Defragmentation of The False-Pseudo Thinking Process of Students in Solving Mathematical Connection Ability Problems

Defragmentasi Proses Berpikir Pseudo Salah Peserta Didik Dalam Menyelesaikan Soal Kemampuan Koneksi Matematis

Belda Nurmultiefa Lesmana[1], Supratman[2], Diar Veni Rahayu[3]
[1]Universitas Siliwangi, Jl. Siliwangi No. 24 Tasikmalaya 46115, Jawa Barat, Indonesia
beldanlesmana@gmail.com
[2]Universitas Siliwangi, Jl. Siliwangi No. 24 Tasikmalaya 46115, Jawa Barat, Indonesia
supratman@unsil.ac.id
[3]Universitas Siliwangi, Jl. Siliwangi No. 24 Tasikmalaya 46115, Jawa Barat, Indonesia
diarvenirahayu@unsil.ac.id

ABSTRAK

Tujuan dari penelitian ini untuk mendeskripsikan defragmentasi proses berpikir pseudo salah peserta didik dalam menyelesaikan soal kemampuan koneksi matematis. Penelitian ini menggunakan metode kualitatif deskriptif. Teknik pengumpulan data menggunakan soal tes kemampuan koneksi matematis pada materi Teorema Pythagoras yang memuat indikator koneksi matematis (koneksi antar topik matematika, koneksi dengan disiplin ilmu lain, dan koneksi dengan kehidupan sehari-hari) dan wawancara tidak terstruktur. Subjek penelitian ini adalah peserta didik kelas VIII SMPN 5 Tasikmalaya yang mengalami proses berpikir pseudo salah dan dapat mempertanggungjawabkan hasil pengerjaannya. Hasil penelitian menunjukan bahwa defragmentasi dilakukan kepada subjek yang mengalami pseudo salah dengan beberapa tahapan yaitu *scanning, check some errors, repairing* (*disequilibrasi, conflict cognitive,* dan *scaffolding*), *give a chance to re-work,* dan *certan the result*. Berdasarkan defragmentasi yang dilakukan, peserta didik yang mengalami pseudo salah dapat merefleksi kesalahannya dan merestrukturisasi proses berpikir yang awalnya semu menjadi proses berpikir yang benar dan jelas.
Kata kunci: Defragmentasi, Proses Berpikir, Pseudo Salah, Kemampuan Koneksi Matematis

ABSTRACT

The purpose of this research is to describe the defragmentation of pseudo-thinking processes carried out by students in problem solving of mathematical connection abilities. This research uses a descriptive qualitative method. The data collection techniques used mathematical connection ability test with questions on the Pythagorean Theorem which contained indicators of mathematical connecetions (connections between mathematical topics, connections with other disciplines, and connections with everyday life) and unstructured interviews. The research subject were taken from students of class VIII of SMPN 5 Tasikmalaya who experienced a pseudo thingking process that focused on false-pseudo and could take responsibility for the results of their work. The results showed that defragmentation was carried out on students who experienced false-pseudo through several stages, namely scanning, check some errors, repairing (disequilibration, conflict cognitive, and scaffolding), give a chance to re-work, and certain the result. Based on the defragmentation carried out, students who experience false-pseudo can reflect on their mistakes and restructure the thought process that was originally false into correct and clear thought process.
Keywords: Defragmentation, Thinking Process, False-Pseudo, Mathematical Connection Ability

PRELIMINARY

Students carry out thinking processes to solve mathematical problems. But in fact, the thinking process of students in solving mathematical problems still often experiences errors in concepts, principles arithmetic operations, or lack of accuracy. According to Efendi (2020) when solving problems with new concepts, students' thinking processes still experience errors when constructing previously owned concepts, this thinking process is called pseudo thinking. The thought process of students who experience pseudo still experiences a shallow and pseudo-concept understanding, where questions can be answered but the actual linkage of the concepts they have is still weak. According to Pujilestari (2018) the cause of errors in this thinking process is because the meaning related to the concept of completion is not well understood and students tend to memorize. This causes studentas to experience errors because they are too based on the memorization they have when carrying out the problem construction process. Wibawa (2016) revealed that the pseudo thinking process based on the students' final answers was divided into two, namely the right-pseudo thinking process and the false-pseudo thinking process. The right-pseudo thinking process is when the final answer obtained is the correct answer but no justification can be given for the answer, while the false-pseudo thinking process is when the final answer obtained is the wrong answer but after reflection it can be corrected so that it becomes the correct answer.

