



Analyzing Students' Deductive Reasoning and Problem-Solving Skills in Algebraic Derivatives: The Role of Adversity Quotient (AQ)

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Abstrak

Tujuan penelitian ini adalah menganalisis dan mendeskripsikan penggunaan kemampuan penalaran deduktif dan pemecahan masalah matematika berbasis Adversity Quotient (AQ). Jenis penelitian yang digunakan adalah penelitian deskriptif kualitatif. Instrumen dalam penelitian ini berupa soal tes kemampuan penalaran deduktif dan pemecahan masalah, dan kuisisioner AQ. Responden penelitian berjumlah 20 siswa. Responden dibagi menjadi tiga tipe yaitu Quitter, Camper, dan Climber. Hasil penelitian menunjukkan bahwa mahasiswa dengan tipe Quitter hanya mampu melakukan perhitungan berdasarkan aturan/rumus saja, tetapi belum mampu menarik kesimpulan dan menyusun langkah-langkah pembuktian langsung sehingga indikator pemecahan masalah belum tercapai secara maksimal. Siswa dengan tipe Camper sudah mampu melakukan perhitungan berdasarkan aturan atau rumus, serta mampu merencanakan dan melaksanakan rencana pada aspek pemecahan masalah. Siswa dengan tipe Climber dapat memenuhi semua indikator penalaran deduktif dan pemecahan masalah dalam memahami masalah, merencanakan, melaksanakan rencana, dan memeriksa kembali.

Kata Kunci: Adversity Quotient, Penalaran deduktif, Pemecahan Masalah.

Abstract

The purpose of this study was to analyze and describe the use of deductive reasoning and mathematical problem solving skills based on Adversity Quotient (AQ). The type of research used is qualitative descriptive research. The instruments in this study were deductive reasoning and problem solving ability test questions, and AQ questionnaires. The number of respondents in the study was 20 students. Respondents were divided into three types, namely Quitter, Camper, and Climber. The results showed that students with the Quitter type were only able to make calculations based on rules/formulas, but had not been able to draw conclusions and compile direct proof steps so that the problem solving indicators had not been achieved optimally. Students with the Camper type were able to make calculations based on rules or formulas, and were able to plan and implement plans in the problem solving aspect. Students

with the Climber type were able to meet all indicators of deductive reasoning and problem solving in understanding problems, planning, implementing plans, and re-checking.

Keywords: Deductive Reasoning, Problem Solving, Adversity Quotient.

A. Introduction

Mathematical reasoning is reasoning in mathematics. Mathematical reasoning connects information to draw conclusions (Manyira, M., Saidi, S., & Hamid, 2021). Learning and reasoning in arithmetic are inseparable. Understanding and training reasoning may be done simultaneously via mathematics learning. When studying arithmetic, pupils must reason. Students' reasoning skills are measured by their ability to present mathematical statements orally, in writing, in pictures and diagrams; put forward conjectures; perform mathematical manipulations; compile evidence; provide reasons or evidence for the solution; draw conclusions from statements; check the validity of an argument; and find patterns or properties of mathematical phenomena to make generalizations. From the explanation above, mathematical reasoning may be divided into inductive and deductive. Inductive reasoning draws conclusions from particular statements to generic statements (Amir, 2015). In deductive reasoning, specificity follows applied generality (Winarso, 2018). Furthermore, this course will include logical reasoning. A person will contemplate how to resolve an issue using deductive reasoning.

The thought process for solving a problem includes analyzing the issue, forming conclusions, and re-examining Polya's answer (Alhusna, C., 2020). Arithmetic operations, logical conclusions, explanations of models, facts, properties, relationships, or patterns, counterexamples, inference rules, argument validity checks, valid argument compilation, definitions, and direct, indirect, and mathematical induction proofs are examples of deductive reasoning (Mawarni Nehe, Pargaulan Siagian, 2017). The ability to calculate using rules or formulas, draw logical conclusions with inference rules, and compile direct, indirect, and mathematical induction proofs indicates a person's deductive reasoning ability (Baroody, 2017). Development of logical thinking affects mathematical problem-solving. Solving these difficulties demands hard thinking and accepting challenges to solve them. Formulas, theorems, and work rules are not necessarily necessary to solve issues, as their solutions vary (Siagian, S. S., Mujib, A., 2024). Due to the significance of mathematics teachings, particularly deductive reasoning and problem solving, student-centred learning is encouraged to make learning more engaging and enhance education (Hr, 2020).

Teachers must be able to enhance education and identify alternate learning methods to boost students' deductive reasoning skills. AQ (Adversity Quotient) intelligence is employed for problem-solving (Usman, M. R., & Syam, 2022). A person's aptitude or intellect to live and overcome problems is called AQ (Minarni, 2017). AQ may indicate if someone can overcome their challenges to become winners or give up or quit when they meet severe problems. Students

will experience barriers, difficulties, and challenges while addressing problems ((Hidayat, W., & Sariningsih, 2018). It's commonly recognized that students have different backgrounds and personalities. They can answer problem-solving questions because numerous variables affect problem-solving success. Six factors related to IQ, EQ, and SQ are widely discussed and investigated. Adversity Quotient (AQ) is another success component that may be unfamiliar to us. Stoltz says "Adversity quotient is the capacity of the person to deal with the adversities of his life" . This viewpoint means "a person's ability to face the challenges of adversity in his life" (Mulyani, 2019). Thus, AQ is a specific intelligence connected to students' creative and critical thinking in addressing reasoning-based challenges.

