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Analysis of Mathematical Connection Ability in Geometry at MEA Learning Based on Spatial Intelligence

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Abstract

Problem solving activities require students to apply mathematics rules on non-routine problems. Mathematical connection ability is required so that students can relate real problems to mathematical model nor relate the interrelationships between the concepts that required to solve problems. This study aims to examine the effectiveness of MEA in geometry and to analyze the mathematical connections ability of students in geometry based on upper, middle, and lower spatial intelligence categories on MEA. The research method is Mixed Methods and research design is Sequential Explanatory Design. The subjects of the study is the 9^{th} grade students. The study started by first spatial intelligence test in experimental class, then followed by MEA learning in experimental class and expository learning in control class. The study ended by mathematical connection ability test in experimental and control classes and last spatial intelligence test in experimental class. The results showed that MEA learning in geometry were effective. The result of mathematical connection ability in geometry of upper spatial intelligence category students has reached five indicators of mathematical connection ability well. Students of middle spatial intelligence category on first, second and fourth indicators have been maximized, but third and fifth indicators have not been maximized. Students of lower spatial intelligence category on first indicator have been maximized, second indicator has not been maximized, while third, fourth and fifth indicators can not be achieved well. Teachers should know the spatial intelligence of students so that the learning process especially in geometry achieve maximum results.

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INTRODUCTION

Mathematics learning in school should pay attention of its development, past, present, and future possibilities (Suherman et al., 2003: 55). One of the characteristics of mathematics is having an abstract object. Due to its abstract nature, many students have difficulty in mathematics (Afriyani et al, 2014: 49). 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). The learning process is very important not only the final result (Masrukan, 2013: 8). Learning with satisfactory results requires the maximum process (Satrianawati, 2017: 109).

According to National Council of Theacher of Mathematics (NCTM) there are 5 (five) process standards in acquiring and applying content knowledge (NCTM, 2000). The five process standards are problem solving, reasoning and proof, communication, connections, and representations (NCTM, 2000: 29). Problem solving activities require students to apply mathematics rules on non-routine problems. One of the abilities that must be possessed by students is mathematical connections ability in order to relate real problems into the mathematical model nor relate the interrelationship between the concepts needed in problem solving (Sari, 2016: 113).

Mathematical connections or connections in mathematics discuss about the understanding of students in connecting mathematical ideas that will facilitate the ability to formulate and verify the assumptions between topics deductively. The developed concepts and procedures of mathematics can be applied to solve problems in mathematics and other disciplines (Rohendi, 2012: 3). When students can connect their Mathematical ideas, their understanding is deeper and more lasting (NCTM, 2000: 64).

The indicator of mathematical connection ability according to NCTM (2000: 64) is to recognize and use connections among mathematical ideas, understand how mathematical ideas interconnect and build on one another to produce a coherent whole, and recognize and apply mathematics in contexts outside of mathematics. The indicator of mathematical connection ability in this study is recognize the relationship between concepts in mathematics, using relationships between concepts in mathematics, recognizing the relationship between concepts in mathematics with topics outside mathematics or in daily life, using the relationship between concepts in mathematics with topics outside mathematics or in daily life, and declare a procedure with other procedures in equivalent representation.

Gardner (2011: 77-292) states that there are six intelligences, there are linguistic intelligence, musical intelligence, logical-mathematical intelligence, spatial intelligence, bodily-kinesthetic intelligence, and (6) personal intelligence. Maier (1998: 69-72) states that there are five elements of spatial intelligence based on several theories of intelligence, meta-analysis, and a number of studies of spatial abilities such as spatial perception, visualization, mental rotation, spatial relations, and spatial orientation. The preparation of the spatial intelligence test instrument adapted the design of spatial ability test instrument prepared by Prabowo & Ristiani (2011: 72). Ningsih & Budiarto (2014: 204) states that spatial visuals will affect the ability of students to understand the geometry properties and detect relationships and changes in geometry to solve mathematical problems and daily life problems. Teachers should know the spatial intelligence of students so that the learning process especially in geometry achieve maximum results.

