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Geometric Thinking Profile in Problem Solving Based on SOLO Plus Taxonomy

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Abstract

The purpose of this study is to describe geometric thinking based on the SOLO Plus taxonomy. This research used qualitative method which involved 34 students of the mathematics education study program. Data collection is done by tests and interviews. Data analysis is done by triangulation which, includes data reduction, data presentation, and conclusion drawing. The results showed that subjects with high and moderate mathematical abilities were included in the Van Hiele category of geometric thinking analytically by connecting components and geometric properties that were interconnected. This analytical ability is categorized as multistructural by identifying information that is considered useful and has a relationship with the problem solving process. In ordering-multistructural geometric thinking, it is done by sorting and connecting properties accompanied by informal arguments. Deduction-semirelational geometric thinking is done by analyzing and explaining the relationships between shapes and being able to prove theorems deductively, giving reasons with formal proof but not reaching the truth. Meanwhile, subjects with a low ability to think are said to think analytically geometrically by connecting components and geometric properties and in problem solving have multistructural responses. In ordering thinking, it is done by sorting and connecting the properties found previously and providing informal arguments. In the problem solving process included in the pre-structural category, they do not understand the problem and the information provided and do something that has nothing to do with the problem that is given.

Keywords: geometric reasoning, problem solving, SOLO taxonomy plus

INTRODUCTION

Mathematics is a subject that is learned at every level of education. The abstract nature of mathematics requires reasoning in studying and understanding it. One of the materials in mathematics is geometry. According to Fitriani, Suryadi, & Darhim (2018), the concept of geometry belongs to the category of abstract shapes. The abstraction process reveals that students can present reasons for decisions in concluding their activities (Fitriani, 2017). Therefore, in studying geometry material, it is necessary to be able to illustrate images well, because in geometry material many use images such as circles, lines, points, and so on (Nurbaiti & Arcana, 2019). In solving geometric problems, it takes the ability to think in applying concepts and skills to visualize and analyze the completion steps that will be used (Baeti & Murtalib, 2018). Likewise, solving the problem of the area and volume of the cube which is part of the geometry material.

In some materials, geometry is always an interesting discussion. Through the experience of learning geometry, it can improve problem solving skills, reasoning, and ease in learning various mathematical topics, as well as various other sciences. Geometry learning can also increase children's interest in mathematics, improve problem solving skills, reasoning, and ease in learning various math topics and other sciences.

Meanwhile, one of the causes of students' lack of understanding in solving mathematical

problems is that most students only memorize formulas without knowing how the formulas were obtained, so that students' understanding of concepts is still lacking and not optimal (Fitri, R. 2017). Since the understanding of the concept is still lacking, students also make mistakes in solving mathematical problems. It could be that from the start, the student had made a mistake in the systematics of solving the problem so he could not continue to the next step of completion (Ariyana et al., 2019).

Various studies have shown that many students face difficulties and have low achievement in middle and high school geometry classes (Gutiérrez, Jaime, & Fortuny, 2020). According to Usiskin, many students fail to understand key concepts in geometry and leave geometry class without learning basic terminology. In addition, research shows a decrease in students' motivation toward mathematics (Gottfried, Fleming, & Gottfried, 2001).

The level of geometric thinking in problem solving can be characterized based on Van Hiele's theory. Level-I: Visualization or Recognition, at this level, students recognize and identify certain geometric shapes according to their familiar appearance. However, students do not understand geometric properties. When students call a square shape, they are reacting to the whole shape and not to the right angles, the lengths of the sides are the same, and the lengths of the diagonals are the same. Level-II: Analysis, at this level, students analyze shapes in terms of components and their relationships. Students can also identify and name geometric shapes by knowing their properties. Level-III ordering, at this level, students logically order and relate previously found properties by providing informal arguments. Level-IV: Deduction, at this level, students can analyze and explain relationships between shapes and be able to prove theorems deductively, provide reasons for statements in formal proofs, and understand the role of axioms and definitions. Level-V: Rigor, at this level, students are able to analyze and compare various deductive systems (c, 2018).