The thinking process involves the link between previous concepts and new concepts that will be used and collaborated to solve a problem. This is in line with the opinion of NCTM (2000) which states that there are five mathematical abilities that students must possess, namely problem solving, reasoning and proof, communication, representation, and connection. Nurhayati (2020) also revealed that connecting subject matter with life in learning activities can familiarize students with understanding and linking mathematical concepts so that their understanding becomes deeper and lasts longer. But in fact, students' mathematical connection abilities are still experiencing difficulties. This is in accordance with Aspuri's research (2019) which revealed that based on test results, students have not been able to utilize the information in the questions given and

have not been able to make mathematical models so that errors in mathematical connections still occur.

One of the materials that students need to master is the Pythagorean Theorem material. The subject matter of the Pythagorean Theorem is widely used in mathematical study topics such as Geometry and Trigonometry. The application of the Pythagorean concept is also often used in everyday life, for example calculating the height of a building, measuring the slope of a building, and others. Based on that, the Pythagorean Theorem is indeed one of the important material to master. But in fact, there are still many students who do not understand well about the concept of the Pythagorean Theorem which causes errors to occur in solving problems. This is evidenced by research related to the Pythagorean Thorem, including according to the results of Rohmah's (2020) research which conducted research on 23 students of class VIII, the result was that when working on five essay questions, only 37% answered correctly. Based on the result of Hasan (2019), it also shows that students still make conceptual errors, procedural errors, and calculating errors in solving the Pythagorean Thorem. If this error continues to occur repeatedly, it will have a bad impact on students. Because the concept of Pythagorean Theorem is releated to thetopics of further material, so it is necessary to handle it so that students do not make continuous mistakes and their understanding becomes clearer and can be mastered. This is also in line with Qobtiyah (2018) which reveals that the results of the mathematical connection ability test of class VIII students in the researched place and their learning motivation are still low in solving th Pythagorean Theorem, so it is recommeded to overcome these problems by carrying out learning innovations such as through innovative learning approaches or models.

One of the factors causing the errors made by students is due to the absence of conformity to the structure of thinking of students in solving a problem. According to Rahayu (2015) the process of learning mathematics is basically not just a transfer of concepts from the teacher to students, but the process when students are given the opportunity by the teacher to understand and construct the ideas given to solve the problems given, Based on this, the teacher's role is to help students by providing direction so that students can understand and construct problems with their own abilities. One way is to defragmentation the thinking structure of students. According to Efendi (2020) defragmentation of the thinking structure is a rearrangement process by looking at the basic errors in students' answers so that it can be shown which steps have errors and students can understand their mistake and know how to justify them, to get the expected

solution. Meanwhile, according to Rochayati (2019), defragmentation is a process of rearranging the thinking structure of students who are fragmented so that they are reconnected. This defragmentation can be said as a solution to overcome th mistakes of students so that they can solve problems correctly and understand concepts correclty. Based on the understanding of experts, it can be concluded that defragmentation is a process of rearranging the structure of thinking so that each concept can be interconnected. The defragmentation carried out in this study went through several steps according to Wibawa (2018), which consisted of scanning, check some errors, repairing (disequilibration, conflict cognitive, and scaffolding), give a chance to re-work, and certain the result.

Based on this description, a research was conducted on the defragmentation of students' pseudo thinking process which focused on the false-pseudo of the students in solving mathematical connection ability problems. It is hoped that this research can provide information related to the pseudo-thinking process of students in solving problems of mathematical connection abilities and defragmentation of their thinking structures as a solution to overcome problems in students' thinking processes.

METHOD

This study uses a descriptive qualitative method that aims to reveal and describe in depth the pseudo-thinking process of students in solving problems of mathematical connection abilities, as well as defragmentation of the structure of thinking as a solution to overcome errors that may occur during the process in solving mathematical connection abilities tests. This research was conducted at SMPN 5 Tasikmalaya for class VIII F. The selection of subjects in this study was carried out purposive with certain considerations and goals. As for the consideration of students who are used as research subjects, they are students who experience a false-pseudo thinking process and can account for the results of their work.

Data collection techniques were carried out by giving a mathematical connection ability test and unstructured interviews. The instrument used in this study is a mathematical connection ability test question, consisting of three questions in the form of a description of the Pythagorean Thorem material which contains three indicators of connection ability (NCTM, 2000), namely connections between mathematical topics, connections with other disciplines, and connections with everyday life. While the interview guide refers to the

stages of defragmentation, the factors causing the pseudo-thinking process, and indicators of mathematical connection ability.

The implementation of the research began by giving mathematical connection ability test questions to class VIII F. After giving the mathematical connection ability test, it was continued by selecting research subjects who experienced false-pseudo thinking process. Based on the analysis of the results in solving the test and interviews, one research subject was chosen, namely subject S2 who experienced false-pseudo because he got the wrong final answer and the thought process was fictitious. Based on this, defragmentation stages were carried put which consisted of scanning, check some errors, repairing (disequilibration, conflict cognitive, and scaffolding), give a chance to re-work, and certain the result.