Mathematical learning is rarely related to the daily life problems. This makes the students just able to remember the definitions, theorems and mathematical formulas so that the other abilities of students do not develop (Handayani et al, 2013: 71). Various problems that occur in the students life environment can be used as problems to look for solution (Geni & Hidayah, 2017: 12). Students who already have some knowledge needed to solve a mathematical problem, often have not been able to use that knowledge to solve new problems or problems that are not familiar with the students (Dewanti, 2009: 24). Students have difficulty in making mathematical models of a problem because students have difficulty in analyzing facts which are connected with relevant mathematical concepts (Sari & Wijaya, 2017: 105). The main cause of students failure in learning is the difficulty of students in capturing the correct concept, because they are less understanding of the abstraction process and still in the understanding, can only do the exercises but do not understand the concept (Adiastuty et al., 2012: 88). Aszalos & Bako (2004: 1) states that one of the most difficult parts of the Mathematics in primary and secondary education is geometry. Wulansari &

Kumaidi (2015: 109) states that the main cause of concept errors in geometry and measurement is not applying formulas, concepts, or properties properly. Based on the interviews with teachers in Banjarnegara, in Mathematics learning is still a lot of students who must be guided by teachers in connecting the concept that has been studied with the concept that is being studied. Students also have difficulty in solving problems related to the combination of several parts.

Rahmawati et al (2013: 55) states that effective learning process need the right model and learning strategy in the students and teachers learning process. One of the learning models that develops connection ability is the Model Eliciting Activities (MEA). Chamberlin & Moon (2005: 39) states that MEA foster communication and problem solving, two principles outlined in the NCTM principles and standards document. In line with that opinion Yildirim et al (2010: 832) states that MEA contribute to students understanding of engineering concepts, problem solving, communications and teamwork skills. Chamberlin & Moon (2005: 37) states that the MEA encourages students to create mathematical models to solve complex problems and MEA is designed to identify students mathematical thinking, a task endorsed by NCTM. Therefore, MEA is a learning model that supports connections ability in a problem through mathematical modeling and supports students ability to work in groups. Eraslan (2011: 2) states that the use of MEA in mathematics learning provides an opportunity for students to describe, explain, interpret, build, and communicate relationships, verify students hypotheses, and verify students solutions. Jumadi (2017: 48) states that the MEA approach can theoretically be used as an alternative in encouraging students to formulate a mathematical model in solving problems.

Arsyad (2002: 4-5) states that media is a component of learning resources or physical tools that contain instructional materials in students environment that can stimulate students to learn. Mathematics learning in primary schools (elementary schools and junior high school) requires instructional media (Hidayah et al, 2017: 1). Learning aids can be manipulatives and student worksheets (Hidayah et al, 2013: 117). Manipulatives are needed by teachers to facilitate students understand of mathematics which is abstract (Sulistyaningsih et al, 2016: 1). Manipulative assisted mathematics learning can facilitate students thinking low to high levels (Hidayah, 2018: 1). Implementation of manipulative and student worksheets assisted mathematics learning can be implemented with a learning models by teachers (Hidayah, 2018: 9). The use of student worksheets and manipulative will help students to find concepts (Hidayah et al, 2016: 2).

Based on the previous explanation, it is required to conduct research to examine the effectiveness of MEA in geometry. Further research is needed to analyze the students mathematical connection ability based on indicators of mathematical connection ability especially students with upper, middle and lower spatial intelligence categories.

The purpose of this study was to examine the effectiveness of MEA in geometry and to analyze the mathematical connection ability of students in geometry based on upper, middle, and lower spatial intelligence categories on MEA.

METHODS

This research method is mixed methods that combine quantitative and qualitative research methods. The research design is sequential explanatory design. The population in this study is the 9th grade students of odd semester of the 2015/2016 school year of SMP Negeri 2 Banjarnegara which consists of 8 classes. The sample in this research determined by cluster sampling technique. One class as the experimental group was treated with MEA learning in geometry while another class as control group was treated with expository learning in geometry. The study started by first spatial intelligence test in experimental class students. Then followed by learning activities for 4 meetings to familiarize students with the problem of mathematical connection ability. After the learning has been completed, the mathematical connection ability test are given to the experimental class and control class students and the last spatial intelligence test in the experimental class students.

