning, this writing component also provides an opportunity for students to connect their mathematical understanding with the local culture through the process of reflection that is written. This writing process encourages students to think further about the possibilities of applying mathematics in their culture and how they can innovate by using the principles of geometry in creative design. Mathematics writing helps students communicate their thoughts and

The application of the Ethno-based STTEP-W model has been proven to influence students' mathematical connection skills positively. According to its portion, each component in the learning model contributes to improving students' mathematical connection skills. Mathematical connection refers to the ability of students to relate mathematical concepts to each other and to real-world situations. Furthermore, ethno-based learning has a vital role in connecting mathematics learning with the local culture of students, in this case, Banten culture.

Ethnomathematics is a branch of mathematics education that studies how mathematical concepts develop in different cultures and how those cultures influence the way of thinking mathematically (Mania & Alam, 2021). In the context of the STTEP-W (Think-Talk-Evaluate-Presentation-Write) model, this ethnomathematics-based approach enriches learning and makes mathematics more relevant and meaningful for students. Through the Ethno-based STTEP-W model, mathematics learning is not only limited to formulas or theories that are formally taught in the classroom but also incorporates local cultural knowledge, such as geometric patterns in Banten batik art, calculations in making traditional crafts or how local communities calculate time and measure distances. This allows students to see that mathematics is alive and varied and can be found in many aspects of their daily lives (Ergene & Ergene, 2020; Machaba & Dhlamini, 2021).

Furthermore, according to Umbara *et al.* (2021), ethnomath-based learning allows students to relate abstract concepts in mathematics to their cultural experiences and knowledge. For example, in geometry learning, students can learn geometric shapes in traditional Banten art and architecture, such as motifs in wood carvings or patterns in woven fabrics. Thus, students can understand symmetry, angles, and shapes more concretely based on their cultural experience. Mathematics learning that integrates local culture can increase student engagement. When students see that the material they are learning connects to their lives and the culture they are familiar with, they become more motivated to learn.

## 5. Conclusion

The Ethno-based STTEP-W (Think-Talk-Evaluate-Presentation-Write) learning model has proven valid, practical, and effective in improving students' mathematical connection skills. The components of the STTEP-W learning model can improve students' mathematical connection skills during mathematics learning. Ethno-based mathematics learning mathematics applied in the Ethno-based STTEP-W model also shows that mathematics is not only limited to abstract concepts and formulas that are difficult to understand but also as a living and relevant tool in daily life. Students can deepen their understanding of math concepts by integrating local cultures while feeling more connected and motivated to learn. Ethnomathematics-based learning helps develop students' mathematical connection abilities more authentically, connecting theories and applications in their cultural contexts and improving their understanding of the role of mathematics in their social and cultural lives.

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