

Students' Social Arithmetic Problem Solving Base on Cognitive Style

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ABSTRACT

This study aims to describe the problem solving of FI and FD students in solving social arithmetic problems. Subjects in the study were obtained based on the results of the Group Embedded Figure Test cognitive style test developed by Witkin at SMPN 4 Palu. The results showed that FI subjects were able to: identify what was known and what was asked, make a problem-solving plan and would use the "profit formula" to determine answers, implement a structured problem-solving plan, according to a plan that had been prepared previously and be able to apply knowledge so that they can solve the problem correctly, and check the answers again by using the "purchase price formula". While FD can identify what is known and what is being asked by reading the questions and using the question mark symbol, making a problem-solving plan by first looking for the "remaining and selling price" that is not yet known, then looking for the "overall selling price" by adding up "selling price" that has been obtained and using the "profit formula" to get an answer but still unsure of the formula he will use, using problem-solving strategies according to what is planned, and re-examining the answers by rereading and checking the answers step by step.

Keywords: Social Arithmetic, Field Dependent, Field Independent, Cognitive Style, Problem Solving.

1. INTRODUCTION

Mathematics is a field of study that is studied by students from elementary to high school. Mathematics is also one of the fields of study that students do not like and even hate the most, because they think that mathematics is difficult to learn. Mathematics is not a field of study that is of interest to students. Many students see mathematics as a field of study that is difficult to understand. Mathematics is a field of study that is considered very difficult by students, both those who do not have learning difficulties and those who have learning difficulties [1,2,3].

One of the goals in studying mathematics is to solve a problem related to mathematics. The purpose of learning mathematics in schools is to solve problems which include the ability to understand problems, investigate problems, collect problems, design mathematical models, solve models, and interpret the solutions obtained [4]. The main objective of learning mathematics is to enable students to solve problems in everyday [5]. The ability to solve problems is a general goal of teaching mathematics, and the main asset for learning mathematical skills and models [6]. In the Minister of Education, one of the objectives of studying

mathematics is that students must have the ability to solve problems which includes the ability to understand problems, design mathematical models, solve models and interpret the solutions obtained [7]. The better the child's ability to solve problems, the better the results will be obtained.

One of the keys to success in learning mathematics is being able to solve math problems well. Problem solving is a process used to solve problems [8]. In solving problems, it is necessary to have a person's business process by using all the knowledge, skills and understanding they have to find solutions to the problems that are given or faced [9]. Problem solving is one of the core components in the Mathematics Curriculum and contains the essence of Mathematics activities, so it needs to be considered in the learning process. The importance of problem-solving abilities is not only to make it easier for students to understand mathematics but in other subjects as well as in everyday [10,11,12]. Problem solving is the heart of mathematics," meaning that problem solving is very important to learn.

Problem solving is a learning approach that involves active students optimally that allows students to explore, observe, experiment, and investigate. This

aims to facilitate students' understanding of the subject matter obtained as well as supporting media or techniques to make students more active and independent. The problem-solving ability that students must have is how to solve problems related to their learning activities, including solving problems in math problems [13].

There are 4 steps in problem solving, namely: 1) understanding the problem, 2) making a problem-solving plan, 3) implementing a problem-solving plan, 4) checking back on the results of problem solving [14]. From the first stage to the next stage in problem solving are interrelated to produce solutions to the problems contained in the problem. Students play a role in understanding each stage of problem solving so that the thinking process goes well.

Every student has a different level of thinking, remembering, understanding and applying. Every student has a variety of ways and styles of thinking [15]. Therefore, students often do different things in solving a math problem. A person's differences in understanding, thinking, solving problems, learning and interacting with other people are known as cognitive styles. [16].

Cognitive style is a different way of seeing, recognizing, and organizing information [17]. Everyone has a certain way of processing and organizing information in response to their environment. A person's cognitive style is a person's actions in solving problems, receiving information, remembering, and thinking and making decisions. Cognitive style is a characteristic of a person in thinking, solving problems, remembering, organizing and processing information, and making decisions [18]. One type of cognitive style is the Field Independent (FI) - Field Dependent (FD) cognitive style. Individuals who are analytic are individuals who separate the environment

2. METHOD

This research was conducted in class VIII Rambutan SMPN 4 Palu in the even semester of 2021. The research subjects were all students in that class. This type of research is a qualitative-descriptive study. The data collection technique in this study was carried

out through the following stages: 1) students were asked to answer the Group Embedded Figure Test (GEFT) test developed by [16]. 2) the results of the student's work are checked and the type of cognitive style is determined based on the scoring criteria of the cognitive style instrument. 3) choosing one research subject each, namely one FI cognitive style student and one FD cognitive style student.

