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The Sixth Seminar Nasional Pendidikan Matematika Universitas Ahmad Dahlan 2018

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The Preface of the Seminar Nasional Pendidikan Matematika (SENDIKMAD) 2018

Puguh Wahyu Prasetyo

Editor in Chief of SENDIKMAD's 2018 Publication, Universitas Ahmad Dahlan Kampus IV UAD, Jl. Ringroad Selatan, Kragilan, Tamanan, Banguntapan, Bantul, Daerah Istimewa Yogyakarta 55191

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Preface

The Sixth Seminar Nasional Pendidikan Matematika Ahmad Dahlan is a biennial event of Department of Mathematics Education of Universitas Ahmad Dahlan. The objectives are to improve mathematics teaching and to expand mathematics contributions to the society. The main topics of the conference are divided into five categories namely Analysis, Statistics, Algebra, Applied Mathematics, and Mathematics Education.

The keynote presentations are provided especially to show the contribution of Mathematician and Mathematics Educators in the world of mathematics and mathematics education towards research and knowledge sharing where our conference theme for this year is Developing literation skills and High Order Thinking Skills by Innovative Mathematics Learning in Industry Era 4.0. The main event is the talk of the Minister for the Ministry of Education and Culture of the Republic of Indonesia, Professor Dr. Muhadjir Effendy, M.A.P as the first keynote speaker. We have two another keynote speakers coming from Universitas Muhammadiyah Malang, Professor Dr. Yus Mochamad Cholily and Universitas Gadjah Mada, Dr. Nanang Susyanto, M.Sc.

We also have a speaker in workshop session coming from Universitas Ahmad Dahlan, Dr. Rully Charitas Indra Prahmana, S.Si., M.Pd. SENDIKMAD 2018 was an overwhelming success, attracting the delegates, speakers and sponsors from many countries and provided great intellectual and social interaction for the participants. Without their support, the conference would not have been successfully organized. I trust that all the participants found their involvement in the Conference both valuable and rewarding. Our wish is that all participants would enjoy this conference, contribute effectively toward it and take back with you knowledge, experiences, contacts and happy memories of this conference and especially with this beautiful kingdom of Yogyakarta.

Dr. Puguh Wahyu Prasetyo, S.Si., M.Sc

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Keynote Speakers

Muhadjir Effendy	Ministry of Education and Culture of the Republic of Indonesia
Yus Mochamad Cholily	Universitas Muhammadiyah Malang
Nanang Susyanto	Universitas Gadjah Mada

Figure 1. Muhadjir Effendy, the Minister for Education and Culture delivering his keynote talk on Higher Order Thinking Skills

Figure 2. Yus Mochamad Cholily from Universitas Muhammadiyah Malang delivering his keynote talk

Figure 3. Nanang Susyanto form Universitas Gadjah Mada delivering his keynote talk

Figure 4. One of the Participants of SENDIKMAD 2018 giving his talk in parallel session.

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Pseudo-thinking process in solving logic problem

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Abstract. This study was intended to describe the students' false-pseudo-thinking process in solving a mathematical logic problem. The problem presented was the true value of a compound statement without using the truth table. The subjects consisting of male and female students. Data collection used the think aloud method. The results indicated that (1) in understanding problem: male subjects were able to understand some components of the problem, women could understand each element of the problem; (2) in planning problem-solving: male subject unaware of the initial concepts needed to solve problem, while female subject aware of it; (3) in implementing the plan: both male and female subjects used incomplete knowledge structures to solve problem; and (4) both subjects did not re-check the answers found. The thinking structure of false-pseudo in solving mathematical logic problem occurred because 1) the lack of initial knowledge that will be used to plan problem-solving, 2) superficial similarities: the habit of completing the previous practice makes the subject consider the many similarities in the problem-solving process, and there is no reflection on the answers given.

1. Introduction

Mathematics is the study of patterns and rules [1]. In order to be able to understand, students are required to develop the thinking ability through learning activities [2]. Ruggiero said the thinking process is a mental activity that is used to formulate or solve problems, make decisions and get understanding [3]. Meanwhile, Subanji said that thinking is a mental activity that occurs in the brain in order to remember, understand to find or make a way, analyze, synthesize problems and solve them [4]. This shows that students will have the ability to understand, analyze, and be able to solve mathematics problems when their thinking potential is trained and developed.

