Pupils' Reflective Thinking and Self-Efficacy Level for Problem Solving

Dr. M N Kholid, Annisa Swastika, Evatias Nirmala, Swasti Maharani, Majid
Indonesia

Abstract: Reflective thinking begins by pupils' perplexity and re-evaluation for problem solving. In term of overcoming perplexity and another confusion, pupils' beliefs and level of self-efficacy are necessary. The study conducted to address the impact of self-efficacy level into pupils reflective thinking for problem solving. The research is a qualitative study that describes data and facts without any manipulation. The research employed 149 pupils as subjects from 9 Senior High Schools in Central Java and East Java – Indonesia. The data collection consisted of questionnaire to categorize self-efficacy level, a test to explore pupils' reflective thinking, and an in-depth interview to make sure the data of pupils' reflective thinking. The data validation employed a triangulation technique. Different levels of pupils' self-efficacy indicate differences in reflective thinking in solving problems. We successfully concluded the higher self-efficacy level the more reflective thinking indictors fulfilled. In improving pupils' reflective thinking ability, the educational practices must improve pupils' self-efficacy by designed model learning or another instruments.

Keywords: Mathematics Problems, Pupils' Reflective Thinking, Self-Efficacy Level

1. Introduction

Learning outcomes is an indicator of pupils' achievement in learning mathematics. Based on the survey in nine Senior High Schools in Central Java and East Java – Indonesia, pupils' outcomes in mathematics are relatively low. The averages of mathematics national examination in nine schools are below 50 out of 100. In terms of the international arena, Indonesian pupils' achievement in PISA 2018 ranked 72 out of 78 participating countries (OECD, 2018). That is why pupils' thinking ability must be developed to improve achievement (Ningsih, 2016). Thinking is a transformation process in problem-solving to reach a new representation (Solso et al., 2014). One thinking type that can be implemented for problem-solving is reflective thinking (Agustan et al., 2017; Odafe, 2007).

Gurol (2011) argues that reflective thinking is a cognitive process of employee analysis, re-evaluation, and motivation for problem-solving. Reflective thinking begins with pupils' perplexity and re-evaluation for problem-solving (Rodgers, 2002; Suharna, 2018). Reflective thinking employee pupils' presumption and imagination (Chee & Mehrotra, 2012) so they can conduct re-evaluation and re-thinking what they have done (Nuriadin et al., 2015). Re-evaluation includes an inquiry effort to make a decision for the best solution (Berkovitz, 2015). Pupils who can manage knowledge and experience certainly employ reflective thinking in problem-solving properly (Cottrell, 2017).

Unfortunately, the role of reflective thinking in solving problems has not yet received attention both by teachers and pupils (Sezer, 2008). Pupils cannot manage their knowledge and experience to solve new problems or obtain the best solutions for problem-solving. They focus on how to answer the problem without evaluating or conceptualizing, whereas, teachers tend to pay attention to pupils' answers without understanding the process of obtaining answers (Dervent, 2015).

There are four aspects of reflective thinking namely: technique, monitoring, insight, and conceptualization (Zehavi & Mann, 2005). Technique is a step where pupils can select an effective and efficient solution. Monitoring is a re-evaluation step for employee their knowledge. Insight is the pupils' ability to manage knowledge and emotions so that the problems are solved. Meanwhile, conceptualization is pupils' ability in connecting their concepts. The preliminary research concluded the indicators of reflective thinking in four aspects. The indicators presented in Table 1.

Table 1. The indicators of reflective thinking

Aspects	Indicators	Code
Techniques	Understanding to obtain information	T1
	Finding how to understand the question	T2
Monitoring	Monitoring the step of solution	M1
	Monitoring whether answers are correct or not	M2
Insight	Understanding how to overcome difficulties	I1
	Being ready to correct wrong answers	I2

Conceptualization	Considering another way to solve the problems	C1
	Able to relate mathematics concepts	C2

Besides, pupils' self-efficacy takes apart in problem-solving. Self-efficacy is the pupils' belief based on their knowledge and concepts to decide for problem-solving. Self-efficacy is a managed belief with oriented objectives (Schunk & Pajares, 2009). It illustrates pupils' belief and hope of their problem-solving ability in dealing with learning objective (Cai et al., 2019). Categorize self-efficacy into three levels namely high, moderate, and low level (Riani & Rozali, 2014). Pupils with low self-efficacy level feel unsure about their ability to solve a problem, while pupils with high self-efficacy levels feel optimistic and confident of their abilities and persistent in solving a problem (Liu & Koirala, 2009). Both have similarities in duration needed when solving a problem (Corkett et al., 2011). Pupils with low self-efficacy levels need a long time to build a belief and to overcome their confusion in solving a problem. Meanwhile, pupils with high self-efficacy levels need a long time in solving a problem to find the best solution (Kim & Lorsbach, 2005). Pupils' self-efficacy can be categorized by looking at three dimensions namely level, strength, and generality (Ghufron & Risnawita, 2011). Each dimension emerges indicators describe in Table 2.