Error response analysis in solving geometric problems can be explored using the SOLO Plus taxonomy. The SOLO (Structure of Observed Learning Outcomes) taxonomy is designed as an evaluation tool for the quality of student responses to a task (Biggs & Collis, 1982). There are five levels of the taxonomy, namely prestructural, unistructural, multistructural, relational, and extended abstract.

Then Sunardi (2006) conducted research on the development of this taxonomy level because based on the results of his research, there were student responses that did not fall into one of these levels (Amalia, 2017). This development is called the SOLO Plus Taxonomy, which consists of seven levels of student responses to problem solving mathematics (Fitriah, 2017). The seven levels are refinements of the five levels of SOLO Plus Taxonomy, including prestructural, unistructural, multistructural, semirelational, relational, abstract and extended abstract levels.

According to Sunardi (2006), the seven levels of this taxonomy are, (1) Prestructural, namely students do not understand the problem and the information provided so that students do something that has nothing to do with the problem; (2) Unistructural, i.e. students use the information on the questions but do not get the correct results; (3) Multistructural, namely students use several interconnected information separately and solve problems only in certain cases, so they do not get the right answer; (4) Semirelational, namely students understand the available problems, but have not been able to solve them correctly. Because in solving it, students combine two unrelated pieces of information, and students try to use new ways but have not succeeded; (5) Relational, namely students understand the problem well and can solve it. However, they have the wrong concept and do not find a new principle, so that when faced with another case with the same concept, students cannot apply it; (6) Abstract, namely students understand and solve problems correctly using all the information they get and try to make new statements with existing

information, but they have not been able to prove the truth. So, it has not been able to find a new principle; (7) Extended Abstract, namely students can use all available information to solve a mathematical problem, have been able to find new principles and can prove the truth. This taxonomy has the advantage that it makes it easy to classify the level or level of student responses to math problems, because several levels of students' ability to solve math problems have been determined (Fitriah, 2017).

Küchemann & Hoyles (2006) suggest that in order to solve geometric tasks by reasoning, it is important to consider how to support students to balance their need to be strict with the use of spatial intuition. Students may have difficulty interpreting geometric image representations. Thus, more attention needs to be paid to how people reason about geometric shapes when they are working on problems in mathematics and other subjects. The geometric representation of the image form is an important focus because it can be the main media tool. Teaching geometry provides a fundamental means of developing learners' spatial visualization skills and a means of developing their capacity for deductive reasoning and proof (Battista, 2011).

METHOD

The method used in this study is a qualitative research method conducted on of the 2021-2022 academic year. The research subjects were 34 mathematics education students. From 34 subjects, 3 subjects were selected based on their level of mathematical ability, namely high, medium, and low. It also pays attention to communication skills to make it easier for researchers in the interview process to obtain information related to Van Hiele's geometric thinking level in solving problems based on the SOLO Plus taxonomy. Selection of 3 subjects for further exploration based on the level of mathematical ability, namely high, middle, and low, and also pay attention to the types of errors made by the subject at each level of ability. In addition, to make it easier to conduct interviews, subject selection also pays attention to the subject's ability to communicate. The data collection techniques used were tests and interviews. The test instrument consisted of problem-solving test questions on the area and volume of the cube. Data analysis was performed using triangulation. There are three steps in analyzing test result data including: (1) Data reduction, namely selecting the appropriate data to avoid data accumulation; (2) Presenting data, namely classifying data results based on the types of errors and the causal factors in interviews; (3) Verifying data, namely drawing conclusions from comparing the data analysis of test results and interviews.

RESULTS AND DISCUSSION

The research was conducted by giving tests to 34 fourth credit students of the STKIP PGRI Bangkalan mathematics education department consisting of 25 female students and 9 male students. Based on the results of math problem solving tests on geometry material, groupings are obtained based on mathematical ability (see Table 1).