Quantitative analysis is used to determine the effectiveness of MEA learning in geometry. Quantitative analysis conducted include proportion π right tailed test, two proportion right tailed test, two paired sampel righ tailed t test, and normalized gain $\langle g \rangle$ test. The data are the score of mathematical connection ability test of experimental class and control class and the score of the first spatial intelligence test and the last spatial intelligence test from the experimental class. The data of last spatial intelligence test is used to categorize students into upper spatial intelligence category, middle spatial intelligence category, and lower spatial intelligence category by using standard deviation. After spatial intelligence categorization of students into upper spatial intelligence category, middle spatial intelligence category, and lower spatial intelligence category by using standard deviation, students are selected to be observed their mathematical connection ability. There were 6 students who were representatives of each category: two students from the upper spatial intelligence category, two students from the middle spatial intelligence category, and two students from the lower spatial intelligence category which has a spatial intelligence test score closest to the mean score of spatial intelligence test score in each category. In addition, the selection of students representatives from each category also takes into teacher considerations. This relates to the subject's ability to express opinions or ways of his thoughts both orally and in writing. Qualitative analysis done by reducing the data, presenting the data, and drawing conclusions from the data that has been collected and verify the conclusion.

RESULT AND DISCUSSION

The students mathematical connection ability in geometry with MEA learning reaches a classical completeness when the number of students whose score is ≥ 77 at least 75% of the number of students in the class. The Proportion π right tailed test was used to determine the students mathematical connection ability in geometry with MEA learning reaches a classical completeness. Based on test result obtained $z = 2{,}858$. It can be concluded that the proportion of students who have reached the Minimum Completeness Criteria of 77 at least 75%. This means the students mathematical connection ability in geometry with MEA learning reaches a classical completeness. The students mathematical connection ability in geometry with MEA learning is better than the students mathematical connection ability in geometry with expository learning when the number of students with MEA learning whose score is ≥ 77 more than the number of students with expository learning whose score is ≥ 77. The two proportion right tailed test was used to determine the students mathematical connection ability in geometry with MEA learning better than the students mathematical connection ability in geometry with expository learning. Based on test result obtained $z = 1{,}715$. It can be concluded that the number of students with MEA learning whose score is ≥ 77 more than the number of students with expository learning whose score is ≥ 77. This means the students mathematical connection ability in geometry with MEA learning is better than the students mathematical connection ability in geometry with expository learning. The students spatial intelligence with MEA learning in geometry increases when the mean score of last spatial intelligence test score is reduced by the mean score of first spatial intelligence test score > 0. The two paired sampel righ tailed t test was used to determine the students spatial intelligence with MEA learning in geometry increases when the mean score of last spatial intelligence test score is reduced by the mean score of first spatial intelligence test score > 0. Based on test result obtained $t = 2{,}49087$. It can be concluded that the mean score of last spatial intelligence test score is reduced by the mean score of first spatial intelligence test score > 0. This means the students spatial intelligence with MEA learning in geometry increases. The normalized gain $\langle g \rangle$ test was used to determine the improvement of students spatial intelligence of representatives 6 students. Based on test result by normalized gain $\langle g \rangle$ test, obtained two students from the upper spatial intelligence category in the medium criteria, two students from the middle spatial intelligence category in the low criteria, and two students from the lower spatial intelligence category in the low criteria.

MEA learning in geometry were effective. This is because it meets the criteria, (1) the students mathematical connection ability in geometry with MEA learning reaches a classical completeness when the number of students whose score is ≥ 77 at least 75% of the number of students in the class, (2) The students mathematical connection ability in geometry with MEA learning is better than the students mathematical connection ability in geometry with expository learning when the number of students with MEA learning whose score is ≥ 77 more than the number of students with expository learning whose score is ≥ 77, (3) the students spatial intelligence with MEA learning in geometry increases when the mean score of last spatial intelligence test score is reduced by the mean score of first spatial intelligence test score > 0, and (4) there is an improvement of students spatial intelligence of representatives 6 students with MEA learning in geometry.

