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Mathematical Connection Ability Based on Self Confidence of Class XI Students in STEM-Based CONINCON Learning

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Abstract

This study aims to (1) identify the quality of STEM-based CONINCON learning on the mathematical connection abilities, (2) describe the mathematical connection ability of class XI students in terms of self-confidence in the line material in STEM-based CONINCON learning. This research used a mixed method with a sequential explanatory design. In this study there are three categories self-confidence, that is high as many as 5 people, medium as many as 24 people, and low as many as 7 people. The results showed that the STEM-based CONINCON learning model was in the good category. Student with self confidence students who have high mathematical connection skills are able to master three of the four indicators, while in one other component students are able to relate and only have obstacles that are less precise in calculating the final results.Students with moderate self-confidence are able to master two indicators, namely the indicator connections between one topic and another in mathematics, and indicator connection of mathematics with everyday life.Students with low self-confidence are able to master one mathematical connection indicator, namely the indicator connection of mathematics with everyday life, while in other indicators students have not been able to meet the indicators of mathematical connection well.
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INTRODUCTION

Mathematics is a universal science that is learned at every level of education and very important to learn in daily life. Mathematical connection ability in the national council of teacher of mathematics (NCTM, 2000) is included in one of five standard processes in mathematics learning, namely connection, problem solving, reasoning and proof, communication, and representation. Mathematical connection ability is the ability of students to connect between mathematical topics, connect mathematics with other disciplines, and connect mathematics with daily life (Siregar & Surya, 2017). Meanwhile, according to Adjie et al (2021), mathematical connection is a skill that must be built and learned, because good mathematical connection skills will help students to know the relationship of various concepts in mathematics and apply mathematics in everyday life.

Mathematical connections are a very important part of learning mathematics. This is because basically one of the goals of learning mathematics for students is for students to have the ability or skill in solving mathematical problems, to hone careful, logical, critical, analytical, and creative reasoning (Asiyah et al., 2017). By having mathematical connection skills, students can understand the mathematical concepts they have learned in everyday life.

The importance of mathematics is not only studied in the classroom, but also mathematics is close to the daily life activities (Utami & Wutsqa, 2017: 167). Every human activity, consciously or not, always has a connection with mathematics (wardono et al, 2018). The relationship between mathematical contexts makes learning more meaningful because students can see real problems in learning and can solve them using mathematical concepts (Ainurrizqiyah et al, 2015; Putri & Santosa, 2015).

Mentioned in NCTM (2000), mathematical connection means that mathematics is not a separate collection of sciences. Mathematics is an integrated field of study. When students connect mathematical ideas, understanding can be deeper and can last longer. Students can see mathematics as a unified whole. Can see mathematical relationships in interactions between math topics, other subjects, and in everyday life. In this study the indicators used are as follows: (1) Connections between topics in one mathematics material, (2) Connections between one topic and another in mathematics, (3) Connections between mathematics and other disciplines besides mathematics, (4) Connections mathematics with everyday life.

The ability of students to connect their mathematics to mathematics is caused by several factors, namely internal and external factors. The internal factor itself is related to the confidence of students in absorbing, processing, and managing the information they get during learning. While the external factors are related to the methods and approaches in learning.

Currently, there are various learning methods that are student-centered and are being developed in the field of mathematics education specifically to answer all the needs of students for this education. The learning method used in this research is CONINCON. The CONINCON learning model is a learning model that implements a constructivist approach, an integrative approach, and a contextual approach to foster mathematical connection skills together on all indicators (Saminanto, Kartono, & Waluyo, 2018). In the CONINCON learning model there are several phases used, namely: construct orientation, construct phase, contextual phase integrative phase and reflection phase. In combining models and approaches as well as syntax, the learning theory relates to indicators of mathematical connections.

CONINCON is a learning model that focuses on mathematical connection abilities. The CONINCON learning model uses a constructivist, integrative and contextual approach. Constructivism is an attempt to integrate the prior knowledge that students have with the knowledge acquired in the classroom. Students' knowledge is personal and developed through informal learning to understand everyday situations (Muchlis & Maizora, 2018). The constructivist approach in the CONINCON model is that students will build new knowledge using what they already know. This can be done either during official or informal activities.

The integrative approach is skills, where one skill will be related to other skills. Integrative includes activities inside and outside the classroom (Sihong &

Damayanti, 2018). Integrative is a learning effort that links several subjects (Saputri & Mawardi, 2017). Integrative is learning that is used by teachers to unite teaching materials (Lubis, 2016). Integrative in the CONINCON model means integrated learning. All concepts are covered, whether it is from the realm of mathematics or from other disciplines or from everyday life. Students can complete this assignment inside or outside the classroom. This activity can be done by students in the classroom or outside the classroom. While in the contextual approach, Students are expected to know the relationship between subject matter that is built and understood in school with real everyday life to be further applied in solving problems in society (Ulya et al., 2016). The mathematical problems discussed can be found in everyday life and the surrounding environment.