Table 2. Dimension and indicator in categorization of self-efficacy

Dimension	**Indicators**
Level	Feels optimistic
	Able to overcome cnfuison and obstacle in solving a problem
	Planning in their tasks
Strength	Able in any condition for problem solving
	Trust in their ability
	Employes knoledges and experience to achieve best solution
Generality	Making consideration and decission to solve a problem effiently

Reflective thinking begins with pupils' confusion (Rodgers, 2002). Therefore, a question type to understand pupils' reflective thinking is a question that can cause pupils' confusion. The questions employees various experience, reflection, and related concepts (Funny et al., 2019). It may be a non-routine question (Hong & Choi, 2011). It is an unfamiliar question for pupils so they experience confusion (Hidajat et al., 2019). The study employee a non-routine question in matrix content. The content is easy to develop into a non-routine question (Kaplan et al., 2017). Thus, a non-routine problem in matrix content can be employed to understand pupils' reflective thinking.

The study addresses pupils' reflective thinking for solving matrix problems in terms of self-efficacy level. Their self-efficacy categorized into three levels namely high, moderate, and low. The similarities and differences between pupils' reflective thinking at all three levels will be revealed qualitatively.

2. Method

2.1. Design

This research is qualitative. Qualitative research method is a research method that relies on the philosophy of positivism. The design used in this research is descriptive. Descriptive research is research that aims to give pictures or describe the state of an object (reality or phenomenon) following the situation and conditions with no manipulation (Kholid et al., 2020). Therefore, to achieve the objectives we describe the nature of pupil reflective thinking following by self-efficacy level.

2.2. Participants

The participants of the study are 149 pupils of nine Senior High Schools in Central Java and East Java - Indonesia. Taking into the mean and standard deviation of self-efficacy questionnaire score they filled, there are 42 pupils categorized into the high level, 61 pupils categorized into the moderate level, and 46 pupils categorized into the low level.

Table 3. Participant demographic characteristics

Self-efficacy Level	**Participants**	**Male/Female**	**Mean Age**
High	42	23/19	16.78
Moderate	61	28/33	17.03
Low	46	24/22	16.80

2.3. Instruments and Data Collection Technique

A questionnaire to categorize self-efficacy level and a set of tests developed by researchers to describe pupils' reflective thinking developed by researchers. The Cronbach alpha score of the questionnaire was 0.831. An in-depth interview conducted to make sure the tendency of pupils' reflective thinking. Subjects solve the problems by the think-aloud method. Think-aloud is a method that involves research subjects to think hard in analyzing a problem accompanied by talking loudly when solving problems (Jaspers et al., 2004). The problem to describe pupils' reflective thinking shown in Figure 1.

Mathematical Problem

1. Determine value a, b, c and d fulfill matrices $P^t = Q$, under $P = \begin{bmatrix} 2a-4 & 3b \\ d+2a & 2c \\ 4 & 7 \end{bmatrix}$ and $Q = \begin{bmatrix} b-5 & 3a-c & 4 \\ 3 & 6 & 7 \end{bmatrix}$!
2. Find matrices X satisfies $\begin{bmatrix} 4 & -3 \\ -1 & 5 \end{bmatrix} X = \begin{bmatrix} 7 & 18 \\ -6 & 21 \end{bmatrix}$!

Figure 1. Mathematical problem

2.4. Analysing of Data

Data analysis in this study includes data reduction, data presentation, and conclusion. Data collection can be presented in the diagram in Figure 2.

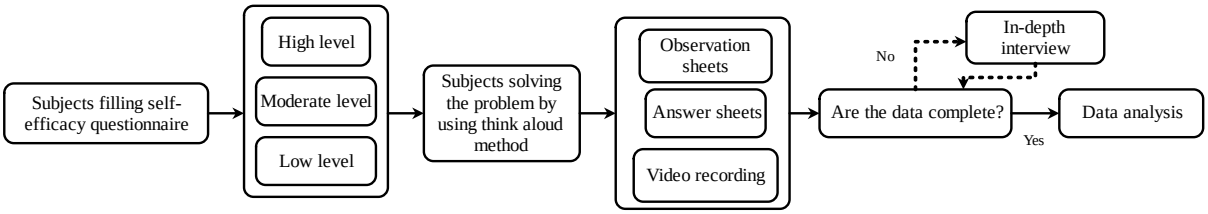

Figure 2. Data collection flow chart

3. Results

In this paper, we describe a pupil from each level. They are selected because their reflective thinking represents other subjects at each level. S-1 represents subjects at the high level of self-efficacy, S-2 represents subjects at the moderate level, and S-3 represents subjects at the low level.