Table 1. Percentage of Subject Groups

Subject Ability	Subject Percentage
high	17 %
middle	52 %
low	34 %

From the grouping of mathematical abilities on geometry material, 3 subjects were chosen to represent each group. The selection was based on the results of the subject's work that gave rise to geometric thinking indicators for in-depth study. The following are the results of the subject's work in solving geometry problems.

Subjects with High Mathematical Ability (ST)

To examine geometric thinking, the researcher analyzed the results of the subject's work and the results of interviews. Figure 1 shows the work results of ST.

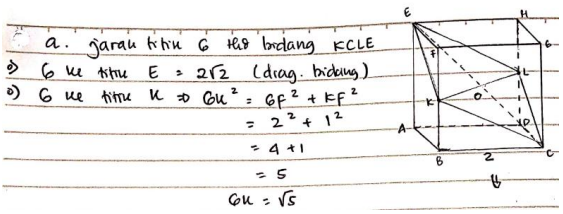

Figure 1. Work Results of ST

ST's work results in solving problems. ST is able to identify shapes by performing additional constructions to solve problems. Construction carried out by making KCLE rhombuses as planes on the GKCLE pyramid.

R : what steps do you use?
ST : create a pyramid GKCLE and determine the diagonal line of space CE
R : for what?
ST : as a base to determine the distance G to the CE line.

From the interview results, it can be seen that ST is able to analyze the geometric thinking process where ST connects components and geometric properties by mentioning CE as the diagonal of the KCLE plane as the base of the pyramid to determine the distance G to CE. At this stage of analysis, the ST subject is able to use some information that is interconnected separately and solve problems. This analytical ability is categorized as multistructural based on the SOLO Plus Taxonomy (Sunardi, 2006). In this multistructural category, ST subjects identify information that is considered useful and has a relationship in the problem solving process. ST subjects used the diagonal CE as a line for the KCLE plane that served as the base on the triangle CEG.

Geometry thinking of the ST subject in the ordering process, the ST subject logically sorts and relates the properties found previously by providing informal arguments. According to ST on the GKCLE pyramid, the height of the pyramid can be obtained as the distance G to the KCLE plane. Figure 2 presents the results of the work of ST subject in the use of mathematical concepts. Figure 3 shows the work results of ST.

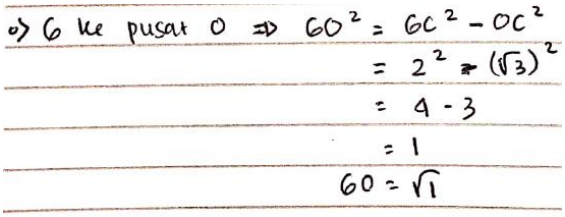

Figure 2. The results of the work of ST subject in the use of mathematical concepts

R : what is the function of point O?
ST : as a point connected with point G
R : for what?
ST : The line GO is the height of the pyramid and as the distance G to the KCLE bidang plane

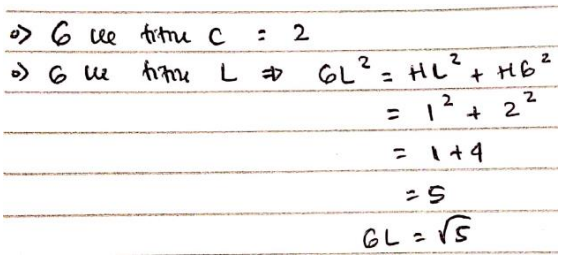

Figure 3. Work Results of ST

In the SOLO Plus taxonomy, the ability to relate previously found traits accompanied by informal reasons is also included in the multistructural category (Sunardi, 2006). This can be seen from the results of work and interviews with ST subjects by connecting G to E as a plane diagonal, G to K and G to L obtained using the Pythagorean theorem. The lines GE, GK, GL and GC are considered as some distances from G to the KCLE plane. Thus, the ST subject thinks in ordering and multi-structural geometry in the process of solving problems based on the SOLO Plus taxonomy.