The results of this study support the results of previous study, such as the study by Akhmad & Masriyah (2014: 101), states that learning outcomes after treated with the Model Eliciting Activities approach completed in a classical. Hidayah et al (2016: 5), states that the Missouri Mathematics Project aided with students worksheet and manipulative could help the students achieve classical completeness in the learning results. Furthermore, Hartatiana et al (2017: 4), states that Model Eliciting Activities learning with Cabri has a significant effect in improving students spatial reasoning ability. Harmony & Theis (2012: 12), states that there is a significant effect between the spatial ability to students mathematics learning outcomes. Syahputra (2013: 353), states that the students spatial ability of Realistic Mathematics approach is better than the students spatial ability of conventional approaches.

Mathematics learning aided with manipulative and worksheet students designed to assist students in understanding a concept. The problems related to real problems that exist around the students so that cause students to solve the problem. A similar opinion is expressed by Hidayah (2018: 2) states that manipulative assisted mathematics learning is not only to find concepts and principles but also expected to strengthen students competence in attitude, knowledge, and skill, able to solve daily life problems.

Students are able to find various kinds of solution strategies. There is difference of problem solving between the students in solving given problem. Some students are able to sketch the problems according to the students own idea. Students are able to connect the concepts that have been received during the lesson and apply them to the given problem. Sulistyaningsih et al (2016: 1) states that students can connect their ideas and then integrate their mathematics knowledge so that they gain a deep understanding of mathematical concepts by many different ways. MEA learning contributes to improving students creativity in solving problems. Students build their own knowledge to help them in solving problems especially real problems. A similar opinion is expressed by Istianah (2013: 51) states that the improvement of creative thinking ability with MEA approach is better than ordinary learning. This is because learning using the MEA approach is designed to practice students to think creatively. Another opinion expressed by Amalia et al (2015: 46) states that students mathematical creative thinking ability after applied with MEA learning is better then compared to before applied with MEA learning. In line with that opinion, Wessels (2014: 11) states that in MEA learning, creativity can be developed through the completion of the MEA task. Hanifah (2015: 197-198) states that Model Eliciting Activities (MEA) learning with a scientific approach directing students to find their own solutions by students own information. This is the added value of Model Eliciting Activities (MEA) with a scientific approach.

The students mathematical connection ability is analyzed based on spatial intelligence, where students spatial intelligence are categorized into upper spatial intelligence, middle spatial intelligence, and lower spatial intelligence. Students of the upper spatial intelligence category have achieved the five indicators of mathematical connection ability well. The four indicators, the first indicator to the fourth indicator has been achieved maximally. The indicator that has not been achieved maximally is the fifth indicator in the mathematical connection ability is declare a procedure with other procedures in equivalent representation. The study subjects on the fifth indicator write down the required formula and perform the calculations correctly but less careful in performing the final calculation as shown in Figure 1.

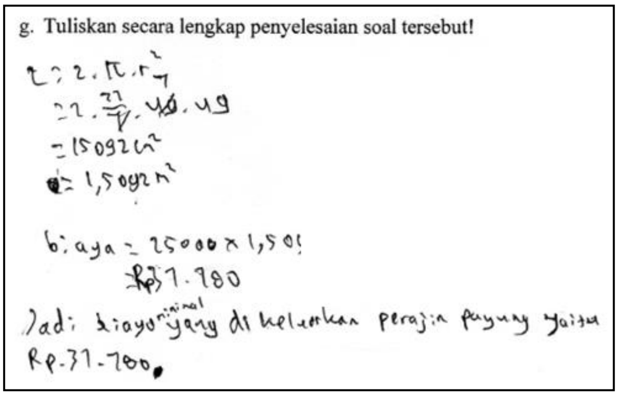

Figure 1. Upper Spatial Intelligence Subject in Problem 3

Students of the middle spatial intelligence category have not achieved the five indicators of mathematical connection ability well. The three indicators, the first, second, and fourth indicators have been achieved maximally. The indicators that have not been achieved maximally are the third and fifth indicators in the mathematical connection ability are recognizing the relationship between concepts in mathematics with topics outside mathematics or in daily life and declare a procedure with other procedures in equivalent representation. The study subjects on the third indicator can not or wrong in writing the formula but can write the concept used to solve the problem even though the writing is less perfect as shown in Figure 2.

