Al Khawarizmi: Jurnal Pendidikan dan Pembelajaran Matematika

ISSN 2549-3906
E-ISSN 2549-3914

ANALYSIS OF MATHEMATICS CONNECTION ABILITY IN SOLVING ALGEBRA PROBLEMS AT VIII GRADE JUNIOR HIGH SCHOOL

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Abstract

Penelitian ini bertujuan untuk mengetahui kemampuan koneksi matematis siswa kelas VIII dalam menyelesaikan soal bentuk aljabar di salah satu SMP Negeri di Kota Makassar. Penelitian penelitian termasuk penelitian kualitatif. Subjek penelitian terdiri tiga siswa yang dipilih berdasarkan hasil tes kemapuan dasar. Teknik pengumpulan data menggunakan tes kemampuan dasar, tes kemampuan koneksi matematis, dan wawancara. Teknik analisis data melalui reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa: (1) kemampuan koneksi matematis subjek berkemampuan dasar tinggi memenuhi tiga indikator kemampuan koneksi matematis yaitu menghubungkan antar konsep matematika, menghubungkan konsep matematika dengan bidang ilmu lain dan menghubungkan konsep matematika dengan kehidupan sehari-hari (2) Kemampuan koneksi matematis subjek berkemampuan dasar sedang memenuhi dua indikator kemampuan koneksi matematis yaitu menghubungkan antar konsep matematika dan menghubungkan konsep matematika dengan kehidupan sehari-hari (3) kemampuan koneksi matematis subjek berkemampuan dasar rendah hanya memenuhi satu indikator kemampuan koneksi matematis yaitu menghubungkan antar konsep matematika.
Keywords: Kemampuan Koneksi Matematis, Materi Bentuk Aljabar

Abstract

This study aims to determine the mathematics connection ability of VIII Grade students in solving algebraic questions in one of the public junior high schools in Makassar City. This research was qualitative. The research subjects consisted of three students selected based on the results of the basic ability test. Data collection techniques used basic ability tests, mathematics connection skills tests, and interviews. Data analysis techniques were data reduction, data presentation, and conclusion. The results showed that: (1) the mathematics connection ability of subjects with high basic abilities met three indicators of mathematical connection ability, namely connecting mathematical concepts, connecting mathematical concepts with other fields of science, and connecting mathematical concepts with everyday life (2) The subject's mathematics connection ability moderate basic ability met two indicators of mathematics connection ability, namely connecting between mathematical concepts and connecting mathematics concepts with everyday life (3) mathematics connection ability of subjects with the low basic ability only meets one indicator of mathematical connection ability, namely connecting between mathematical concepts.

Keywords*: Mathematical Connection Ability, Algebraic Materials*

INTRODUCTION

Mathematics is a branch of science that has an important role in the development of science and technology, both as a tool in the application of other fields of science and in the development of mathematics itself. Mathematics is not a science that is only for its own purposes, but a science that is useful for the most part for other sciences (Siagian, 2016).

An important battle in mathematics is "It would be very difficult- perhaps impossible-to live a normal life in very many parts of the world in the twentieth century without making use of mathematics of some kind." to live in this part of the earth in the 20th century without the slightest use of mathematics is recognized (Shadiq, 2014). Therefore, to achieve student mastery of mathematics, it must be done by building an active, creative and innovative learning system that can activate students in the mathematics learning process that based on Permendikbud No. 68 of 2013 concerning the basic framework and structure of the SMP/MTS curriculum, mathematics is included in the mandatory A as subject group (Sari et al., 2021).

Based on this description, mathematics learning is required for students in essence that mathematics can be useful for solving problems in everyday life (Wahyuddin, 2016). Mathematics is one of the important subjects in improving students' intellectual abilities. The importance of learning mathematics at every level of education, it is expected that students can master mathematics subjects with the demands of the curriculum.

One of the indicators that need to be mastered in learning mathematics is mathematics connection. Because students have not been able to relate concepts between math topics (Romli, 2016). Apipiah and Kartono also expressed the same thing that in learning mathematics it is seen that students still had difficulty connecting the material studied with the prerequisite material they mastered and the increase in the mathematics connection of Junior High School students is still not as expected (Apipah & Kartono, 2017). Furthermore, Agustina also stated that the assessment of students' mathematics learning outcomes includes 5 aspects, namely: understanding concepts, problem solving, reasoning, communication and connections (Agustina, 2016).

Mathematics connection ability is the ability to link mathematics concepts both between mathematics concepts themselves (in mathematics) and to link mathematics concepts to other fields (Meylinda & Surya, 2017). Mathematics connection skills are needed by students because mathematics is a unit, where one concept is related to other

concepts (Widiyawati et al., 2020). In other words, to learn a certain concept in mathematics requires prerequisites from other concepts. Without a mathematics connection, students must learn and remember too many separate mathematics concepts and procedures (Dewi, 2013).

