The difficulties of students when solving HOTS problem and the description of students cognitive load after given worked example as a feedback

Asrafil¹, H Retnawati², E Retnowati²
¹Graduate Program of Mathematics Education, Yogyakarta State University, Yogyakarta, Indonesia.
²,3Mathematics Education Department, Yogyakarta State University, Yogyakarta, Indonesia.

Email: ¹asrafil.2018@student.uny.ac.id, asrapilo96@gmail.com.

Abstract: The study aims to describe the obstacles of high school mathematics teachers in teaching the distance and angle of the three dimensions materials. This research is a descriptive exploratory study with a qualitative approach. We collected the data using interviews and questionnaires. The subject was 11 mathematics teachers of SMA, SMK, and MA in Semarang City and Demak Regency. The data was analyzed by looking for themes and determining inter-theme relations to gain an understanding. The findings are as follows. First, obstacles faced by mathematics teachers to teach the distance and angle of the three dimensions materials are teachers’ limited professional competence, students’ difficulties in understanding the concept, students’ difficulties in thinking, and the need for proper learning media. Second, some efforts made by teachers to overcome and expect obstacles happened namely discussing problems with other senior teachers, preparing and learning the materials that require special attention, using visual media, provides exercises with many types, close to psychology with students, and testing various proper teaching models and methods of three-dimension materials.

1. Introduction
Quality of Human Resources is one of the most important and needed things in facing the globalization era. One of the factors that influence the quality of Human Resources is education [1]. Therefore, the effort to improve the quality of education in a country is very necessary to be continued. Good quality of the learning activities is one of the most important ways to achieve a good quality of education. This means that the quality of education must in a parallel line with the quality of the learning process itself and of course the mathematics learning process too.

Problem-solving is the focus of the mathematics learning process [2]. Problem-solving is a very important element in the mathematics teaching-learning curriculum. Problem-solving is the core of mathematics learning from elementary school, junior high school even until senior high school (SMA) [3]. So, it is clear that problem-solving is very important in mathematics learning.

Problem-solving has a strong relationship with Higher Order Thinking Skills (HOTS). HOTS is a skill such as critical thinking, creative thinking, innovative thinking, and solving problem skills. Students will be able to solve a problem if they were able to examine a problem and be able to use their knowledge in current situations, this ability is also known as HOTS [4]. Through problem-solving, someone is required to think in higher-level thinking. problem-solving is how students use
higher thinking processes to obtain a solution from the problem [5]. The core of the ability to think is the ability to solve the problems [6]. Education implemented in Indonesia is the 2013 curriculum (K-13), which is HOTS served as one of the focus and learning goals, this fact reinforces the urgency of the development of HOTS itself. To defining HOTS in Indonesia, it is always associated with Bloom's taxonomy, HOTS is defined as "cognitive skills in the analyzing, evaluating and creating levels" [7].

Talking about problem-solving and HOTS, that's can't be separated from thinking activity, in the activity of thinking itself there must be a cognitive load. Cognitive load is caused by learning activities [8]. Cognitive load on students does not always indicate something bad, cognitive load is also a good sign as long as it does not cross the line, in this case, its indicating that someone is doing a learning activity in his mind, so it is dependent on teacher effort to minimize students cognitive load, so the learning activity can go well and allows the students to build and store a new knowledge in their memories for a long time.

Cognitive load theory [8] explained that cognitive load occurs due to the limited capacity of student work memory. Basically, cognitive load consists of 3 types, namely "intrinsic load", "extraneous load", and "germane load" [9]. Intrinsic load is related to the characteristics and difficulties of learning material, extraneous cognitive load is the impact of poor learning design, while germane load associated with the process of automation and building knowledge schemes in student memory. If the complexity of the material is high and the presentation of the material is less systematic this will lead to a very high cognitive load, so inhibiting the germane cognitive load in the building of the scheme of knowledge. If students got high cognitive load (especially extraneous load), students will feel difficulties when receiving new learning material [10]. The point is, to make the learning process going well and effective, "intrinsic load" and "extraneous load" must be kept as minimum as possible while "germane load" must be tried to be maximal as much as possible.