Furthermore, ST can also carry out the deduction process. ST subject can analyze and explain the relationship between shapes and can prove the theorem deductively, which provides reasons for the statement in the formal proof ST states that the distance from point G to point O can be obtained by using the Pythagorean theorem. In line with Baeti & Murtalib (2018), that in solving geometric problems, it takes the ability to think in applying concepts and skills to visualize and analyze the completion steps

that will be used. However, based on the analysis of the ST subject's geometric thinking, there are errors in problem solving. In the process of solving the problem, the ST subject is able to use all the information and use it in the problem solving process, but the solution obtained by the ST subject has not reached the truth. The ability to use information in solving problems that are not accompanied by appropriate answers is included in the semi-relational category (Sunardi, 2006). Based on the SOLO Plus taxonomy, the geometric thinking process of ST subjects is included in the semirelational category in problem solving.

R : GO as the closest distance of point G to the KCLE plane
ST : yes sir
R : why?
ST : because O is the center

Based on the interview, ST's work shows that GO is the closest distance from point G to the KCLE plane. Subject ST gives an argument that GO is perpendicular to the KCLE plane so that GO is the closest distance G to the KCLE plane. In this case, the ST subject has not been able to use image visualization properly so that it produces a different representation of the GO line and the KCLE plane. Classification and modification of problems in visualization provide different representations (Mac an Bhaird et al., 2017). In line with this, it is the combination of icons, videos, plain text, orality, images, graphics, and video clips that seems to have new consequences for mathematics (Engelbrecht, Llinares, & Borba, 2020).

Basically, ST subject is able to perform analysis and is able to use information but have not compared various systems or other concepts to produce deductive conclusions to create new settlement procedures. It can be said that the ST subject is able to think rigor geometry. According to the SOLO Plus taxonomic response, ST subject understand and solve problems correctly using all the information obtained and try to make new statements with existing information, but ST subject has not been able to prove the truth so he has not been able to find new principles so that ST subject can be said to be abstract according to SOLO Plus taxonomy in problem solving.

Subjects with Medium Mathematics Ability (SS)

The results of the work of SS subject is not much different from ST subject, SS subject is able to identify shapes by carrying out additional constructions in solving given problems (see Figure 4).

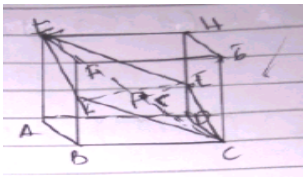

Figure 4. The Work Results of SS

R : how do you find the distance G to the KCLE field?
ST : make the diagonal of the CE space on the KCLE plane
R : so what are you doing?
SS : the point of intersection of CE and KL is the center of the KCLE plane (point P)
R : next?
SS : the distance P and G is the closest distance G to the KCLE plane.
R : why is that?
SS : because P is the center of the KCLE plane.

From the results of the interview, it can be seen that SS is able to connect components and geometric properties that are interrelated so that SS can think about geometry in an analytical way. At this stage of analysis, SS subject uses information that has a separate relationship in solving problems. The analytical ability possessed by this SS subject is categorized as multistructural based on the SOLO Plus Taxonomy (Sunardi, 2006). The multistructural category that is owned by the SS subject is by identifying information that can be used and has a relationship in the problem solving process. The SS subject connects G to O (center of the KCLE plane). By using the Pythagorean theorem, the length of GO can be obtained.

By ordering, the geometric thinking ability of SS subject sorts and connects previously found properties logically and gives reasons for their truth. The subject SS mentions by making a space diagonal (CE) that coincides with the KCLE plane where the intersection of CE and KL is the center of the KCLE plane. Furthermore, SS also determines the length of GP using the Pythagorean theorem. Thus, Van Hiele's geometric thinking process on SS subject is included in the ordering category. Figure 5 shows the work results of of SS subject in the use of mathematical concepts.