3.1. The Result of S-1

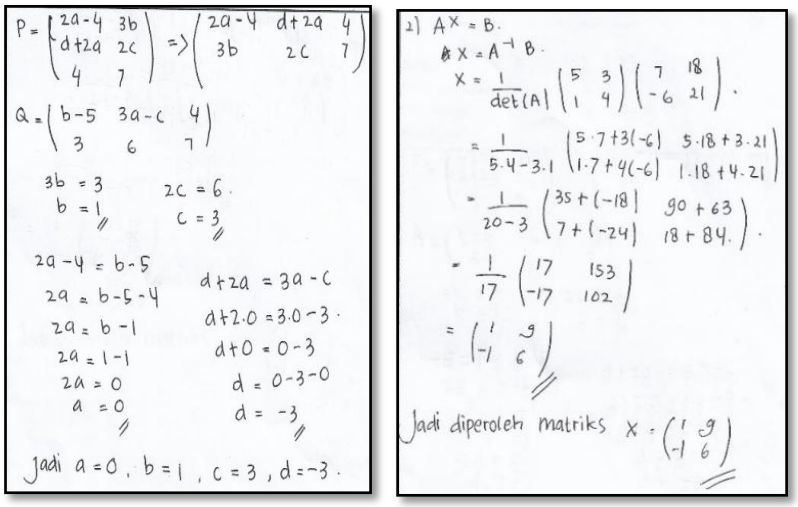

Figure 3. Answer sheet of S-1

Pupil's answer sheet shown in Figure 3. S-1 understands what is information given and what is the question by reading the problem over and over. In solving Question 1, S-1 transformed matrix P into P^t. S-1 found a perplexity in finding the next step. S-1 overcome the confusion by determining the value of b and c, so that the value $b=1$ and $c=3$. S-1 substituted value b into equation $2a-4=b-5$ to find value of a. S-1 got value $a=0$. Next, S-1 substituted value a and c into equation $d+2a=3a-c$ to find the value of d, S-1 got value $d=-3$. S-1 successfully concluded the answer by saying "So …. value $a=0$, $b=1$, $c=3$, $d=-3$". In terms of Question 2, S-1 wrote a formula. S-1 got an obstacle to determine the next step. It can be seen when S-1 said "matrix A … mmmh this is an incorrect step". S-1 crossed out the matrix A then continued writing next to it "$X=A^{-1}$. B". S-1 found confusion in finding X, S-1 said "$X = \frac{1}{\det(A)}$ multiplied by ….". S-1 overcame the confusion by reading back to the questionso S-1 got "matrix $\begin{bmatrix} 5 & 3 \\ 1 & 4 \end{bmatrix}$ multiplied by $\begin{bmatrix} 7 & 18 \\ -6 & 21 \end{bmatrix}$". S-1 made a consideration in determining matrix X. S-1 said that "So matrix $X = \begin{bmatrix} 1 & 9 \\ -1 & 6 \end{bmatrix}$". S-1 conducted monitoring into the answer. He also tried to find an alternative way in ensuring the answer is already correct. It showed when S-1 halt for a while and looked back at the answer sheet. The reflective thinking structure of S-1 illustrated in Figure 4.