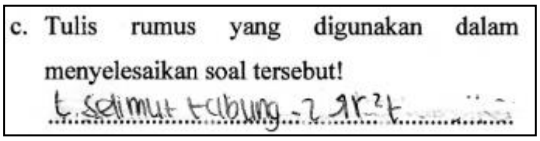
c. Tulis rumus yang digunakan dalam menyelesaikan soal tersebut!
L selimut tabung = 2 π r² t

Figure 2. Middle Spatial Intelligence Subject in Problem 1

The study subjects on the fifth indicator there is an error in writing the formula so that the results obtained are not appropriate, there are errors in determining the height and radius on the problem, units used are not appropriate, unfinished calculations and errors in the calculation so the results obtained not appropriate. In line with Joubert (2009: 33) states that one of students difficulties in mathematics learning is the error of calculation.

Students of the lower spatial intelligence have not achieved the five indicators of mathematical connection ability well. The first indicator has been achieved maximally. The indicators that have not been achieved maximally are the second indicator. The study subjects on the second indicator write down the calculations in detail and correctly but not complete with the unit on the final result, in the calculation of the slant height is less appropriate in writing the root of the slant height, directly write the final result of the slant height or radius without calculating and not accompanied by the unit on the final result. The other three indicators, the third, fourth and fifth indicators can not be achieved well. The study subjects on the third indicator can not or wrong in writing the formula used to solve the problem and not appropriate or not accompanied the size in the sketch. The study subjects on the fourth indicator write down the concepts needed to solve the daily life problems but not correctly in mentioning the formula used to solve the problem as shown in Figure 3.

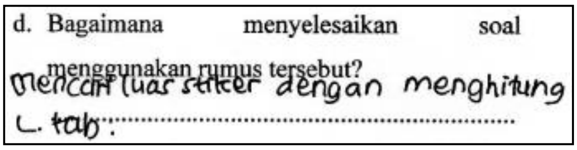
d. Bagaimana menyelesaikan soal menggunakan rumus tersebut?
mencari luas stiker dengan menghitung L. tab

Figure 3. Lower Spatial Intelligence Subject in Problem 1

The study subjects on the fifth indicator there is an error in writing the formula so that the results obtained not appropriate and there is an error in writing the size so that the results obtained not appropriate. In line with Wulansari & Kumaidi (2015: 109) states that the main cause of concept errors in geometry and measurement is not applying formulas, concepts, or geometry properties properly.

CONCLUSION

The conclusion of this study is MEA learning in geometry were effective. The mathematical connection ability in geometry of upper spatial intelligence category students has reached five indicators of mathematical connection ability well. Students of middle spatial intelligence category on first, second, and fourth indicators have been maximized, but third and fifth indicators have not been maximized. Students of lower spatial intelligence category on first indicator have been maximized, second indicator has not been maximized, while third, fourth and fifth indicators can not be achieved well.

REFERENCES

Adiastuty, N., Rochmad, & Masrukan. 2012. “Perangkat Pembelajaran Model BBL Materi Barisan dan Deret untuk Meningkatkan Kemampuan Pemecahan Masalah”. Unnes Journal of Mathematics Education Research. 1 (2), 87-93.

Afriyani, A.D.N., Chotim, M., & Hidayah, I. 2014. “Keefektifan Pembelajaran TTW dan SGW Berbantuan Kartu Soal Terhadap Kemampuan Pemecahan Masalah”. Unnes Journal of Mathematics Education. 3 (1), 48-55.

Akhmad, G.P.A. & Masriyah. 2014. "Efektivitas Pembelajaran Matematika dengan Pendekatan Model-Eliciting Activities (MEAs) pada Materi Persamaan dan Pertidaksamaan Linear Satu Variabel di Kelas VII-A SMP Negeri 1 Lamongan". MATHEdunesa Jurnal Ilmiah Pendidikan Matematika. 3 (2), 97-102.

Amalia, Y., Duskuri, M., & Ahmad, A. 2015. "Penerapan Model Eliciting Activities untuk Meningkatkan Kemampuan Berpikir Kreatif Matematis dan Self Confidence Siswa SMA". Jurnal Didaktik Matematika. 2 (2), 38-48.

Arsyad, A. 2008. *Media Pembelajaran*. Jakarta: PT Raja Grafindo Persada.

