**ANALISIS KETERAMPILAN BERPIKIR TINGKAT TINGGI DALAM PEMECAHAN MASALAH MATEMATIKA BERDASARKAN REVISI TAKSONAMI BLOOM DITINJAU DARI KESETERAAN GENDER**

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**Abstrak:**

Penelitian ini bertujuan untuk mengetahui deskripsi hasil analisis keterampilan berpikir tingkat tinggi dalam pemecahan masalah matematika berdasarkan revisi taksonomi bloom ditinjau dari kesetaraan gender pada siswa kelas VIII SMP Negeri 1 Takalar. Jenis penelitian kualitatif yang bertujuan untuk mengetahui deskripsi hasil analisis keterampilan berpikir tingkat tinggi dalam pemecahan masalah matematika berdasarkan revisi taksonomi Bloom. Pendeskripsian diperoleh melalui analisis hasil tes keterampilan berpikir tingkat tinggi dalam pemecahan masalah matematika. Uji keabsahan data menggunakan triagulasi waktu yaitu dengan melakukan wawancara untuk mencari kesesuaian data menggunakan langkah-langkah analisis data menurut (Miles & B, 1992). Penelitian ini dilaksanakan di SMP Negeri 1 Takalar dengan jumlah subjek 2 orang yang terpilih menggunakan teknik purposive sampling. Hasil Penelitian menunjukkan bahwa: (1) analisis keterampilan berpikir tingkat tinggi siswa dengan kategori laki-laki dalam pemecahan masalah matematika berdasarkan revisi taksonomi bloom. Kategori menganalisis (C4) melibatkan keterampilan dalam memahami(C2) dan mengaplikasikan (C3). Kategori mengevaluasi (C5) mampu melibatkan keterampilan dalam memahami (C2), mengaplikasi (C3) dan menganalisis (C4). Kategori mencipta (C6) melibatkan keterampilan menganalisis (C4) dan mengevaluasi (C5). (2) analisis keterampilan berpikir tingkat tinggi siswa dengan kategori perempuan dalam pemecahan masalah matematika berdasarkan revisi taksonomi Bloom. Kategori menganalisis (C4) melibatkan keterampilan dalam memahami(C2) dan mengaplikasikan (C3). Kategori mengevaluasi (C5) mampu melibatkan keterampilan dalam memahami (C2) dan menganalisis (C4). Kategori mencipta (C6) melibatkan keterampilan mengingat (C1), memahami (C2) dam menganalisis (C4).

Kata Kunci: keterampilan berpikir tingkat tinggi, revisi taksonomi bloom, pemecahan masalah.

**ANALYSIS SKILLS HIGH LEVEL THINKING IN MATHEMATICS PROBLEM SOLVING BASED ON REVISED TAKSONAMI BLOOM TERMS OF GENDER EQUALITY**

***Abstract:***

*This study aims to determine the description of the results of the analysis of the skills of high level thinking in mathematics problem solving based on revised bloom's taxonomy was reviewed from gender equality to the students of class VIII SMP Negeri 1 Takalar. A type of qualitative research that aims to determine the description of the results of the analysis of the skills of high level thinking in mathematics problem solving based on revised Bloom's taxonomy. The description is obtained through the analysis of the results of the tests the skills of high level thinking in mathematical problem solving. Test the validity of the data using triagulasi time is to perform interviews to seek the suitability of the data using the steps of data analysis according to Miles and hubberman. This research was conducted in SMP Negeri 1 Takalar with the number of the subject of the 2 people that selected using purposive sampling technique. The results showed that: (1) analysis of thinking skills high level of students with the category of males in mathematical problem solving based on revised bloom's taxonomy. Category analyze (C4) involves skills in understanding(C2) and applying (C3). Category of evaluating (C5) is able to involves skills in understanding (C2), apply (C3) and analyzing (C4). Category create (C6) involves the skill of analyzing (C4) and evaluate (C5). (2) analysis of thinking skills high level of students with the category of women in mathematics problem solving based on revised Bloom's taxonomy. Category analyze (C4) involves skills in understanding(C2) and applying (C3). Category of evaluating (C5) is able to involves skills in understanding (C2) and analyzing (C4). Category create (C6) involves the skill of remembering (C1), understanding (C2) and analyzing (C4).*