Besides the urgency of students success in doing problem-solving especially based on HOTS problems and the efforts to minimize students cognitive load, the fact is there are still exist a big gaps from what we expect with the reality, we still can find that there are still quite a large number of students that feel difficulties even fail to solve HOTS-based mathematical problem that is accompanied by high cognitive load. Problem-solving is a strategy that is highly recommended to be applied at school because of its various advantages. But it is only suitable to be applied when the students are experts already, for novice students this would make them experience high cognitive load and make them fail to build their knowledge through working memory and then stored into the long-term memory.

Therefore in this study, there are 3 main goals: (1) to find what factors that cause students difficulty in solving HOTS problem, (2) to see whether the working examples support the success of students in doing problem-solving activities, (3) to see whether the working examples as effective in reducing students cognitive load.

2. Research Method

This research is a case study that aims to identify the difficulties of students when doing problem-solving on HOTS problems and want to see whether worked example as feedback is effective to reduce students' cognitive load and support their success in doing problem-solving on the solid geometry topic by using qualitative and quantitative approaches. Data were collected through tests, cognitive load questionnaires, observations, and interviews with data sources from 15 students. These students are those who have learned the material and study in school at Special Region of Yogyakarta Province with ages ranging from 14-17 years.

The study was not conducted classically but carried out individually on each sample so that the researcher can obtain the information more deeply related to what was observed. The research procedure is as follows:
1) students are given 3 HOTS items taken from a valid and reliable test kit and represent the top three Bloom’s taxonomy levels, which requires analyzing, evaluating and creating skills,
2) students are asked to work on questions as much as they can,
3) students are given a questionnaire consisting of nine Likert scales to measure their cognitive load,
4) students are given a worked example to learn about isomorphic examples, while the role of worked example in this research is as feedback so that the students will be aware of which parts of their previous work are still inaccurate or need to be fixed,
5) students are asked to do problem-solving that previously failed to be solved and then again measured the cognitive load to see whether there is a decrease in the cognitive load.
6) during this process (1 - 5), the researcher makes observations to look directly and record complaints and problems encountered by the students during the HOTS problem-solving process
7) researchers conducted interviews with the students to know about their perception about HOTS, worked examples, and the difficulties they faced while doing HOTS problem-solving activities.

Keep in mind that the problem-solving activities in this study are not intended to measure how well students problem-solving skills, but intend to provide a fresh and real problem-solving experience for the students because if the researcher only try to obtain information by asking the students to recall their old experiences without the existence of a new and real experience, the researcher will not able to get a valid and complete information about the difficulties they faced when doing HOTS problem-solving.

After the data is obtained, the data was analyzed. Data obtained through observation and interviews were analyzed by determining the relationships between themes to gain understanding using the Bogdan & Biklen model. In this study, the relationship between themes is used to gain an understanding of the difficulties which the students faced when doing problem-solving and to see the benefits of worked examples when doing problem-solving. Furthermore, the data obtained from the cognitive load questionnaire was analyzed using statistic simple pair t-test to see the effectiveness of worked example in reducing students’ cognitive load, with the condition that the data is normally and homogeny distributed.

3. Results
The result this research contained three main topics: (1) Difficulty of students when Solving HOTS Problem, (2) worked example role in helping student Solving HOTS Problem, (3) worked example effectivity in decreasing the student cognitive load.

3.1. The difficulty of students when Solving HOTS Problem
Based on the triangulation of the observations results, interviews, and student responses, it was found that there were some difficulties faced by the students in solving the HOTS problem as presented in table 1 below.