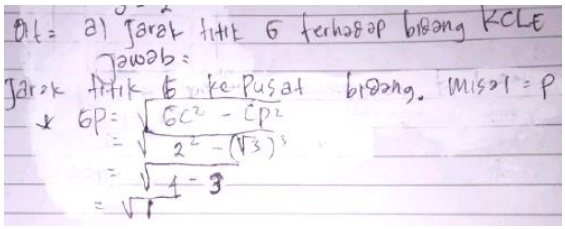

Figure 5. The work results of of SS subject in the use of mathematical concepts

Furthermore, the SS subject analyzes and explains the relationship between shapes and can prove the theorem deductively. In other words, the SS subject thinks deductively in geometry. In the concept of SOLO Plus taxonomy, the ability to use information to solve problems but not accompanied by appropriate answers is categorized as semi-relational (Sunardi, 2006). This can be seen from the work of the SS subject (see Figure 6), where the SS subject connects the GK and GL lines to find the length of GP.

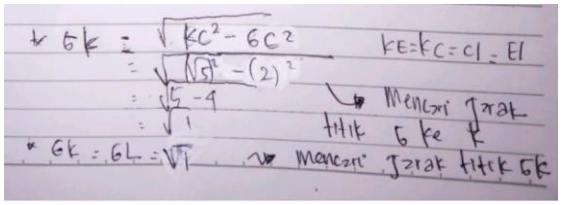

Figure 6. The Work Results of SS

Furthermore, the subject of SS provides a logical argument by stating that GP is the closest distance from point G to the KCLE plane. The length of GP can be obtained using the Pythagorean theorem. The argument is expressed by SS without regard to the visualization of the cube ABCD.EFGH. SS subject has the assumption that GP is perpendicular to KCLE. In fact, the GP is not perpendicular to the KCLE so that it has an impact on the SS subject's weak answers. Thus, even though the SS is able to identify and relate properties or concepts that are known to the SS subject, he has not been able to think geometrically rigor. This is a consequence of the SS subject that has not compared various systems or other concepts to draw conclusions deductively. SS subject did not look back at the visualization of the cube ABCD.EFGH.

In the process of solving the problem, the SS subject uses all the information and uses it in problem solving, but the solution obtained by the SS subject is not in accordance with the desired answer. According to Sunardi (2006), the subject of SS is included in the semirelational category in problem solving based on the SOLO Plus taxonomy.

R : GO as the closest distance of point G to the KCLE plane?
ST : yes sir
R : why?
ST : because O is the center

The result of SS work shows that GO is the closest distance of point G to the KCLE plane. SS subject argued that GO is perpendicular to the KCLE plane so that GO is the closest distance G to the KCLE plane. In this case, the SS subject has not been able to use image visualization properly so that it produces a different representation of the GO line and the KCLE field. According to Mac an Bhaird et al. (2017), different visualizations provide different representations in problem solving

Subjects with Low Mathematics Ability (SR)

The results of SR's work in solving problems. SR subject identifies information and relationships in geometric shapes by making the FC line as the distance G to the KCLE (see Figure 7).

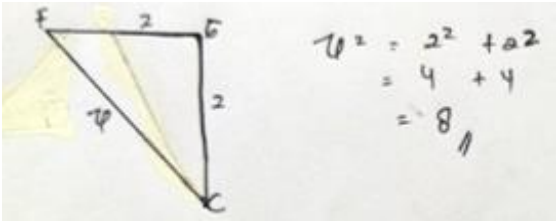

Figure 7. The work results of SR

R : please try to explain your answer

SR : FC can be found by the Pythagorean theorem because it is perpendicular

R : how does it relate to point G to the KCLE plane?

SR : hmmm, is it wrong, sir?

The construction carried out by the SR subject by making the line FC and finding its length is not related to solving the problem. From the interview results, it can be seen that SR performs analysis, where SR connects components and geometric properties by mentioning CF can be found using the Pythagorean theorem because it is perpendicular. Thus, the subject SR thinks about geometry analytically. The geometric thinking process in analysis of the subject SR is more on solving multistructural problems based on the SOLO Plus taxonomy (Sunardi, 2006). In this case, the SR subject connects GC and GF to find the length of the FC. This step is considered as one way to solve the problem.