The graphic above shows that students with high and low adversity quotients utilize their reasoning skills differently while assessing peers and subsequently solving problems. Students with high adversity quotients solve issues better than those with low ones. Students' fighting spirit seems to be the key issue. Low student battling spirit shows poor problem-solving. This hurts educational development and pupils. Low problem-solving skills limit pupils' motivation to achieve (Rahayu, N., & Alyani, 2020). Math may be utilized to teach kids, build their personalities, and improve abilities (Sarah, R., & Iskandar, 2017). The problem-solving strategy taught in schools may be used to prepare pupils to solve mathematical problems, which are beneficial for learning and for developing problem-solving skills (Saragih, S., & Habeahan, 2014).

According to the answers above, students with high abilities can apply good problem-solving strategies and control difficulties, so they can solve the problems given even if their knowledge sources are lacking due to their fighting spirit. Students with low abilities will not have good control over difficulties, resulting in an inability to solve problems even with sufficient knowledge sources (Fadillah, 2019), so students with good problem-solving abilities and a good fighting spirit in facing difficulties are thought to have a good quality of life and vice versa. AQ is a key intelligence concept to understand and define. Problem-based assessments help strengthen pupils' logical thinking. The researcher will teach algebraic function derivatives since it is problem-based and trains students' logical thinking. Based on first observations on February 12, 2024, the field determined that pupils' mathematical thinking and problem-solving skills are still lacking, notably in algebraic function derivatives. Reasoning mistakes and problem comprehension result from reasoning deficits ((Rusdewanti, Panca Putri, 2014).

Students have trouble applying algebraic function derivatives in procedural, conceptual, or application questions to problem-solving schemes; understanding mathematical symbols or terms in questions so they don't understand the core of the problem; and understanding the right

mathematical concepts and applying them to problem-solving strategies or difficult problems (Branca, 2017). These questions encourage students to think, solve issues, and discover algebraic function derivative mathematical processes/concepts. However, when applying it, students are confused by long conceptual or applied questions, making it hard to understand and making mistakes when using the correct algebraic function derivative concept.

Like other students' responses, kids can't grasp the problems and solve them appropriately. Another issue is that students still struggle to compile straightforward proofs using algebraic function derivatives. According to (Saputra, E., & Zulmaulida, 2021), assembling direct proofs utilizing concepts/theorems is the lowest measure of reasoning skill. If arithmetic mistakes, particularly problem-solving errors, are not corrected quickly, they will affect pupils' knowledge of later mathematical ideas. Learning math involves connected and helpful content. Additionally, the instructor will utilize the analysis findings to help pupils with their issues. From the description above, the researcher will study how students' Adversity Quotient (AQ) affects their deductive reasoning and problem-solving abilities by examining the fighting power of high school students in class XI in overcoming mathematical challenges, especially algebraic function derivatives. Researchers will relate these issues to undertake a study. The purpose of this study is: To analyze students' deductive reasoning abilities and solve mathematical problems of class XI SMA Swasta Pembangunan Galang on the material of algebraic function derivatives.

B. Research Method

The research approach is descriptive qualitative (Moleong, 2017). Qualitative research describes, explores, and understands the significance of social or humanitarian issues for individuals or communities (Creswell, 2016). This study was done at SMA Swasta Pembangunan Galang on Jalan Petani Lingkungan VII. This site was selected because the school employs the adversity quotient approach to teach thinking and problem-solving, which builds character. The study was done in the even semester of 2023/2024; however, further interviews and observations were done from January to February 2024 to refine the results. Based on the literature analysis, the research instrument was created to gather thorough data and information on the topics researched. Instrument quality considerably affects research results. Twenty grade XI students participated. The data analysis technique used in this study is interactive analysis according to (Miles, B. M., Huberman, M. A., & Saldana, 2014). The reason this study uses a descriptive qualitative approach is because in this study the data collected and analyzed are descriptive data obtained from data in the form of writings, words and documents originating from sources or informants that are researched and can be trusted.

This research employed exams, interviews, and questionnaires. The image shows research implementation stages:

