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A Correlational Study on Representational Abilities and Mathematical Connections in Junior High School

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ABSTRACT

Mathematical representation and connection ability are part of the student's ability. Because of their low ability, educators will find it difficult to determine learning tools in the classroom. Therefore, finding a link between the two abilities is necessary to make it easier for teachers to prepare lessons. This study aims to determine the relationship between representational abilities and students' mathematical connections. The population in this study were all grade eight students at a state junior high school in Merbau Mataram, with a total sample of 34 selected using a class random sampling technique. The research instrument was a mathematical representation test and a connection ability test with a total of six questions. Data analysis used the correlation coefficient test of the Pearson/Product Moment formula. The results showed a significant relationship between students' mathematical representation ability and the overall connection. This means that the ability of mathematical representation is directly proportional to the ability of mathematical connections. The higher the student's mathematical representation ability, the higher the student's connection ability, and vice versa. Teachers can focus on preparing learning tools for one of these two abilities.

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1. INTRODUCTION

The ability to represent is one of the important abilities in learning mathematics (Graciella & Suwangsih, 2016; Nurfitriyanti et al., 2020; Suningsih & Istiani, 2021; Utami et al., 2019) and is an object that will not be separated from the basic knowledge of mathematics (Sanders, 2022). Zhe (2012) states that mathematical representation is an instrument for students to understand mathematical knowledge and abilities. The ability of mathematical representation can assist students in building concepts and

expressing mathematical ideas, as well as making it easier for students to develop their abilities (Muhamad, 2017). Various forms of mathematical representations, such as verbal representations, images, numeric, algebraic symbols, tables, diagrams, and graphs, are essential learning components that cannot be separated in mathematics lessons (Brenner et al., 1997; Goldin & Kaput, 2013; Santia & Sutawidjadja, 2019). However, in general, in learning mathematics, mathematical representations are not used as the main focus (Handayani, 2015; Yuniarti, 2013). Even though mathematical representation abilities are very important in learning mathematics, in reality, students tend to imitate the teacher's steps in solving problems (Athallah & Roesdiana, 2021; Rivaldo, 2021; Silviani et al., 2021; Sri, 2019). As a result, students' representation abilities do not develop, even though mathematical representation is very necessary for learning mathematics for both students and teachers (Ambarwati et al., 2020; Gaffar et al., 2019; Maryati & Monica, 2021; Ulya et al., 2019)

However, several studies have found that students' mathematical representation abilities are still relatively low. Based on descriptive research conducted by Panduwinata et al. (2019), It was discovered that junior high school (SMP) students in Bengkulu were unable to represent or interpret questions, resulting in incorrect answers, mistakes in modelling mathematics, and students who were still confused in using. Yuliardi et al. (2021) and Syafitri et al. (2021) discovered that students were still misinterpreting the concept's application and having difficulty determining the steps to solve the math problem. In addition to mathematical representation skills, another ability that is no less important in the mathematics learning process is the ability to connect mathematically (Meylinda & Surya, 2017; Nurafni & Pujiastuti, 2019; Ulya et al., 2016; Widiyawati et al., 2020).

Mathematical connection ability will increase students' understanding of the material being studied, and the knowledge gained will not be easily forgotten (NCTM, 2000). That makes mathematics a connection is not a material or topic that is separated but is interrelated between one. When students can see a connection between different mathematical content, students have developed mathematical values as one integrated unity (Abidin, 2020; Apriani, 2017). Mathematical connection ability is the ability to recognize and use mathematical ideas, and know-how mathematical ideas are connected and built between each other as a whole, recognizing and applying mathematics outside the context of mathematics states that connections refer to the ability to see and make relationships between ideas Mathematics, between mathematics and other lessons, and between mathematics and daily life (Rismawati et al., 2016; Susanty, 2018; Yusuf et al., 2022). In addition, the ability of mathematical representation is very closely related to the ability of mathematical connections. This is in accordance with the statement of NCTM (2000), which states that students' representation of mathematics is to connect what they learn with existing knowledge and make the purpose of a formula make sense.

Karakoç & Alacaci (2015) mentioned that the majority of students agreed that making real-world connections with mathematics helps in the following ways: 1) increase or develop motivation and interest in mathematics (96%); 2) a positive attitude towards mathematics (92%); 3) mathematical process skills such as reasoning and problem-solving (96%); 4) conceptual learning (100%); 5) awareness of future career choices (88%); and 6) the ability to generalize mathematical ideas (75%). The ability of mathematical connections is necessary for students to have strong tendencies and dedication to be mathematical.

