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Management Student Thinking Process in Solving Functional Problems

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ABSTRACT

Students in solving problems have different abilities according to their intelligence. The purpose of this study was to analyze the thinking processes of management students in solving functional problems. This study used a descriptive qualitative research type. The research subjects consisted of three students with the lowest, medium and highest average learning outcomes. The data collection technique was carried out by triangulation (combined) and the results of qualitative research emphasized meaning rather than generalization. The results show that: (1) Students with high average learning outcomes understand the problem, develop a resolution plan, solve the problem according to the plan and re-examine the results obtained so that the assimilation process is carried out at each stage. (2) Students with average learning are not understanding the problem carefully, causing errors in planning and problem solving. In the re-examination stage, the assimilation and accommodation process is carried out by students. (3) Students with low learning averages make imperfections in the assimilation and accommodation processes both in understanding the problem, compiling a settlement plan, solving problems and re-examining the results obtained.

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1. INTRODUCTION

Understanding mathematical concepts is a basic aspect needed by students in learning mathematics. By understanding mathematical concepts, students can solve various kinds of problems regarding mathematics. Research conducted by Hiebert and Lefevre in Robson [1] shows that mathematical thinking or mathematical understanding consists of two types, namely conceptual understanding and procedural understanding. Conceptual understanding includes understanding concepts, relationships and strategies while procedural understanding includes steps in solving a problem. In connection with the above, Ngilawajan [2] also said that many facts in the field still show that learning mathematics is only seen as a monotonous and procedural activity. So that students will find it difficult when they learn the application of mathematics, as is the case in learning economics and business mathematics. Students are required to understand mathematical concepts applied in economics such as the application of functions in the world of commerce, finding the break-even point, annuities and so on. If students do not understand the concept thoroughly, students will have difficulty solving the problems they face.

Problem solving is one of the techniques used to train students in understanding mathematical concepts. Troubleshooting involves using certain steps to find the right solution. Some experts suggest several steps that are applied in problem solving, one of which is Polya who provides several steps in solving a problem, namely: (a) understanding the problem, (b) formulating a settlement plan, (c) implementing a problem solving plan and (d) double check [3]. Krulik also provides another step in solving problems to develop Polya's ideas, namely: (a) reading and exploring, (b) choosing a strategy, (c)

solving the problem. And (d) looking back and reflection. In this study, a problem-solving process will be used based on the steps proposed by Polya.

Based on the results of tests conducted by Pisa in 2012 showed that Indonesia was ranked second to last out of 65 countries in the world with a math test score of 375 out of the best score of 613. In addition, empirical data from the results of the Trends in International Mathematics and Science Study (TIMSS) showed that the ability of Indonesian students in general is still very low, especially in the field of mathematics studies. The facts above show that students' understanding of mathematical concepts in solving mathematical problems in Indonesia is very low, this may be influenced by various factors such as students' thinking processes, learning processes, quality of education, teaching staff and so on. One of the factors, namely the thinking process of students in learning mathematics is an important point that must be addressed to improve the quality of education in Indonesia. Sudarman in Widodo [4] states that the thinking process is an activity that occurs in the human brain. While Siswono [5] states that the thinking process is a process that begins with receiving data, processing and storing it in memory which is then retrieved from memory when needed for further processing.

Management students are also required to study economic mathematics at the beginning of the semester, so that they also carry out problem solving processes and thinking processes in solving problems. The thinking process in learning mathematics is a mental activity that is in the minds of students, so Herbert in Herawati [6] states that to find out how students' thinking processes can be observed through the process of how to take tests and the results are written sequentially. how it works. To be able to stimulate and train students' thinking skills in learning mathematics, lecturers need to use appropriate methods or techniques in learning that can stimulate students to use all their thinking potential. Therefore, the lecturer's efforts to see how the students' thinking processes in solving mathematical problems are important so that the lecturers are able to provide teaching techniques for students to be able to have good thinking skills in understanding and mastering the mathematical concepts they are learning. in depth related to the thinking process of management students in solving economic and business mathematical problems so that lecturers can better know the right techniques in future learning as an effort to improve the quality of mathematics education in Indonesia in the future.

2. METHOD

This study aims to describe students' thinking processes in solving functional problems. This research was conducted at the Faculty of Economics, Lamongan Islamic University. This research used descriptive qualitative research methods. Qualitative research methods are research methods used to examine the condition of natural objects, where the researcher is the key instrument so that all researchers are tasked with collecting data to working out the output. such as reports, journals and proceeding articles. Data collection techniques are carried out by triangulation (combined) and based on [7][18] qualitative research results emphasizing meaning rather than generalization. The subjects in this study were three management students in semester 1 of the 2019 Academic Year/ 2020 with the average learning outcomes of the lowest, medium and high scores. Data collection techniques used observation, interviews and documentation. Then, the data that had been collected was triangulated using technical triangulation and analyzed using Miles and Huberman Model data analysis. The Miles and Huberman model in [7] has activities carried out, namely: data collection, data reduction, data display, and verification / drawing conclusions.