The data analysis used in this study is a qualitative analysis according to Miles and Huberman which consists of data reduction, data display, and verification (Sugiyono, 2016). The stages of data reduction in this study include analyzing the results of the students' work on solving mathematical connection abilities, classifying students which include psudo-false thinking, defragmenting the thinking structure to become a correct and clear thinking process, analyzing the results of interviews and compiling them into an appropriate language, so that the data is ready to be display. After the data has been reduced, it is continued with the data display which includes the presentation of the results in solving mathematical connection ability test, data resulting from the pseudo thinking process, data resulting from defragmentation, and data from the interviews. The next stage of data analysis is verification. In this study, conclusions were drawn by describing the results of pseudo-thinking process of the research subject in solving the problem of mathematical connection abilities, the defragmentation process carried out, and the results of interviews, so that conclusions could be drawn referring to the formulation of the problem formulated earlier.

RESULT AND DISCUSSION

The first defragmentation stage is scanning, which is to provide opportunities for research subject to solve the problems given. After working on the questions given, the results of the work that has been done are analyzed to be taken into consideration in choosing research subjects that are in accordance with what the research expects. Followed by check some errors, which is seeing the mistakes made by the research subjects. Based on scanning and check some errors, on the results of S2 solving the three questions given,

S2 made several mistakes. The thought process of the subject of S2 is also still pseudo, so that the subject of S2 is false-pseudo.

In question number 1 with indicators of connection between mathematical topics, the subject S2 knows what formulas will be used when solving problem number 1. The subject uses the concept Pythagoras, Algebra, and the Area of Flat Shapes, namely Triangle. However, in the process the subject experienced confusion in interpreting the symbols or formulas he wrote. Subject S2 wrote down the Pythagorean formula with $a^2 + b^2 = c^2$ and the formula for the area of triangle $\frac{1}{2} \times a \times t$. The formula that was written, confused the subject of S2, so that the subject S2 made an error in entering the value that should be the base of the triangle with the side of a right triangle for example of a. Subjects also made mistakes because they did not carefully read the information that was known in the questions. The following are the results of working on the subject of S2 in solving the mathematical connection ability problem in question number 1 with connection indicators between mathematical topics before defragmentation is carried out.

Figure 1. The Results of S2 Work on Question Number 1 Before Defragmentation

In scanning and check some errors stage for question number 2 with connection indicators with other disciplines, S2 knows the peed formula which is a concept studied in the field of physics to solve the problem. However, the subject of S2 made an error in
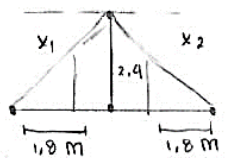
changing the unit of time. S2 counts $\frac{5}{4}$ hours by dividing 5 divided by 4 to get 1.25 hours and is considered to be worth 1 hour 25 minutes. At that stage, the final answer will also be wrong. This is in line with Vinner (1997) who revealed that inappropriate concepts cause psuedo understanding of students and are not controlled, so this includes pseudo-conceptual. The following are the results of working on the subject of S2 in solving the problem of mathematical connection ability in question number 2.
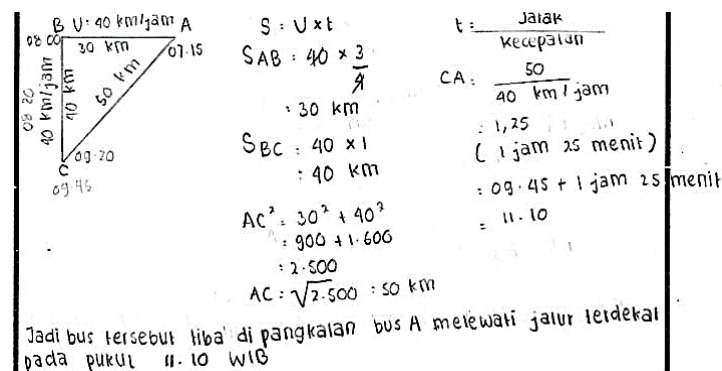
Figure 2. The Results of S2 Work on Question Number 2 Before Defragmentation

At the stage of scanning and check some errors in question number 3 with connection indicators with everyday life, S2 also experienced errors. S2 made a mistake in making a mathematical model based on the information that was known on the problem, this resulted in errors in the next working steps. In the problem, it is known that the distance form the bottom of the pole to the stake is 1.8 meters shorter than the length of the rope in question, but he subject of S2 wrote that the distance from the pole to the stake is 1.8 meter. The subject S2 ignores one of the known components in the problem, thus causing the loss of the control stage in understanding the problem. Thi is in line with Sopamena (2018) which reveals that students are actually able to solve problems, but because tha answers are obtained from the results of spontaneous, vague, and uncontrolled thinking, the wrong answers are obtained. The following are the results of working on S2 in solving the problem of mathematical connection ability in question number 3.