Subject selection is based on the highest and lowest scores from the Group Embedded Figure Test (GEFT) test results as well as recommendations from mathematics subject teachers to solve tests of social arithmetic problems. Data obtained by giving tests. The cognitive style test used was GEFT. The type of data in this study is in the form of social arithmetic problem-solving analysis data in terms of FI and FD cognitive styles in class VIII students of SMPN 4 Palu City, which consists of: understanding the problem, making problem solving plans, implementing problem solving plans, and checking the answers again. solution to problem. The validity of the data was obtained from time triangulation and member check. Data analysis in this study refers to qualitative data analysis according to Miles, Huberman, and Saldana (2014), namely Data Condensation, Data Display, and Conclusion Drawing / Verification.

3. RESULT AND DISCUSSION

In this study the results of the analysis obtained by solving the problem of arithmetic social class VIII SMPN 4 Palu Rambutan in terms of cognitive style with troubleshooting steps Polya as follows:

1) FI subject in understanding the problem

At the stage of understanding the problem, the FI subject was able to write down (Fig.1) what was known in the questions, namely Mrs. Raihan bought 100 pieces of chicken for Rp. 5,000,000, on the way there were 12 chickens that died, 35 chickens were sold at a price of Rp. 75,000 / head, the rest is sold at a price of Rp. 70,000 / head. Then FW could also write down what was asked, namely: how much profit or loss did Mrs Raihan get?

Jawab:
Diket:
ibu Raihan membeli 100 ekor ayam potong dengan harga Rp. 5.000.000. Dalam perjalanan ada ayam yg mati sebanyak 12 ekor. Ada 35 ekor ayam laku dijual dengan harga Rp. 75.000 per ekor. Sisanya dijual dengan harga Rp. 70.000/ekor
Ditanya:
Berapa besar keuntungan atau kerugian yg didapat ibu Raihan?

Figure 1. Answers to FI Subjects at the stage of understanding the problem

Transcript 1 Subject FI at the stage of understanding the problem

- M101P : Please pay attention to this problem, have you ever got a question like this?
- FWM102S : Yes, sis
- M103P : Yes?
- FWM104S : Yes, sis
- M105P : Look at it again. Can you understand the meaning of this question?
- FWM106S : yes, you can

The results of the interview showed that the FI subject had already received the questions given, so that the FI subject could understand the meaning of the questions. Based on the results of the answers and interviews with FI subjects, the researcher concluded that in understanding the problem, the FI subjects were able to know what was known and what was asked in the question.

2) The subject of FI in making a problem-solving plan

At the stage of making a problem-solving plan, the subject of FI, the researcher concludes that the subject of FI in making a problem-solving plan is able to plan the solution of the given problem. This can be seen in the following interview transcript:

Transcript 2 FI Subject at the stage of making a problem-solving plan

- M129P : OK, then how do you solve the problem on this question?
- FWM130S : first there were 35 chickens that were sold and then I multiplied it by the price of Rp. 75,000/head. Then Mrs. Raihan who bought the chicken that was equal to 100 was reduced by 12 because there were chickens that died so it was reduced. Then 100-12-35.
- M131P : why is it reduced by 35?
- FWM132S : because there are 35 chickens that are sold, Sis.
- M133P : So what?
- FWM134S : then if you get the rest, multiply it by Rp. 70,000
- M135P : then what?

FWM136S : then the results of 35 chickens and the remaining chickens are added up.

- M137P : why are they added up?
- FWM138S : to find out the total price
- M139P : okay, then?
- FWM140S : then mmm see the selling price is greater than the purchase price or the selling price is less than the purchase price sis
- M141P : why do you have to look at it bro?
- FWM142S : because in order to know the profit or loss, Sis. If you make a profit, it means that the selling price is greater than the purchase price and if you lose, it means that the selling price is less than the purchase price.
- M143P : Where do you know from?
- FWM144S : from the formula, sis.
- M145P : what's the formula, bro?
- FWM146S : if you make a profit, the Selling Price – Buying Price. If you lose, the Buying Price – the Selling Price, sis.