3. RELUST AND DISCUSSION

Based on the results of data analysis that has been carried out from the results of task-based interviews with the three subjects to obtain the thinking processes of management students in solving functional problems. Thinking processes are described at each step of problem solving. The problem-solving steps used refer to the problem-solving steps according to Polya include: (1) understanding the problem (understand the problem), (2) preparing a plan (device a plan), (3) carrying out the plan (carry out the plan), (4) check back (look back). The results of data analysis are obtained as follows:

Thinking Process of Students with High Average Learning Outcomes

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In the first stage, namely understanding the problem, the subject receives information by observing and reading the question aloud twice. FE begins to write down what is known and what is asked on the answer sheet. FE's perception on the problem of applying linear inequalities in everyday life can be directly converted into mathematical symbols correctly. FE tries to recall its knowledge by creating new variables to symbolize the cost of food A and the cost of food B with variables X_1 and X_2. The subject provided fairly clear information during the interview process regarding the mathematical representation as outlined in the answer sheet. Subjects confidently explain the process of symbolic representation of economic language into mathematical symbols. From the results of the interview, the subject understood the problem by knowing the core of the problem he was facing.

Furthermore, FE began to draw up a settlement plan by observing what was known without reading aloud. With this repetition method, the subject stores information for the stages of problem solving that are carried out. Subjects process information by linking the completion plan with the knowledge they have, namely by changing all known things to the form of a linear function. The subject re-explains the solution plan by graphing the linear equations of the constraint functions that have been formed in the problem. When compiling a completion plan, the subject explains how FE makes a graph, namely by determining the point of intersection on each of its axes. Subjects when planning problem solving by remembering the concept of a two-variable linear equation.

When carrying out the settlement plan, FE carries out a problem solving plan by writing on the answer sheet from the previous completion plan in accordance with the sequence, starting from finding the intersection point and drawing graphs on the Cartesian plane for all the constraint functions it has made. FE in carrying out the completion plan several times looked at the mathematical symbols that had been written in the understanding of the previous problem to provide confidence in what would be done on the graph. Thus, it can be concluded that the subject of FE stores information by repeating the previous steps. After that, FE gives points on the graph which according to him are critical points in the settlement set area. As in Figure 1 below:

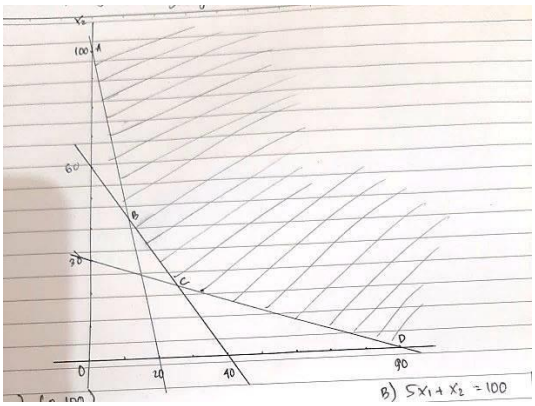

Figure 1. Results of FE's Work in Implementing the Completion Plan

in the picture it can be seen that FE provides several written symbols namely A, B, C, and D to indicate critical points which according to him will be checked to obtain the minimum value. In addition, during the interview, FE also said that the shading given emphasized that the settlement area was in the shading. FE has a logical argument against its solution, because everything it does is a linear inequality concept applied to economics and FE correctly translates and uses mathematical concepts in solving it.

At the last stage, namely checking the solution, the subject re-examines the problem only on the part of the graph he describes and the critical points he has made to find the maximum value, at this stage the subject is less careful in observing the intersection points which are the critical points, so the subject less observant in determining the critical points. Therefore, it can be concluded that when examining problem solving, the subject retains information by explaining how to solve it, but when processing the information the subject does

not relate to the core of the problem that should be the solution to the problem. So that the subject is less precise in determining the desired minimum value in the problem.

Student Thinking Process Average Learning Outcomes

In the first stage, namely understanding the problem, the subject receives information by observing and reading the questions silently. SL then began to write down what was known and what was asked on the answer sheet. Based on the results of the interview, SL was very sure that what was written was correct. As in the conversation below:

Q: What do you think about the questions you are working on?
SL: In terms of questions, it's not difficult, I just need to symbolize it in the form of an equation, I hope it's correct, doesn't it... looks like it's correct.
P : OK, does that mean what has been known and asked has been caught, right?
SL: yes bud..

