

# Connection Ability in Learning Mathematics in Indonesia

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**Abstract** The basic idea of writing this article is motivated by the importance of mathematical connection skills in learning mathematics. But it is unfortunate that there are many facts that show the low ability of students' mathematical connections in Indonesia so that this writer wants to reveal further how the role of mathematical connections in learning in Indonesia. The method used is a meta-analysis and uses 17 data relating to mathematical connections and applies statistical methods to complement other purposes. This article shows that the application of mathematical connections used as a reference for learning makes learning more meaningful

The mathematical connection is a skill that must be built and learned because a good mathematical connection ability will help students to be able to know the relationship of various concepts in mathematics and to apply mathematics in everyday life. With the ability to connect mathematical students will feel the benefits of learning mathematics, and the understanding of students' understanding of the concepts learned will last longer. In the school mathematics curriculum, mathematical connections are one of the basic mathematical abilities that must be mastered by high school students.

**Keywords:** *mathematical connections, learning, Indonesia*

## I. INTRODUCTION

The Indonesian government emphasizes that the abilities that students must possess after learning mathematics are: 1) Understanding mathematical concepts, explaining the interrelationships of concepts and applying algorithmic concepts flexibly, accurately, efficiently and precisely in problem-solving, 2) Using reasoning on patterns and properties, doing mathematical manipulation in generalizing, compiling evidence, or explaining ideas in mathematical statements, 3) Solving problems that include the ability to understand problems, design mathematical models, solve models, and interpret the solutions obtained, 4) Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem. 5) Having an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention, and interest in learning mathematics, as well as being tenacious and confident in problem-solving (Yenni & Risna, 2016).

It is unfortunate that many learning processes at this time have not been able to optimize the ability of these students, including the ability of mathematical connections (Prastiwi et al, 2014; Muchlis et al, 2018). The low ability of mathematical connections has an impact on the low pest of students in schools.

Based on the above review, this paper will look at how the ability of connections in mathematics learning in Indonesia, with several objectives, namely: an explanation of mathematical connections, the role of mathematical connections in learning in schools, materials on mathematics learning that tendencies are used for mathematical connection skills and opportunities for increasing mathematical connections in students.

## II. METHODS

The research method uses the meta-analysis method, using a considerable amount of data and the application of statistical methods by practicing and organizing a number of information that comes from a large sample and serves to complement other purposes (Glass, 1981). The database used is derived from google scholar and manual search. Search for articles with a focus on keywords is quite a lot of mathematical connections, but the data taken is limited to articles 2015 to 2019. so that 17 articles can be used as data.

## III. RESULTS AND DISCUSSION

Based on the proposed research objective, the writer tries to discuss the research questions one by one. Starting from the first destination.

### A. *Mathematical connection*

NCTM (2000: 274) explains that Thinking mathematically involves looking for connections, and making connections builds mathematical understanding. Without connections, students must learn and remember

too many isolated concepts and skills. With connections, they can build new understandings of previous knowledge. The important mathematical functions in the middle grades rational numbers, proportionality, and linear relationships are all intimately connected, so as middle-grades students encounter diverse new mathematical content, they have many opportunities to use and make connections.

Explanation of mathematical connections which was revealed by NCTM implies that the ability of mathematical connections is an important part that must be mastered by students at every level of education. Because with mathematical connections students will see the connections and benefits of mathematics itself. By making connections, mathematical concepts that have been learned are not left behind as separate parts but are used as basic knowledge to understand new concepts (Siagian, 2016).

Coxford (1995) suggests that mathematical connection skills include: (1) connecting conceptual and procedural knowledge, (2) using mathematics in other topics (other curriculum areas), (3) using mathematics in life activities, (4) seeing mathematics as one integrated unity, (5) knowing the connections between topics in mathematics, and (6) recognizing various representations for the same concept.

*Mathematical Connections in Learning in Schools*

The following describes the analysis of the article which is divided into several categories below:

*Identify mathematical connection research needs*

Table 1: Identification of requirements regarding mathematical connections

Needs	Frequency
Mathematical connection profile for learning	5
Effect of mathematical connections on learning	1
The use of certain learning methods/approaches to mathematical connections	7
The use of certain learning media on mathematical connections	2
Learning style towards mathematical connections	2

Based on the identification of 17 articles analyzed showed that among the needs of the use of learning methods/approaches is the most appropriate composition to look at mathematical connections while research on the effect of mathematical connections on learning has the lowest frequency, namely 1.