| Sub-theme | Relations between the themes |
|-----------|-----------------------------|
| 1 Students cannot draw the shape of solid geometry correctly. |  |
| 2 Students cannot distinguish the shapes between solid geometry. | Student's Prior Knowledge is not enough |
| 3 Students forget the formula to calculate the volume and area of the solid geometry. |  |
| 4 Student lack of mastery in applying the basic concepts regarding surface area and volume of solid geometry. |  |
| 5 Students dont understand the intent of HOTS questions. | Students are still poorly trained and unfamiliar with solving the HOTS questions |
| 6 Students are always hesitant and take a long time during the process of completing the HOTS questions |  |
| 7 Students are less motivated to solve the HOTS questions. | Students have a bad perception of HOTS questions |
| 8 Students feel anxious when solving HOTS questions. |  |
### Sub-theme Relations between the themes

|   | Students lack confidence when dealing with HOTS questions |
|---|----------------------------------------------------------|
| 9 | There is a high cognitive load in the initial phase of problem-solving activities |
| 10| Students are not careful in completing the HOTS questions. Students can’t draw the net of a solid geometry efficiently. |

### 3.1.1. Students Prior Knowledge is not enough

The lack of prior knowledge causes student difficulty in dealing with new situations and problems [11]. Learning is said to have high quality if students can connect their prior knowledge with new knowledge that being studied [12]. Students with insufficient prior knowledge will certainly have difficulty connecting and using prior knowledge to solve HOTS problems. Some of the concrete forms due to the lack of prior knowledge of students are as follows.

1) Students cannot draw the shape of a solid geometry correctly:

   “... I forgot how prism looks like, I just remember cube shape ...” (student_7)

   “... I will just write the known and asked from the problem because I forgot prism shape ...” (student_3)

   “…I actually, can’t draw it …” (student_14).

![Figure 1](image1.png)  
**Figure 1.** Student 7 and student 3 respond.

2) Students cannot distinguish the form between solid geometry:

   “...I can’t distinguish between prism and pyramid, it's just too difficult for me...” (student_11)

   “... when reading square prism, I reflex remember the square pyramid ...” (student_2)

   “… I knew that the prism was a triangular, rectangular, pentagon, or hexagon. If it's a square prism, it feels weird, so I confused …” (student_5).

   When answering the first problem, the students draw the square pyramid rather than the actual square prism or beam, this is indicated that students still cannot distinguish the form between solid geometry so the student can’t find the right solution from the problem.

![Figure 2](image2.png)  
**Figure 2.** Student 5 Respond.

3) Students forget the formula to calculate the volume and surface area of solid geometry:

   "...actually, I understand what is asked by the problem, I also know how to solve it, I forget the formula, if I were told the formula, I might be able to solve this problem" (student_4).

   "... I forget the formula, so I can't continue to solve this problem..." (student_9),

   "... I didn't know the formula..." (student 6).
This is the example of student 4 response when answering the second problem about criticizing the truth of information received about contextual issues relating to the volume of cubes and beams representing the evaluate level of bloom's taxonomy. Students are on the right path, students forgot the cube volume formula, instead of writing \( V = s^3 \) students write that the cube volume formula is "number of sides of cube \( \times \) length of sides" which is leading the student to the wrong solution. There is still a lack of mastery in applying the basic concepts of the students regarding the solid geometry and the volume of solid geometry, this causes the students were not able to continue problem-solving activities, although the student was able to pick the correct steps to solve the given problem.

4) Lack of mastery of students' basic concepts application.

"… to solve this problem, I can calculate the surface area of the blocks and cubes then I will divide them…" (student_1).

"… I am confused about which formula to use, between the volume formula or the surface area formula…" (student 10).

"…actually, I don't know when to calculate using the volume or surface area formula…" (student_8).

An example can be seen from the student response when dealing with a second problem. The students use the surface area concept to solve problems regarding the volume of a solid geometry. The lack of mastery of students' basic concepts causes students to feel difficulty and hesitation in determining what strategies will be used to solve the given problem.