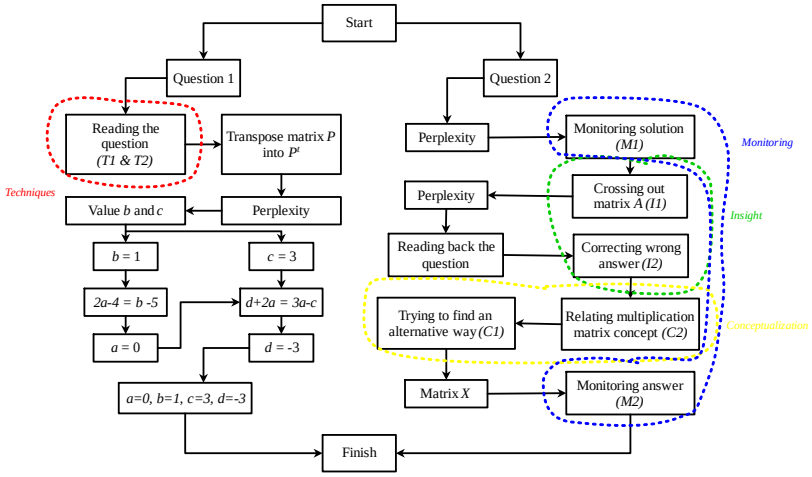

Figure 4. The Illustration of Reflective Thinking Structure S-1

3.2. The Result of S-2

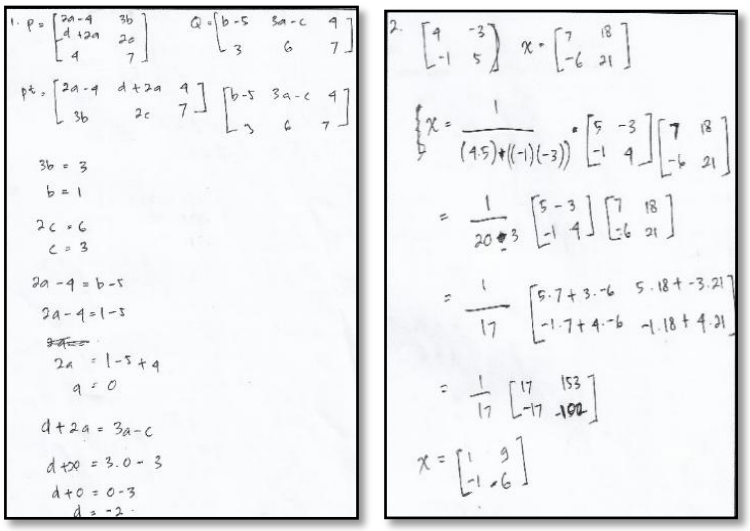

Figure 5. Answer sheet of S-2

Pupil's answer sheet presented in Figure 5. S-2 understands the given information by repeatedly reading and writing the information into the answer sheet. In solving Question 1, S-2 wrote matrix $P = \begin{bmatrix} 2a-4 & 3b \\ d+2a & 2c \\ 4 & 7 \end{bmatrix}$ as well as $Q=\begin{bmatrix} b-5 & 3a-c & 4 \\ 3 & 6 & 7 \end{bmatrix}$. S-2 tried to solve Question 1 by transforming matrix P into $P^t = \begin{bmatrix} 2a-3 & d+2a & 4 \\ 3b & 2c & 7 \end{bmatrix}$. Perplexity appears when S-2 determining value *b*, but S-2 looks enthusiastic to solve the problem. Then, S-2 overcame the perplexity by re-reading the question and re-calling her concepts to get value $b=1$ and $c=3$. After getting equation $3b=3$ and $2c=6$, S-2 substituted value b into equation $2a-4=b-5$ to determine value $a=0$. Next, S-2 substituted value *a* and *c* into equation $d+2a=3a-c$ to find value $d=-2$. In solving Question 2, S-2 faced an obstacle in determining matrix *X*. The obstacle appears when S-2 looks to keep silent. Then S-2 wrote $\frac{1}{(4.5)+((-1)(-3))}$ multiplied by $\begin{bmatrix} 5 & -3 \\ -1 & 4 \end{bmatrix}$ multiplied by $\begin{bmatrix} 7 & 18 \\ -6 & 21 \end{bmatrix}$. S-2 got confusion by crossing out the answer. The effort to overcome the confusion by monitoring the written solution. After finding the mistakes, S-2 conducted a correction so S-2 successfully concluded matrix *X* by saying "So, matrix *X* fulfills $\begin{bmatrix} 4 & -3 \\ -1 & 5 \end{bmatrix}$ $X=\begin{bmatrix} 7 & 18 \\ -6 & 21 \end{bmatrix}$ shuld be $X=\begin{bmatrix} 1 & 9 \\ -1 & -6 \end{bmatrix}$". S-2 did not re-monitor the final answers that have been written in Questions 1 and 2. This can be seen from the final answers of an error due to lack of accuracy. The reflective thinking structure of S-2 illustrated in Figure 6.