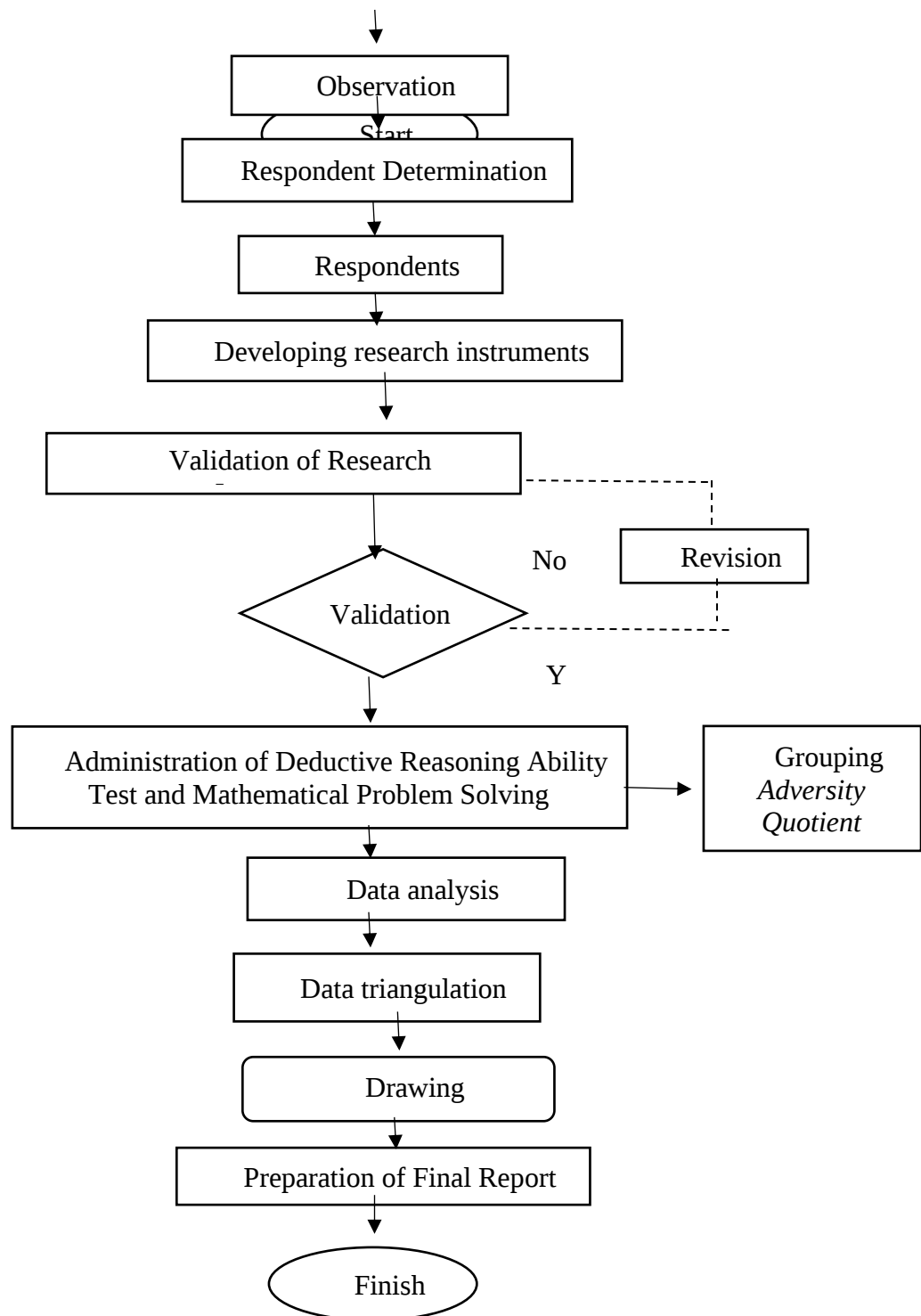


Figure 2. Research Design Chart

C. Result and Discussion

In this study, the data presentation is the clarification and identification of students' answers based on deductive reasoning indicators and mathematical problem solving indicators which are given information in the form of deductive reasoning ability analysis codes in problem solving. The indicator codes for deductive reasoning ability in solving linear programming problems can be seen in table 1 below.

Table 1. Coding of Deductive Reasoning Ability Indicators in Problem Solving

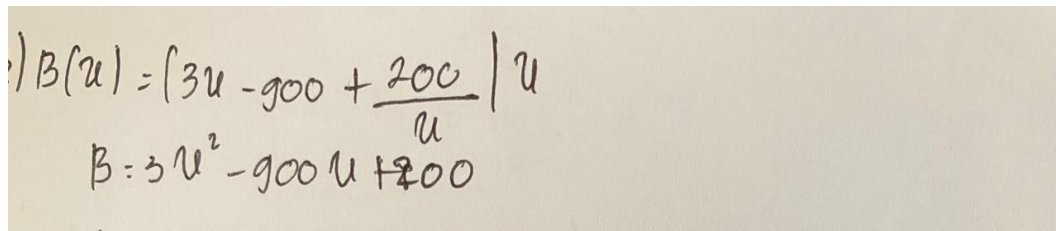
Respondents	Indicators Reasoning	Solution to problem			
		Understanding the Problem (1)	Planning the Settlement (2)	Executing the Plan (3)	Checking Back (4)
R1	Deductive (P) Carrying out Calculations Based on Certain Rules/Formulas (MP)	R1PMP1	R1PMP2	R1PMP3	R1PMP4
R2		R2PMP1	R2PMP2	R2PMP3	R2PMP4
R3		R3PMP1	R3PMP2	R3PMP3	R3PMP4
R1	Drawing Logical Conclusions (MK)	R1PMK1	R1PMK2	R1PMK3	R1PMK4
R2		R2PMK1	R2PMK2	R2PMK3	R2PMK4
R3		R3PMPK1	R3PMK2	R3PMK3	R3PMK4
R1	Compiling Direct Proof (ML)	R1PML1	R1PML2	R1PML3	R1PML4
R2		R2PML1	R2PML2	R2PML3	R2PML4
R3		R3PML1	R3PML2	R3PML3	R3PML4

In answering the first algebraic function derivative question (R1) it takes 25 minutes. The first step taken by R1 is to read the question and try to understand the question in order to obtain the information needed. R1 is able to write down the data known by the story question in the application of algebraic function derivatives.