Thus, the teacher needs to consider the ability of students' mathematical connections. However, this ability is still relatively low among students in Indonesia. This can be seen from the number of students who make mistakes in connecting mathematical concepts with topics or other disciplines, both conceptually and procedurally (Arjudin et al., 2016; Gee & Harefa, 2021). In accordance with NCTM, which stipulates that the ability to represent and connections are included in the five standard process standards that must be possessed by students who are interrelated in the mathematics learning process (NCTM, 2020; Pape & Tchoshanov, 2001; Yaniawati et al., 2019). Because of the low abilities, the teacher must prepare a learning tool that can accommodate both. Therefore, to make it is easier for teachers to look at the relationship between student representation abilities and mathematical connections so that the teacher can be used in the preparation of teaching and learning process devices in the classroom.

Several studies that have been conducted regarding representational abilities are related to mathematical disposition (Ismawati, 2021; Wiriandi & Suratman, 2015), learning independence (Khoirunnisa et al., 2018; Maulydia, 2017), self-confidence (Inayah & Nurhasanah, 2019), learning motivation (Maulydia, 2017), and learning achievement (Mandur et al., 2016). Likewise regarding previous research related to mathematical connections, some of which saw a relationship between mathematical connection abilities and mathematical reasoning (Badjeber, 2017; Hadiat & Karyati, 2019), mathematical communication (Fajri, 2015), interest in learning (Hamdani & Nurdin, 2020), and mathematical problem-solving ability (Hodiyanto, 2017). Based on several studies that exist and have a positive influence, there has been no research related to the correlation between the ability of representation and mathematical connections; Therefore, this research needs to be done to complete previous research that already exists. This study aims to see the relationship between the ability of representation and mathematical connections. This is to help teachers focus learning tools on the teaching and learning process in class.

2. METHODS

This study is a correlational one. The researcher aims to find the relationship between representational abilities and students' mathematical connections without first giving any treatment. The population in this study were all class VIII students at Merbau Mataram SMPN-3, Lampung, in the academic year 2021-2022. Of all eight -grade students, one class was selected with a total of 34 students as a research sample. Class options use random class techniques.

The research instrument used was a test instrument for representation and mathematical connection. Data were obtained through testing activities, namely by doing a test consisting of six questions (three questions about the ability of Mathematics Representation and three about the ability of mathematical connections). The test instrument has gone through all stages of validity testing by asking the opinions of experts consisting of two lecturers of the mathematics and reliability education study program using the *Alpha Cronbach's* formula with the calculation results obtained the mathematical representation coefficient of 0.66 with the estimated *standard error measurement* (SEM), namely 1.76 and mathematical connection 0.88 with SEM Estimation of 1.78. From the results that have been obtained, the instrument is suitable for use.

Data analysis was carried out after the prerequisite tests for normality and linearity were fulfilled. If the criteria in the prerequisite analysis test have been fulfilled, then proceed with product-moment correlation analysis (Pearson). The guidelines for providing an interpretation of the correlation coefficient obtained from the calculation results can be seen in Table 1 below:

Table 1. Interpretation Guidelines for Correlation Coefficients

Coefficient Interval (x)	Level of Relationship
$0{,}00 \le x < 0{,}20$	Very low
$0{,}20 \le x < 0{,}40$	Low
$0{,}40 \le x < 0{,}60$	Moderate
$0{,}60 \le x < 0{,}80$	Strong
$0{,}80 \le x \le 1$	Very Strong

Source: (Sugiyono, 2011)

3. FINDINGS AND DISCUSSION

3.1 Findings

Data collection was carried out using a mathematical representation test instrument and mathematical connection ability with a total of 6 questions which were then tested for statistical analysis. The results of the prerequisite test calculations that have been carried out show that the data are normally

distributed, homogeneous, and linear. Then a product-moment correlation test (Pearson) was used to see the relationship between the two abilities. Product moment correlation test results are presented in Table 1.