Based on the results of interviews with FI subjects, the researcher concludes that FI subjects in making problem solving plans are able to plan solutions to the given problems. FI subjects can make a problem-solving plan by finding the selling price of 35 chickens, then looking for the remaining chickens and multiplying by Rp. 70,000, then FW adds up the sales of 35 chickens and the sales of the remaining chickens to find out the total price, then FW sees the selling price is greater than the purchase price or the selling price is less than the purchase price to find out the profit or loss, then FW uses the profit or loss formula to determine the result.

3) The subject of FI in implementing the problem-solving plan

At the stage of implementing the problem-solving plan, the subject of FI seeks the selling price of 35 chickens that sell for Rp. 75,000, then look for the remaining chicken, then find the selling price of the remaining chicken, then add up the results of 35 chickens and the remaining chicken, then determine the profit or loss, then use the profit formula to find the result. And FW concluded that Mrs. Raihan got a profit of Rp. 1.335,000 (Fig.2).

Perencanaan
 Harga jual 35 ekor ayam = 35×75
 $= 2.625.000$
 Sisa ayam = $100 - 35 = 65$
 Harga jual sisa ayam = 65×70.000
 $= 4.550.000$
 Harga total ayam = $2.625.000 + 4.550.000$
 $= 7.175.000$
 Karena harga jual lebih tinggi dari harga beli maka ada keuntungan
 Rumus keuntungan = $100 - 45$
 $= 55$
 Jadi keuntungan ada 55 atau Rp. 1.330.000

Figure 2. FI Subject's answers at the stage of implementing the problem-solving plan

Transcript 3 FI Subject at the stage of implementing the problem-solving plan

M147P : So how do you solve it, brother?

FWM186S : first there are 35 chickens sold for Rp. 75,000 so that is multiplied by Rp. 2.625.000

M153P : okay next?

FWM154S : then there are 100 chickens, minus 12 chickens that died, then subtracted again by 35 chickens that are sold and get the remaining 53.

M157P : what to do next?

FWM158S : then 53 was multiplied by the price, which was Rp. 70,000/head.

M163P : then sis?

FWM164S : then, the 35 chickens were sold at a price of Rp. I added this 75,000 with the rest which was sold at a price of Rp. 70,000 becomes $3,710,000 + 2,625,000 = \text{Rp. } 6.330,000$.

M167P : next bro?

FWM168S : hereinafter the selling price is greater than the purchase price, so that means using the profit formula, sis.

M169P : So how are the results, sis?

FWM170S : the formula is selling price - buying price, so $6,330,000 - 5,000,000 = \text{Rp. } 1.330,000$.

Based on the results of the answers and interviews with the FI subject, the researcher concluded that in implementing the problem solving plan, the FI subject carried out the problem solving plan as previously planned, namely looking for the price of 35 chickens,

then looking for the rest of the chickens which was then multiplied by 70,000, then adding up the price of 35 chickens with the price of selling the remaining chickens, then investigate the profit or loss, and use the formula to determine the result.

4) FI subjects in re-examining the results of problem solving

At the stage of re-examining the results of problem solving, the researcher concluded that FI subjects re-examined the correct answers obtained from the selling price formula. This can be seen from the interview results below:

Transcript 4 FI Subjects at the stage of re-examining the results of problem solving

M173P : are you sure about your answer, brother?

FWM174S : yes.

M175P : what makes you sure?

FWM176S : I will prove it with the purchase price, Sis.

M177P : what is the formula?

FWM178S : purchase price = selling price - profit.

M179P : So how did it go?

FWM180S : the result corresponds to $6,330,000 - 1.330,000 = 5,000,000$.

At the stage of re-examining the FI subject, he is sure that the answer is correct and in re-examining the answer obtained by the FI subject,

it is done by using the purchase price formula, namely purchase price = selling price - profit.

5) FD subjects in understanding the problem

At the stage of understanding the problem, the FD subject can write (Fig. 3) it is known that Mrs. Raihan bought 100 chickens at a price of Rp.