***Keywords:*** *Higher order thinking skills, Revision of bloom's taxonomy, Problem solving*

**INTRODUCTION (12pt)**

T

hink is to manipulate or manage and transform information in memory (Santrock, 2011). Thinking skills is a skill in combining the attitudes, knowledge, and skills that allow a person can form an effective environment (Anjarsari, 2014). Prowess has the meaning of ability to do something quickly and correctly. So, the skill of the thought can be defined as the ability to develop knowledge or ideas quickly and precisely by connecting the parts of knowledge resulting in a conclusion that effective.

According to Spradley (Sugiyono, 2014) in latin states that the “Analysis ut sitis forma est operatiom amalysis in preater de probare aliquid contra est de order cogitas viam definiri parte cognatione inter partes totius”. “In analysis quae explicare conatus est, sive address quaestio in focus de studiis partium (compositione) et compositionem/compages proofing in forma visibilis scilicet aliquid quod est motum esse, liviusque sit capi apertius percipi sive ejus significatione illum.

The level of thinking skills can be classified into six levels, i.e., given (C1), understanding (C2), applying (C3), analyze (C4), evaluating (C5), and creating (C6). Thinking skills lower level consists of skills in terms of recall, understand, and apply. Whereas, the skills of high-level thinking consists of skills in terms of analyzing, evaluating, and creating (Anderson & Krathwohl, 2010). According to (Brookhart, n.d.), skills high level of thinking or higher order thinking skills (HOTS) is a student's skills in connecting and developing knowledge-their knowledge during learning to new contexts. The new definition should not be a new universally, but the form of things that have not been thought of by previous students. Keteampilan think high level students are considered as pemebelajaran that is able to connect the knowledge of the previous to reach new knowledge. According to Corebina, et al. (Elyani et al., 2019) says that thinking skills high level of students can be identified through a cognitive ability on the level of analysis, synthesis, and evaluation. Thinking skills a high level of regard and the results of cognitive learning related to the initial ability of the students. The initial ability is the knowledge which is formed through the learning experienced by students. (Ariyana et al., 2018) skills high-level thinking is a complex thought process in deciphering the material, make inferences, construct representation, analyze, and build a relationship with involves the mental activity of the most basic. There are two things characteristic of the underlying thinking skills a high level, namely critical and creative thinking. (Setiawati et al., 2019) stated that the ability to think high level is a process: analyze, reflect, give an argument (reason), apply the concept in different situations, composing, creating. Ability to think high level is not the ability to remember, know, or repeat. Based on some opinions conclusions can be drawn skills of high level thinking is process thinking skills with a depth and breadth that involves processing information critically and creatively in the face and solve problems that are complex and involves the skills to analyze, evaluate and create.

(Polya, 1945) considers problem solving as the effort in finding a way out of a difficulty to achieve a goal that can not be immediately achieved. In line with the opinion of (Fatmawati et al., 2014) that the existence of a problem in general encourage students to be able to solve the problem immediately but does not directly solve it. But the process of solving such problems helps levels think high.

Research conducted Amer titled “Reflextion on Bloom's Taxonomy” revealed that in the application of bloom's taxonomy since its publication in 1956 there are several weaknesses and practical limitations. So in the years of the 1990s, Bloom's taxonomy was redesigned by the students of Benjamin Bloom's named Lorin Anderson and Krathwohl. The framework of thinking the work of Benjamin Bloom et al. contains six main categories, namely: (1) knowledge (knowledge); (2) understanding (comprehension); (3) application (the application); (4) analysis (analysis); (5) synthesis (synthesis); (6) evaluation (evaluation). Then, according to Anderson and Krathwohl thinking ability learners are grouped in six stages, namely: remember, understand, apply, analyze, evaluate, and create. Different with Bloom that use nouns (nown) in the stages of thinking, Anderson and Krathwohl use of the verb (verb) in the stage of thinking. Reasons for the use of the theory of Anderson and Krathwohl thinking skills of students seen from the process of thinking instead of just looking at the result.