Table 2. Karl Pearson Correlation Test

		Representation	Connection
Representation	Pearson Correlation	1	.797**
	Sig. (2-tailed)		.000
	N	34	34
Connection	Pearson Correlation	.797**	1
	Sig. (2-tailed)	.000	
	N	34	34

**. Correlation is significant at the 0,01 level (2-tailed)

Based on Table 1, it can be concluded that the ability of mathematical representation and connection has a positive relationship by obtaining a total value of 0.797 and is in the strong relationship category. This means that the higher the ability of mathematical representation, the higher the ability of students' mathematical connections. This can also be seen from the students' answers in solving the problems given. Data obtained from the results of the study are described based on each variable in accordance with the specified categories. The calculation results through the statistical analysis test for the ability of representation and mathematical connection capabilities.

3.2 Discussion

This research aims to look at the relationship between students' representational abilities and mathematical connections. The results of this research show that the abilities of mathematical representation and connection have a positive relationship. This shows that students with high mathematical representation abilities have high mathematical connection abilities and vice versa. These results complement studies related to the relationship between mathematical (representation and connection) abilities and other mathematical abilities, such as research conducted by Wiriandi & Suratman (2015) and Khoirunnisa et al. (2018), which state that mathematical representation ability has a positive relationship with mathematical disposition and learning independence. Similarly, Fajri (2015) and Hamdani & Nurdin (2020) found that mathematical connection abilities positively correlate with mathematical communication skills and students' learning interests. Based on previous research and this research, it can also be concluded that mathematical representation ability has a relationship with communication skills and learning interests.

The abilities of junior high school students in this study were clearly different so the mathematical representation abilities provided were more in the direction of how to represent from visual forms to forms of mathematical expressions or to forms of everyday problems, representing from forms of mathematical expressions to forms of everyday problems or visuals, and represent everyday problems in other forms such as visuals and mathematical expressions. Meanwhile, his mathematical connection skills include the ability to connect mathematical concepts and relate mathematical concepts to other disciplines. In the process of learning the ability of representation and mathematical connection capabilities, students are needed to help students in solving mathematical problems that can cause good new relationships between mathematical abilities.

Students can represent a particular problem related to students' knowledge and understanding of a concept that has been known before. Student representation in mathematics learning helps students build connection skills. Therefore, when the teaching and learning process is focused on improving representational abilities, so that it trains students' mathematical connection abilities. Mathematical connection ability plays a role in linking mathematical concepts with other concepts, so that correct

mathematical ideas and ideas will arise. Therefore it can be seen that students' mathematical representation and connection abilities are interconnected and related to one another in solving a mathematical problem. This is also supported by the results of research conducted by Ilma et al. (2020) which showed that the results of tests conducted for students' mathematical representation and connection abilities obtained an original sample estimate value of 0.571, indicating a positive relationship between the two. In addition, the results of research conducted by Musrianti & Ikman (2014) also stated that the increased ability of mathematical connections also contributed to the ability of mathematical representation. This is because students with good mathematical connection skills can relate mathematical concepts to the material they have studied so that their representation skills in applying mathematical models can be applied properly.

The results obtained in this study indicate that there is a relationship between students' connection abilities and students' mathematical representation abilities. Some of the ways that can be done are by implementing mathematics learning that supports the development of representational abilities and mathematical connection abilities and also by increasing the number of math exercises that can train these mathematical abilities. The results of this study can later be used as input for teachers and prospective teachers to always see the relationship between the number of students' mathematical abilities. Steps like this can shorten the process of selecting the right learning tools for teachers, and will make it easier for students to achieve the desired learning outcomes. When preparing it, the teacher can concentrate on just one ability so that the results obtained are more valid and practical. The teacher's emphasis should also be on improving mathematical representation abilities and mathematical connection abilities.

Based on the researcher's direct experience in this research process, there were several limitations experienced. Some of them are the number of respondents who only numbered 34 people, not enough to describe the actual situation. In the data collection process, the information provided by respondents through tests of representation abilities and mathematical connection abilities that have been carried out sometimes does not show the actual opinions of respondents; this happens because sometimes the thoughts, assumptions, and understandings are different for each respondent, as well as other factors such as the honesty factor in filling out the test given by the researcher. Therefore, it is suggested that future researchers improve the deficiencies in this study better.

4. CONCLUSION

Based on the results of the study and discussion, it can be concluded that there is a significant relationship between the ability to represent and the mathematical connection of students as a whole and it shows a positive relationship. This means that the higher the ability of representation, the higher the ability of mathematical connections, and vice versa. The ability of representation and mathematical connection capabilities can produce mathematical concepts needed in solving problems both in various knowledge and in everyday life. Based on the results of this study, the teacher can determine one of these two abilities as a foundation in the preparation of the teaching and learning process in the classroom.