5,000,000, 12 chickens died, 35 chickens were sold at a price of 75,000 per head, the rest of the chickens were sold for 70,000 per head. Then AN was also able to write down what was asked of the question, namely: how much profit or loss did Mrs. Raihan get.

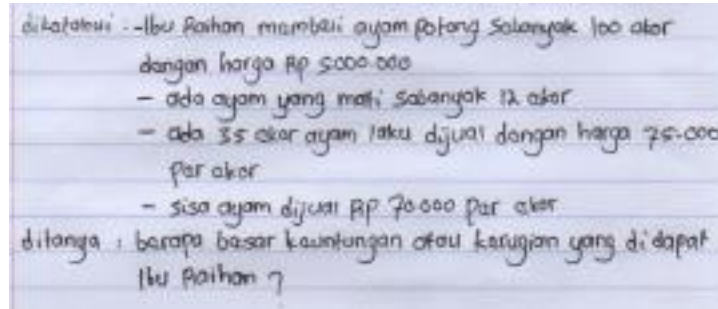


Figure 3. Answers of FI Subjects on understanding of the problem

Transcript 5 FI Subjects at the stage of understanding the problem

M103P : So, let's look at this question, have you ever received a question like this?

ANM104S : not yet, Ms.

M105P : have you received the story when it comes to stories?

ANM106S : done, Ms

M107P : take a look again, brother, brother, can you understand the meaning of this question?

ANM108S : Wait, Sis, I'll read it first.

The results of the interview show that the subject of FD has never received the questions given, so that the subject of FD takes a few minutes to find out the meaning of the questions given. Based on the results of answers and interviews with FD subjects, the researchers concluded that in understanding the problem, FD subjects could write down what was known and write down what was asked of the question based on the mark symbol question but it took a few minutes to find out the meaning of the questions given. At this stage, the FD subject understands the problem and can write down what is known and what is being asked of the problem. FD subjects are able to understand the problem well, the subject can write down all the elements of the problem completely but still in everyday sentences [19].

6) FD subjects in making plans for solving social arithmetic problems

At the stage of making problem solving plans, FD subjects concluded that FD subjects in making problem solving plans were able to plan

solutions to the given problems. This can be seen from the transcript of the interview below. Transcript of 6 Subjects of FD at the stage of making a problem-solving plan

M133P : then how do you solve the problem in this question?

ANM134S : First, I'll look for the rest of the chicken.

M139P : next bro?

ANM140S : Next, look for the price of the remaining chicken.

M143P : what about you, bro?

ANM144S : after that I looked for the selling price of 35 chickens, Sisbrother

M145P : after that, what do you do,?

ANM146S : after that the selling price of 35 chickens is added up with the remaining selling price.

M149P : next sis

ANM150S : eee use the formula sis.

M151P : what's the formula, bro?

ANM152S : use the profit or loss formula

M153P : why use that formula?

ANM154S : Do you really use that formula, Sis.

M155P : Wow, what's the formula, bro?

ANM156S : yes, if the profit is Selling Price – Buying Price, Sis, if you are losing, Buying Price – Selling Price, Sis.

Based on the results of interviews with FD subjects, first look for the remaining chickens, then look for the remaining chicken prices, then AN looks for the selling price of 35 chickens then add up the sales of 35 chickens and the sale of the remaining chicken to get the price total, then AN uses the profit or loss formula to determine the result. AN also mentions the profit and loss formula correctly.

- 7) FD subjects in implementing the problem-solving plan

At the stage of implementing the problem-solving plan, the FD subject first looks for the remaining chickens that are not yet known, then looks for the selling price of the remaining

chickens, then looks for the selling price of 35 chickens, then adds up the results of 35 chickens and the rest of the chickens, then AN seeing that the selling price > the purchase price, the mother made a profit, then AN used the profit formula to find the profit and concluded that the mother made a profit of Rp. 1.335,000 (Fig. 4).

Pengalasan :

$$\text{Sisa ayam} = 100 - 12 - 35 = 53$$

$$53 \times 70.000 = 3.710.000$$

$$35 \times 75.000 = 2.625.000$$

$$3.710.000 + 2.625.000 = 6.335.000$$

Karena harga jual lebih dari harga beli maka untung

$$\text{Rumus keuntungan} = \text{HJ} - \text{HB}$$

$$= 6.335.000 - 5.000.000$$

$$= 1.335.000$$

Jadi keuntungan Ibu Raihan adalah Rp. 1.335.000

Figure 4. FI Subject's answers at the stage of implementing the plan. problem-solving

Transcript 7 FI Subject at the stage of implementing the problem-solving plan.solution,

M157P : what is your next sis?