Some of the factors that cause students not to be high-level thinking is the teacher gives questions mathematics for students only up to the level of thinking on the order of the low, and the emphasis on questions that are more procedural and mechanistic, do not emphasize on understanding. Another factor is in the learning of mathematics teacher gives examples of exercises and exercises is not can develop the ability to think high level students so that the students are familiar with the questions that the setting of low-level as a result students are not able to analyze, evaluate, and create. Because it may be one of the most difficult skills to cultivate in the classroom environment is the students ' ability to think outside the learning steps of traditional. The difference of each teacher to overcome the problems in class it's different due to the characteristics of each child are incorporated in the learning group is very specific so each teacher also has a strategy in aboutgatasi problems in class.

Based on the results of interviews of mathematics teachers of SMPN 1 Barru on October 29, 2018, the problems that arise with regard to the learning of mathematics at SMPN 1 Barru is the difficulty teachers make math problems which can measure the ability to think high level students and is always dependent on textbooks, more dominant about the routine and the question of low-level, so that the students many not able to complete the math problems when given a problem that is not the same with the examples ever given then not able to bring the knowledge of the previous concept because it is not accustomed to completing the math problems which can measure the ability of high-level thinking of the students, as a result when there are some students which according to him is capable of in terms of the power of thought higher than the other students in the class included in the olympic games rarely get a champion. In addition, the lack reference and time to make the math problems which can measure the ability to think level high students.

The importance of analyzing the thinking skills of students especially in the skills of high-level thinking is also shown from the demands of the 2013 curriculum, which makes the increase in HOTS (*Higher Order Thinking Skills*) as one of the learning objectives and assessment. Reason for the increase in HOTS is because of the high-level thinking can push students to think widely and deeply about the subject matter.

The analysis skills of students can be done through the exploration of their ability to solve problems that can represent each indicator skills high-level thinking based on Bloom's Taxonomy Revision. Therefore, researchers interested in doing research about analysis skills high-level thinking of students in mathematics problem solving based on Revised Bloom's Taxonomy was reviewed from gender equality to the students of class VIII SMP Negeri 1 Takalar.

**METODE RESEARCH**

The type of this research is included in qualitative research that uses the methodology of descriptive research. The things described in this research is skills high-level thinking of students in mathematics problem solving based on Revised Bloom's Taxonomy. The description of this will be traced through direct observation in the process of completed the problem, namely analyzing test results skills high-level thinking students in understanding the problem, plan the completion and evaluation . The description is also supported by the interview data after the test is conducted.

This research was conducted in SMP Negeri 1 Takalar Regency Takalar. The research subject was the students of semester 1 of grade VIII. Subjects in this study were 2 students of class VIII SMPN 1 Barru. In this study the subject is selected based on the ability of the beginning that is owned by the students, the ability to represent the answer, the consideration of teachers of mathematics, and the difference in the categories (of gender equality).

As for the Instruments used in qualitative research is a test of thinking skills high level of shaped test description. Such tests are prepared with attention to the involvement of each indicator revision of bloom's taxonomy at the level of analyzing (C4), evaluating (C5), and creating (C6) and interview guidelines will be used type of interview semi-terstruktyr is meant to verify the data obtained from the results of the test your thinking skills to a high level. Interview questions are arranged only in the form of the outline of the course, which is based on the stage of the problem solving steps of polya, which develops in accordance with the conditions in the field.

Data collection techniques in this research are test methods used to obtain data about the skills of high-level thinking of students in solving mathematical problems based on Bloom's taxonomy Revised, the interview method was conducted to determine in more depth the skills of high-level thinking of students and the problem-solving phase of the subject based on the step of polya, the Method of observation done by doing observations carefully on the natural conditions at the school. Documentation is data collection techniques to search for, collect and make notes, transcripts, nuku, newspapers, magazines, minutes, report, agenda and so on

In this study, the researcher used triangulation techniques to determine the validity of the data. (Sugiyono, 2012) stated that the triangulation time is a test of the validity of the data by checking back through interview, observation or other techniques in time or different situations. The achievement of trigualasi time in this research by using interviews to find the suitability of the data sourced from the same problem at different times. When there is a lot of similarity of the data obtained through trigulasi then the data is declared invalid. Data analysis in this qualitative research consists of several steps as proposed by Miles and Huberman, namely: data reduction, data presentation and verification.