The success of a learning, in addition to depending on the method used is also very dependent on the approach. The presence of the 2013 curriculum is an effort that has been made by the government to develop education in Indonesia, given the competition in the 21st century that demands competent human resources in science, technology, engineering design and mathematics so that education is expected to integrate four disciplines (Milaturrahmah et al, 2017). Given the importance of mathematics, it is highly expected that the role of a teacher is to be able to determine a learning approach that can change students thinking patterns and views on mathematics (Saparwadi, 2016).

In learning mathematics, an understanding that is in line with the trends in the current era of globalization is needed, one of the mathematics lessons that are in accordance with the 2013 curriculum is using the STEM (Science, Technology, Engineering and Mathematics) approach (Niam & Asikin, 2020). The STEM approach is a learning approach that combines two or more fields of knowledge contained in STEM, namely science, technology, engineering, and mathematics (Ismayani, 2016). Through the STEM approach, students are expected to have learning and innovating skills which include critical thinking, creative, innovative, and able to communicate and collaborate (Winarni et al, 2016). The purpose of STEM is to improve students' abilities in science and be able to innovate technological products to compete (Utami et al, 2017).

The implementation of STEM learning educators must be able to integrate knowledge, skills and values of science, technology, engineering, and mathematics to solve a problem related to learning in everyday life (Setiawan, 2020). The STEM approach is used to ensure that students are able and understand the four STEM areas that are connected to one subject and can use these fields to apply their previous knowledge to solve problems and make conclusions (Bashooir and Supahar, 2018).

In addition to the cognitive aspects that support students' success in learning, there is also an affective aspect, namely student self-confidence. The causes of low self-confidence affect students' abilities. This is because the lack of self-confidence that students have can lead to doubts and solutions that are less than optimally promoted in (Rizqi, 2021). This is in line with Anggraini et al. (2015) which suggests that students doubt in determining plans indicate that students are not confident in their skills or abilities. Even during the discussion, it appeared that the students did not express their ideas less because of embarrassment.

In the learning process that is carried out, every student needs to have self-confidence or self-confidence for all the abilities or competencies they have. Self-Confidence is the formation of understanding based on students' beliefs and feelings about their abilities in aspects of confidence in their abilities (Haeruman, Rahayu, & Ambarwati, 2017). Self-confidence is a student's belief in his abilities and can be proven through behavior in his life. When students have mathematical connection abilities, indirectly students have also grown their self-confidence.

According to (Fauziah et al., 2018) suggesting self-confidence in mathematics is that students have the ability, good mathematics learning abilities, are fast and unyielding, and have confidence in their mathematical abilities. Meanwhile, according to (Pitriyani, Fitrianna, Malinda & Hajar, 2018) states that Self-Confidence is the belief of everyone in his abilities and feels confidence and right about everything he does himself. In associating several concepts in mathematics or with other fields of science, it is necessary for students to have confidence

in solving the problems they face. Self-confidence is the belief of everyone in his abilities and feels confident and right about what he is doing.

The following indicators of self-confidence used in this study according to Hendriana, Rohaeti and Soemarmo (2017) are as follows: (1). Believe in ability. themselves, (2) Act independently in making decisions, (3) Have a positive self-concept, (4) Dare to express opinions. Based on the explanation above, this study aims to describe the mathematical connection abilities of class XI students in terms of self-confidence in STEM-based CONINCON learning.

METHOD

This research is mixed methods research with explanatory sequential design. The type of this research is Quasi Experimental with The Nonequivalent Pretest-Posttest Control Group Design. This research was carried out at SMA Negeri 8 Semarang in March 2022 on material for class XI in the even semester of the 2021/2022 academic year. The subject of this research is the ability of student's mathematical connection according to self-confidence in the experimental class which amounts to 36. The subject has three categories, namely self-confidence 5 people with high self-confidence, 24 people with moderate self-confidence, and 7 people with low self-confidence.

This research was conducted in two classes, namely XI MIPA 1 as the experimental class and XI MIPA 4 as the control class. The way to determine the students' mathematical connection ability and self-confidence is to give the subject a self-confidence questionnaire and mathematical connection ability test questions. This student self-confidence questionnaire aims to determine student self-confidence, which is categorized into three, namely high, medium, and low. While the mathematical connection ability test questions are used to determine the students' abilities in connecting mathematical concepts. The existence of a mathematical connection ability test and a self-confidence questionnaire is to determine the different student's mathematical connection abilities according to self-confidence.