Drawing conclusions is the final stage in the data analysis process. In this section, the researcher states the conclusions from the data that has been obtained. In this study, drawing conclusions is based on deductive reasoning skills, problem-solving indicators and Adversity Quotient. Drawing conclusions is based on the results of working on responses with problem solving, Adversity Quotient questionnaires and interviews.

Description of First Respondent Data (R1) Quitter Type on Mathematical Problem Solving Questions

The first algebraic function question (R1) takes 25 minutes. R1 initially reads and understands the query to get the information. R1 can write the story question's data using algebraic function derivatives, including knowing the equation $(3x-900+200/x)$ hundred thousand rupiah, and using the algebraic function derivative rule formula to determine the maximum and minimum values, namely if $x=0$ at $f'(a)=0$ so that $f''(a)>0$. $B(x)=(3x-900+200/x)x$ is the first derivative of the original equation, which students may calculate using the derivative function formula. R1 also recorded the minimal cost of the equation and the first derivative. Next, students calculate the building project equation's least cost using the algebraic function derivative rule formula. The algebraic function derivative rules/concepts are used to generate the first derivative equation so students may better grasp a direct proving procedure. The algebraic function derivative rule formula yields the minimal cost, $B'(x)$. Due to the story question in the algebraic function derivative function, mathematical modelling is needed, but R1 cannot do it. Following image shows R1's work outcomes.



$$B(u) = \left(3u - 900 + \frac{200}{u} \right) u$$

$$B = 3u^2 - 900u + 200$$

Figure 3. Results of R1's Work Understanding Problems in Problem Solving

The question states that the function $B(x)$ is the key solution procedure for the STIS Building construction cost equation's least cost. According to Figure 3, R1 cannot comprehend the question's issue and cannot calculate using rules/formulas. R1 cannot use mathematical modelling or algebraic function derivative formulas to determine the minimum cost of the equation. Instead, R1 correctly writes the first derivative of the equation without considering the conditions, such as $x=0$ at $f'(a)=0$ so that $f''(a)>0$, meaning $x=a$ is the minimum $f(x)$.

Description of Second Respondent Data (R2) Camper Type on Mathematical Problem Solving Questions

R2 took 20 minutes to solve the algebraic function derivative question. R2 started by reading and understanding the question to gather the knowledge required to solve it. R2 wrote down the story question of the derivative of the algebraic function, $(3x-900+200/x)$ hundred thousand rupiah, and the student was able to find the formula for the solution using the derivative formula. If $x=0$ at $f'(a)=0$ and $f''(a)>0$, then $f(x)$ is minimal at $f(a)$. At $f'(a)=0$, $x=a$ is the maximum $f(x)$ maker or $f(a)$ is the greatest value of $f(x)$. Students used the derivative function formula to find the maximum and lowest values of a given equation in contextual scenarios. Since R2 detailed the known sections, his responses were better than R1's. Thus, R2 can solve the algebraic function derivative application issue by applying the rule of the algebraic function derivative formula to calculate the number of days required to lower the cost of

constructing the STIS constructing. Algebraic function derivatives are needed to solve the application/contextual issue. R2 has successfully utilized these mathematical notions. See Figure 4. for R2's findings.

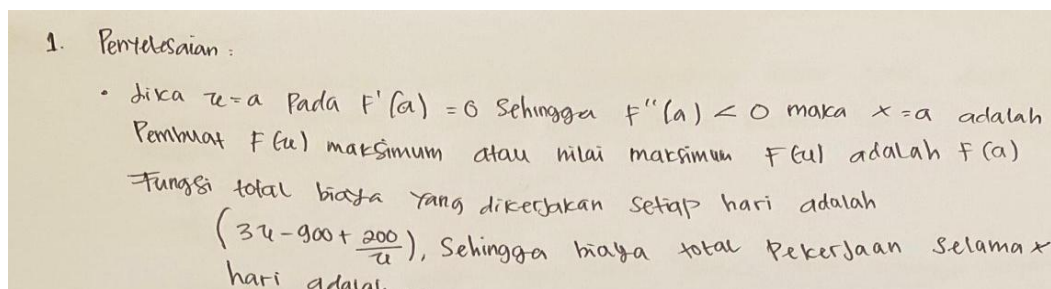


Figure 4. Results of R2's Work in Understanding Problems in Problem Solving

According to Figure 4. R2 calculates using rules/formulas to grasp the situation. R2 uses the rule of algebraic function derivatives to solve the problem, producing a more specific, detailed, and logical answer than R1. R2 may also explain the derivative formula for the algebraic function that will be utilized to determine the equation's maximum and lowest values from the questions.