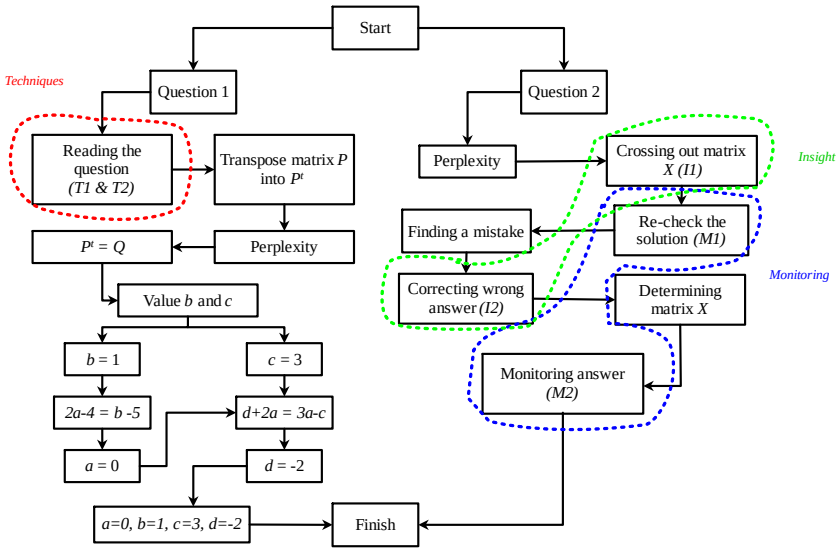

Figure 6. The Illustration of Reflective Thinking Structure S-2

3.3. The Result of S-3

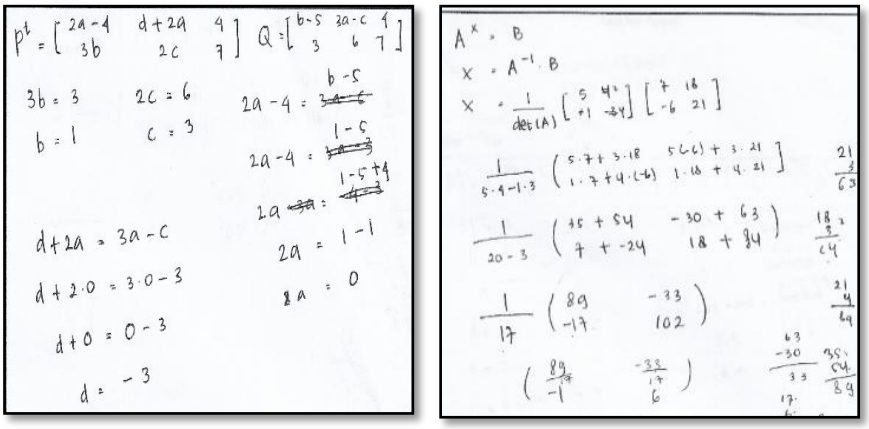

Figure 7. Answer sheet of S-3

S-3 understands the problem by repeatedly reading the problems. In solving Question 1, S-3 transformed matrix *P* into P^t. S-3 said, "firsts step, matrix *P* transformed into $P^t = \begin{bmatrix} 2a-4 & d+2a & 4 \\ 3b & 2c & 7 \end{bmatrix}$". S-3 wrote matrix *Q* next to matrix P^t. In finding the value b, S-3 said "$Q = \begin{bmatrix} b-5 & 3a-c & 4 \\ 3 & 6 & 7 \end{bmatrix}$. I will determine... the value of *b*". S-3 got the value $b= 1$ and $c = 3$. S-3 faced a perplexity on determining value *a*. In overcoming the perplexity, by looking back at the step of written solution. It represented by crossing out the answer. S-3 made sure the solution so S-3 found value $a=0$. Value *a* and *c* employed in finding value $d=-3$. S-3 begun problem-solving Question 2 by confusion. S-3 tried to remember the formula, "$AX = B$". S-3 finding value *X* by multiplying A^{-1} and *B*, "$\frac{1}{\det(A)}\begin{bmatrix} 5 & 3 \\ 1 & 4 \end{bmatrix}$ multiplied by $\begin{bmatrix} 7 & 18 \\ -6 & 21 \end{bmatrix}$". In this step, S-3 faced confusion in matrix multiplication. The effort to overcome confusion is recalling the old concepts. S-3 successfully concluded $X= \begin{bmatrix} \frac{89}{17} & \frac{-33}{17} \\ -1 & 6 \end{bmatrix}$. The reflective thinking structure of S3 illustrated in Figure 8.