Furthermore, the subject SR connects the previously found traits by giving reasons informally. According to the SR, the side of the cube $FC^2 = 8$ is obtained using the Pythagorean theorem. Thus, the subject SR thinks geometrically in an ordering manner based on Van Hiele's theory of geometric thinking.

Unlike ST and SS subjects, SR subject was unable to analyze and explain the relationship between shapes and prove theorems deductively and provide reasons for statements in formal proofs. In this case, the subject SR is not included in deductive geometric thinking. SR subject did not provide logical arguments when asked about the relationship between the length of the FC line and the distance of point G to the KCLE. Likewise in rigor geometry thinking, SR subject has not shown the activities carried out in solving problems. SR subject did not conduct analysis to compare various systems or other concepts to produce deductive conclusions as a procedure in problem solving.

Based on the analysis of geometric thinking of SR subject in problem solving, SR subject did not understand the problem and did not identify the information contained in the questions that could be used in problem solving. Thus, the geometric thinking process of the SR subject in problem solving is said to be prestructural based on the SOLO Plus taxonomy. The SR subject did not understand the problem and the information provided so that the SR subject did something that had nothing to do with the question. According to Ariyana et al. (2019), someone who makes a mistake in the systematics of problem solving cannot proceed to the next step of completion. According to SR, the length of $FC^2 = 8$ was obtained by using the Pythagorean theorem, but SR was still in doubt and could not provide a logical argument for the relationship between FC and the question. Furthermore, SR tried to come up with another answer (see Figure 8).

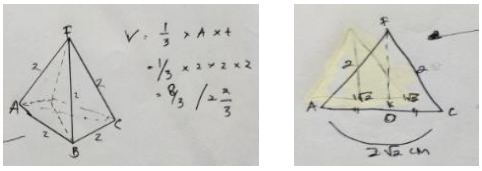

Figure 8. Conceptual Errors by SS Subjects

SR makes an additional construction by making a pyramid F.ABCD, where the volume of the pyramid F.ABCD = 8/3 then AC = $2\sqrt{2}$, which is the side diagonal.

R : here there is a pyramid volume that is 8/3 and AC = $2\sqrt{2}$, what is the relationship with the question in the problem?

SR : I'm confused where to start sir

The statement of the SR subject proves that he does not understand the problem and the information provided so that it has an impact on the answers produced in solving the problem. This is in line with the statement of Ariyana et

al. (2019), a person who makes a mistake in the systematics of problem solving cannot proceed to the next step of completion. This means that problem solving requires an understanding of the problem so that it is able to explore the information contained in the problem and be able to plan settlement procedures.

CONCLUSION

Subjects with a high mathematical ability are doing Van Hiele geometric thinking analytically by connecting components and geometric properties that are interconnected. This analytical ability is categorized as multistructural based on the SOLO Plus Taxonomy by identifying information that is considered useful and has a relationship in the problem solving process. The process of ordering geometric thinking is done by sorting and connecting the previously found properties by providing informal arguments. This capability is a multistructural category based on the SOLO Plus taxonomy in problem solving. To think geometrically deductively is done by analyzing and explaining the relationship between shapes and being able to prove theorems deductively and give reasons for statements made with formal proof. In the problem solving process based on the SOLO plus taxonomy in the semirelational category, all information is used in problem solving but the solution has not yet reached the truth.

Meanwhile, subjects with low ability think in Van Hiele geometry analytically by connecting components and geometric properties and in solving problems have a multistructural response based on the SOLO Plus taxonomy. In the Van Hiele geometric thinking category, ordering is done by sorting and connecting the properties found previously and providing informal arguments. In the problem solving process based on the SOLO plus taxonomy included in the pre-structural category, they do not understand the problem and the information provided and do something that does not work has to do with the given problem.