Description of Data of Third Respondent (R3) Climber Type in Mathematical Problem Solving Questions

Third responder (R3) required 20 minutes to solve the algebraic function derivative question. R3 read the question to grasp it and acquire the information. R3 wrote down the equation $(3x-900+200/x)$ which became $B(x)=(3x-900+200/x)x$, which was clearer than R1 and R2, and the mathematics written by R3 was in accordance with what it should be, namely the writing of mathematical symbols/terms. Students were able to understand the derivative formula and the solution to determine the minimum value to b. To help R3 create and determine the function formula for solving the problem, if $x=0$ at $f'(a)=0$, $f(x)$ is the minimum maker or the minimum value of $f(x)$ is $f(a)$. If $x=a$ at $f'(a)=0$, $f(x)$ is the maximum maker or the maximum value of $f(x)$. The daily cost function is $(3x-900+200/x)$, hence the overall cost of work for x days is $B(x)=(3x-900+200/x)x$, or $3x^2-900x+200$. The derivative of $B(x)$ is $B'(x)=6x-900$. The issue requires algebraic function limits. R3 understands these notions. Figure .5 shows R3's findings.

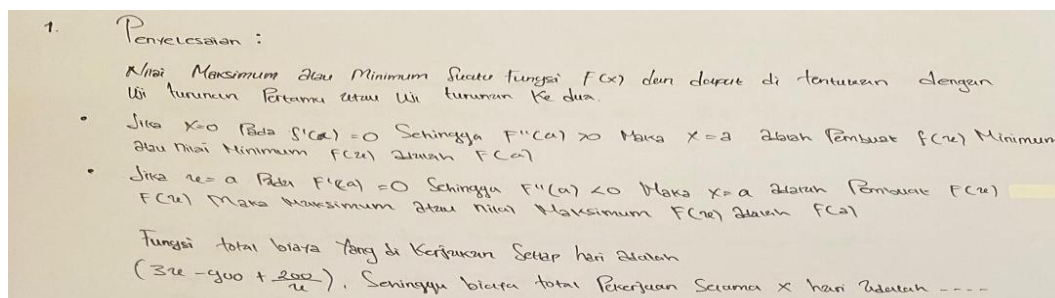


Figure 5. Results of R3's Work in Understanding Problems in Problem Solving

Figure .5 shows that R3 can calculate contextual issues using rules/formulas. R3 solves the derivatives of algebraic functions issue utilizing curve functions and coordinate locations that are known accurately using formulas/rules from the first derivative of algebraic functions, avoiding errors.

Description of First Respondent Data (R1) Quitter Type in Deductive Reasoning

This course has two tests: mathematical problem solving and logical reasoning. Student deductive reasoning exam solutions will be discussed here. The first algebraic function derivative question (R1) takes 15 minutes. R1 initially reads and understands the query to get the information. R1 can record the curve and point (2,9) for the solution, and students can use the algebraic function limit formula ($m_{PGS} = \lim_{\Delta x \rightarrow 0} \frac{f(x_1 + \Delta x) - f(x)}{\Delta x}$) to solve the problem. Using the given location (2,9), students may utilize the derivative function to change the preceding function to $2 \Delta x^2 + 11 \Delta x + 9$. Following the question, R1 recorded the gradient of the tangent line of the curve $y = 2x^2 + 3x - 5$. Students then determine the gradient of the curve's tangent line using the algebraic function limit formula. The algebraic function limit rule is used to find the gradient equation to help pupils grasp direct proof. The algebraic function limit rule yields m_{PGS} , the tangent line gradient. This issue requires mathematical modelling of the derivative curve of the algebraic function and the limit rule, however R1 struggled. See R1's findings in the picture below.

Handwritten work by R1:

b, dan c

Jawab.

Diketahui Kurva $y = 2x^2 + 3x - 5$ pada titik (2,9)

$Fx = 2x^2 + 3x - 5$

$F2 = 2 \cdot 2^2 + 3 \cdot 2 - 5 = 8 + 6 - 5 = 9$

$F2 + \Delta x = 2 \cdot 2^2 + \Delta x \cdot 2 + 6 + 3 \Delta x - 5$

$= 2 \Delta x^2 + 11 \Delta x + 9$

$m_{PGS} = \lim_{\Delta x \rightarrow 0} \frac{F2 + \Delta x - F2}{\Delta x}$

$m_{PGS} = \lim_{\Delta x \rightarrow 0} \frac{2 \Delta x^2 + 11 \Delta x + 9 - 9}{\Delta x}$

$m_{PGS} = 0 + 11 = 11$

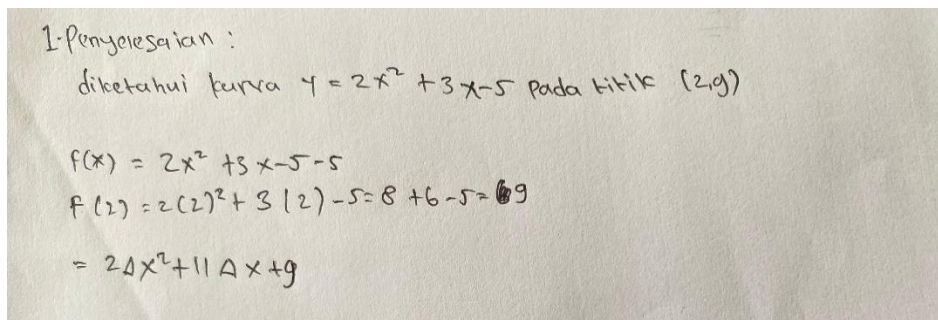
Figure 6, Results of R1's Work Performing Calculations Based on Rules/Formulas in Deductive Reasoning