Figure 2. Conversations between researchers and SL

From the results of the interview above, it can be seen that the perception of SL shows that the problems faced are the application of linear functions in everyday life that can be changed in the form of mathematical symbols. SL tries to recall the knowledge it has by creating new variables to symbolize the cost of food A and the cost of food B with variables X_1 and X_2. However, during the follow-up interview, SL seemed to be not careful in observing the problem, so there was one constraint function that was not written completely in the information he knew, as a result all important information was not written correctly.

Furthermore, SL began to develop a settlement plan by observing what was written on the answer sheet, it was seen that the author made movements by circling some of the variables he wrote. In carrying out the settlement plan, SL carries out its settlement plan by finding the intersection point of each constraint function and describing it in a Cartesian diagram. SL during carrying out the completion plan looks very confident with the work he is doing. explains how the intersection point of each constraint function is searched and explained very loudly and shaded in every area that is not a solution set. Furthermore, SL also looks for the critical point of each set of solutions carried out from the planning process that has been thought out previously, this can be seen in the picture below:

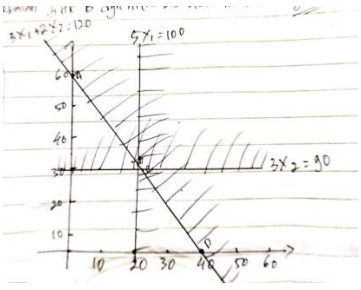

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Figure 3. Results of SL's Work in Implementing the Completion Plan

In the picture, it can be seen that the subject provides shading for every linear equation described, it's just that SL is too sure of what was written earlier as initial information from the mathematical symbolization of the economic problems he is facing, resulting in further errors in solving the problem.

In the last stage, namely checking the solution, the subject re-examined the problem only on the graph section and the critical point he determined, so that SL directly did the calculations to find the minimum value asked for the question in the objective function. continue to solve the problem from the initial information written in the question sheet. Therefore, it can be concluded that the subject is less careful in examining what is written on the things that are known and asked about the problems he faces, so that the information received at the beginning of his perception is under the direct completion stage.

The Thinking Process of Students with Low Average Learning Outcomes

In the first stage, namely understanding the problem, the subject receives information by observing and reading the question aloud twice. SW began to write down what he knew incompletely on his answer sheet. SW perception the problem he faces is a problem related to linear equations. SW tries to recall his knowledge by creating new variables to symbolize the cost of food A and the cost of food B with variables X_1 and X_2. The subject gave unclear information during the interview process about what he wrote related to what was known and what was asked. The subject is not sure in explaining the mathematical symbols he wrote.

Next, SW begins to draw up a settlement plan by observing what is known by reading it aloud twice. With this repetition method, the subject stores information for the stages of problem solving that are carried out. The subject processes the information by finding the intersection point on each X and Y axes. Next, SW makes a graph by determining the intersection point on each axis in several Cartesian diagrams. In processing information, SW writes a solution plan that is not detailed and directed, sometimes SW rereads the problem aloud as if he does not understand the problem he is facing. SW directly describes the constraint functions in a Cartesian plane and directly determines the critical point without writing down the solution. SW does not give assumptions to the solution set described in the Cartesian plane. The following is the result of SW's written work.

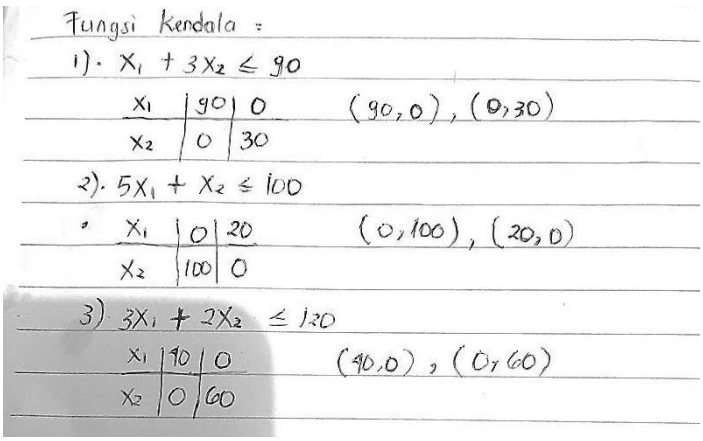

Figure 4. Results of SW's written work in compiling a completion plan

In the last stage, namely checking the completion, SW did not re-examine the problem in the graphic section and the critical points that have been determined.

> *Q: Are you sure about the answer you got?*
> *SW: the steps look like this, ma'am, but I'm not sure if the answer is correct or not, hehe*

Based on the written results and interviews with the subject, SW did not re-read the questions aloud, so that the storage of information received was not processed properly. SW directly calculated the minimum value of the written solution.