In solving mathematics problems, students often experience difficulties and produce wrong answers. This often happens because the solution to the problem is not immediately known by using routine procedures [5–9], and also the mathematics learning that is monotonous and procedural, such as the teacher explaining the material, giving examples, assigning students to practice the problem, then discussing the problem-solving which is then copied by the students. An essential aspect of learning, namely the process of students thinking is not the main focus. The impact of this condition resulted in many students who could not understand the concept of mathematics well [10–12].

Other conditions, students also often apply procedures that are wrong in solving problems, they consider the problems are same, even though the context is different, so the answers obtained are

wrong [13]. According to Vinner, most students assume that he has done the thinking process in problem-solving, even though students only imitate what is done by the teacher. This situation is called pseudo-thinking, a situation where students do not really use their minds to solve a problem [14]. The results of a problem-solving process are not the output of actual mental activity [4]. Based on the understanding of procedures used by students in answering questions and relatedness to other concepts, pseudo-thinking is divided into two, namely: analytic pseudo-thinking and pseudo conceptual thinking. Analytic pseudo-thinking is a mental activity that occurs in the brain that is not based on controls on the chosen procedures and used procedures. Conceptual pseudo-thinking is a mental activity that occurs in the brain that does not think about the meaning of a concept used and its relationship to other concepts. Based on the answers given by students and the clarification process used, pseudo-thinking is divided into two, namely: false-pseudo-thinking and true-pseudo-thinking. False-pseudo-thinking is a mental activity that occurs in the brain in giving wrong answers but can correct errors after self-reflection. True-pseudo is a mental activity that occurs in the brain in giving the correct answer but cannot give or occur errors in justifying the answers given [15].

According to Subanji and Nusantara, pseudo-thinking has an impact that there are errors made by students in working on mathematical problems. This matter really needs attention, because these mistakes will greatly affect their understanding of mathematics concepts [16]. To reduce the impact of errors in building the next concept, it is important to search for sources and causes of errors. These sources can be found through the formation of student thought schemes called the concept construction process of students [17]. Through this research, it will be revealed the source of the formation of students' thinking errors in solving problems. The results of this study will be useful to improve the structure of students' thinking, thus helping them to understand the correct mathematical concepts.

2. Method

This study was intended to describe the students' false-pseudo-thinking process in solving a mathematical logic problem. The logic problem was to indicate whether a compound statement is a tautology or not without using the truth table. This research was classified as qualitative research. According to Bogdan dan Taylor, qualitative methods are research procedures that produce descriptive data from research subjects related to observed behavior [18]. The research subjects were students in the odd semester of 2018/2019 academic year who had studied the logic material, especially the topic of compound statements and the truth tables. The research subjects were selected based on purposive sampling, which was taken by considering their communication ability so that the disclosure of the thinking process could be done well. Researchers took two samples as subjects based on gender.

The instrument of this research was the researcher that guided by the task sheet instrument to solve the problem of mathematical logic. In this case, researchers are planners, data collectors, analysts, data interpreters, and research conclusion makers. The task sheet instruments used in this study is shown in Figure 1.
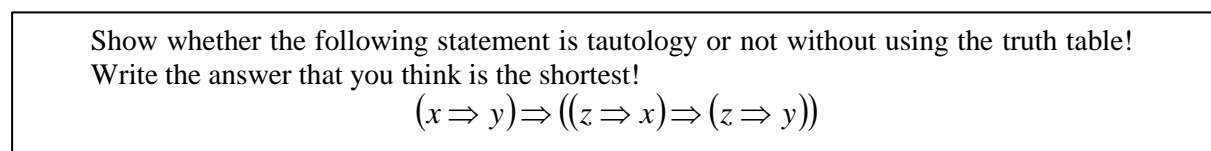

Show whether the following statement is tautology or not without using the truth table!
Write the answer that you think is the shortest!
$$(x \Rightarrow y) \Rightarrow ((z \Rightarrow x) \Rightarrow (z \Rightarrow y))$$

Figure 1. The task sheet instruments

The problems raised as follows [19]. (1) The question faced subject must be understood. The concept needed to solve the problem is the concept of the truth table of implication. (2) The question given must be a challenge for the subject to answer it. The challenge of the problem is the subject must be able to determine the truth value of one single statement at the beginning so that the resulting step becomes shorter. (3) The question requires the subject to answer using the nonroutine procedure, that is without using the truth table. Subjects required using Polya's steps in solving the problem of mathematical logic material [20]. Polya's steps are an understanding problem, planning the steps in