Aszalos, L. & Bako, M. 2004. "How Can We Improve The Spatial Intelligence?". 6th International Conference on Applied Informatics. Eger, Hungary. 27-31 Januari 2004. 1-7.

Chamberlin, S.A. & Moon, S.M. 2005. "Model-Eliciting Activities as a Tool to Develop and Identify Creatively Gifted Mathematicians". The Journal of Secondary Gifted Education. XVII (1), 37-47.

Dewanti, S.S. 2009. "The Combination of Problem-Centered Learning And Meta-Cognitive Training to Increase Students' Ability To Solve Mathematics Problems". Jurnal Penelitian dan Evaluasi Pendidikan. 12 (1), 21-39.

Eraslan, A. 2011. "Prospective Elementary Mathematics Teachers' Perceptions on Model Eliciting Activities and their Effects on Mathematics Learning". Elementary Education Online. 10 (1), 364-377.

Geni, P.R.L. & Hidayah, I. 2017. "Kemampuan Pemecahan Masalah Siswa pada Pembelajaran Problem Based Learning Bernuansa Etnomatematika Ditinjau dari Gaya Kognitif". Unnes Journal of Mathematics Education Research. 6 (1), 11-17.

Gardner, H. 2011. Frames of Mind. New York: Basic Books.

Handayani, P., Agoestanto, A., & Masrukan. 2013. "Pengaruh Pembelajaran Berbasis Masalah dengan Asesmen Kinerja Terhadap Kemampuan Pemecahan Masalah". Unnes Journal of Mathematics Education. 2 (1), 70-76.

Hanifah. 2015. "Penerapan Pembelajaran Model Eliciting Activities (MEA) dengan Pendekatan Saintifik untuk Meningkatkan Kemampuan Representasi Matematis Siswa". Kreano. 6 (2), 191-198.

Harmony, J. & Theis, R. 2012. "Pengaruh Kemampuan Spasial Terhadap Hasil Belajar Matematika Siswa Kelas VII SMP Negeri 9 Kota Jambi". Edumatica. 2 (1), 11-19.

Hartatiana, Darhim, & Nurlaelah, E. 2017. "Student's Spatial Reasoning through Model Eliciting Activities with Cabri 3D". International Conference on Mathematics and Science Education. Journal of Physics: Conference Series. 895 (2017) 012075, 1-5.

Hidayah, I. 2018. "Pembelajaran Matematika Berbantuan Alat Peraga Manipulatif Pada Jenjang Pendidikan Dasar dan Gerakan Literasi Sekolah". *Prisma 1, Prosiding Seminar Nasional Matematika*. Universitas Negeri Semarang.

Hidayah, I., Margunani, & Dwijanto. 2017. "Predictive factors of user acceptance on the primary educational mathematics aids product". *International Conference on Mathematics, Science and Education 2017"*. Journal of Physics: Conference Series. 983 (2018) 012090, 1-5.

Hidayah, I., Pujiastuti, E., & Chrisna, J.E. 2016. "Teacher's Stimulus Helps Students Achieve Mathematics Reasoning and Problem Solving Competences". *The 3rd International Conference on Mathematics, Science and Education 2016"*. Journal of Physics: Conference Series. 824 (2017) 012042, 1-5.

Hidayah, I., Sugiarto, & Sutarto, H. 2013. "Suplemen Panduan Guru dalam Pengembangan Pembelajaran Tematik Kompetensi Dasar Matematika Kelas IV". *Kreano*. 4 (2), 115-125.

Istianah, E. 2013. "Meningkatkan Kemampuan Berpikir Kritis dan Kreatif Matematik dengan Pendekatan Model Eliciting Activities (MEAs) pada Siswa SMA". Infinity. 2 (1), 43-54.

Joubert, M. 2009. "Children's Difficulties with Mathematical Word Problems". Proceedings of the British Society for Research into Learning Mathematics. 29 (3), 31-36. Nopember.

Jumadi. 2017. "Penerapan Pendekatan Model-Eliciting Activities (MEAs) dalam Meningkatkan Kemampuan Pemecahan

Masalah Siswa Kelas XII SMA N 2 Yogyakarta". Aksioma. 8 (2), 43-49.