4. CONLUSION

Based on the results of the analysis and discussion that have been described previously, the following conclusions are obtained: (1) Students with high average learning outcomes understand the problem, develop a plan of completion, solve problems according to the plan and re-examine the results obtained properly so that the assimilation process is carried out at each stage . (2) Students with average learning are not understanding the problem carefully, causing errors in planning and problem solving. In the re-examination stage, the assimilation and accommodation process is carried out by students. (3) Students with low learning averages make imperfections in the assimilation and accommodation processes both in understanding the problem, compiling a settlement plan, solving problems and re-examining the results obtained. From these results, suggestions can be made to lecturers of economics and business mathematics to be able to motivate and give more attention to students with low average learning outcomes when solving mathematical problems, especially material related to the application of mathematics in the world of economics. low learning averages to solve problems with clear stages such as using polya steps so that students find it easier to solve problems. And lecturers must familiarize all students with being able to re-examine the answers they have written in order to provide confidence in the correctness of the answers they have written. .

REFERENCES

[1] Robson, D., Walt, A., Therese, B.. 2012. Encouraging Students to Think Strategically When Learning to Solve Linear Equations. *International Joernal for Mathematics Teaching and Learning,* ISSN 1473-011.

[2] Ngilawajan, D. A. (2013). Proses Berpikir Siswa SMA dalam Memecahkan Masalah Matematika Materi Turunan Ditinjau dari Gaya Kognitif Field Independent dan Field Dependent. Pedagogia, 1 (2), 71-83

[3] Widodo, S.A. (2012). Proses Berpikir Mahasiswa dalam Menyelesaikan Masalah Matematika Berdasarkan Dimensi Healer.Prosiding, FMIPA UNY, 85,796-800.

[4] Siswono, T. Y. E. (2002). Proses Berpikir Siswa dalam Pengajuan Soal. Konferensi Nasional Matematika XI, 22-25 Juli 2002, Malang

[5] Herawati, S. (1994). Penelusuran Kemampuan Siswa Sekolah Dasar dalam Memahami Bangun-bangun Geometri.(Studi Kasus di kelas V SD No. 4 Purus Selatan).Tesis magister, tidak diterbitkan, IKIP Malang.

[6] Depdiknas. 2003. *Pedoman Khusus Pengembangan Sistem Penilaian Berbasis Kompetensi SMP.* Jakarta: Depdiknas.
[7] Syairozi, M. I., & Fattah, A. (2018). "YOUTH CREATIVE ENTERPRENEUR EMPOWERMENT (YOUTIVEE)": SOLUSI BAGI KAUM MUDA UNTUK BERKONSTRIBUSI PADA PEREKONOMIAN DAN MENGURANGI PENGANGGURAN. *Jesya (Jurnal Ekonomi dan Ekonomi Syariah)*, *1*(2), 43-55.
[8] Baroody, A. J., Feol, Y., & Johnson, A.R. (2007). An alternative Reconceptualization of Prosedural and Conceptual Knowladge.*Journal for Research in Mathematics Education*, *38*, 115-131.
[9] diSessa, A. A., Gillespie, N. M., & Esterly, J. B. 2004. Coherence versus Fragmentation in the Development of the Concept of Force.*Cognitive Science, 28,* 843-900.
[10] Schneider, M. & Stern, E. 2009. The inverse relation of addition and substraction: a Knowledge Integration Perspective. *Mathematical Thinking and Learning, 11,* 92-101.
[11] Duffin, J. M..& Simpson, A. P. 2000.A Search for Understanding.*Journal of Mathematical Behavior. 18(4):* 415-427.
[12] Candra, I. W., dkk. (2017). *Psikologi.*Yogyakarta: Andi.
[13] Wardana, Uswah. (2004). *Psikologi Umum.*Jakarta: PT. Bina Ilmu.
[14] Widyastuti, R., Budi U, Riyadi. 2013. Proses Berpikir Siswa SMP dalam Menyelesaikan Masalah Matematika Berdasarkan Langkah-langkah Polya ditinjau dari Adversity Quotient. *Jurnal Pembelajaran Matematika,* 1 (2), 239-249.
[15] Muhtarom, A., Syairozi, M. I., & Yonita, H. L. (2022). Analisis Persepsi Harga, Lokasi, Fasilitas, dan Kualitas Pelayanan terhadap Loyalitas Pelanggan Dimediasi Keputusan Pembelian (Studi Kasus pada Umkm Skck (Stasiun Kuliner Canditunggal Kalitengah) Metode Structural Equation Modelling (SEM)-Partial Least. *EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi dan Bisnis*, *10*(S1), 391-402.
[16] National Council of Teachers of Mathematics. 2000. *Principles and Standards for School Mathematics.* United States of America.
[17] Güler, G., Çiltaş, A. 2011. The Visual Representation Usage Levels of Mathematics Teacher and Students in Solving Verbal Problem.*International Journal Of Humanities and Sosial Science.* 1 (11).
[18] Sugiono. 2011. *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Bandung: Alfabeta.