The question states that the function curve y is the primary solution procedure for finding the tangent line gradient. Figure 6 shows that R1 does not use rules/formulas to comprehend the situation. The gradient of the tangent line cannot be found using mathematical modelling of the limit of algebraic functions, thus R1 merely prints the curve y without using the formula.

Description of Second Respondent Data (R2) Camper Type in Deductive Reasoning

R2 took 20 minutes to solve the procedural question on the algebraic function derivative. R2 started by reading and understanding the question to gather the knowledge required to solve it. The student utilized the algebraic function limit formula $m_{PGS} = \lim_{\Delta x \rightarrow 0} \frac{f(x_1 + \Delta x) - f(x)}{\Delta x}$ to solve the curve $y = 2x^2 + 3x - 5$ at point (2,9). Using the given position (2,9), the student used the derivative function to formulate $2 \Delta x^2 + 11 \Delta x + 9$. R2

detailed the known sections to improve his response above R1. R2 can solve the issue by determining the y curve gradient using the limit rule of algebraic functions. The limit rule of algebraic functions is needed to solve the issue. R2 has successfully utilized these mathematical notions. R2's findings are shown in Figure 7.



1. Penyelesaian :

diketahui kurva $y = 2x^2 + 3x - 5$ pada titik $(2,9)$

$$f(x) = 2x^2 + 3x - 5$$

$$f(2) = 2(2)^2 + 3(2) - 5 = 8 + 6 - 5 = 9$$

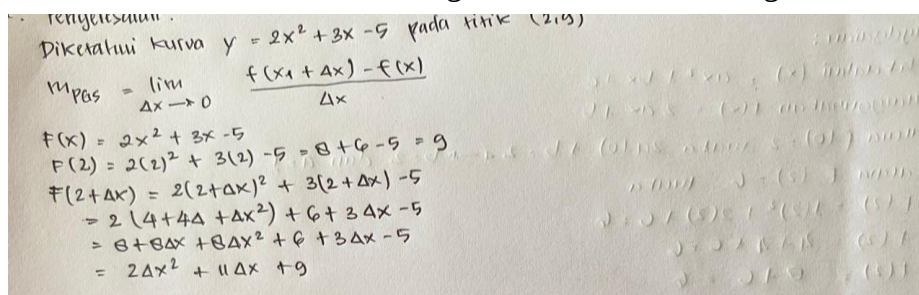
$$= 2\Delta x^2 + 11\Delta x + 9$$

Figure 7. Results of R2's Work in Carrying Out Calculations Based on Rules/Formulas in Deductive Reasoning

Based on Figure 7, R2 carries out calculations based on rules/formulas in understanding the problem. R2 makes a solution to the answer from the application of the concept of the rule of derivatives of algebraic functions. R2 is also able to describe the function of the y curve and the points passed through well from the given problem

Description of Data of Third Respondent (R3) Climber Type in Deductive Reasoning

R3, who required more time to deliberate, took 25 minutes to solve the derivative of the algebraic function question. R3 read the question to grasp it and acquire the information. R3 represented the curve $y = 2x^2 + 3x - 5$ at point $(2,9)$ in a clearer manner than R1 and R2, using clear writing and mathematical symbols/terms. Students were able to understand the solution formula, namely the algebraic function limit formula m_P. R3 can find the function formula for addressing the problem: $(x) = 2x^2 + 3x - 5 \rightarrow f(2) = 2(2)^2 + 3(2) - 5 = 8 + 6 - 5 = 9 \rightarrow f(2 + \Delta x) = 2(2 + \Delta x)^2 + 3(2 + \Delta x) - 5 \rightarrow 2(4 + 4\Delta x + \Delta x^2) + 6 + 3\Delta x - 5 \rightarrow 8 + 8\Delta x + 2\Delta x^2 + 6 + 3\Delta x - 5 \rightarrow 2\Delta x^2 + 11\Delta x + 9$. The issue requires algebraic function limits. R3 understands these notions. Figure 8 shows R3's findings.



1. Penyelesaian :

Diketahui kurva $y = 2x^2 + 3x - 5$ pada titik $(2,9)$

$$m_{\text{pas}} = \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

$$f(x) = 2x^2 + 3x - 5$$

$$f(2) = 2(2)^2 + 3(2) - 5 = 8 + 6 - 5 = 9$$

$$f(2 + \Delta x) = 2(2 + \Delta x)^2 + 3(2 + \Delta x) - 5$$

$$= 2(4 + 4\Delta x + \Delta x^2) + 6 + 3\Delta x - 5$$

$$= 8 + 8\Delta x + 2\Delta x^2 + 6 + 3\Delta x - 5$$

$$= 2\Delta x^2 + 11\Delta x + 9$$

Figure 8. Results of R3's Work in Performing Calculations Based on Rules/Formulas in Deductive Reasoning

Based on Figure 8, it is obtained that R3 can carry out calculations based on rules/formulas in understanding the given problems. R3 is able to use formulas/rules from the limits of algebraic functions in solving problems of derivatives of algebraic functions using curve functions and coordinate points that are known precisely, so that R3 does not make mistakes in solving the problems.