solving the problems, implementing the strategies to solve the problems, and doing verification (see in Figure 2).
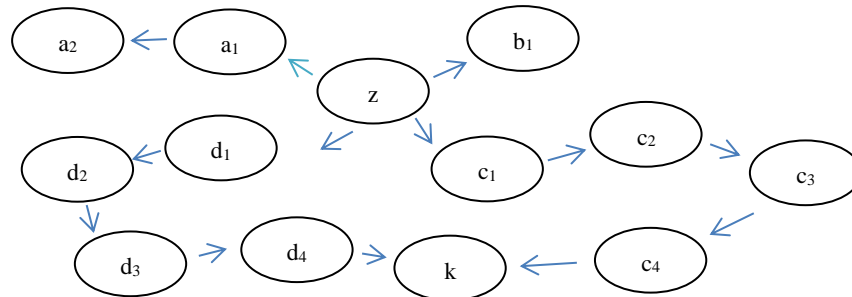

Figure 2. Thinking Structure in Solving Mathematical Logic Problem

Table 1. Encoding and Explanation of Thinking Structure in Completing Mathematical Logic Problem

Code	Explanation
Z	Being able to understand the main problem, that is mathematical logic
a_1	Being able to understand what is known from the problem: a compound statement in the form of implications, the antecedents is $(x \Rightarrow y)$, the consequence is $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$
a_2	Being able to understand what is asked from the problem: whether a compound statement is a tautology or not without using the truth table
B	Being able to make a plan: using two possibilities from the concept of true value in implication briefly, what is the implications are true if the value of antecedents is false without regard to the consequent truth value or if consequents are true regardless of the truth value of the antecedents.
c_1	Being able to implement the plan, by assuming z is false so $(z \Rightarrow x)$ is true and $(z \Rightarrow y)$ is true. So that $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$ is true. As consequence is true, then the implications of compound statements are true.
c_2	Being able to implement the plan, by assuming z is true and y is true, then $(z \Rightarrow y)$ is true, so that $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$ is true. As consequence is true, then the implications of compound statements are true.
c_3	Being able to implement the plan, by assuming z is true, y is false, and x is false, then $(z \Rightarrow x)$ is false, so that $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$ is true. As consequence is true, then the implications of compound statements are true.
c_4	Being able to implement the plan, by assuming z is true, y is false, and x is true, then $(x \Rightarrow y)$ is false. As antecedents are false, then the implications of compound statements are true.
k	Conclusion: the compound statements is a tautology
d_1	Checking answer, by assuming y is true, then $(z \Rightarrow y)$ is true, so that $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$ is true. As consequence is true, then the implications of compound statements are true.
d_2	Checking answer, by assuming y is false and z is false, so that $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$ is true. As consequence is true, then the implications of compound statements are true.
d_3	Checking answer, by assuming y is false, z is true, and x is false, so that $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$ is true. As consequence is true, then the implications of compound statements are true.
d_4	Checking answer, by assuming y is false, z is true, and x is true, so that $(x \Rightarrow y)$ is false. As antecedents are false, then the implications of compound statements are true.

Table 1 is the description of Figure 2. Based on the three reasons stated in Table 1, the researcher believes that the task sheet given to the subject is a problem-solving type. The task sheet instrument was validated by a senior lecturer in the field of mathematics education. Validation is directed to the problem-solving process and the suitability of the language used. Data collected by giving the problem to the subject. In the problem-solving process, the subject is asked to convey verbally what is thought. In this case, the method used is thought aloud. Interviews conducted are only used to clarify the thinking process delivered by students. The data analysis process is carried out by 1) reduce data, which means to summarize, choose the main things from the results of the interview, and focus on important things that show the existence of a pseudo-thinking process; 2) presenting data, which means describing the cognitive structure of the subject's thinking based on problem-solving activities; 3) draw conclusions, which means giving an explanation of the meaning of the data that has been presented [21].

3. Result

3. 1.   Description of The Pseudo-thinking Process in Male Subject (S1)

In the thinking process, it appeared that S1 has understood some of the known variable from the problem. This is indicated by the statement from S1 shown in Figure 3.

> S1:   This problem is about logic … about tautology, compound statements. ... This question is asked to show whether a compound statement is tautology or not without using the truth table.

Figure 3. S1's statement of some known variables

The first time S1 faced a problem, S1 could understand that what is known from the problem is a compound statement. Even though S1 did not say that compound statement was an implication, S1 understood that what is asked of the problem is to show the compound statement is a tautology or not without using the truth table.

Furthermore, in planning problem-solving, S1 did not realize that the initial concept needed to show whether the compound statement is a tautology or not are two possibilities of the concept of implication in true value (see in Figure 4).