ANM158S : eee the 100 chickens that my mother bought, minus the 12 that died, then reduced by another 35 which were sold, so $100 - 12 - 35 = 53$

M161P : so what next, brother?

ANM162S : then $53 \times 70,000 = 3.710,000$

M165P : what's next, brother?

ANM166S : then 35 chickens multiplied by 75,000 = Rp. 2,625,000.

M167P: what are you going to do next?

ANM168S : then the price of 35 chickens is added up with the selling price of 53 chickens so $2,625,000 + 3,710,000 = \text{Rp. } 6,335,000$

M173P : So what's next, sis?

ANM174S : Next, we'll see what the selling price is and how much is the buying price. If the selling price is greater than the purchase price, the formula is profit, but if the selling price is less than the purchase price, then the loss formula is used, Ms.

M175P : what are the results?

ANM176S : Yes, because the selling price is greater than the purchase price, so I use the profit formula, bro, so the result is

$6,335,000 - 5,000,000 = \text{Rp. } 1.335 \text{ million}$

M177P : Okay, 1.335 million is what brother?

ANM178S : eee it results Raihan Capital gains Ms

Based on the analysis of the answers and interviews on the subject of FD, the researchers concluded that in carrying out the problem-solving plan, subject FI implement problem-solving plan in accordance with previous plans, but less skilled in the analytic process. FD subjects repeatedly use algebraic operations to be able to determine the results.

- 8) Subject FD in re-examining the results of problem solving

At the stage of re-examining the problem solving of FD subjects, the researcher concluded that AN was sure of the answer on the grounds that he had read it again and checked the answers step by step. This can be seen from the interview transcript below: Transcript 8 Subjects FI at the stage of re-examining the results of problem solving

M179P : are you sure that your answer is correct,

M179P : are you sure that your answer is correct?

ANM180S : (read the questions, then pay attention to the answers each step)

M181P : how? are you sure about your

answer?
 ANM182S : *sure you are*
 M183P : *sure your answer is correct*
 ANM184S : *yes you are*
 M185P : *why can you be sure*
 ANM186S : *eee because it is according to*
 the steps sis
 M187P : *can you conclude?*
 ANM188S : *being a mother, you earn Rp.*
 1.335.000 sis
 M189P : *okay, thank you being*
 willing to be interviewed
 ANM190S : *yes sis, you are the same.*

Based on the interview results, the subject of FD is sure that the answer is correct and in re-checking the answers obtained by the subject of FD, do it by reading and looking back step by step completion .

At the stage of understanding the problem, the subject of the FI can state all the information contained in the question, namely the things that are known based on the statement sentences and the things that are asked based on the interrogative sentences. At this stage, the FI subject can mention all the information contained in the question, namely the things that are known based on the statement sentence and the things that are asked based on the interrogative sentence. Students already have a scheme that what is known can be identified from the statement sentence and the thing asked is identified from the question sentence on the problem to find out what information is known and what is being asked in the problem [20]. While the FD subject at the stage of understanding the problem can write down what is known and what is asked from the question. In this case the subject (FD subject) is able to understand the problem well, the subject can write down all the elements of the problem completely but still in everyday sentences [19]

At the stage of compiling a problem-solving plan, FI subjects are able to understand the problem and convert it into mathematical sentences. Students (Subject F1) can understand verbal statements of problems and convert them into mathematical sentences [21]. FI subjects plan problem solving well, so that they can carry out problem solving plans appropriately. Subjects (FI subjects) are categorized both in the steps of planning for completion, FI subjects make plans and take actions that lead to solutions [22]. While the subject of FD At the stage of compiling a problem-solving plan perform a problem-solving plan based on the information obtained from the problem given. The problem-solving steps that are planned first are to find the remaining and unknown selling prices then look for the overall selling price, determine the formula to be used in solving the problem but are still unsure about the formula that he will use.