Discussion

Based on the purpose of this study, namely to describe the ability of deductive reasoning in problem solving as reviewed from the Adversity Quotient, it will be discussed based on the indicators of deductive reasoning, namely calculating based on certain rules/formulas, drawing logical conclusions, and compiling direct evidence and solving problems according to (Polya, 1973) (understanding the problem, making a plan, carrying out the plan, and checking again). Performing calculations according to specific rules or formulas during problem solving indicates that students are recognizing mathematical processes and concepts, which align with the stages of problem solving outlined by Polya: understanding the problem, making a plan, carrying out the plan, and checking again.

In the Quitter/R1 type, they are only able to understand the problem, are unable to plan a solution, are unable to carry out the solution plan, and are unable to check the answers that have been written. This is in line with the research of (Roswanti, 2020) that students in the quitter category have less ability in solving every mathematical problem, where they are only able to understand a problem. And quitter students only meet one of the four problem-solving indicators, namely understanding the problem (Sarwono, E., Yusmin, E., Suratman, 2018). In the Camper/R2 type, they are able to understand the problem, plan a solution, and implement the plan but are unable to recheck the written answers. This is in line with the research of (Sarah, R., & Iskandar, 2017) that camper respondents are able to carry out 3 stages of problem solving, namely (1) the stage of understanding the problem, (2) the stage of planning the solution, and (3) the stage of carrying out the problem-solving plan. For the 4th stage of re-examination, camper respondents have not been able to do this stage. In the Climber/R3 type, they have been able to meet all problem-solving indicators, namely understanding the problem, planning a solution, implementing the plan, and rechecking the answers. This is in line with the research of (Rahayu, I. F., & Aini, 2021) that climbing-type students are able to meet all problem-solving indicators in story questions, which include indicators of understanding the problem, planning a problem-solving strategy, implementing a problem-solving plan, and re-checking the results of problem-solving. Drawing logical conclusions in problem-solving is an indicator of students providing reinforcement and drawing conclusions from the final results obtained with the problem-solving stages based on Polya's steps, namely understanding the problem, making a plan, implementing the plan, and rechecking.

At the stage of drawing logical conclusions, quitter/R1 students and camper/R2 students were unable to understand the problem given, were unable to plan a solution, were unable to implement the solution plan properly, and were unable to recheck the answers that had been written. This is also in line with the research of (Alhusna, C., 2020), which found that quitter and camper respondents were unable to carry out all stages of problem-solving properly and correctly. In R3/Climber type, they were able to fulfill all problem-solving indicators, namely understanding the problem, planning a solution, implementing the plan, and rechecking the answers. This is also in line with the research of that students in the climber category have very good abilities in solving problems by fulfilling the four indicators, namely understanding, planning, implementing problem solving, and re-evaluating.

D. Conclusion

The following conclusions may be taken from the preceding chapter's study and debate. Students with the Adversity Quotient (AQ) type Quitter have not yet met the deductive reasoning ability indicator for calculations based on rules/formulas, drawing conclusions, and compiling direct evidence. Responses to the mathematical problem solution indication only grasp the issue and cannot plan, solve, or review responses. Students with Adversity Quotient (AQ) type Campers have not yet satisfied the deductive reasoning ability indication, which requires drawing inferences and accumulating direct evidence while solving mathematics problems. In the mathematical problem-solving indication, responders grasp the issue, plan, solve, and are pleased with the solutions without rechecking. Students with the Climber type Adversity Quotient (AQ) can solve mathematical problems by meeting deductive reasoning indicators like calculating using rules/formulas, drawing conclusions, and gathering direct evidence. In the mathematical problem-solving indication, respondents understood the issue, planned, and solved it, but they would not be pleased with the findings until verifying them again. According to studies, the author faces the following challenges. Only 3 of 20 tested respondents were chosen for research because they met the criteria for deductive reasoning and solving mathematical problems on derivatives of algebraic functions based on adversity quotient.

Reference

- Alhusna, C. (2020). Menemukan Pola Perkalian Dengan Angka 9. *Jurnal Pendidikan Dan Pembelajaran Terpadu*, 2(1), 55–70.
- Amir, M. F. (2015). Proses Berpikir Kritis Siswa Sekolah Dasar Dalam Memecahkan Masalah Berbentuk Soal Cerita Matematika Berdasarkan Gaya Belajar. *Jurnal Math Educator Nusantara: Wahana Publikasi Karya Tulis Ilmiah Di Bidang Pendidikan Matematika*, 1(2), 159–170.