Figure 3. The Results of S2 Work on Question Number 3 Before Defragmentation

Based on the results of S2, it can be seen that some errors and pseudo thinking processes are still being carried out by the S2 subject. The work process carried out by S2 is based on the habits of the teaching methods given by the teacher, does not re-check every result of the work, and is pegged by rote. This is in accordance with the factors causing the psuedo thinking process according to Vinner including lack of cognitive commitment, loss of control stage, rote learning, lack of understanding of prerequisite concepts, and habit factors (Nur, 2013).

To overcome this, repairing is carried out to rearrange the thinking structure of the S2 subject according to the level of error. The repairing stage is divided into three main process, namely disequilibration, conflict cognitive, and scaffolding. Disequilibration is asking questions that raise an imbalance of thinking. At this stage, S2 becomes aware of his mistakes and begins to think again to correct there mistakes. S2 are also sometimes confused and doubtful about the concepts they use, because their understanding is not well connected. Thus, there is a conflict cognitive, namely the conflict experienced by S2 after being disequilibated. At the stage conflict cognitive, S2 begins to relize and understand his mistakes. This is in line Subanji (2016) who revealed that students' misconceptions can be corrected with conflict cognitive interventions.

After a conflict cognitive arises, scaffolding is given as sufficient assistance or direction to remember the concept. According to Anghileri (2006) there are three levels of scaffolding. Level 1 (*environmental provisions*) is the assistance provided to the learning environment not to direct mathematical content. Level 2 (*explaining, reviewing, and restructuring*) is assistance provided on direct mathematical content such as explaing, reviewing, and restructuring again. Assistance at level 2 is in the form of questions that direct students to identify aspects related to the problem, encourage students to convey

their justification, and emphasize the discussion process. Level 3 (*making connection and generating conceptual discourse*) is an extension of level 2 justification so that many concepts emerge, The scaffolding used in this research is level 2 scaffolding.

In question number 1, scaffolding is carried out by directing the subject to understand the use of symbols and naming lines to make it easier to distinguish symbols ain the Pythagorean formula from the formula for the area of a triangle. In question number 2, scaffolding is done by assigning the subject to change the time from hours to minutes using different examples of problems. In question number 3, scaffolding is carried out by assigning S2 to read more carefully the meaning of the question and assigning them to create a mathematical model that fits the problem in the problem and calculates decimal division an relates it to concept of fractional division. This is in line with Faisal (2021) who revealed that at the scaffolding stage, it is done by providing other examples related to the given problem so that the subject can reflect on previous knowledge.

After repairing stage, S2 can recall the right concept so that it can provide stimulation to the structure of his thinking. S2 subjects begin to understand the mistakes made and the understanding of the concepts made in the thinking process becomes clear, not artificial anymore. Then, followed by give a chance to re-work. This stage is the stage when the research subject is given the opportunity to correct errors from the results of his work with a clearer understanding of the concept. The following is the result of working on the subject of S2 in question number 1 after defragmentation.

Figure 4. The Results of S2 Work on Question Number 1 After Defragmentation

Based on the give a chance to re-work stage, it can be seen that S2 subject is able to improve his answer to become the correct answer. In question number 1, the S2 subject is able to distinguish the meaning of each symbol or formula used, so that the S2 subject is no longer confused in entering the values that will be used to find the correct final answer.

As for the stage of giving a chance to re-work question number 2, the subject of S2 can also correct the error. The following are the results of working on the subject of S2 in question number 2 after defragmentation.

Figure 5. The Results of S2 Work on Question Number 2 After Defragmentation

Based on the give a chance to re-work stages, it can be seen that S2 is able to correct his mistakes. S2 were able to correct their mistakes in changing the unit of time. S2 understood that in converting the fraction from hours to minutes, it should be done by multiplying the fraction by 60 minutes.

As for the give a chance to re-work stage on question number 3, S2 was also able to fix it. The following are the results of working on the S2 in question number 3 after defragmentation.

Figure 6. The Results of S2 Work on Question Number 3 After Defragmentation

Based on the give a chance to re-work stages, it can be seen that the S2 subject is able to correct his mistakes. S2 are able to make mathematical model according to the information known on the questions so that they get correct final answer.

The last stage in defragmentation is certain the result, which is the stage to re-assure the correct answer and a good level of understanding of the concept of the given problem. Based on the results of the S2 subjet's work after defragmentation on the three questions given, the S2 was able to improve each answer with the correct answer and a clear understanding of the concept. The thought process carried out by S2 which were initially fictitious, not yet connected to each other, became clearer and could be connected to each other.