RESULTS AND DISCUSSIONS

This research was conducted in two classes, namely XI MIPA 1 as the experimental class and XI MIPA 4 as the control class. This study aims to determine the ability of mathematical connections in terms of self-confidence of students in class XI. The material taken in this research is sequence material. The way to determine the student's mathematical connection ability and self-confidence is to give the subject a self-confidence questionnaire and mathematical connection ability test questions. This student self-confidence questionnaire aims to determine student self-confidence, which is categorized into three, namely high, medium, and low. While the mathematical connection test questions are used to determine the students' abilities in connecting mathematical concepts. The existence of this mathematical connection ability test is to determine the different levels of connection abilities according to students' self-confidence. The following is the presentation of the research results.

A. Quality of STEM-based CONINCON Learning on Students Mathematical Connection Ability

According to Hightower, et al (2011) quality learning is a series of activities that can increase the achievement of student competencies. According to MacGregor (2007) the quality of learning is seen from three aspects, namely (a) the planning stage, (b) the implementation stage, (c) the assessment stage.

In this study, the planning stage was carried out by designing learning devices. Planning includes making learning tools including syllabus, lesson plans, worksheets, Mathematical Connection Ability Tests which are then validated by expert validators, which are presented as follows.

Device	Validation Results			Average	Classification
	V1	V2	V3		
Syllabus	4.00	3.88	3.88	3.92	Well
RPP	4.20	3.88	3.92	3.97	Well
LKS	3.92	3.80	3.88	3.86	Well
TKKM	4.00	3.83	3.80	3.90	Well

The next stage as a measure of the quality of learning is the implementation stage. The implementation stage is the learning stage in the classroom using learning tools that have been planned and tested for validity at the planning stage. The implementation stage is also measured using a learning implementation sheet. The summary of the results of the calculation of the assessment of the implementation of learning during the four meetings is presented in the following table.

Meeting	Validation result	Category
1	3.52	Well
2	3.76	Well
3	4.00	Well
4	4.23	Very good

Based on the results of observations of the quality of learning in the table above, an average score of 8.57 was obtained. Thus, the learning quality category of the STEM-based CONINCON model was good.

At the learning assessment stage, it is carried out by providing a student response questionnaire to the STEM-based CONINCON learning that has been carried out. Based on a student response questionnaire filled out by 36 students after obtaining STEM-based CONINCON learning, the results showed that students gave a positive response to learning reaching more than or equal to 70%. This shows that most students assess the learning that has been carried out well.

B. Mathematical Connection

The results of the student's mathematical connection ability test were carried out at SMAN 8 Semarang in class XI MIPA 1 student as many as 36 people with different levels of confidence. The following are the results of the self-confidence categorization.

Self-Confidence Category	Amount	Percentage
Tall	5	15%
Currently	24	66%
Low	7	19%
Amount	36	100%

Each student who will be the subject of research will describe his mathematical connection ability by describing his ability to relate between concepts, between materials, with subjects other than mathematics, and relate them to everyday life.

The results of the data analysis of the mathematical connection ability test and interviews with the subjects showed that the mathematical connection abilities of each subject were different, depending on the students self-confidence.This is in line with Nurhayati's (2014) opinion about the fact that students mathematical connection abilities and self-confidence are important aspects in learning mathematics.The following is an explanation of students mathematical connection abilities in terms of self-confidence.

Students Mathematical Connection Ability Judging from High Self-Confidence

Students with high self-confidence category are 5 students or 15% of the total 36 students. Based on the results of the study, students' mathematical connection abilities in terms of high self-confidence are as follows.

On the indicator of the connection between topics in one mathematical material with categories self-confidence high students can relate the relationship between concepts in arithmetic sequence material. Able to solve sequence problems using the concepts of the first, second, third, and nth terms.

On the indicator of the connection between one topic and another in mathematics with category self-confidence able to relate the relationship between the concept of geometric sequences with the concept of comparison. Able to apply and solve problems using the concepts of geometric sequences and comparisons to determine age.

On indicators of the connection of mathematics with other disciplines besides mathematics with category self-confidence high students can relate the relationship of the concepts involved in the problem, namely finding the number of residents with the concept of a geometric series. Able to apply and solve problems using the concept of geometric series, but there are errors in counting.