> S1:   The implication is false if antecedent is true and consequent is false. The implication is true if the antecedent is true and the consequent is true, or the antecedent is false and the consequent is true, or the antecedent is false and the consequent is false.

Figure 4. S1's statement of the concept of implication

Based on the statement said by the S1, S1 only repeated the statement from the truth table. S1 has not carried out an analysis of the implication concept of true value, that implication will be true value if the antecedent is false or consequent is true. This concept is urgently needed to determine which single statement will be chosen to show whether the compound statement is tautology briefly. On the other side, the implication concept of false value was needed if, through the implications concept of true value, the compound statement cannot be shown the truth value.

S1 started to implement the planning by writing down the truth value of one of a single statement. The first step, S1 supposed z is true and x is false, so that $(z \Rightarrow x)$ is false. Then, suppose y is false, so that $(z \Rightarrow y)$ is false. It can be concluded that the implication of the compound statement is true. The second step, S1 supposed x is true and y is true, so that $(x \Rightarrow y)$ is true. Then, supposed z is false, so that the implication of the compound statement is true. The completion produced by S1 is presented in Figure 5.
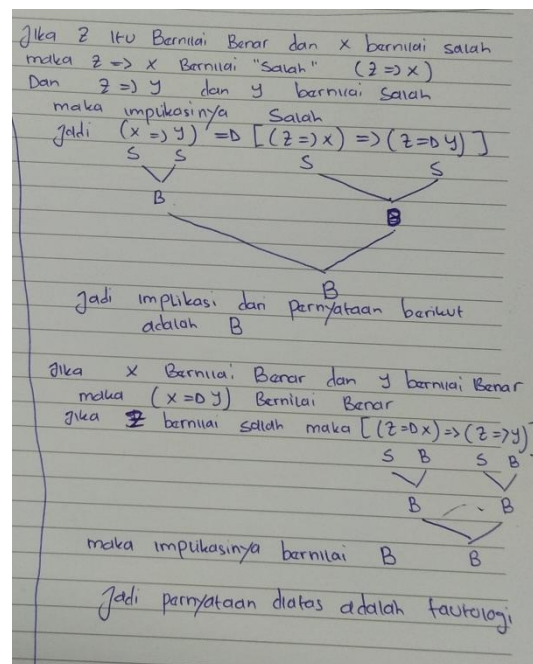
Figure 5. S1' answer

The problem-solving steps that have been written by S1 are incomplete (see in Figure 5). Showing what is a compound statement is a tautology, not only seen from the two examples written. There are still six other possibilities, which can be shortened to four steps through the implications concept of true value. In addition, S1 is not consistent in writing his single statement. In addition, S1 was not consistent in supposing the truth value of a single statement. First, S1 supposed that the value of z is true, but S1 did not assume how if the value of z is false. To get a short answer, if S1 started by assuming z is false, then it can quickly be shown that the implication of the compound statement is true. However, S1 did not aware that S1 written incomplete problem-solving steps. This can be seen in Figure 6.

R   : Does this answer enough to show that compound statement is tautology?
S1 : Yes.
R   : Do you think there is a lack of steps?
S1 : No. It is enough.

Figure 6. S1's statement of compound statement

After solving the problem based on the plan made, S1 did not re-check the answers found. S1 is in the pseudo-thinking process because in solving problems do not control what is thought [12, 20]. Because there are some errors on the assumptions given, so the answers got is wrong. It is possible, S1 has not used the thinking process optimally because the concepts stored in memory are not well connected.

Based on these incorrect answers, the researcher gave the intervention to S1 to use the implication concept of true value. However, S1 is still cannot understand the intent of the researcher. So when the researcher gave intervention again by mentioning two possibilities of the implication concept of true value, S1 started to realize that the steps are written are incomplete. S1 was in the pseudo-thinking process because, after the reflection, S1 started to realize its mistakes in solving the problem [15]. An intervention that researchers gave to S1 was seen in Figure 7. While Table 2 is the description of Figure 8.

R   : State the terms so that the implication is true!

S1 : The implication is true if the antecedent is true and the consequent is true, or the antecedent is false and the consequent is true, or the antecedent is false and the consequent is false.

R   : Yes, based on this it can be concluded that two possibilities of the true value of implication. First, if the antecedent is false, regardless of consequent, then?

S1 : Then the implication is true.

R   : Next?

S1 : If the antecedent is true, there are two possibilities.

R   : Yes. If the consequence is true, then?

S1 : Then ... Implication is true.

R   : Well, let z is false.

S1 : If z is false, then $(z \Rightarrow x)$ is true, $(z \Rightarrow y)$ is true, so that implication is true.