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REFERENCES

Abidin, Z. (2020). Efektivitas pembelajaran berbasis masalah, pembelajaran berbasis proyek literasi, dan pembelajaran inkuiri dalam meningkatkan kemampuan koneksi matematis. *Profesi Pendidikan Dasar*, *7*(1), 37–52.

Ambarwati, E. P., Sutiarso, S., & Noer, S. H. (2020). Pengembangan Strategi Pembelajaran Kontekstual Untuk Meningkatkan Kemampuan Representasi Matematis Siswa. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *4*(2), 1011–1022.

Apriani, D. (2017). Pengaruh pembelajaran problem based learning terhadap kemampuan koneksi matematis siswa. *Nabla Dewantara*, *2*(1), 15–24.

Arjudin, A., Sutawidjaja, A., Irawan, E. B., & Sa"dijah, C. (2016). Characterization of Mathematical Connection Errors in Derivative Problem Solving. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, *6*(5), 7–12.

Athallah, P. F., & Roesdiana, L. (2021). Studi Kasus Kemampuan Representasi Matematis Siswa pada Kelas IX SMP Negeri 2 Telukjambe Timur Kabupaten Karawang. *Delta-Pi: Jurnal Matematika Dan Pendidikan Matematika*, *10*(1).

Badjeber, R. (2017). Asosiasi kemampuan penalaran matematis dengan kemampuan koneksi matematis siswa SMP dalam pembelajaran inkuiri model alberta. *JPPM (Jurnal Penelitian dan Pembelajaran Matematika)*, *10*(2), 50–56.

Brenner, M. E., Mayer, R. E., Moseley, B., Brar, T., Durán, R., Reed, B. S., & Webb, D. (1997). Learning by understanding: The role of multiple representations in learning algebra. *American Educational Research Journal*, *34*(4), 663–689.

Fajri, N. (2015). Korelasi antara kemampuan koneksi dan komunikasi matematis siswa dengan menggunakan pendekatan contextual teaching and learning (CTL). *Numeracy*, *2*(1), 51–60. https://doi.org/10.46244/numeracy.v2i1.159

Gaffar, A., Afriadi, A., & Satriani, S. (2019). Analisis Kemampuan Representasi Matematis Siswa Dalam Menyelesaikan Soal Matematika Materi Komposisi Fungsi dan Invers Kelas XI IPA SMAN 1 Gowa. *Pedagogy: Jurnal Pendidikan Matematika*, *4*(1), 42–52.

Gee, E., & Harefa, D. (2021). Analysis of Students' Mathematic Analisis Kemampuan Koneksi dan Pemahaman Konsep Matematis Siswa. *Musamus Journal of Primary Education*, *4*(1), 1–11.

Goldin, G. A., & Kaput, J. J. (2013). A joint perspective on the idea of representation in learning and doing mathematics. In *Theories of mathematical learning* (pp. 409–442). Routledge.

Graciella, M., & Suwangsih, E. (2016). Penerapan pendekatan matematika realistik untuk meningkatkan kemampuan representasi matematis siswa. *Metodik Didaktik : Jurnal Pendidikan Ke-SD-an*, *10*(2), 27–36. https://doi.org/10.17509/md.v10i2.3180

Hadiat, H. L., & Karyati, K. (2019). Hubungan kemampuan koneksi matematika, rasa ingin tahu dan self-efficacy dengan kemampuan penalaran matematika. *Jurnal Riset Pendidikan Matematika*, *6*(2), 200–210. https://doi.org/10.21831/jrpm.v6i2.26552

Hamdani, M. F., & Nurdin, E. (2020). Kemampuan Koneksi Matematis berdasarkan Minat Belajar Siswa. *JURING (Journal for Research in Mathematics Learning)*, *3*(3), 275–282. https://doi.org/10.24014/juring.v3i3.10346

Handayani, H. (2015). Pengaruh pembelajaran kontekstual terhadap kemampuan pemahaman dan representasi matematis siswa sekolah dasar. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, *1*(1), 142–149.

Hodiyanto, H. (2017). Hubungan Kemampuan Pemecahan Masalah Matematis dan Kemampuan Koneksi Matematis dengan Prestasi Belajar Mahasiswa. *Jurnal Pendidikan Informatika Dan Sains*, *6*(2), 208–218.