**THE RESULTS OF RESEARCH AND DISCUSSION**

In this chapter the presented data and the results of the research about the ability of high level thinking on the students class VIII SMP Negeri 1 Takalar. This research was conducted on grade VIII students of SMP Negeri 1 Takalar for 3 weeks. The first week begins on Thursday August 1, 2019 with the observation to determine the subject of the research, the next day on Saturday, August 10, granting the test the skills of high level thinking in mathematical problem solving to 2 the Subject of the researchers, the next on Thursday, August 15, conducted interviews with the two subjects, interviews were conducted to determine the validity of the data. Monday August 26, carried out administration of the test to the students who are selected as the research subject as a distraction to keep the authenticity of the data, where the addition of each subject with 2 people in each category. Data collection in this research was conducted through the administration of the test the ability to think high level and interview. Test the ability of high level thinking to take data about problem solving ability mathematics students, whereas the interview is used to determine how the process or stages carried out by the students in solving the problem.The instrument used in this research is to test the skills of high level thinking, and interview guidelines. All instruments have been through the stages of validation of some of the validators who are experts in their field.

**The Results Of The Selection Of The Subject**

The selection of the research subject is taken from the 6 students of class VIII.1 of SMP Negeri 1 Takalar academic year 2019/2020 who have completed the material pattern of numbers. Students were given a test of the ability of high level thinking in mathematical problem solving. Classification 6 students of class VIII.1 are divided into two categories, namely the three students with the category men and three students with the women's category.

Based on the results of the test has been divided, obtained by 2 students who have the highest value, i.e. 1 student male category and 1 student category of women. The selection of this subject also mengacuh on the ability of the presented answers, able to communicate well in expressing opinions/ideas orally and in writing sarta is willing to follow the overall process of data collection in this study.

Description Of The Results Of The Analysis Of The Thinking Skills High Level Of

The results of the analysis skills of a high level of thinking of students in solving the problem of mathematics that has been verified through interviews from both the subject summarized in the following table.

Table 1.1 Description Of The Results Of The Analysis Of Thinking Skills Tigkat High Category Analyze (C4)

|  |  |  |
| --- | --- | --- |
| Said Operational C4 that can Appear | S1 | S2 |
| Find the | Analyze by way of identifying and classifying known information that is used to interpret the problem into a mathematical model. (S1B001, S1B004, S1B007) | Analyze how to interpret the information that is known to be linked into the mathematical model. However, the model used only using the pattern of numbers. (S2B001, S2B003, S2B008) |
| Connect the |
| Planning of the Completion of the |
| Study |
| Find |
| Analyze |
| Mengenalis Relationship |
| Groups |

Table 1.2 Description Of The Results Of The Analysis Of Thinking Skills Tigkat High Category Mengavaluasi (C5)

|  |  |  |
| --- | --- | --- |
| Said Operational C5 that can Appear | S1 | S2 |
| Check | Evaluate by way of providing an assessment of a solution in order to the conclusion of solving the problem, by using the comparison. (S1A009)  Provide arguments that support to what has been shown by researchers, that by using patterns will be much more easy to work. (S1A011) | Evaluate by way of providing an assessment against a solution in order to withdrawal kesimpilan, with membandikan the first with the second salary. (S2A002, S2A006)  Give arguments about the use of the mathematical model with the first exemplified what is known in the matter. (S2A009, S2A010) |
| States |
| Choose |
| to Give the assessment |
| to Evaluate |
| Re-Testing |
| to make an Argument |
|  |

Table 1.3 Description Of The Results Of The Analysis Of Thinking Skills Tigkat High Category Create (C6)

|  |  |  |
| --- | --- | --- |
| Said Operational C6 that can Appear | S1 | S2 |
| Create | Create by way of forming a new structure in the form of a simple equation through the ability of analysis and application, which is useful to answer the problem question; (S1C003)  Create a way to resolve the problem by way of experiment; (S1C007) | Designing a way or find a mathematical model that is new to ever resolve the issue with how to implement mathematical model in the can earlier and solve them systematically; (S1C001, S1C002) |
| Write |
| Find the |
| Design |
| to Formulate the |
| outline |

**DISCUSSION**

Based on the results of the analysis skills of a high level of thinking of students in solving the problem of mathematics is seen that the second subject can use his skill even though not achieved optimally. The second subject in the troubleshooting of high level involving almost all aspects of thinking skills based on the revised bloom's taxonomy, either directly or to bridge the subject in constructing the skills of high level thinking.