*Research objectives analyzed*

The purpose of the research identified from 17 articles is clear. Most of the focus is to look at the ability of mathematical connections, but there is 1 article that correlates with the learning achievements achieved by students.

*The research method being analyzed*

Research on mathematical connections analyzed from 17 articles shows there are 6 variations of research methods. From several studies, the experimental method is the most widely used method, from the results of the analysis of 17 articles, there are 8 using the experimental method while for the survey method, class action, and correlational research are only 1 each, the rest use qualitative descriptive. As described in table 2

Table 2: Research methods analyzed

Methodologi	Frequency
Experiment	3
Classroom action research	1
Survey	1
Pre experiment	1
Descriptive Qualitative	6
Quasi Experiment	4
Correlational	1

*Collection of research data analyzed*

The collection of data from all the articles analyzed is entirely using the test format in the form of description to measure the ability of mathematical connections, but there are a number of articles that are reinforced with in-depth semi-structured interview data.

*Sample*

The sample in this study is in the range of elementary school to college students, with the elaboration as in table 3.

Table 3: Research Samples

Data coletion tools	Frequency
Primary school	1
Junior high school	10
Senior High School	2
College	4
Unknown	1

*B. Material Relevant to Mathematical Connection Capabilities*

Of the 17 articles analyzed, 7 articles did not mention the material in their research, but some mentioned in detail the material used as content to see the mathematical connection ability. At the tertiary level, the average is on calculus material and there is one that uses flat plane geometry material, at the junior high school level mostly on building material but there are two articles about equations and linear inequalities of one and

two variables and one article about the theorem Pythagoras At the high school level, no one mentioned his research on the material that was the content.

### C. *Opportunities for the Development of Mathematical Connections in Mathematics Learning*

Mathematics is one of the subjects that has an important role in various disciplines and advancing human thought power. It was revealed that student mathematics learning outcomes so far have not been encouraging, especially in the aspect of mathematical connections and are in a low category (Prastiwi et al, 2014; Muchlis et al, 2018). there are several learning processes that focus on developing mathematical connection skills, but their nature is still common (Henningsen & Stein, 1997) In general mathematics learning still consists of the following set of activities: the beginning of learning begins with the presentation of problems by the teacher, then a demonstration of solving the problem, and finally the teacher asks students to do the problem-solving exercise. In line with Peterson (1988) who also showed that learning that emphasizes more on mathematical connection activities and mathematical problem solving is very closely related to high student achievement.

Problems with low or general mathematical connection ability have an impact on decreased learning achievement. There are several reasons why the decline in learning achievement one of them is the learning style because the learning style is the way in which individuals process and process information in learning situations (Gilakjani, 2012).

Mousley (2004) explains the things that must be emphasized in learning to develop mathematical connection skills, namely: (a) broadening the scope of the mathematical content learned to give children a broad understanding of mathematics and its applications, (b ) emphasizing connections between mathematical ideas, (c) exploring mathematics by enriching real-life situations, (d) giving direction to students to find more than one solution and finding connections between those solutions, (e) making various representation of a mathematical idea.

The above description can be concluded that with the learning process that aims to develop mathematical connection skills, students can learn meaningfully because of several indicators of mathematical connections that require students to construct concepts from the learning process that takes place. The nature of the mathematical connection that requires students to connect several abilities makes students acquire a concept that is not memorized but actually has to connect,

construct so that students understand how a concept can enter their memories which are expected to have an impact on long-term memory.

### IV. CONCLUSION

This article discusses the role of mathematical connections in the learning process can enhance meaningful learning because of indicators of mathematical connections which include connection of concept and procedural knowledge link with other concepts and other activities that make students construct their knowledge no longer through memorization. There are several opportunities that can be developed for further research, such as the use of approaches and learning strategies or learning media that are more varied for the learning process in the classroom.

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