R   : What a statement that has been assumed?

S1 : Only z.

R   : How about your answer?

S1 : I was assuming all of the truth value of the statement.

R   : So.. try to let if z is true!

S1 : I should assume the truth value of x dan y.

R   : Okay, what do you think about your answer?

S1 : This should be checked one by one.

R   : Is there lack of steps?

S1 : Yes.

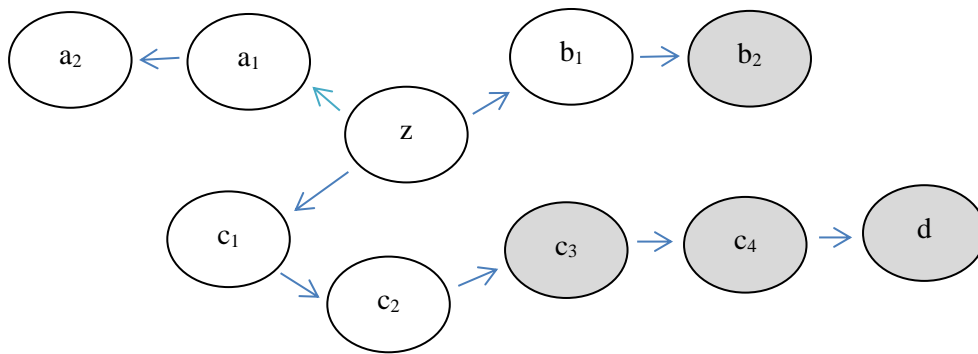**Figure 7.** S1's statement of some known variable from the problem

Figure 8. S1 Thinking Structure in Solving Mathematical Logic Problem

Table 2. Encoding and Explanation of S1 Thinking Structure in Completing Mathematical Logic Problem

Code	Explanation
z	Being able to understand the main problem, that is mathematical logic.
a_1	Being able to understand what is known from the problem: a compound statement.
a_2	Being able to understand what is asked from the problem: whether a compound statement is a tautology or not without using the truth table.
b_1	Being able to make a plan: stating the four possibilities from the concept of true or false value in implication.
b_2	Not being able to make the other plan: stating two possibilities from the concept of true value in implication briefly. *Pseudo 1*: did not analyze the truth table of implication.
c_1	Being able to implement the plan: determining the truth value of implication by assuming the truth value of z, x, and y.
c_2	Being able to implement the plan: determining the truth value of implication by assuming the truth value of x, y, and z.
c_3	Not being able to make other probabilities of implication which true value. *Pseudo 2*: incomplete in showing that implication of the compound statement is a tautology.
c_4	Did not make an assumption for z is false, after making an assumption for z is true. *Pseudo 3*: inconsistent in making an assumption.
d	Did not check the answers that have been written. *Pseudo 4*: no controlling/reflection.

3. 2.   Description of The Pseudo-thinking Process in Female Subject (S2)

In the thinking process, it appeared that S2 has understood all of known from the problem. S2's statement of known variables is shown in Figure 9.

> S2: The keyword is implication … this is antecedent (*S2 appoint* $x \Rightarrow y$), and this is consequent (*S2 appoint* $(z \Rightarrow x) \Rightarrow (z \Rightarrow y)$). ... This question is asked to show whether a compound statement is tautology or not without using the truth table.

Figure 9. S2's statement about known variable

S2 could understand that what is known from the problem are a compound statement and its implication. S2 knew which one antecedent and which one consequent. S2 understood that what is asked of the problem is to show the compound statement is a tautology or not without using the truth table.

Furthermore, in planning problem-solving, S2 aware that the initial concept needed to show the compound statement is a tautology or not are two possibilities of the implication concept of true value. S2's statement about the concept of implication is shown in Figure 10.

> S2: The implications are true if the value of antecedents are false without regard to the consequent truth value or if consequents are true regardless of the truth value of the antecedents.

Figure 10. S2's statement about the concept of implication

Based on the statement said by the S2, S2 has carried out an analysis of the implication concept of true value, that implication will be true value if the antecedent is false or consequent is true. This concept is urgently needed to determine which single statement will be chosen to show whether the compound

statement is tautology briefly. However, when researchers asked which single statement would be chosen, S2 said the weak reason. S2's statement of a single statement is shown in Figure 11.