The following is the flow of S2 thought process in solving problem number 1 before and after defragmentation.
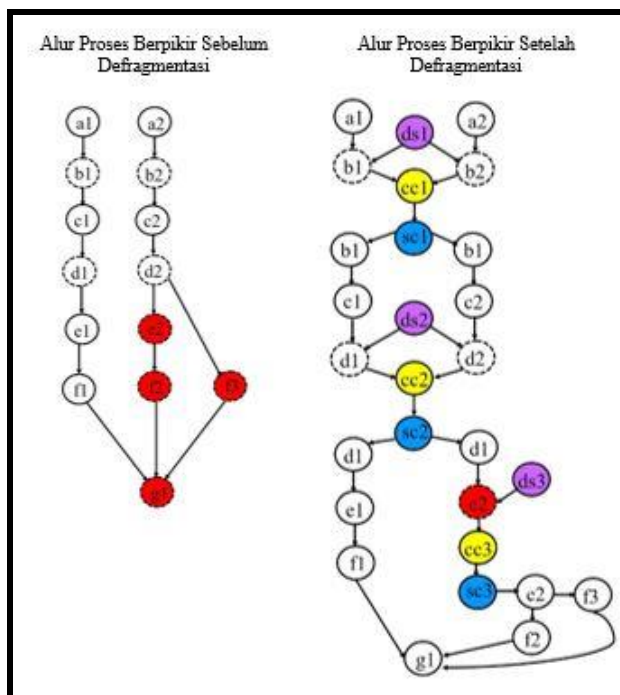
Figure 7. Thinking Process Flow of S2 in Working on Problem Number 1

Table 1. Description of S2 Thinking Process Flow in Working on Problem Number 1

Code	Informatio
a1	Using the Pythagorean formula to find the value variable of the triangle ABC
b1	Squaring algebra in the calculation of triangle ABC
c1	Adding algebraic terms in the calculation of triangle ABC
d1	Determine the value of the variable sought, namely the value x in triangle ABC
e1	Value substitution $x = 5$ to BC
e1'	Value substitution $x = 5$ to AC
f1	Calculating the area of triangle ABC
a2	Using the Pythagorean formula to find the value of the triangle variable ACD
b2	Squaring algebra in the calculating of triangle ACD
c2	Adding the algebraic terms in the calculating triangle ACD
d2	Determine the value of the variable sought, namely y in the triangle ACD
e2	Value substitution $y = 4$ to CD
f2	Calculating the area of triangle ACD
a3	Finding the unknown side of the triangle CDE with Pythgorean
b3	Squaring algebra in the calculating of the triangle CDE
c3	Calculating arithmetic operation on triangle CDE
d3	Finding the root result of the obtained value
e3	Substitute the obtained value into the formula for the area of the triangle CDE
f3	Calculating the area of triangle CDE
g1	Adding the area of triangles ABC, ACD, and CDE
ds1	Disequilibration of line naming and use of the Pythagorean concept and the area of the triangle
cc1	Conflict cognitive ds1
sc1	Scaffolding names the line according to the line in problem
ds2	Disequilibration of algebraic concept (times rainbow, moving segment)

Code	Informatio
cc2	Conflict cognitive ds2
sc2	Scaffolding algebraic concepts (times rainbow, moving segment)
🔴	Making mistakes and pseudo thinking
⭕	Doing pseudo thought processes

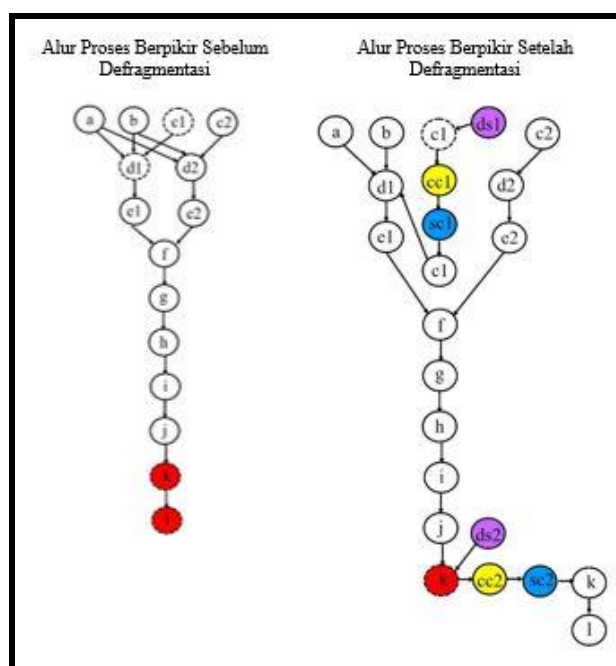The following presents the flow of S2 thought process in solving problem number 2 before and after defragmentation.