3.1.2. Students unfamiliar with solving HOTS problems.

Learning should be based on HOTS problem, so that the students will be familiar and trained to solve HOTS problem and facilitated the development of students’ higher-order thinking skills [13]. Students' lack of experience in solving HOTS problems certainly makes students feel difficult when suddenly confronted with HOTS problems. Some of the concrete sub-themes are:

1) Students do not understand the intent of HOTS questions well;

This is the response from student 9 when doing the first problem. The student tends to only do trial and error and is far from the right solution. Students look like they do not understand the given problem, in the first problem students were asked to calculate the volume of 4/5 parts that are still empty as one of the steps to solve the problem, but what student doing is the opposite with the first problem asked. For the next step, the student used irrelevant procedures and just doing trial and error, which is leading the student to the wrong solution. The worst response when the student does not understand the problem is when students barely can't write anything, like what student 2 did when dealing with the third problem about creating new surface area formula for some conditionally beam representing the creating level of bloom's taxonomy.
"... I don't understand the problem and I'm not used to working on questions that are full of statements like this, I am confused ..." (student 2).
"...I do not know what is known and asked because questions are full of statements..." (student 5).
"...I'm not trained to solve reasoning problems, this is difficult, I do not understand ..." (student 13).
"... I don’t understand. I’ll just do trial and error, at least I’ll fill out the sheet..." (student 9).

2) Students always hesitate during the process of completing the HOTS questions.
"...I am still not used to solving the questions like this, I need a lot of time to think, 5 minutes or 10 minutes certainly will not be enough..." (student 8).
"if I have a lot of time maybe I will be able to solve it, I hesitate to determine the order of the solution..." (student 10).
"...I did not usually work on things because usually when I meet something like this, I only skipped it. After all, it must take so much time..." (student 13).

3.1.3. Students have a negative perception of the HOTS problem.
The student will be facing a big obstacle when solving HOTS problems if the student has a negative perception about HOTS, it will make them less motivated and lose the confidence to solve HOTS problem [14].

1) Students themselves are less motivated to solve HOTS questions.
When the researcher dealing with student 2, right after the student read the first problem and found the word "prism" the students immediately stated "...I can't do this..." without knowing the fact that basically, a square prism is a beam.
"...I am confused with the third-problem, I don't even know where to start. I just want to give up because the problem is all in the form of statements. Even if you give me 30 minutes or an hour, the results will remain the same. I can't do it, it's too complicated for me ". (student 14).
"... I don’t even want to start..." (student 6).
"... I know HOTS problem is difficult, I gave up..." (student 10).

2) Students feel anxious and when solving HOTS questions.
"...for example, when you (the researcher) ask me to solve HOTS problem, it's giving me big anxiety, because I knew HOTS is an unreasonable problem, it doesn't make sense, it's hard..." (student 4). "... Yes. HOTS is a problem used in National Exam and it's too difficult to solve, I'm a little bit nervous when you ask me to solve the HOTS problem..." (student 6).
"... I'm worried, I'm afraid because the questions are weird. After all, HOTS is not an easy problem, it must be difficult and make me dizzy..." (student 8)

3) Students lack confidence when dealing with HOTS questions
"... I'm not sure I can solve it properly, especially the time is limited..." (student 14).
"... HOTS only for people who are already experts, not for someone like me..." (student 12).
"... I can’t solve HOTS problem, I already struggling with just ordinary problems..." (student 10).

3.1.4. High cognitive load triggers errors in problem-solving activities about HOTS questions.
Effective learning is a learning that can minimize the cognitive load of students because it will be very effective both in helping students to understand and build the knowledge they learn [8]. In this case, the students can process and store knowledge for a long time without excessive mental effort. Problem-solving raises a high cognitive load especially for novice students because problem-solving begins with the cognitive acquisition process, and most of the working memory capacity is used [15].

1) There is a high cognitive load in the initial phase of problem-solving activities.
Based on cognitive load questionnaire, student's problem activity starts with a fairly high cognitive load and ranges from 5 to 8 for the first problem, 5 to 6 for the second problem and the third problem becomes the problem with the highest cognitive load, which is in the range 6 to 9.

"...when I reading the problems, it makes me automatically thinking a lot, in my opinion for the first impression, the questions given are quite difficult..." (student 1).

"...my brain is suddenly forced to think hard, that makes me think of various possible ways and it is quite making my brain feels hot..." (student 7).

“... I’m tired already just by reading the problem...” (student 6).

2) Students are not careful in completing HOTS questions.

"... I think so many things at the same time, and what I write is sometimes different from what I think, it's like my hands are still in the previous stage but my mind has tried to find a solution in the next step..." (Student 8).