R   : Which single statement would be assumed its truth value?
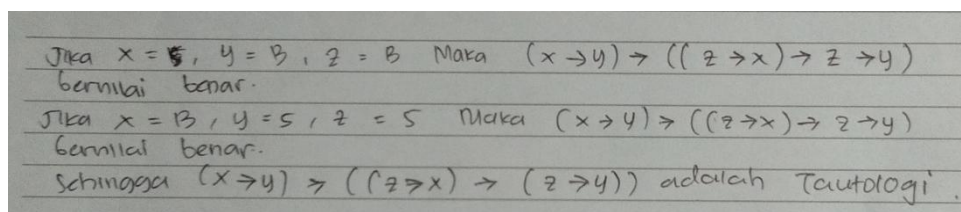S2   : If we want to show it quickly, we should assume the false value first.

Figure 11. S2's statement about the concept of a single statement

The initial process in problem-solving carried out by the S2 shows that S2 is experiencing a pseudo-thinking process. This is due to the reason given by S2 that "if we want to show it quickly, we should assume the false value first" is influenced by the habit of solving a tautology problem that is by assuming one of single statement is false. In fact, the subject can assume one of a single statement with true value. This depends on the single statement that will be taken, if as an antecedent. it is assumed to be false value, it is consequent, it is assumed to be a true value. According to Subanji, S2 used superficial similarities [4]. S2's statement of a single statement is shown in Figure 12.

S2   : So, if x is false, whatever the truth value of y means the antecedent is true. If x is false and z is true, then $(z \Rightarrow x)$ is false. If z is true and y is true, then $(z \Rightarrow y)$ is true, means the consequent is true. Antecedent is true and consequent is true, then the implication is true. It means tautology.
R   : Can it be concluded that tautology?
S2   : Not yet, we have to test for x is true. If x is true, y is false, z is false, then the implication is true. Because for x is false, the implication is true, and for x is true, the implication is also true. It means the compound statement is tautology.

Figure 12. S2's statement about the concept of tautology

S2 started to solve the problem by writing down the truth value of one of a single statement. The first step, S2 supposed x is false, so $x \Rightarrow y$ is true. Then S2 supposed z is true, then $(z \Rightarrow x)$ is false and supposed y is true so that $(z \Rightarrow y)$ is true. It could be concluded that the implication of the compound statement is true. The second step, S2 supposed x is true, y is false, and z is false so that the implication of the compound statement is true. The solution produced by S2 is presented in Figure 13.

Figure 13. S2' Answer

The solution steps that have been written by S2 are incomplete (see in Figure 13). S2 has not supposed that x is false and y is false. In addition, in the second step, S2 also supposed x is true, y is false, and z is false. If S2 has supposed z is false, it is not necessary to suppose another single statement. Without supposing the truth values of x and y, and only by assuming z is false, the implication of the compound statement is true.

After writing down the problem-solving steps, S2 did not re-check the answers found. This can be seen in Figure 14.

R	: Is this like enough?
S2	: Yes.
R	: Are there other possibilities?
S2	: Nothing, Mom.

Figure 14. S2's statement about the concept of similarities of the statement

S2 was in the pseudo-thinking process because in solving problem did not control what is being thought [22]. When the researchers asked questions, S2 answered with inappropriate reasons (see in Figure 14). This was because the concepts stored in S2 memory are not well connected, so the answers got were still wrong. Researchers asked to S2, the conversation can be seen in Figure 15. While Table 3 is the description of Figure 16.

R	: If taken x is false, y is true, and z is false, already in your answer sheet?
S2	: Not yet.
R	: Is it needed?
S2	: No. Because whatever the truth value, z is true or z is false, the implication is certainly true.

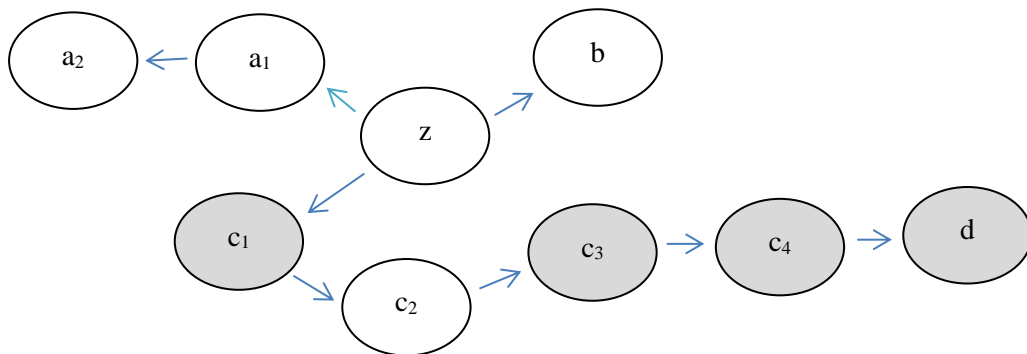**Figure 15.** S2's statement about the concept of implication