Figure 8. Thinking Process Flow of S2 in Working on Problem Number 2

Table 2. Description of S2 Thinking Process Flow in Working on Problem Number 2

Kode	Keterangan
a	Make illustrations based on the problems given
b	Speed on known questions
c1	Time from city A to B (in hours)
c2	Time from city B to C (in hours)
d1	Find the distance from city A to city B using the speed formula
d2	Find the distance from city B to city C using the speed formula
e1	Perform multiplication operation to find the distance from city A to B
e2	Perform multiplication operation to find the distance from city B to C
f	Find the distance from city C to A using Pythagorean
g	Calculating arithmetic operations to determine the distance from city C to A
h	Calculating arithmetic operations to determine the distance from city C to A
i	Finding the root result of a calculation in the Pythagorean formula
j	Perform multiplication operations to determine the time from city C to A with the speed formula

Kode	Keterangan
k	Convert the obtained time into hours
l	Summing up with the initial departure time from the city of C
ds1	*Disequilibrasi* $\frac{3}{4}$ hours to minutes
cc1	*Conflict cognitive* ds1
sc1	*Scaffolding* converts hours in minutes
ds2	*Disequilibrasi* 1,25 hours to minutes
cc2	*Conflict cognitive* ds2
sc2	*Scaffolding* converts hours in decimal fraction to minutes
🔴	Making mistakes and pseudo thinking
⭕	Doing pseudo thought processes

The following presents the flow of S2 thought process in solving problem number 2 before and after defragmentation.
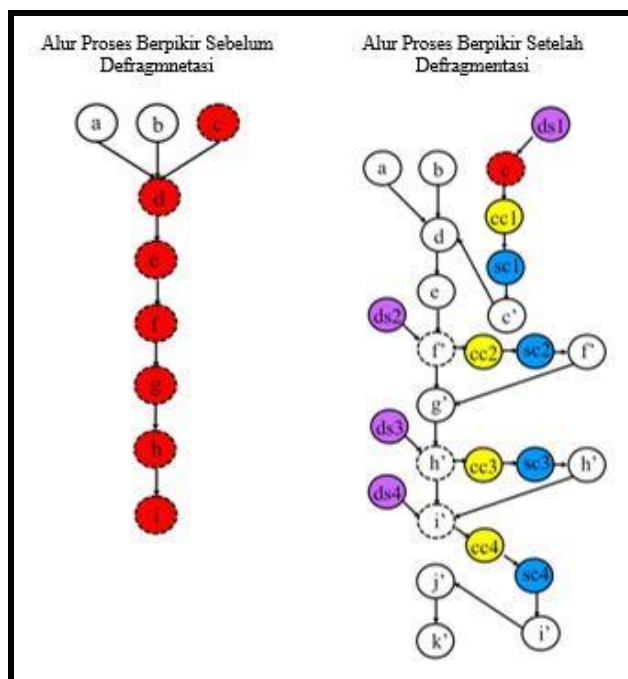
Figure 9. Thinking Process Flow of S2 in Working on Problem Number 3

Table 3. Description of S2 Thinking Process Flow in Working on Problem Number 3

Kode	Keterangan
a	Known pile height
b	The suggested length of the rope with x
c	The distance from the pile to the stake is 1.8 meters
d	Make an illustration based on the information known from the problem
e	Calculation to find value x with Pythagorean
f	Adding the square of the height of the pile and the distance from the pile to the stake

Kode	Keterangan
g	Finding the root result
h	Multiplying the length of the rope by the rope requirement per one tent $3 \times 40 = 12$ m/tent
i	Multiply by the total tent provided $12 \times 150 = 180$ m
c'	The distance from the pile to the stake is expressed in $(x - 1,8)$ m
f'	Squaring algebra
g'	Adding algebraic terms
h'	Determining the value x
i'	Doing decimal division to get the value of $x = 2.5$
j'	Multiplying $2,5 \times 4 = 10$ m/tent
k'	Multiply $10 \times 15 = 150$ m
ds1	Disequilibration asks the distance from the tent pole to the stake
cc1	Conflict cognitive ds1
sc1	Scaffolding makes a mathematical model based on the statement 1.8 m shorter than the length of the rope
ds2	Disequilibration of algebraic multiplication concept
cc2	Conflict cognitive ds2
sc2	Scaffolding of algebraic multiplication concept
ds3	Disequilibration of the concept of moving segments
cc3	Conflict cognitive ds3
sc3	Scaffolding of the concept of moving segments by performing the same arithmetic operations on both sides
ds4	Disequilibration decimal division
cc4	Conflict cognitive ds4
sc4	Scaffolding decimal division by converting it to a common fraction
🔴	Making mistakes and pseudo thinking
⭕	Doing pseudo thought processes