On indicators of the connection of mathematics with everyday life in categories self-confidence able to identify mathematical problems in everyday life. Students can apply mathematical problems in everyday life, namely a) calculating the

time needed to complete a job, b) calculating the amount of production.

Based on the results of the analysis, it was found that in general students who included high self-confidence had good mathematical connection abilities. Three of the four indicators can master it, while one other component students are able to master and only have obstacles that are less precise in calculating the final results, namely the indicators. connection of mathematics with other disciplines besides mathematics.

This is in accordance with Nufus et al. (2018) which confirms that there is a relationship between self-confidence with mathematics learning outcomes. In addition, having good self-confidence and tending to be positive will have an impact on the enthusiasm of student's efforts in learning the material, this statement is in line with Hendriana, et al. (2014) which explains that students who have a positive self-concept will tend to optimize their power and effort to achieve learning achievement in the learning process.

Students Mathematical Connection Ability Judging from Medium Self-Confidence

Students with moderate self-confidence category are 24 students or 66% of the total 36 students. Based on research data, students' mathematical connection abilities in terms of moderate self-confidence are as follows.

On the indicator of the connection between topics in one mathematical material with categories self-confidence being able to relate the relationship between concepts in arithmetic sequence material. Able to apply and solve sequence problems using the concepts of the first, second, third, and nth terms.

On the indicator of the connection between one topic and another in mathematics by category self-confidence being unable to relate the relationship between the concept of geometric sequences and the concept of comparison. But students can solve problems using the concepts of geometric sequences and comparisons to determine age.

On indicators of the connection of mathematics with other disciplines besides mathematics with categories self-confidence being able to relate the relationship of the concepts involved in the problem, namely finding the population with the concept of a geometric series. Students can solve problems using the concept of geometric series. But there was an error in calculating the result.

On indicators of the connection of mathematics with everyday life in categories self-confidence being able to identify mathematical problems in everyday life. Students can apply mathematical problems in everyday life, namely a) calculating the time needed to complete a job, b) calculating the amount of production.

The group of students who have moderate self-confidence in their mathematical connection abilities generally show good results. Of the four indicators measured, two indicators were able to be mastered, namely the indicator connections between one topic and another in mathematics, and indicator mathematical connection with everyday life that is solved properly and correctly.

Students Mathematical Connection Ability Judging from Low Self-Confidence

Students with high self-confidence category are 7 students or 19% of the total 36 students. Based on research data, students' mathematical connection abilities in terms of low self-confidence are as follows.

On the indicator of the connection between topics in one mathematical material with categories self-confidence students are able to relate the relationship between concepts in arithmetic sequence material. Able to apply and solve sequence problems using the concepts of the first, second, third, and nth terms.

On the indicator of the connection between one topic and another in mathematics by category self-confidence able to relate the relationship between the concept of geometric sequences with the concept of comparison. Able to apply and solve problems using the concepts of geometric sequences and comparisons to determine age. using the concept of geometric sequences.

On indicators of the connection of mathematics with other disciplines besides mathematics with categories self-confidence have not been able to relate the relationship of the concepts involved in the problem, namely finding the number of residents with the concept of a geometric series. Students have not been able to apply and have not

been able to solve problems using the concept of geometric series.

On indicators of the connection of mathematics with everyday life by category self-confidence low on number 4 have not been able to relate math problems in everyday life. Students can solve mathematical problems in everyday life, namely a) calculating the time needed to complete the work, b) calculating the amount of production.

Students in the low self-confidence group showed a lack of mathematical connection results. This is because of the four mathematical connection indicators, only indicators mathematical connection with everyday life that is solved properly and correctly. While on other indicators students are able to relate mathematical connections but cannot solve the problem.

Training students to improve their self-confidence to be more positive will have an impact on students' mathematical connection abilities. This matter confirmed by Malinda & Minarti (2018), that the effect of student's self-confidence on students' mathematical connection abilities has a significant effect so that students self-confidence has a positive effect on students mathematical connection abilities. This shows that students mathematical connection abilities can be influenced by students' self-confidence.

CONCLUSION

Based on the results and discussion, it is concluded that (1) The learning quality of the STEM-based CONINCON model on the mathematical connection abilities of class XI students is in the good category, (2) Student with self confidence students who have high mathematical connection skills are able to master three of the four indicators, while in one other component students are able to relate and only have obstacles that are less precise in calculating the final results..Students with moderate self-confidence are able to master two indicators, namely the indicatorconnections between one topic and another in mathematics, andindicatorconnection of mathematics with everyday life. Students with low self-confidence can master one mathematical connection indicator, namely the indicator mathematical connections with everyday life, while on other indicators students have not been able to link mathematical connections and solve problems.

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