- Baroody, A. J. (2017). *Problem Solving, Reasoning and Communicating, K-8*. Macmillan Publishing Company.
- Branca, N. . (2017). *Problem Solving as a Goal, Process, and Basic Skill*. NCTM.
- Fadillah, A. (2019). Analisis Kemampuan Penalaran Deduktif Matematis Siswa. *Jurnal Teori Dan Aplikasi Matematika (JTAM)*, 3(1), 15–21.
- Hidayat, W., & Sariningsih, R. (2018). Kemampuan Pemecahan Masalah Matematis dan Adversity Quotient Siswa SMP Melalui Pembelajaran Open Ended. *Jurnal JNPM (Jurnal Nasional Pendidikan Matematika)*, 2(1), 109–118.
- Hr, B. (2020). Kemampuan Penalaran Deduktif Matematis Siswa MA NW Kabar Berdasarkan Sintaks Modeling The Way. *Media Pendidikan Matematika*, 8(1), 87–96.
- Manyira, M., Saidi, S., & Hamid, H. (2021). Analisis Kemampuan Penalaran Deduktif Matematis Siswa SMP Dalam Menyelesaikan Masalah Pertidaksamaan Linear Satu Variabel. *Urnal Pendidikan Guru Matematika*, 1(3), 260–270.
- Mawarni Nehe, Pargaulan Siagian, M. (2017). The Development Of Learning Device Based Contextual Teaching Learning (CTL) Assisted Autograpg To Improve The Ability Of Problem Solving Mathematics Class X SMA Negeri 1 Telukdalam. *Jornal of Education and Practice*, 8(19), 108-117.
- Miles, B. M., Huberman, M. A., & Saldana, J. (2014). Qualitative data analysis: a methods sourcebook third edition. *SAGE Publications Asia-Pacific Pte*, 30(25), 33.
- Minarni, A. (2017). On Eight Grade Students Understanding in Solving Mathematical Problems. *Asian Social Science*, 13 (12), 86–96. <https://doi.org/10.5539/ass.v13n12p86>.
- Moleong, L. J. (2017). *Metode Penelitian Kualitatif*. PT.Remaja Rosdakarya Offset.
- Mulyani, E. (2019). Adversity Quotient Mahasiswa Pendidikan Matematika dan Keterkaitannya dengan Indeks Prestasi Kumulatif Mosharafa. *Mosharafa: Jurnal Pendidikan Matematika*, 8(1), 119–130.
- Polya, G. (1973). *How To Solve It. A New Aspect of Mathematical Method*. Stanford University.
- Rahayu, I. F., & Aini, I. N. (2021). Analisis Kemandirian Belajar dalam Pembelajaran Matematika pada Siswa SMP. *JPMI – Jurnal Pembelajaran Matematika Inovatif*, 4(4), 789–798.
- Rahayu, N., & Alyani, F. (2020). Kemampuan Berpikir Kritis Matematis ditinjau dari Adversity Quotient. *Prima: Jurnal Pendidikan Matematika*, 4(2), 121–136.
- Roswanti, dkk. (2020). Kemampuan Pemecahan Masalah Siswa Berkemampuan Matematis Rendah pada Pembelajaran Creative Problem Solving. *Jurnal Imajiner*, 2 (3), 191–201.
- Rusdewanti, Panca Putri, dan A. G. (2014). Pengembangan Media Pembelajaran Interaktif Seni Musik Untuk Siswa SMP. *Jurnal Inovasi Teknologi Pendidikan*, 1(2), 153-164.
- Saputra, E., & Zulmaulida, R. (2021). Analisis Kemampuan Penalaran Deduktif Pembelajaran Creative Problem Solving (CPS) Siswa pada. Suska. *Journal of Mathematics Education*,

7(2), 113–122.

- Saragih, S., & Habeahan, W. (2014). The Improving of Probem Solving Ability and Students' Creativity Mathematical by Using Problem Based Learning in SMP Negeri 2 Siantar. *Journal of Education and Practice*, Vol. 5. No, 123-132.
- Sarah, R., & Iskandar, F. (2017). Pengaruh Adversity Quotient Terhadap Kemampuan Matematika Pada Mata Kuliah Teori Bilangan. *Prima: Jurnal Program Studi Pendidikan Dan Penelitian Matematika*, 6(1), 21–32.
- Sarwono, E., Yusmin, E., Suratman, D. (2018). Pengaruh Model Pembelajaran Kooperatif Tipe STAD Terhadap Kemampuan Pemecahan Masalah Dan Motivasi Belajar Siswa SMP. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa*, 7(5).
- Siagian, S. S., Mujib, A., & F. (2024). The role of concept image in constructing mathematical proof. *AIP Conference Proceedings*, 3(1), 41.
- Usman, M. R., & Syam, N. (2022). Profil Kemampuan Pemecahan Masalah Matematika Siswa Ditinjau Dari Adversity Quotient. *Jurnal Program Studi Pendidikan Matematika*, 11(2), 1039–1051.
- Winarso, W. (2018). Membangun Kemampuan Berfikir Matematika Tingkat Tinggi Melalui Pendekatan Induktif, Deduktif Dan Induktif-Deduktif Dalam Pembelajaran Matematika. *Duma : Mathematics Education Learning and Teaching*, 3(2), 95–118.