Maier, P.H. 1998. "Spatial Geometry and Spatial Ability - How To Make Solid Geometri Solid?". Selected Papers from The Annual Conference of Didactics of Mathematics 1996. Proceeding of the Annual Meeting Of the Gesellschaft fur Didaktik der Mathematik (GDM). Osnabrueck. 63-75.

Masrukan. 2013. Asesmen Otentik Pembelajaran Matematika, Mencakup Asesmen Afektif dan Karakter. Semarang: FMIPA Unnes.

NCTM. 2000. Principles and Standards for School Mathematics. Reston, VA: The National Council of Theacher of Mathematics, Inc.

Ningsih, S. & Budiarto, M.T. 2014. "Kecerdasan Visual Spasial Siswa SMP dalam Mengkonstruksi Rumus Pythagoras dengan Pembelajaran Berbasis Origami di Kelas VIII". MATHEdunesa Jurnal Ilmiah Pendidikan Matematika. 3 (1), 203-211.

Prabowo, A. & Ristiani, E. 2011. "Rancang Bangun Instrumen Tes Kemampuan Keruangan Pengembangan Tes Kemampuan Keruangan Hubert Maier dan Identifikasi Penskoran Berdasar Teori Van Hielle". Kreano. 2 (2), 72-87.

Rahmawati, J., Hidayah, I., & Darmo. 2013. "Keefektifan Experiential Learning dengan Strategi REACT Terhadap Kemampuan Komunikasi Matematis". Unnes Journal of Mathematics Education. 2 (3), 54-59.

Rohendi, D. 2012. "Developing E-Learning Based on Animation Content for Improving Mathematical Connection Abilities in High School Students". International Journal of Computer Science Issues. 9 (1), 1-5.

Sari, R.H.N. & Wijaya, A. 2017. "Mathematical Literacy of Senior High School Students in Yogyakarta". Jurnal Riset Pendidikan Matematika. 4 (1), 100-107.

Sari, W. R. 2016. "Pengembangan Perangkat Pembelajaran Bangun Ruang Di SMP dengan Pendekatan Pendidikan Matematika Realistik". Jurnal Riset Pendidikan Matematika. 3 (1), 109-121.

Satrianawati, S. 2017. "Pengembangan Materi Bangun Ruang Sisi Datar Sebagai Bagian dari Persiapan Calon Guru Sekolah Dasar". Jurnal Riset Pendidikan Matematika. 4 (1), 108-119.

Suherman, E., Turmudi, Suryadi, D., Herman, T., Suhendra, Prabawanto, S., Nurjanah, & Rohayati, A. 2003. Strategi Pembelajaran Matematika Kontemporer. Bandung: JICA-Universitas Pendidikan Indonesia.

Sulistyaningsih, D., Mawarsari, V.D., Hidayah, I., & Dwijanto. 2016. "Manipulative Implementation For Supporting Learning Of Mathematics For Prospective Teachers". *The 3rd International Conference on Mathematics, Science and Education 2016"*. Journal of Physics: Conference Series. 824 (2017) 012047, 1-5.

Syahputra, E. 2013. "Peningkatan Kemampuan Spasial Siswa Melalui Penerapan Pembelajaran Matematika Realistik". Cakrwala Pendidikan. XXXII (3), 353-364.

Utami, R.W. & Wutsqa, D.U. 2017 "Analisis Kemampuan Pemecahan Masalah Matematika dan Self-Efficacy Siswa SMP Negeri di Kabupaten Ciamis". Jurnal Riset Pendidikan Matematika. 4 (2), 166-175.

Wessels, H. 2014. "Level of mathematical creativity in model-eliciting activities". Journal of Mathematical Modelling and Application. 1 (9), 1-19.

Wulansari, W. & Kumaidi. 2015. "Analisis Kesalahan Konsep Siswa dalam Menyelesaikan Soal Ujian Nasional Matematika SD". Jurnal Ilmu Pendidikan. 21 (1), 97-105.

Yildirim, T.P., Shuman, L., & Besterfield-Sacre, M. 2010. "Model-Eliciting Activities Assessing Engineering Student Problem Solving and Skill Integration Processes". *International Journal Engineering Education*. 26 (4), 831-845.