Several previous research results have also found that mathematics connections are important or can affect student learning outcomes, including research conducted by Sulistyaningsi who revealed that in general students' ability in mathematics connections is still low. This low ability will affect the quality of student learning which is affected by low student achievement (Sulistyaningsih et al., 2012). Then the research conducted by Widiyawati revealed that the mathematics connection ability of students at the junior high school level was still relatively low. This can be seen from the average mathematics connection ability of students from each indicator. The low ability of mathematics connections is because there are several mistakes that are often made by students including conceptual errors, computational skills errors, and language interpretation errors (Widiyawati et al., 2020).

However, the current situation is not in line with expectations. This can be seen from various problems, one example of which is that there are still many students who have difficulty understanding mathematics lessons. Not a few research and assessment results in learning mathematics state that there are still many students' low understanding of mathematics concepts. One of them is the research conducted by Murizal (2012) which states that there are still many students who do not understand the concepts in learning mathematics.

This general problem also occurs in one of the State Junior High Schools in Makassar City, namely the low understanding of students in learning mathematics, this is based on observations made on April 19, 2021 which showed the average student learning outcomes in mathematics are still relatively low, this can be seen from the number of student scores on daily tests that do not meet the Minimum Completeness Criteria (KKM). Of the 244 class VIII students, there were only 98 students who got score above 73 (KKM scores) with a percentage of 40% and 146 students who got score under 73 (KKM scores) with a percentage of 60%.

Based on this, the analysis of mathematics connection abilities in solving algebra questions is important to do with the aim of knowing the mathematics connection abilities of class VIII students in solving algebra questions and knowing the causes of students' low

mathematics connection abilities. With an overview of the results of this study, a method and method can be recommended in improving students' mathematics connection skills.

RESEARCH METHODS

Research research includes qualitative research. The research subjects consisted of three students who were selected based on the results of the basic ability test, from the results of the basic ability test 3 students with high, medium, and low abilities were selected. Data collection techniques used basic ability tests, mathematics connection skills tests, and interviews. Data analysis techniques were through data reduction, data presentation, and conclusion drawing.

RESEARCH RESULTS AND DISCUSSION

Research result

Data collection in this study was carried out through basic ability tests, mathematics connection skills tests and interviews. The basic ability test was used to determine the subject, then 3 students were selected as research subjects. From the results of the basic ability test, it was found that 5 students had high basic abilities, 5 students with moderate basic abilities and 18 students with low basic abilities. 1 student with moderate basic ability and 1 student with low basic ability and based on the considerations of the teacher in the field of mathematics education as research subjects. Furthermore, each subject 1, 2, and 3 were given the ST, SS and SR codes as written in the following table.

Table 1. Research Subjects

No.	Student Initials	Basic skills	Subject Code
1	AA	High	ST
2	FAS	Average	SS
3	RA	Low	SR

The next process was to give a test of mathematics connection ability on algebra material with a total of 3 questions for 3 subjects in the form of essays. The results of the student's mathematics connection ability test were as follows:

Table 2. Research Subjects

No	Indikator	ST	SS	SR
1	Connection between mathematics concepts	√	√	√
2	Connection mathematics concepts with other disciplines	√	x	x
3	Connection mathematics concepts with everyday life	√	x	x

Info : √ : Fulfilled × : Unfulfilled

Discussion

1. Ability to connect between mathematics concepts

Based on the results of the student's mathematics connection ability test and interview results which showed ST was able to describe what was known, what was asked and solved the problem properly and correctly even though the ST answer sheet did not write down what was known but after checking through the interview ST understood the meaning of the question. the. ST was able to solve problems properly and correctly. When confirmed through the interview, the ST subject was able to explain in detail and fluently the ST answered on the mathematics connection ability test. ST was able to connect the relationship between the concept of algebra material with the material of flat shapes, namely finding the area of a rectangle in solving the problem. This is in line with the results of research conducted by Risdayani (2022) who found that subjects who achieved mathematics connection skills in the high category were able to bring up indicators of connection abilities between mathematics topics/concepts.

Furthermore, the results of the interview showed that the SS was able to describe what was known in the question and was able to describe what was asked. It can be seen that the SS subject was able to describe what known, what asked, and solved the problem properly and correctly. When confirmed through interviews, SS subjects were able to explain in detail and fluently the answers to the mathematics connection ability test. This is in line with research which explains that students who have moderate mathematics connection abilities are able to bring up indicators of connection abilities between mathematics concepts (Fauzi, 2011; Latipah & Afriansyah, 2018).