Figure 16. S2 Thinking Structure in Solving Mathematical Logic Problem

Table 3. Encoding and Explanation of S2 Thinking Structure in Completing Mathematical Logic Problem

Code	Explanation
z	Being able to understand the main problem, that is mathematical logic.
a_1	Being able to understand what is known from the problem: a compound statement and its implication, which one antecedent and which one consequent.
a_2	Being able to understand what is asked from the problem: whether a compound statement is a tautology or not without using the truth table.
b	Being able to make a plan: stating two possibilities from the concept of true value in implication briefly
c_1	Being able to implement the plan: determining the truth value of implication by assuming one of a single statement that true value. *Pseudo 1*: assume that in order to show tautology, it should presuppose that a single statement is false
c_2	Being able to implement the plan: determining the truth value of implication by assuming x is false, y is true, and z is true
c_3	Not being able to make other probabilities of implication which true value. *Pseudo 2*: incomplete in showing that implication of the compound statement is a tautology
c_4	Being able to implement the plan: determining the truth value of implication by assuming x is true, y is false, and z is false. *Pseudo 3*: presupposing the other single statement even though had been presupposing z is false
d	Did not check the answers that have been written. *Pseudo 4*: no controlling/reflection.

4. Discussion

Based on the results of the research described, the thinking structure of false-pseudo in solving mathematical logic problem occurred because: (1) the lack of initial knowledge that will be used to plan problem-solving, (2) superficial similarities: the habit of completing the previous practice makes the subject consider the many similarities in the problem-solving process, and (3) there is no reflection on the answers given.

This becomes additional evidence of other research that the thinking structure of false-pseudo of student in solving the problem of inequality is because (1) begins with students' errors in making assumptions when understanding the problem, (2) incompleteness of the students' thinking structure when understanding the problem, and (3) incompleteness of students' thinking substructure in planning ways of completion [23]. Subanji also conducts research, the results show that the pseudo-thinking process of covariational reasoning occurs from incomplete assimilation process, incomplete accommodation process, or both. They are 3 components of the occurrence of the pseudo covariational reasoning thinking process: (1) the existence of imperative thinking structure used in generalizing the solution, (2) the reflection process is not maximized, (3) the existence of the awareness up to the straightening the wrong solution process out [17, 24].

Furthermore, several facts related to students and teachers who were in problem-solving situations, namely (1) students often did not control when solving a problem, (2) students only thought to give the right answer, and (3) students know what can be given to the teacher and how to get it only for teacher satisfaction, and (4) the teacher only expects learning to get the right answer [14]. This causes students to experience pseudo-thinking. Students do not really control what they have done. The biggest motivation is only to give the right answer to the teacher, not to be an important thing for himself as a process of constructing knowledge through right reasoning [15]. On the other hand, students' mistakes in constructing mathematical concepts so that the pseudo-thinking process occurs because students only memorize the material, spontaneously answer the question or rush in understanding things and focus on remembering the procedure [25].

5. Conclusion

The results indicated that (1) in understanding problem: male subjects were able to understand some components of the problem, women could understand each element of the problem; (2) in planning problem-solving: male subject unaware of the initial concepts needed to solve problem, while female subject aware of it; (3) in implementing the plan: both male and female subjects used incomplete knowledge structures to solve problem; and (4) both subjects did not re-check the answers found.

References

[1]   Walle J A Van de, Karp K S and Bay-Williams J M 2012 *Elementary and Middle School Mathematics: Teaching Developmentally, Student Value Edition* (Upper Saddle River, N.J.: Pearson)

[2]   Rohana R 2015 Peningkatan Kemampuan Penalaran Matematis Mahasiswa Calon Guru Melalui Pembelajaran Reflektif *Infin. J.* **4** 105

[3]   Ruggiero V R 1995 *Beyond Feelings: A Guide to Critical Thinking* (Mayfield Publishing Company)

[4]   Subanji S 2009 Berpikir Pseudo Penalaran Kovariasi dalam Mengkonstruksi Grafik Fungsi Kejadian Dinamik: Sebuah Analisis Berdasarkan Kerangka Kerja VL2P dan Implikasinya pada Pembelajaran Matematika *J. Ilmu Pendidik. Univ. Negeri Malang* **13**

[5]   Yost D 2008 Integration: Reversing traditional pedagogy *Aust. Sr. Math. J.* **22** 37