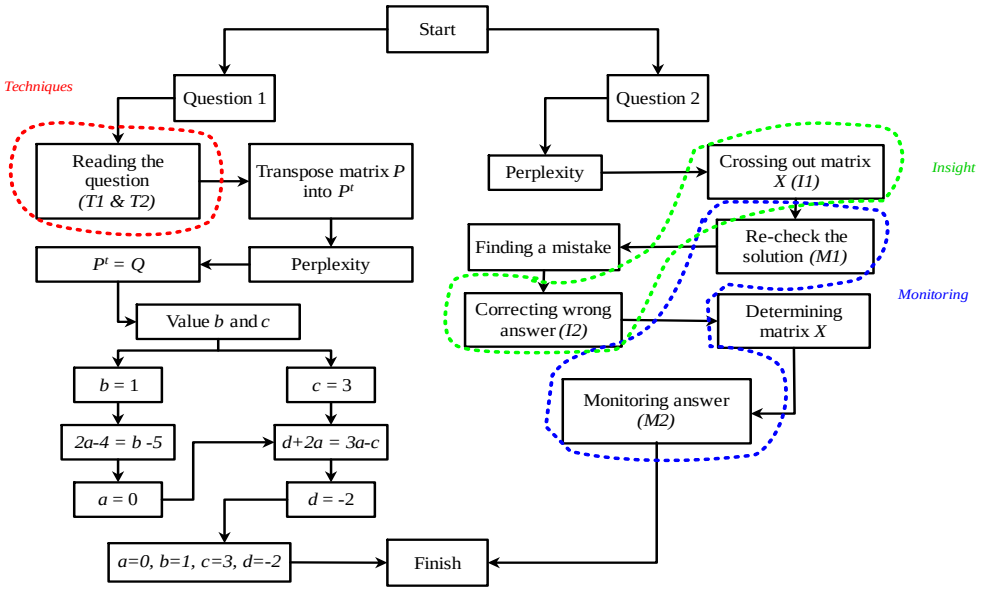

Figure 8. The Illustration of Reflective Thinking Structure S3

4. Discussions

In the technique aspect, subjects understand the information given and question by repeating the question. This step called identifying the problem (Suharna et al., 2020). The pupil with high self-efficacy level recalling the knowledge and connecting the concepts to solve the problem. The recalling and concepts connecting conducted in a consistent way (Lee, 2005). The subject tries to find a piece of new information by connecting some information they have. Meanwhile, pupils with moderate self-efficacy levels achieve critical thinking (Suharna, 2018). It shown in step f problem analysis, determining all necessary information, and looking at other information that are not given in the problem. The pupils with low self-efficacy level solve the mathematical problems by doing trial and error (Kholid et al., 2021). Besides, they try to remember and connect the concept. It is relevant to the statement that pupils with low self-efficacy levels is in recall level as the lowest level of thinking (Krulik et al., 2003).

In the monitoring aspect, pupils in each self-efficacy level arrange a plan before solving the problem. Moreover, only pupils with high self-efficacy levels conduct re-monitoring to step and answer to make sure the solution is correct. It means pupils show a rationalisation by connecting old and new experiences with a reasonable background (Lee, 2005). The pupil with moderate self-efficacy level conducts a looking back step only in Question 2, while Pupil with low self-efficacy level does not. It is relevant with a statement that subjects with self-efficacy levels achieve a reflection step. The step includes thinking activity and connecting experience with the problem (Leung & Kember, 2003). Pupils with low self-efficacy conduct re-monitoring when they face confusion. They do an activity only on purpose (Masduki et al., 2020). This step called reflectivity.

In the insight aspect, subject in each self-efficacy level employee enthusiastic in correcting mistakes. One characteristic of reflective thinking is being aware of mistakes and correcting them to completion (Suharna et al., 2020). Subjects with high self-efficacy have an optimistic attitude, do not give up easily, always feel confident, and will give all their efforts to the maximum so that they will get maximum results as well (Riani & Rozali, 2014). This is in line with subjects with high self-efficacy who look optimistic (Kholid et al., 2019), do not give up easily, are confident of the solution to the problem written, and exert all their efforts to the maximum so that they get the correct answer to question 1 and correct. Subjects with moderate levels of self-efficacy feel less confident with the solutions written and are less than optimal in exerting their efforts in working on the problems so that they do not get maximum results. The answers to Questions 1 and 2 are incorrect due to a lack of accuracy during the counting process. They have a less confident attitude and are less than optimal in exerting their business to get suboptimal results. Meanwhile, subjects with low self-efficacy always feel doubtful and anxious, unsure of the solutions written and do not maximize their efforts to work on the problems so that the results obtained are only a correct Question 1. In solving Question 2, the subject takes many errors starting from writing the formula to the concept multiplication between matrix. They have an attitude of insecurity, always feel doubtful and anxious, and do not maximize their efforts to work on the problem to get results that are not optimal.

In the conceptualization aspect, pupils in each self-efficacy level connecting the prior concepts to the problem. On the other hand, they have no idea to solve the problem in a different way. It is relevant to a statement that conceptualization is an activity in connecting a prior concept to the problem (Zehavi & Mann, 2005). The pupils with high self-efficacy levels able in connecting the prior concept to the problems both in Question 1 and 2, they can tackle related concepts and a unique situation (Bakar et al., 2020). Also, they tend to have independent field cognitive styles because they can relate knowledge and experience to solve a problem (Son et al., 2020). The pupils with moderate self-efficacy levels make a bit mistake in Question 2. Meanwhile, the pupils with low self-efficacy levels are not able in connecting prior concept to Question 2. Moreover, the pupils with low self-efficacy levels face more obstacles and confusion in solving Question 2.

5. Conclusions

We successfully conclude three points as follow: 1) pupil with high self-efficacy able to acquire given information by repeatedly reading the question, connecting prior experience and concept to overcome the confusion, conduct re-monitoring to the step and solution, and enthusiastic in correcting errors; 2) pupil with moderate self-efficacy level able to acquire given information by repeatedly reading the question, looking the necessary information, look back the step and solution, connecting prior experience and concept to overcome the confusion, make some errors, and ready to correct the mistakes; and 3) pupil with low self-efficacy level face more confusion and obstacle, able to acquire given information by repeatedly reading the question, remember formula and experience to solve the problem, conduct looking back if necessary, and ready to correct the mistake.