Ilma, Z. A., Turmudi, T., & Dahlan, J. A. (2022). Analisis Pengaruh Kemampuan Spasial dan Representasi terhadap Koneksi Matematis Siswa. *Prosiding Sesiomadika*, *4*(1), 11-21.

Inayah, S., & Nurhasanah, G. A. (2019). Pengaruh kemampuan representasi matematis siswa terhadap kepercayaan dirinya. *JPPM (Jurnal Penelitian Dan Pembelajaran Matematika)*, *12*(1), 17–31.

https://doi.org/10.30870/jppm.v12i1.4852
Ismawati, Y. (2021). Hubungan Antara Disposisi Matematis dengan Kemampuan Representasi Matematika Siswa Kelas X Sekolah Menengah Kejuruan. *Jurnal Equation: Teori Dan Penelitian Pendidikan Matematika*, *4*(1), 35–46. https://doi.org/10.29300/equation.v4i1.3962
Karakoç, G., & Alacaci, C. (2015). Real World Connections in High School Mathematics Curriculum and Teaching. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *6*(1), 31–46. https://doi.org/10.16949/turcomat.76099
Khoirunnisa, K., Azhar, E., & Jusra, H. (2018). Hubungan Kemandirian Belajar dengan Kemampuan Representasi Matematis Siswa di Smpn 18 Tangerang. *Prosiding SENAMKU*, *1*, 182–190.
Mandur, K., Sadra, W., & Suparta, I. N. (2016). Kontribusi kemampuan koneksi, kemampuan representasi, dan disposisi matematis terhadap prestasi belajar matematika siswa sma swasta di kabupaten Manggarai. *Jurnal Pendidikan Dan Kebudayaan Missio*, *8*(1), 65–72.
Maryati, I., & Monica, V. (2021). Pembelajaran Berbasis Masalah dan Inkuiri dalam Kemampuan Representasi Matematis. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(2), 333–344.
Maulydia, S. S. (2017). *Hubungan Antara Kemampuan Representasi Matematis Dengan Kepercayaan Diri, Kemandirian Belajar, Motivasi Belajar, Disposisi Matematis Dan Gender Siswa SMK* [PhD Thesis]. UNIMED.
Meylinda, D., & Surya, E. (2017). Kemampuan koneksi dalam pembelajaran matematika di sekolah. *Jurnal Pendidikan Matematika*, *1*(1), 1–12.
Muhamad, N. (2017). Pengaruh Metode Discovery Learning untuk Meningkatkan Representasi Matematis dan Percaya Diri Siswa. *Jurnal Pendidikan UNIGA*, *10*(1), 9–22. https://doi.org/10.52434/jp.v10i1.83
Musrianti, W. O. S., & Ikman. (2014). Analisis Kemampuan Koneksi dan Representasi Matematik Siswa Kelas VIII SMP Negeri di Kota Kendari. *Jurnal Penelitian Pendidikan Matematika*, 2(3), 165–176.
NCTM. (2000). *Principle and Standars for School Mathematics.* Reston: NCTM.
Nurafni, A., & Pujiastuti, H. (2019). Analisis Kemampuan Koneksi Matematis ditinjau dari Self Confidence Siswa: Studi Kasus Di SMKN 4 Pandeglang. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, *2*(1), 27–33.
Nurfitriyanti, M., Kusumawardani, R., & Lestari, I. (2020). Kemampuan Representasi Matematis Peserta Didik Ditinjau Penalaran Matematis pada Pembelajaran Berbasis Masalah. *Jurnal Gantang*, *5*(1), 19–28. https://doi.org/10.31629/jg.v5i1.1665
Panduwinata, B., Tuzzahra, R., Berlinda, K., & Widada, W. (2019). Analisis Kesulitan Representasi Matematika Siswa Kelas VII Sekolah Menengah Pertama Pada Materi Sistem Persamaan Linier Satu Variabel. *Jurnal Pendidikan Matematika Raflesia*, *4*(2), 202–210. https://doi.org/10.33449/jpmr.v4i2.9819
Pape, S. J., & Tchoshanov, M. A. (2001). The role of representation (s) in developing mathematical understanding. *Theory into Practice*, *40*(2), 118–127.
Rismawati, M., Irawan, E. B., & Susanto, H. (2016). Analisis kesalahan koneksi matematis siswa pada materi sistem persamaan linier dua variabel. *Prosiding Konferensi Nasional Penelitian Matematika Dan Pembelajarannya*, 126–134.
Rivaldo, Y. (2021). Pembelajaran Matematika Dengan Pendekatan Investigatif Untuk Meningkatkan Kemampuan Penalaran Dan Representasi Matematis Siswa Sekolah Dasar: Indonesia. *Al-Mafahim: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *4*(1), 8–15.
Sanders, S. (2022). Representations and the foundations of mathematics. *Notre Dame Journal of Formal Logic*, *63*(1), 1–28.
Santia, I., & Sutawidjadja, A. (2019). Exploring Mathematical Representations in Solving Ill-Structured Problems: The Case of Quadratic Function. *Journal on Mathematics Education*, *10*(3), 365–378.
Sugiyono, S. (2011). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D).*
Silviani, E., Mardiani, D., & Sofyan, D. (2021). Analisis Kemampuan Representasi Matematis Siswa SMP pada Materi Statistika. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(3), 483–492.