"...I'm cannot focus when reading difficult problems. So, sometimes I incorrectly identify the part that is known and asked from the problem". (student 10).

3) Students have difficulty even failing to draw a correct and efficient net of a solid geometry.

"...I had trouble when doing the imagining activity. it was difficult to manage my thoughts..." (student 15).

"... I feel tired and I can't imagine it properly” (student 6).

"... my imagining skill is poor...” (student 4).

3.2. Worked example role in helping students Solving HOTS problems.
Based on the triangulation of the observations results, interviews, and student responses, it was found that Worked examples supporting students understand the material independently and supporting the success of the students in doing problem-solving activities as presented in table 2 below.

| Sub-theme | Relations between the themes |
|-----------|------------------------------|
| 1 | Worked example cause the students to not be too dependent on the teacher's explanation. |
| 2 | Worked example make the students study the material more efficiently. |
| 3 | Students feels easier if learned through worked examples. |
| 4 | Students feel their cognitive activity is not too heavy when solving problems. |
| 5 | Students are more motivated to correct the previous failures after being given a worked example |
| 6 | Students feel relax when doing problem-solving after worked example was given. |
| 7 | Students find it easier to understand the concept of material and problem-solving procedures through a Worked Example supports the success of the students in doing problem-solving activities |
“… School learning requires us to actively construct our knowledge, and I do not comfortable with it, I still need a lot of guidance from the teacher...” (student 1).
“… without guidance, I have to read the book a lot by myself but I can’t understand the material and it requires a lot of times...” (student 4).
“…constructing our knowledge is more tiring...” (student 2).
“…the presentation of the material in class is not very clear, through the worked example I feel that the material presented is clear and coherent, I am more receptive to the material if it is presented in this detail...” (student 6).
“…with a worked example, there are basic instructions and concepts in each step the process is so I don't need to open the book anymore to remember what concepts are used and I feel that everything is already there...” (student 5).
“…with worked examples, I don't need to read too much, in worked examples everything is presented concisely but it feels complete...” (student 11).
“...through worked examples, difficult material that can be made seemingly easy and make it easier to understand, I feel like my dependence on the teacher has decreased...” (student 10).
“…I would be very happy if later at school the teacher would present this detailed material. I feel that I can and more easily learn on my own through worked example...” (student 14).
“… Before, I felt the question was difficult but after seeing the worked example, I felt it was much easier and I was more motivated to correct my mistakes…” (student 9).
“...worked example is very helpful for me in learning and understanding the concepts and procedures for solving a problem...”. (student 13).
“…I feel very helped in solving HOTS questions, I can learn a lot and feels less tired…” (student 8).
“…I feel more able to learn independently…” (student 7).

3.3. The worked example effectivity in decreasing the student cognitive load.
Based on the cognitive load questionnaire and statistic analytic, it found that worked example effective to reduce student cognitive load as presented in tables 3, 4 and 5 below.

Table 3. The Description of Students Cognitive Loads.

| Scale                        | Before Amount of respondent | No.1 | No.2 | No.3 | Sum | No.1 | No.2 | No.3 | Sum |
|------------------------------|-----------------------------|------|------|------|-----|------|------|------|-----|
| Student Cognitive Load Before and After Worked Example Was Given |                             | 15   | 15   | 15   | 15  | 15   | 15   | 15   | 15  |
| Ideal maximum score          |                             | 9    | 9    | 9    | 9   | 9    | 9    | 9    | 9   |
| Ideal minimum score          |                             | 1    | 1    | 1    | 1   | 1    | 1    | 1    | 1   |
| Maximum score                |                             | 8    | 6    | 9    | 7.3 | 4    | 4    | 5    | 1.64 |
| Minimum score                |                             | 5    | 4    | 6    | 5.3 | 2    | 2    | 2    | 1.5  |
| Average                      |                             | 6.7  | 5.2  | 7.7  | 6.5 | 3.1  | 3    | 3.5  | 3   |
| Standard Deviation           |                             | 0.9  | 0.56 | 0.96 | 0.6 | 0.8  | 0.53 | 0.83 | 0.5 |

Based on table 3, it found that generally, student cognitive before is higher than after worked example was given, so we can assume that worked example effective in decreasing student cognitive load. The simple-paired t-test was used to obtain more reliable results about worked example effectiveness.