6. Recommendations

Reflective thinking and self-efficacy are components that have a role in problem-solving. Thus, it is necessary to carry out further research in defragmenting students' reflective thinking and self-efficacy in problem-solving. research can be in the form of developing a learning model that stimulates reflective thinking and self-efficacy in problem-solving.

7. Limitations

Many subjects don't solve the problem when they experience confusion because they cannot manage their insights and regulations. For this reason, educators need to guide them in dealing with perplexity and obstacles.

8. Acknowledgements

The research was funded by Universitas Muhammadiyah Surakarta through Tridharma Integration Grant Scheme (Skema Hibah Integrasi Tridarma/HIT). Parties that support in-kind are Universitas PGRI Madiun, and Universitas Negeri Gorontalo.

References

1. Agustan, S., Juniati, D., & Siswono, T. Y. E. (2017). Reflective thinking in solving an algebra problem: A case study of field independent-prospective teacher. *Journal of Physics: Conference Series*, *893*(1). https://doi.org/10.1088/1742-6596/893/1/012002
2. Bakar, N. S. A., Maat, S. M., & Rosli, R. (2020). Mathematics teacher's self-efficacy of technology integration and technological pedagogical content knowledge. *Journal on Mathematics Education*, *11*(2), 256–276. https://doi.org/10.22342/jme.11.2.10818.259-276
3. Berkovitz, J. (2015). The Propensity Interpretation of probability: A re-evaluation. *Erkenn*, *80*, 629–711. https://doi.org/https://doi.org/10.1007/s10670-014-9716-8
4. Cai, S., Liu, E., Yang, Y., & Liang, J.-C. (2019). Tablet-based AR Technology: Impacts on students' conceptions and approaches to learning mathematics according to their self-efficacy.*British Journal of Educational Technology*, *50*(1), 248–263. https://doi.org/https://doi.org/10.1111/bjet.12718
5. Chee, Y. S., & Mehrotra, S. (2012). Reflective, reflexive guided appropriation: Facilitating teacher adoption of game based learning in classrooms. *Proceedings of the 6th European Conference on Games Based Learning: ECGBL*, 109.
6. Corkett, J., Hatt, B., & Benevides, T. (2011). Student and teacher self-efficacy and the connection to reading and writing.*Canadian Journal of Education*, *34*(1), 65–98.
7. Cottrell, S. (2017). *Critical Thinking Skills: Effective Analysis Argument and Reflection*. Macmillan International Higher Education.
8. Dervent, F. (2015). The effect of reflective thinking on the teaching practices of preservice physical education teachers. *Issues in Educational Research*, *25*(3), 260–275.
9. Funny, R. A., Ghofur, M. A., Oktiningrum, W., & Nuraini, N. L. S. (2019). Reflective thinking skills of engineering students in learning statistics.*Journal on Mathematics Education*, *10*(3), 445–458. https://doi.org/10.22342/jme.10.3.9446.445-458
10. Ghufron, M. N., & Risnawita, R. (2011). *Teori-teori Psikologi*. Ar-Ruzz Media.
11. Gurol, A. (2011). Determining the reflective thinking skills of pre-service teachers in learning and teaching process.*Energy Education Science and Technology Part B: Social and Educational Studies*, *3*(3), 387–402.
12. Hidajat, F. A., Sa'dijah, C., Sudirman, & Susiswo. (2019). Exploration of students ' arguments to identify perplexity from reflective process on mathematical problems. *International Journal of Instruction*, *12*(2), 573–586. https://doi.org/10.29333/iji.2019.12236a
13. Hong, Y. C., & Choi, I. (2011). Three dimensions of reflective thinking in solving design problems: a conceptual model.*Educational Technology Research and Development*, *59*(5), 687–710. https://doi.org/10.1007/s11423-011-9202-9
14. Jaspers, M. W. M., Steen, T., Bos, C. van den, & Geenen, M. (2004). The think aloud method: A guide to user interface design. *International Journal of Medical Informatics*, *73*(11–12), 781–795. https://doi.org/https://doi.org/10.1016/j.ijmedinf.2004.08.003
15. Kaplan, S., Moraes Monteiro, M., Anderson, M. K., Nielsen, O. A., & Medeiros Dos Santos, E. (2017). The role of information systems in non-routine transit use of university students:evidence from Brazil