The results of the analysis also show differences in thinking skills high level of students from each category, namely the category of male students and the category of female students. It can be caused due to the difference of the initial ability of the students. As said by (Kawuwung, 2011: 158) that the skills of high level thinking and cognitive learning outcomes related to the ability of beginning students which are formed through the learning experience of students.

In analyzing the S1 really understand each of the components formed on the saar problem solving pattern numbers. S1 able to form a precise mathematical model and understand the intent of each element on the mathematical model that was formed. While the S2 have difficulty in problem solving pattern numbers, so that there is some mathematical model that is forgotten. This is because S2 directly apply his experience following the guidance of learning held by teachers.

In evaluating S1 involves thinking skills high level starting at the stage of plan completion. At the planning stage S1 has a hypothesis that the solution using the formula Sn. After doing the evaluation of S1 is aware that there is some way other to resolve the matter. In addition, in evaluating the indicators accept or reject a statement from the researchers, S1 always involves the ability of the analysis to identify and explain the purpose saetiap element and the conjunction.

Skills evaluate the S2 also has involved thinking skills high level starting from the stage of plan completion. At the planning stage S2 is chosen to resolve the problem using patterns of numbers. This shows the S2 good in doing the evaluation for the indicator of receiving the statement, in other words S2 is able to recognize the correct answer and wrong if shown the correct answer.

In creating, S1 apply the experience gained during the learning and dare to experiment-perconaan to get what is being asked. Whereas, S2 is able to apply what is already in the can earlier and to solve it systematically. S2 able to form a new structure of the mathematical model are known in advance, so that S2 can solve the problem of pattern numbers with good and right.

Based on the description of the thinking skills high level of students in creating, it is seen that the learning experience obtained by students are very influential in the improvement of the potential possessed by each student. it is caused due to the difference in the learning experience of students. this is supported by the opinion (Dimyanti, 2013: 295) states that the learning activity is the establishment of a relationship between the stimulation and response, and the repetition of experiences that have an impact on the amount of students in solving mathematical problems that determine the success of the student in respond better to acquire the problem solving that is good and right.

Logically can dikatakanahwa the participation of the subject in tutoring in mathematics has an influence on how to think high level. This is because the students are familiarized with the problems with the level of high level of thinking, so that the achieved perkemangan thinking skills high level of optimal, which is shown from the procedure thinking right. This is in line for tertruktur and can obtain the right result. This is in line with the opinion (Mulyadi, 2010: 107) says that the tutoring is the process of providing assistance to students in solving the difficulties associated with learning problems. So the guidance gives an influence on the development of students ' potential, in this case the skills of high level thinking in mathematical problem solving

Skills thinks a high level of both subjects in mathematical problem solving can be identified from each level based on the revis Bloom's taxonomy which is described in the following discussion.

**Analyze (C4)**

a. The First Subject

In the problem solving pattern numbers visible that the subject can use the skills of analyzing with the good and the right. Thinking skills a high level of subject in the analysis is preceded with the skills to identify the information that is known, then analyze what is being asked in the question and the last mengiterpretasi eachof which is known to then connect into a mathematical model.

It is seen that in solving a problem on the category menganalsis subject involving skills identify, find, carry out plan assessment, and understanding as well as skills in meninterpretasi included in the category of mengapklikasi. So, based on the revised Bloom's taxonomy thinking skills categories to analyze (C4) involves skill preformance understanding (C2) and applying (C3)

b. The Second Subject

In the problem solving pattern numbers visible that the subject can use the skills to analyze it with good will but not using the skills given because forget with a mathematical model that should be used in the matter. The subject began the settlement of the issue by directly interpreting the information that is known, then plugging in a mathematical model in the form of a pattern. The stage of completion of the issue preceded by a process to identify in advance, so that the mathematical model obtained is right.