Sri, D. W. (2019). Profil representasi matematis siswa dalam menyelesaikan masalah matematika dengan media screencast O matic. *Journal of Mathematics Education and Science*, *2*(2), 83–87

Suningsih, A., & Istiani, A. (2021). Analisis Kemampuan Representasi Matematis Siswa. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(2), 225–234. https://doi.org/10.31980/mosharafa.v10i2.984

Susanty, A. (2018). Analisis kemampuan koneksi matematis berdasarkan NCTM siswa SMA kelas X ipa pada materi Eksponen dan Logaritma. *Jurnal Pendidikan Tambusai*, *2*(2), 870–876.

Syafitri, A., Theis, R., & Iriani, D. (2021). Analisis kesulitan kemampuan representasi matematis siswa ekstrovert dalam menyelesaikan soal matematika pada materi aljabar. *Absis: Mathematics Education Journal*, *3*(1), 16–22. https://doi.org/10.32585/absis.v3i1.1382

Ulya, I. F., Irawati, R., & Maulana, M. (2016). Peningkatan kemampuan koneksi matematis dan motivasi belajar siswa menggunakan pendekatan kontekstual. *Jurnal Pena Ilmiah*, *1*(1), 121–130.

Ulya, M. R., Isnarto, I., Rochmad, R., & Wardono, W. (2019). Efektivitas pembelajaran flipped classroom dengan pendekatan matematika realistik Indonesia terhadap kemampuan representasi ditinjau dari self-efficacy. *PRISMA, Prosiding Seminar Nasional Matematika*, *2*, 116–123.

Utami, C. T. P., Mardiyana, & Triyanto. (2019). Profile of students' mathematical representation ability in solving geometry problems. *IOP Conference Series: Earth and Environmental Science*, *243*, 012123. https://doi.org/10.1088/1755-1315/243/1/012123

Widiyawati, W., Septian, A., & Inayah, S. (2020). Analisis kemampuan koneksi matematis siswa SMK pada materi trigonometri. *Jurnal Analisa*, *6*(1), 28–39.

Wiriandi, O., & Suratman, D. (2015). Hubungan antara Kemampuan Representasi Matematis dan Disposisi Matematis Siswa dalam Materi Perbandingan Trigonometri di SMA. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, *4*(5), 1–11.

Yaniawati, R. P., Indrawan, R., & Setiawan, G. (2019). Core Model on Improving Mathematical Communication and Connection, Analysis of Students' Mathematical Disposition. *International Journal of Instruction*, *12*(4), 639–654.

Yuliardi, R., Juandi, D., Maizora, S., & Mahpudin, A. (2021). Analysis of Students' Mathematical Representation Skills through Android Application-based Mathematics Learning. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *12*(1), 178–189. https://doi.org/10.15294/kreano.v12i1.28667

Yuniarti, Y. (2013). Peran Guru Dalam Meningkatkan Kemampuan Representasi Matematika Dalam Pembelajaran Matematika. *EduHumaniora| Jurnal Pendidikan Dasar Kampus Cibiru*, *5*(1).

Yusuf, A. A., Bito, N., Nurwan, N., & Zakaria, P. (2022). Deskripsi Kemampuan Koneksi Matematis Siswa Pada Materi Teorema Pythagoras. *Jambura Journal of Mathematics Education*, *3*(1), 10–17.

Zhe, L. (2012). Survey of primary students' mathematical representation status and study on the teaching model of mathematical representation. *Journal of Mathematics Education*, *5*(1), 63–76.