At the stage of implementing the problem-

solving plan, the subjects of FI and FD solve the problem according to the plan that has been prepared previously. However, the subject of FD is less able to apply the knowledge he has previously so that he repeatedly uses algebraic operations to solve problems. The subject (in this case the subject of FD) made a settlement which was accompanied by an operation error [23]. While the FI subject is very good at applying the knowledge he has previously to solve problems. Previous knowledge that underlies a problem really helps someone in solving problems [24].

The stage of re-checking the answers. The FI subject is very sure that the answers he gets when implementing the problem solving plan are correct and appropriate, the FI subject re-examines the answers by proving using the formula for buying price = selling price - profit. This means that FI subjects are able to make connections between answers to each other. Subjects (FI subjects) can write or make connections between answers to each other [25]. While the subject of FD in re-checking the answers by reading and re-examining the answers step by step solving the problem. Thinking about or reviewing the steps that have been taken in problem solving is a very important activity to improve students' ability to solve problems [26].

4. CONCLUSION

At the stage of understanding the problem, the subject of FI can identify what is known and what is asked based on statement sentences and interrogative sentences, while the subject of FD is able to know what is known and what is being asked by reading the questions and using the question mark symbol. At the stage of making a problem-solving plan, the FI subject first looks for the unknown selling price of the problem then looks for the overall price and uses the profit formula to determine the answer while the FD subject first looks for the remaining and the unknown selling price, then looks for the overall selling price by add up the selling price that has been obtained and use the profit formula to get the answer. At the stage of implementing the problem-solving plan, the FI and FD subjects carried out the problem-solving plan in accordance with the plan that he had previously prepared, but the FD subjects were less capable in the analytical process. FD subjects repeatedly use algebraic operations to be able to determine the result. While the FI subject works in a structured manner and is able to apply the knowledge he has so that he can solve problems appropriately. At the stage of re-examining the answers, the FI subject re-examines the answers by using the purchase price formula, which is to recalculate to find the purchase price and then compare the purchase price obtained with the known purchase price on the question, while the FD subject examines re-

the answers by re-reading and checking step by step answer.