Table 4. Students Cognitive Load.

| Simple t test | Two Sided | One Sided |
|---------------|-----------|-----------|
| T             | 16.143    | 16.143    |
| p-value       | 1.918e-10 | 9.592e-11 |
2) students are not used to doing problem solving in HOTS. Hoard et al., [9] stated that students familiarity and accustomed to solving HOTS questions, and cannot make students difficult to understand the purpose of the given questions. Alhassora et al., [10] said that learning should be based on HOTS problems, and facilitative development of students high-level thinking skills. Unfortunately, students are still poorly trained and unfamiliar with solving HOTS questions, Susanti, Kusumah, Sabandar & Darhim [11], said that students are not trained in solving HOTS problems, and cannot make students high cognitive load.

Based on the results of triangulation data through observations, interviews and student responses, four main points identified as the causes of difficulties for students when solving HOTS problem as follow: 1) student lack of prior knowledge, 2) students are not used to doing problem-solving for HOTS problems, 3) Students negative perceptions about HOTS, 4) problem-solving activities cause students high cognitive load.

These results are in line with opinion such as Gais & Afriansyah [6], one of the factors that cause students difficulty in solving problems related to HOTS is the lack of prior knowledge of students. The adequacy of prior knowledge becomes a prerequisite so that students can find ways to solve the problem solving it faces [16]. The lack of prior knowledge is accompanied by a deficit of student knowledge about basic concepts. According to Alhassora et al., [14] the lack of students' conceptual understanding becomes one of the factors causing structural failure doing problem-solving in HOTS test.

Students are still poorly trained and unfamiliar with solving HOTS questions, Susanti, Kusumah, Sabandar & Darhim [13], said that learning should be based on HOTS problem so that students are familiar and accustomed to solving HOTS problems and facilitating the development of students high-level thinking skills. Hoard et al., [17] said that if students are not trained in solving HOTS problems, it certainly will make students difficult to understand the purpose of the given questions and cannot make students high cognitive load.

### Table 5. Students Cognitive Loads Analyzed for each question.

| Simple t-test | Two Sided | One Sided | Two Sided | One Sided | Two Sided | One Sided |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|
| T             | 10.739    | 10.739    | 20.579    | 20.579    | 13.475    | 13.475    |
| p-value       | 3.837e-08 | 1.918e-08 | 7.3e-12   | 3.65e-12  | 2.083e-09 | 1.041e-09 |
| Df            | 14        | 14        | 14        | 14        | 14        | 14        |
| Qt            | 2.144787  | 1.76131   | 2.144787  | 1.76131   | 2.144787  | 1.76131   |
| p-value       | 0.95012   | 0.95012   | 0.5263    | 0.5263    | 0.5643    | 0.5643    |
| 95 percent confidence interval | 2.011708 - 1.76131 | 3.837e-08 - 3.651039 | 0.4597167 - 0.4785993 | 3.009551 - 1.918e-10 |

Because of \( t = 16.143 > t (0.975,34) = 2.144787 \), and p-value 1.918e-10 < \( \alpha = 0.05 \), with 95% confidence interval does not contain 0. then there is a significant difference students cognitive load before and after the given working example. Because of \( t = 16.143 > t (0.05,34) = 1.76131 \), and p-value= 9.592e-11 < \( \alpha = 0.05 \), with 95% confidence interval does not contain 0. then there is a significant decreased students cognitive load before and after the given working example. With normal and homogenous data distribution is full filled (p-value > \( \alpha = 0.05 \)).

Because of all of the t score is > t table and all of the p-value < \( \alpha = 0.05 \), with all the 95% confidence interval does not contain 0. then there is a significant difference student cognitive load before and after the given working example in each given problem and there is a significantly decreased students cognitive load before and after the given working example in each given problem.