The results of the mathematics connection ability test and interview results showed that the SR subject was able to describe what was known in the question and was able to describe what asked. It can be seen that the SR subject was able to describe what known,

what asked, and solved the problem properly and correctly. When confirmed through an interview, the subject of SR was able to explain in detail and fluently the answers on the mathematics connection ability test. This is in line with research conducted by Elisahaya & Imami (2020) with the results of research that students who have low mathematics connection abilities are able to meet the indicators of connecting between mathematics concepts.

2. Ability to connect mathematics concepts with other fields of science.

Based on the results of the mathematics connection ability test and interview results which showed that the ST subject was able to describe what known in the question and was able to describe what asked. It can be seen that the ST subject was able to describe what known, what asked, and solved the problem properly and correctly. When confirmed through the interview, the ST subject was able to explain in detail and fluently the answers to the mathematics connection ability test. ST was able to connect the relationship between algebra material and flat figure material, namely finding the area of a rectangle. This is in line with research conducted (Wahyuni et al., 2019) which found that subjects who achieved mathematics connection abilities in the high category were able to bring up indicators of mathematics connection abilities with other sciences.

Furthermore, the results of interviews showed that SS subjects had not been able to apply mathematics concepts and procedures appropriately. It can be seen from the SS answered which showed hat the SS can know what i known and know what was being asked but the SS could not solve the problem properly or the SS answer was wrong. SS was not been able to connect algebra material with other sciences. This is in line with research conducted (Nadia & Isnarto, 2017) which says that students who have moderate mathematics connection abilities cannot write mathematics procedures correctly or SS subjects have not been able to master the material well so they cannot produce a comprehensive relationship.

Based on the results of the mathematical connection ability test and interview results which showed that the SR subject was not able to apply mathematical concepts and procedures appropriately. It can be seen from SR's answer which showed that SR can know what known and know what asked but SR cannot solve the problem properly or SR's answer was wrong. This is in line with research conducted (Ramdhani et al., 2016) subjects who achieve mathematical connection abilities in the low category are not able to bring up indicators of connecting mathematical concepts with other fields of science.

3. Connecting mathematics concepts with everyday life.

Based on the results of the mathematics connection ability test and interview results which showed that the ST subject was able to describe what known in the question and was able to describe what asked. It can be seen that the ST subject was able to describe what known, what asked, and solved the problem properly and correctly. When confirmed through the interview, the ST subject was able to explain in detail and fluently the answers to the mathematics connection ability test. This is in line with research conducted by Khaira Nurliza (2021) with the finding that subjects who achieve mathematics connection skills in the high category are able to bring up indicators of mathematics connections with everyday life. Based on the explanation above, it can be concluded that ST is able to meet the indicators of connecting mathematics concepts with everyday life.

Furthermore, the results of the interview showed that the SS subject was able to describe what known in the question and was able to describe what asked. It can be seen that the SS subject was able to describe what known, what asked, and solved the problem properly and correctly. When confirmed through an interview, the SS subject was able to explain in detail and fluently the answers to the mathematics connection ability test. This is in line with research conducted (Ni'mah et al., 2017) that students who have moderate mathematics connection abilities are able to meet the indicators of applying and connecting mathematics concepts in solving mathematics problems related to everyday life.

Furthermore, the results of interviews which show that SR subjects have not been able to answer questions properly and correctly, can be seen from the answers which showed that SR cannot apply mathematics concepts. This is in accordance with research conducted (Adni et al., 2018) that students who have low mathematics connection abilities cannot meet the indicators of applying and connecting mathematics concepts in solving mathematics problems related to everyday life.

CONCLUSION

Based on the results of research and discussion, the conclusions obtained are: 1) Mathematics connection ability of the students with high basic abilities in algebra form material meets three indicators of mathematics connection ability, namely connecting between mathematics concepts seen in working on questions, the students are able to

connect algebra material concepts with rectangular material, connecting mathematics concepts with other fields of science seen in working on problems that the students is able to relate algebra material to other sciences, namely economics and connects mathematics concepts with everyday life seen in working on the subject matter is able to relate algebra material to everyday life; 2) The mathematics connection ability of the students with moderate basic ability in algebra form material meets two indicators of mathematics connection ability, namely connecting between mathematics concepts can be seen in working on the subject matter and being able to relate the concept of algebra material to rectangular material and connecting mathematics concepts with everyday life of the students then able to relate algebra material with everyday life; 3) Mathematics connection ability of subjects with low basic abilities in algebra material only fulfills one indicator of mathematics connection ability, namely connecting between mathematics concepts can be seen when working on questions, the students are only able to relate the concepts of algebra material to rectangular material.

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