REFERENCE

Amalia, R. (2017). Kemampuan berpikir matematis mahasiswa dalam menyelesaikan masalah geometri. EDU-MAT: *Jurnal Pendidikan Matematika*, *4*(2), 118-125. http://dx.doi.org/10.20527/edumat.v4i2.2568

Ariyana, T., Fera, M., & Febrian, F. (2019). Analisis kesalahan siswa pada level multistructural berdasarkan taksonomi SOLO plus dalam menyelesaikan soal materi persamaan lingkaran. *Lentera Sriwijaya: Jurnal Ilmiah Pendidikan Matematika*, *1*(1), 55–63. https://doi.org/10.36706/jls.v1i1.9569

Baeti, N., & Murtalib, M. (2018). Analisis keterampilan geometri siswa dalam memecahkan masalah geometri berdasarkan tingkat berpikir Van Hiele di MTs Muhammadiyah 1 Malang. *2*(2), 39–50. https://doi.org/10.33627/sm.v2i2.96

Battista, M. T. (2011). Conceptualizations and issues related to learning progressions, learning trajectories, and levels of sophistication. *The Mathematics Enthusiast*, *8*(3), 507–570. https://doi.org/10.54870/1551-3440.1228

Biggs, J. & Collis, K.F. (1982). *Evaluating the quality of learning: The SOLO taxonomy*. New York, NY: Academic Press.

Engelbrecht, J., Llinares, S., & Borba, M. C. (2020). Transformation of the mathematics classroom with the internet. *ZDM Mathematics Education*, *52*(5), 825–841. https://doi.org/10.1007/s11858-020-01176-4

Fitri, R. (2017). Pengembangan perangkat pembelajaran berbasis pendekatan

konstruktivisme untuk meningkatkan kemampuan pemahaman konsep pada materi persamaan lingkaran. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *1*(2), 241-257. http://dx.doi.org/10.33603/jnpm.v1i2.562

Fitriah, I. (2017). Profil kemampuan siswa dalam menyelesaikan soal cerita matematika berdasarkan taksonomi SOLO plus ditinjau dari perbedaan kemampuan matematika. *MATHEdunesa*, *6*(2). https://garuda.kemdikbud.go.id/documents/detail/1578022

Fitriani, N., Suryadi, D., & Darhim, D. (2018). Analysis of mathematical abstraction on concept of a three dimensional figure with curved surfaces of junior high school students. *Journal of Physics: Conference Series*, **1132** 012037. http://dx.doi.org/10.1088/1742-6596/1132/1/012037

Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (2001). Continuity of academic intrinsic motivation from childhood through late adolescence: A longitudinal study. *Journal of Educational Psychology*, *93*(1), 3-13. https://doi.org/10.1037/0022-0663.93.1.3

Gutiérrez, A., Jaime, A., & Fortuny, J. M. (2020). An alternative paradigm to evaluate the acquisition of the Van Hiele levels. *Journal for Research in Mathematics Education*, *22*(3), 237-251. https://doi.org/10.2307/749076

Küchemann, D., & Hoyles, C. (2006). Influences on students' mathematical reasoning and patterns in its development: Insights from a Longitudinal study with particular reference to geometry. *International Journal of Science and Mathematics Education*, *4*(4), 581-608. https://doi.org/10.1007/s10763-006-9039-6

Mac an Bhaird, C., Nolan, B. C., O'Shea, A., & Pfeiffer, K. (2017). A study of creative reasoning opportunities in assessments in undergraduate calculus courses. *Research in Mathematics Education*, *19*(2), 147–162. https://doi.org/10.1080/14794802.2017.1318084

Nurbaiti, N., & Arcana, I. N. (2019). Pengembangan YouTube pembelajaran persamaan garis singgung lingkaran di SMA menggunakan videoscribe. *UNION: Jurnal Ilmiah Pendidikan Matematika*, *7*(2), 227–238. https://doi.org/10.30738/union.v7i2.4057

Sunardi, H. (2006). *Pengembangan taksonomi SOLO menjadi taksonomi SOLO plus.* Disertasi tidak dipublikasikan. Surabaya: Perpus Unesa.