and Denmark. *Transportation Research Part A: Policy and Practice*, *95*, 34–48. https://doi.org/10.1016/j.tra.2016.10.029
16. Kholid, M. N., Agustin, R. L., & Pradana, L. N. (2019). Effect of TPSstrategy with portfolio assessment and learning interest on mathematical learning achievement.*International Journal of Scientific & Technology Research*, *8*(9), 616–620.
17. Kholid, M. N., Sa'dijah, C., Hidayanto, E., & Permadi, H. (2020). How are students' reflective thinking for problem solving? *Journal for the Education of Gifted Young Scientists*, *8*(3), 1135–1146. https://doi.org/10.17478/JEGYS.688210
18. Kholid, M. N., Telasih, S., & Pradana, L. N. (2021). Reflective thinking of mathematics prospective teachers ' for problem solving.*Journal of Physics: Conference Series*, *1783*(012102), 1–6. https://doi.org/10.1088/1742-6596/1783/1/012102
19. Kim, J.-A., & Lorsbach, A. W. (2005). Writing Self-Efficacy in Young Children: Issues for the Early Grades Environment. *Learning Environment Research*, *8*, 157–175. https://doi.org/https://doi.org/10.1007/s10984-005-7248-5
20. Krulik, S., Milou, E., & Rudnick, J. (2003). *Teaching Mathematics in Middle School: A Practical Guide*. Pearson Education Inc.
21. Lee, H. J. (2005). Understanding and assessing preservice teachers' reflective thinking. *Teaching and Teacher Education*, *21*(6), 699–715. https://doi.org/10.1016/j.tate.2005.05.007
22. Leung, D. Y. P., & Kember, D. (2003). The relationship between approaches to learning and reflection upon practice.*Educational Psychology*, *23*(1), 61–71. https://doi.org/10.1080/01443410303221
23. Liu, X., & Koirala, H. (2009). The effect of mathematics self-efficacy on mathematics achievement of high school students.*NERA CONFERENCE PROCEEDINGS 2009*, 1–13. https://opencommons.uconn.edu/nera_2009/30/
24. Masduki, Kholid, M. N., & Khotimah, R. P. (2020). Exploring students' problem-solving ability and response towards metacognitive strategy in mathematics learning. *Universal Journal of Educational Research*, *8*(8), 3698–3703. https://doi.org/10.13189/ujer.2020.080849
25. Ningsih, E. F. (2016). Proses Berpikir Mahasiswa dalam pemecahan masalah aplikasi integral ditinjau dari kecemasan belajar matematika (Math Anxiety). *Jurnal IqraKajian Ilmu Pendidikan*, *1*(2), 191–216.
26. Nuriadin, I., Kusumah, Y. S., Sabandar, J., & Dahlan, J. A. (2015). Enhancing of students' mathematical reflective thinking ability through knowledge sharing learning strategy in senior high school. *International Journal of Education and Research*, *3*(9), 255–268.
27. Odafe, V. U. (2007). Teaching and learning mathematics: student reective adds a new dimension.*Proceedings of the Ninth International Conference: Mathematics Education in a Global Community*, 486–490.
28. OECD. (2018). *Programme for International Students Assesment (PISA) Result From PISA 2018*. https://www.oecd.org/
29. Riani, W. S., & Rozali, Y. A. (2014). Hubungan antara self-efficacy dan kecemasan saat presentasi pada mahasiswa universitas esa unggul.*Jurnal Psikologi Esa Unggul*, *12*(1), 1–9.
30. Rodgers, C. (2002). Defining reflection:another look at John Dewey and reflective thinking. *Teachers College Record,104*, *104*(4), 842–866.
31. Schunk, D. H., & Pajares, F. (2009). Self-efficacy Theory. In *Handbook of Motivation at School* (pp. 35–53). Routledge.
32. Sezer, R. (2008). Integration of critical thinking skills into elementary school teacher education courses in mathematics.*Education*, *128*(3), 349–363.
33. Solso, R. L., MacLin, O. H., & Maclin, M. K. (2014). *Cognitive Psychology*. Pearson Education Limited.
34. Son, A. L., Darhim, & Fatimah, S. (2020). Students ' mathematical problem-solving ability based. *Journal on Mathematics Education*, *11*(2), 209–222. https://doi.org/http://doi.org/10.22342/jme.11.2.10744.209-222
35. Suharna, H. (2018). *Teori Berpikir Reflektif dalam Menyelesaikan Masalah Matematika* (1st ed.). DEEPUBLISH.
36. Suharna, H., Hairun, Y., Abdullah, I. H., Alhaddad, I., Afandi, A., Ardiana, & Sari, D. P. (2020). The reflective thinking elementary student in solving problems based on mathematic ability.*International Journal of Advanced Science and Technology*, *29*(6), 3880–3891.
37. Zehavi, N., & Mann, G. (2005). Instrumented techniques and reflective thinking in analytic geometry. *The Montana Mathematics Enthusiast*, *2*(22), 1551–3440.