Seen that the results of solving the problem of the subject on the category to analyze is right, because it was right in using the skills to identify and analyze which belongs to the category of understand, so the results of interpretation that belongs to the category of applying is correct. Based on the revised Bloom's taxonomy, thinking skills high-level categories to analyze (C4) of the subject category of students who participate in tutoring are able to analyze well because it is able to understand (C2) so that the right dapam interpret (C30)

**Evaluate (C5)**

a. The First Subject

In the problem solving pattern numbers visible that the subject can use the skills to evaluate it properly and appropriately. At the time of solving the problem, the subject of a few times involving thinking skills high level in the evaluating, such as in the states, receive and give the argument an information. In the process of the evaluation, the subject always takes the conclusion with the perform identification of each piece of information first and then see the relationship. Jam it, the subject also evaluation in order to making the conclusion to perform testing of the mathematical model.

Seen that in the solution of problems in the categories of evaluating, a subject involving katerampilan in the identify are included in the category of understanding; as well as skills in groups are included in the category apply; as well as skills in connecting and comparing belongs to the category of analyze. So based on the subject category of male students able to involves skills in understanding (C2), apply (C3) and analyzing (C4)

b. The Second Subject

In the problem solving pattern numbers visible that the subject can use the skills to evaluate it with both at the time of the interview. At the time of solving the problem, the subject of a few times involving thinking skills high level in evaluating, diantranta that rate and receive a information. In the process of the evaluation, subject to conclusions with the identification information in advance.

Seen that in the solution of problems in the categories of evaluating, a subject involves skills in identifying who belongs to the category of analyze. So tract revision of Bloom's taxonomy thinking skills categories evaluated (C5) the subject category of female students involves the skills of understanding (C2) and analyze (C4).

**Create (C6)**

a. The First Subject

In the problem solving pattern numbers visible that the subject can use the skills to create it well and right. At the time of solving the problem, the subject of a few times involving thinking skills high level in creating, among which the experiment like never before with involves skill in meganalisis, remember, and understand. In addition, the subject also designing a way with applying some methods, then involve its effectiveness through skill evaluates to find an appropriate solution.

It is seen that in solving a problem on the category create, the subject involves skill in the exemplified and connect the components of an object included in the category of analyze. So based on the revised Bloom's taxonomy katerampilan think category create (C6) the subject category male students involves the skills of analyzing (C4)

b. The second subject

In the problem solving pattern numbers subject to create by forming a new structure which he had never found before with involves skill in analyze, remember and understand. It is seen that in solving a problem on the category create, the subject involves the skills in the given (C1) and analyzing (C4).

**CONCLUSION (12pt)**

Thinking skills a high level of students with the category of males in mathematical problem solving based on revised Bloom's taxonomy categories to analyze (C4) involves skills in understanding (C2) and applying (C3). In analyzing the students always involves information that is unknown and in question, then create a representation of the model the mathematical pattern of numbers. Thinking skills a high level of students with the category of males in mathematical problem solving based on revised taksonomo Bloom category to evaluate (C5) involves skills in understanding (C2), apply (C3) and analyzing (C4). In evaluating the students involves the ability to analyze it to parse an object to understand its meaning, then decide the truth of the object. Thinking skills a high level of student category of males in mathematical problem solving based on revised Bloom's taxonomy categories create (C6) involves the skill of analyzing (C4) and Evaluate (C5). In create students always try something new in the decision-making problem solving. Thinking skills a high level of student category of women in problem solving based on revised Bloom's taxonomy categories to analyze (C4), that is able to understand (C2) so that the correct in interpreting (C3). In the analyze on the Issue of forecast numbers of students to directly apply his memory berupad settlement of the issue by forming a pattern of numbers, and then solved how to see the difference between the first pattern with the next pattern. Thinking skills a high level of students with the category of women in problem solving based on revised Bloom's taxonomy category to evaluate (C5) involves leterampilan in understanding (C2) and analyzing (C4). In evaluating the student can obtain the exact result if shown the correct answer. Thinking skills a high level of students with the category of women in mathematics problem solving based on revised Bloom's Taxonomy categories create (C5) involves skill in remembering (C1), understanding (C2), and analyze (C4). In create students always form a new structure as a reference in decision-making the completion of the problem.

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