Based on the results of the S2 subject, it can be seen that before the defragmentation, S2 experienced a false-pseudo thinking process. This is indicated by the characteristics of the occurence of pseudo which consists of imperfections in the thinking substructure used to find solution, the reflection process has not been maximized, and there is awareness to straighten out the wrong solution process (Subanji & Supratman, 2015). Prior to defragmentation, S2 experienced several errors and unclear understanding in working on mathematical connection abilities, including connection between concepts in several prerequisite materials that were still not well connected, habitual factors that caused the subject to stick to formulas that had been taught without understanding the concept in depth, as well as the lack of accuracy in making mathematical models based on problems in everyday life. Initially, the subjek S2 thinking process was still pseudo, but some errors and pseudo thinking processes could be overcomer by defragmenting the students' thingking structures. Based on the results of the omprovements made through the

stages of defragmentation, S2 is able to do well and can undersantand the improvements and directions given, so that the defragmentation of thinking structures is carried out effectively on subjects who experience false pseudo thinking processes in solving problems of mathematical connection abilities.

Through several stages of defragmentaion, starting from analyzing errors and thinking processes at the scanning stage and check some erros, followed by overcoming the subjects' errors by doing repairing, it can overcome the thinking process of S2. At repairing stage, the subjek is given disequilibration which makes the subject experience conflict cognitive so that he re-examines the final answer given (Rochayati & Fa'ani, 2019). After the conflict cognitive appears, to overcome it, directions are given to understand the given problem and make a problem-solving plan, the subject is also able to reconstruct his understanding (Prayitno et al., 2018). With these several stages, the subject can correct his mistakes again through the give a chance to re-work and can re-assure the correct final answer woth clear understanding of the certain the result stage. Based on this, defragmentaion can be used as the development of a complete learning process with a good and structured concept flow from understanding the problem to re-examining the final answer, so as to improve student learning achievement (Efendi & Pratama, 2020).

Based on the results of the research, it can be seen the impact on students who experience pseudo thinking that with defragmentation carried out they can overcome pseudo thinking processes and correct students' errors in solving mathematical connection ability questions. Guidance from the teacher in one way is that defragmentation can help students' understanding to be able to think with clear understanding and interconnected concepts, so that they can help students to learn the next material that is related to the material that has been previously studied.

CONCLUSION

Based on the results of the study, it can be concluded that the defragmentation carried out on students who false-pseudo thinking process through several stages including scanning, check some errors, repairing (disequilibration, conflict cognitive, and scaffolding), give a chance to re-work, and certain the result. It begins with scanning which is the stage when giving students the opportunity to solve the problems given. Followed by check some errors which is the stage when understanding the problem by looking at the mistakes made by students. At the scanning and check stage for some errors, an analysis of the thinking processes of students in solving mathematical connection skills problems was

carried out which turned out to have pseudo thinking process and some errors in making connections to solve the problems given. To overcome there pseudo thinking process and errors, proceed with repairing which is the stage of realigning students' thinking processes according to the level of errors made which consists of three main processes, namely disequilibration (resulting in thinking imbalances), conflict cognitive (conflicts experienced by students after disequilibration), and scaffolding (providing sufficient assistance to remeber concepts). After repairing is done, it is followed by giving a chance to re-work, which is to give students the opportunity to repair their work. After being repaired, it is continued with certain the result as a step to re-assure the correct answer woth a clear level of understanding of the concept on the problem being worked on. Based in the defragmentation carried out, the research subjects can perform self-reflection optimally. Thought processes that were initially fictitious, not yet connected to each other, became better and clearer. This is indicated by the results of improvements and clear clarifications regarding the concepts used in solving mathmatical connection abilities problems.

Based on the results of this study, here are some suggestions as a contribution from this research. For teacher, should be able to understand the thinking processes of students, especially when students experience errors so that they can be corrected immediately, one way is by doing defragmentation. For students, they should be more careful in solving mathematical problems and if they experience errors, they can be immediately resolved by asking for more explanations from the teacher. For other researchers, it is better to review various references related to several variables in this study so that the results of the study can be more complete.

REFERENCES

Anghileri, J. (2006). Scaffolding Practices that Enhance Mathematics Learning. *Journal of Mathematics Teacher Education*, *9*(1), 33–52. https://doi.org/10.1007/s10857-006-9005-9

Aspuri, A. (2019). Kemampuan Koneksi Matematis Siswa SMP dalam Menyelesaikan Soal Cerita: Studi Kasus di SMP Negeri 3 Cibadak. *JIPM (Jurnal Ilmiah Pendidikan Matematika)*, *7*(2), 124–131. https://doi.org/10.25273/jipm.v7i2.3651

Efendi, J. F., & Pratama, R. A. (2020). Defragmenting Proses Berpikir Pseudo Siswa Dalam Menyelesaikan Masalah Matematika. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(3), 651–661. https://doi.org/10.24127/ajpm.v9i3.2956

Faisal, M., Suharna, H., & Saidi, S. (2021). Defragmentaing Proses Berpikir Matematis Siswa dalam Menyelesaikan Soal Matematika Pada Materi Pangkat dan Bentuk Akar. *Jurnal Pendidikan Guru Matematika*, *1*(1), 73–81.