REFERENCES

- [1] Rohmah M and Sutiarto S 2018 Analysis problem solving in mathematical using theory Newman *Eurasia Journal of Mathematics, Science and Technology Education*. **14**(2) 671–681; <https://doi.org/10.12973/ejmste/80630>
- [2] Simamora R E, Saragih S and Hasratuddin H 2018 improving students' mathematical problem solving ability and self-efficacy through guided discovery learning in local culture context *International Electronic Journal of Mathematics Education*. **14**(1) 61–72; <https://doi.org/10.12973/iejme/3966>
- [3] Andayani F and Lathifah A N 2019 Analisis kemampuan pemecahan masalah siswa SMP dalam menyelesaikan soal pada materi aritmatika sosial. *Jurnal Cendekia: Jurnal Pendidikan Matematika*. **3**(1) 1–10; <https://doi.org/10.31004/cendekia.v3i1.78>
- [4] Daulay K R and Ruhaimah I 2019 Polya theory to improve problem-solving skills *Journal of Physics: Conference Series*. **1188**(1); <https://doi.org/10.1088/1742-6596/1188/1/012070>
- [5] Phonapichat P, Wongwanich S and Sujiva S 2014 An analysis of elementary school students' difficulties in mathematical problem solving. *Procedia - Social and Behavioral Sciences*. **116**(2012) 3169–3174; <https://doi.org/10.1016/j.sbspro.2014.01.728>
- [6] Wafiqoh R, Darmawijoyo D and Hartono Y 2016 LKS berbasis model eliciting activities untuk mengetahui kemampuan pemecahan masalah matematika di kelas VIII *Jurnal Elemen*. **2**(1) 39; <https://doi.org/10.29408/jel.v2i1.176>
- [7] Undang-Undang Republik Indonesia Nomor 22 Tentang Standar Isi Sekolah Menengah Pertama 2006 (Jakarta: Depdiknas)
- [8] Sopian Y A and Afriansyah E A 2017 Kemampuan proses pemecahan masalah matematika siswa melalui pembelajaran (Creative Problem Solving dan Resource Based Learning) *Artikel Ilmiah Mahasiswa*. **3**(1) 97–107
- [9] Annizar A M, Maulida M A, Khairunnisa G F and Hijriani L 2020 Kemampuan pemecahan masalah matematis siswa dalam menyelesaikan soal PISA pada topik geometri *Jurnal Elemen*. **6**(1) 39–55; <https://doi.org/10.29408/jel.v6i1.1688>
- [10] Ariani S, Hartono Y and Hiltrimartin C 2017 Kemampuan pemecahan masalah matematika siswa pada pembelajaran matematika menggunakan strategi Abduktif-Deduktif di SMA Negeri 1 Indralaya Utara *Jurnal Elemen*. **3**(1) 25; <https://doi.org/10.29408/jel.v3i1.304>
- [11] Lester F K 2013 Number 1 numbers 1 & 2 article 12 1-2013 recommended citation recommended citation lester *The Mathematics Enthusiast*. **10**(1) 245–278
- [12] Huda W N and Suyitno H 2017 Analysis of mathematical problem solving abilities in terms of students' motivation and learning styles *Journal of Primary Education*. **6**(3) 209–217
- [13] Bernard M, Nurmala N, Mariam S and Rustyani N 2018 Analisis kemampuan pemecahan masalah matematis siswa SMP kelas IX pada materi bangun datar *SJME (Supremum Journal of Mathematics Education)*. **2**(2) 77–83
- [14] Polya G 1973 *How to Solve It, Second Edition* (Princeton: Princeton University Press)
- [15] Alifah N and Aripin U 2018 Proses berpikir siswa SMP dalam memecahkan masalah matematik ditinjau dari gaya kognitif field dependent dan field independent *JPMI (Jurnal Pembelajaran Matematika Inovatif)*. **1**(4) 505; <https://doi.org/10.22460/jpmi.v1i4.p505-512>
- [16] Witkin, et al. 1977 Field-independent and field-dependent cognitive style and their educational implications *Review of Educational Research Winter*. **47**(1) 1-64
- [17] Woolfolk A 1993 *Education psychology* (Boston: Allyn and Bacon)
- [18] Amamah S, Sa'dijah C and Sudirman 2016 Proses berpikir siswa SMP bergaya kognitif field dependen dalam menyelesaikan masalah berdasarkan teori pemrosesan informasi *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*. **1**(2) 237–245
- [19] Reno P, Geni L and Hidayah I 2017 Kemampuan pemecahan masalah siswa pada pembelajaran problem based learning bernuansa etnomatematika ditinjau dari gaya kognitif *Unnes Journal of Mathematics Education Research*. **6**(1) 11–17
- [20] Lineaus J F, Rizal M and Anggraini A 2016 Analisis pemecahan masalah sistem persamaan linier dua variabel kelas X SMA Negeri 1 Banawa berdasarkan langkah-langkah polya *Jurnal Elektronik Pendidikan Matematika Tadulako*. **3**(3) 1–15
- [21] Vendiagrys L and Junaedi I 2015 analisis kemampuan pemecahan masalah matematika soal setipe timss berdasarkan gaya kognitif siswa pada pembelajaran model problem based learning *Unnes Journal of Research Mathematics Education*. **4**(1) 34–41

- [22] Tisngati U 2015 Proses berpikir reflektif mahasiswa dalam pemecahan masalah pada materi himpunan ditinjau dari gaya kognitif berdasarkan langkah polya *Beta: Jurnal Tadris Matematika*. **8**(2) 142–152
- [23] Wulan E R 2019 Gaya kognitif field-dependent dan field-independent sebagai jendela profil pemecahan masalah polya dari siswa SMP *Factor M*. **1**(2) 123–142; https://doi.org/10.30762/f_m.v1i2.1503
- [24] Rizal M 2013 *Profil pemecahan masalah siswa auditorial kelas X SLTA pada materi sistem persamaan linear dua variabel*. 2013.
- [25] Syamsuddin A 2020 identifikasi kedalaman berpikir reflektif calon guru matematika dalam pemecahan masalah matematika melalui taksonomi berpikir reflektif berdasarkan gaya kognitif *Jurnal Elemen*. **6**(1) 128–145; <https://doi.org/10.29408/jel.v6i1.1743>
- [26] Yuwono T, Supanggih M and Ferdiani R D 2018 Analisis kemampuan pemecahan masalah matematika dalam menyelesaikan soal cerita berdasarkan prosedur polya *Jurnal Tadris Matematika*. **1**(2) 137–144; <https://doi.org/10.21274/jtm.2018.1.2.137-144>