4. Discussion

Based on the results of triangulation data through observations, interviews and student responses, four main points identified as the causes of difficulties for students when solving HOTS problem as follows: 1) student lack of prior knowledge, 2) students are not used to doing problem-solving for HOTS problems, 3) Students negative perceptions about HOTS, 4) problem-solving activities cause students high cognitive load.

These results are in line with opinion such as Gais & Afriansyah [6], one of the factors that cause students difficulty in solving problems related to HOTS is the lack of prior knowledge of students. The adequacy of prior knowledge becomes a prerequisite so that students can find ways to solve the problem solving it faces [16]. The lack of student prior knowledge is accompanied by a lack of student knowledge about basic concepts. According to Alhassora et al., [14] the lack of students' conceptual understanding becomes one of the factors causing structural failure doing problem-solving in HOTS test.

Students are still poorly trained and unfamiliar with solving HOTS questions, Susanti, Kusumah, Sabandar & Darhim [13], said that learning should be based on HOTS problem so that students are familiar and accustomed to solving HOTS problems and facilitating the development of students high-level thinking skills. Hoard et al., [17] said that if students are not trained in solving HOTS problems, it certainly will make students difficult to understand the purpose of the given questions and cannot make students high cognitive load.

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identify the mathematical operations involved, which of course causes students to have difficulty solving HOTS problems.

Alhassora, Abu, and Abdullah [14] said that students' negative perceptions about HOTS such as perceived HOTS questions as difficult to solve and perceived themselves as unable to solve the HOTS questions cause students to have difficulty solving HOTS problems. Negative perception about HOTS was also interrelated with students' lack of motivation or interest in HOTS problem caused them to feel hard to solve HOTS problem. The students will also show less initiative to answer questions and will not have confidence in themselves to solve HOTS problems.

The lack of prior knowledge of students is certainly in line with the emergence of high student cognitive load. High cognitive load, students will experience difficulties in receiving learning material [10]. Ismail [14] states that cognitive activities caused students to make errors in solving problems. Miller [15] states that student working memory is limited, so problem-solving learning causes a high cognitive load.

Based on statistical tests with a 95% confidence level shows that there are significant differences in students 'cognitive load before and after given a working example and it is proven that working examples are effective in reducing students' cognitive load when solving HOTS problems solving both in general terms and per item. This is in line with the results of research by Kester, Kirscher, & Van Merriënboer, [18] and Rohman & Retnowati [19] proving that working example learning strategies are effective in reducing cognitive load.

Worked example helped students in learning and supported the success of students in solving HOTS problem. A worked example can provide prior knowledge for students so that it can be used as a basis for learning new material being studied, worked example is very influential in helping students understand and build the knowledge they learn [8]. A worked example can improve conceptual and procedural knowledge for students. Working examples help students more easily understand the material than problem-solving strategies [20]. Worked example Provides space for students to focus their attention directly on the problem given and the steps that have been provided to solve the problem. The example provided will reduce the cognitive load on work memory to determine the relevant problem-solving strategies so that it will make the learning process easier [14]. Students can solve problems completely, faster and make fewer mistakes when compared to students who learn by using problem-solving.

Many efforts can be implemented to overcome the difficulties experienced by students. Improving the qualification of mathematics teacher [21], using HOTS problems in learning activity [22] so students will be more familiar with solving HOTS problem. Teachers can strengthen the student concept mastery and make some improvements in learning activity [23], such as choosing learning strategy that helps students to connect their prior knowledge with new knowledge that is being studied [12], learning that can minimize students cognitive load [8], using learning strategy that combines problem-solving with working examples or called examples [24].

5. Conclusion
There are four main ideas about the Difficulties of Students When Solving Hots Problem: 1) students lack prior knowledge, 2) students are not used to doing problem-solving for HOTS problems, 3) Students' negative perceptions about HOTS, 4) problem-solving activities cause students high cognitive load. The Worked example supporting the success of students learning and solving HOTS problems. Worked example as feedback for HOTS problem-solving activity is effective to reduce students' cognitive load and recommended to be applied when teaching novice students.

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