Hasan, N., Subanji, S., & Sukorianto, S. (2019). Analisis Kesalahan Siswa Kelas VIII

dalam Menyelesaikan Soal Cerita Terkait Teorema Pythagoras. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *4*(4), 468–477. https://doi.org/10.17977/jptpp.v4i4.12264

NCTM. (2000). *Principles and Standars for school Mathematics*. VA:NCTM.

Nur, F. (2013). Faktor-Faktor Penyebab Berpikir Pseudo dalam Menyelesaikan Soal-Soal Kekontinuan Fungsi Linear yang Melibatkan Nilai Mutlak Berdasarkan Gaya Kognitif Mahasiswa. *Fakultas Tarbiyah Dan Keguruan UIN Alauddin Makassar*, 69–91.

Nurhayati, Y., Zakiah, N. E., & Amam, A. (2020). Integrasi Contextual Teaching Learning (CTL) dengan Geogebra: Dapatkah Meningkatkan Kemampuan Koneksi Matematis Siswa? *Teorema: Teori Dan Riset Matematika*, *5*(1), 27–34. https://doi.org/10.25157/teorema.v5i1.3349

Prayitno, A., Kaka, R., & Hamid, A. (2018). Pemberian Scaffolding Berdasarkan Kesalahan Berpikir Siswa Dalam Memecahkan Masalah Matematika. *Jurnal Review Pembelajaran Matematika*, *3*(2), 161–172. https://doi.org/10.15642/jrpm.2018.3.2.161-172

Pujilestari. (2018). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Matematika Sma Materi Operasi Aljabar Bentuk Pangkat Dan Akar. *JISIP*, *2*(1), 226–232.

Qobtiyah, S. (2018). Analisis Kemampuan Koneksi Matematis Dan Motivasi Belajar Siswa Kelas VIII Di SMP An-Naja Bandung Barat. *Jornal On Education*, *1*(1), 22–29. https://jonedu.org/index.php/joe/article/view/Journal on Education/2

Rahayu, D. V., & Afriansyah, E. A. (2015). Meningkatkan Kemampuan Pemecahan Masalah Matematik Siswa Melalui Model Pembelajaran Pelangi Matematika. *Mosharafa: Jurnal Pendidikan Matematika*, *5*(1), 29–37.

Rochayati, M. Y., & Fa'ani, A. M. (2019). Defragmentasi struktur berpikir siswa dalam menyelesaikan masalah analogi. *Proceeding International Conference on Islamic Education (ICIED)*, *4*, 321–330. http://www.tjyybjb.ac.cn/CN/article/downloadArticleFile.do?attachType=PDF&id=9987

Rohmah, A. S. (2020). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Cerita Materi Teorema Pythagoras. *Transformasi : Jurnal Pendidikan Matematika Dan Matematika*, *4*(2), 387–401. https://doi.org/10.36526/tr.v4i2.1009

Sopamena, P., Mastuti, A. G., & Hukom, J. (2018). Analisis Kesalahan Berpikir Pseudo Siswa dalam Mengkonstruksi Konsep Limit Fungsi Pada Siswa Kelas XII IPA SMA Negeri 11 Ambon. *Prosiding SEMNAS Matematika & Pendidikan Matematika IAIN Ambon*, 209–215.

Subanji. (2016). *Teori Defragmentasi Struktur Berpikir*. UM Press.

Subanji, R., & Supratman, A. M. (2015). The Pseudo-Covariational Reasoning Thought Processes in Constructing Graph Function of Reversible Event Dynamics Based on Assimilation and Accommodation Frameworks. *Research in Mathematical Education*, *19*(1), 61–79. https://doi.org/10.7468/jksmed.2015.19.1.61

Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Vinner, S. (1997). The Pseudo-Conceptual and The Pseudo-Analytical thought Processes in Mathematics Learning. *Educational Studies in Mathematics*, *34*(2), 97–129. https://doi.org/10.1023/A:1002998529016

Wibawa, K. A. (2016). *Defragmenting Struktur Berpikir Pseudo dalam Memecahkan Masalah Matematika*. Deepublish Publisher.

Wibawa, K. A., Nusantara, T., Subanji, S., & Parta, I. N. (2018). Defragmentasi Pengaktifan Skema Mahasiswa Untuk Memperbaiki Terjadinya Berpikir Pseudo Dalam Memecahkan Masalah Matematis. *Prima: Jurnal Pendidikan Matematika*,

2(2), 93–106. https://doi.org/10.31000/prima.v2i2.755