[6]   Kiat S E 2005 Analysis of students' difficulties in solving integration problems *Math. Educ.* **9** 39

[7]   Dorko A and Speer N M 2013 Calculus students' understanding of volume *Investig. Math. Learn.* **6** 48

[8]   Serhan D 2015 Students' Understanding of the Definite Integral Concept. *Int. J. Res. Educ. Sci.* **1** 84

[9]   Wibawa K A, Nusantara T, Subanji S and Parta I N 2018 Defragmentasi Pengaktifan Skema Mahasiswa Untuk Memperbaiki Terjadinya Berpikir Pseudo Dalam Memecahkan Masalah Matematis *Prima J. Pendidik. Mat.* **2** 93

[10]   Ngilawajan D A 2013 Proses Berpikir Siswa SMA dalam memecahkan masalah matematika materi turunan ditinjau dari gaya kognitif field independent dan field dependent *Pedagog. J. Pendidik.* **2** 71

[11]   Setyawan F 2015 Conceptual Understanding Profile of LEOV Junior High School Students Based on Kolb's Learning Style *International Conference on Mathematics, Science, and Education (ICSME)* (Semarang: Universitas Negeri Semarang) pp 61

[12]   Setyawan F 2017 Profil Representasi Siswa SMP terhadap Materi PLSV Ditinjau dari Gaya Belajar KOLB *J. Medives* **1** 82

[13]   Subanji 2013 Proses Berpikir Pseudo Siswa Dalam Menyelesaikan Masalah Proporsi *J-TEQIP J. Peningkatan Kualitas Guru* **4** 207

[14]   Vinner S 1997 The Pseudo-Conceptual and the Pseudo-Analytical Thought Processes in Mathematics Learning *Educ. Stud. Math.* **34** 97

[15]   Adi Wibawa K 2015 Karakteristik Berpikir Pseudo Dalam Pembelajaran Matematika (Universitas Mataram)

[16]   Subanji and Nusantara T 2013 Karakteristik Kesalahan Berpikir Siswa Dalam Mengkonstruksi Konsep Matematika *J. Ilmu Pendidik.* **19** 208

[17]   Subanji S and Nusantara T 2016 Thinking Process of Pseudo Construction in Mathematics Concepts *Int. Educ. Stud.* **9** 17

[18]   Moleong L J 2014 *Metodologi Penelitian Kualitatif Edisi Revisi* (Indonesia: Remaja Rosdakarya)

[19]   Musser G L, Peterson B E and Burger W F 2013 *Mathematics for Elementary Teachers: A Contemporary Approach, 10th Edition* (Wiley Global Education)

[20]   Rahman A and Ahmar A 2016 Exploration of mathematics problem solving process based on

the thinking level of students in junior high school *Int. J. Environ. Sci. Educ.* **11** 7279

[21] Anon 2008 *Metode penelitian pendidikan:(pendekatan kuantitatif, kualitatif dan R & D)* (Alfabeta)

[22] Wibawa K A 2016 *Defragmenting Struktur Berpikir Pseudo dalam Memecahkan Masalah Matematika* (Deepublish)

[23] Susanti D 2016 Defragmenting Struktur Berpikir Pseudo Siswa melalui Pemetaan Kognitif dalam Menyelesaikan Masalah Pertidaksamaan Kuadrat *Diss. Progr. Pascasarjana, Univ. Negeri Malang*

[24] Widodo A, Purnami A S, Charitas R and Prahmana I 2017 Team Accelerated Instruction , Initials , and Problem-Solves Ability i n Junior High School *Int. J. Emerg. Math. Educ.* **1** 193–204

[25] Anggraini D, Kusmayadi T A and Pramudya I 2018 Construction of the mathematical concept of pseudo thinking students *Journal of Physics: Conference Series* vol 1022 (IOP Publishing) p 012010

SERTIFIKAT

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Diberikan kepada

Rima Aksen Cahdriyana

sebagai

PEMAKALAH

dengan judul

Pseudo Thinking Process in Solving Matheatical Problem

Seminar Nasional Pendidikan Matematika Ahmad Dahlan (SENDIKMAD) 2018 dengan tema
"Mengembangkan Kemampuan Literasi dan Keterampilan Berpikir Tingkat Tinggi (HOTS) melalui Pembelajaran Matematika Inovatif di Era Revolusi Industri 4.0"
Sabtu, 3 November 2018 di Kampus IV Universitas Ahmad Dahlan

Yogyakarta, 25 Shafar 1440 H / 3 November 2018 M

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