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STUDENTS' DECISION-MAKING IN SOLVING MATHEMATICAL WORD PROBLEMS BASED ON ADVERSITY QUOTIENT

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ABSTRACT This study aims to describe students' decision-making processes in solving mathematical word problems based on their Adversity Quotient (AQ). A qualitative research method was employed. Data were collected through AQ questionnaires, decision-making tests, and interviews. The data analysis techniques included data reduction, data presentation, verification, and conclusion drawing. The findings revealed the presence of 2 climber-type students, 5 students transitioning from camper to climber, 16 camper-type students, and 4 students transitioning from quitter to camper; no students were identified as quitters. The results show that climber-type rational students fulfilled all indicators of decision-making. Rational students transitioning from camper to climber fulfilled all indicators except for recalling the relationship between the problem, known information, and the decision made. Heuristic students in this category were unable to present or recall that relationship. Camper-type students with intuitive and rational decision-making styles were able to identify problems and goals, find alternative solutions, solve the problems, evaluate the alternatives, and make decisions. Students transitioning from camper to quitter with an intuitive style could identify problems, find alternative solutions, solve the problems, and make decisions. Meanwhile, those with a rational style could only find alternative solutions, solve the problems, and make decisions.

Keywords: decision making, mathematical word problems, adversity quotient, qualitative approach

ABSTRAK Penelitian ini bertujuan untuk mendeskripsikan pengambilan keputusan siswa dalam menyelesaikan soal cerita ditinjau dari adversity quotient. Penelitian ini menggunakan metode penelitian kualitatif. Pengumpulan data pada penelitian ini diperoleh dari angket adversity quotient, tes pengambilan keputusan, dan wawancara. Teknik analisis data yang digunakan yaitu reduksi data, penyajian data, verifikasi data, dan penarikan kesimpulan. Pada penelitian ini ditemukan 2 siswa climber, 5 siswa peralihan camper ke climber, 16 siswa camper, 4 siswa peralihan quitter ke camper, dan tipe quitter tidak ditemukan. Hasil penelitian menunjukkan bahwa subjek climber rasional dapat memenuhi seluruh indikator pengambilan keputusan. Subjek Peralihan camper ke climber rasional memenuhi seluruh indikator kecuali mengingat hubungan antara masalah dengan hal-hal yang diketahui dengan keputusan yang telah diambil. Subjek peralihan camper ke climber heuristik tidak dapat mempresentasikan dan mengingat hubungan antara masalah dengan hal-hal yang

diketahui dengan keputusan yang telah diambil. Subjek camper intuisi dan rasional dapat mengidentifikasi masalah, mengidentifikasi tujuan, menemukan alternatif jawaban, menyelesaikan masalah, mengevaluasi alternatif jawaban, mengambil keputusan. Subjek peralihan camper ke quitter intuisi dapat mengidentifikasi masalah, menemukan alternatif jawaban, menyelesaikan masalah, mengambil keputusan. Subjek peralihan camper ke quitter rasional hanya dapat, menemukan alternatif jawaban, menyelesaikan masalah, mengambil keputusan.

Kata-kata kunci: pengambilan keputusan, soal cerita matematika, adversity quotient, pendekatan kualitatif

INTRODUCTION

Mathematics learning cannot be separated from the activity of solving math problems. One of them is that mathematics learning often applies contextual learning that presents story problems. In the process of solving math problems, each student has different abilities in solving the problems given (Wijaya et al., 2014). Solving story problems does not only focus on the final answer obtained at the end of the calculation, but the process of solving the problem also needs to be considered (Nafi'an, M, 2021). One of the processes that differentiates students in solving math problems is the way students make decisions. Winarso in (Nafi'an, M, 2021) stated that in the problem-solving stage there is a relationship with the decision-making process. Decision Making is one of the thinking processes. As expressed by Suryabrata, there are three stages of the mathematical thinking process, including concept formation, logic, and decision making (Rahma & Rahaju, 2020).

Decision making is one of the cognitive aspects that students need to have. In line with the statement put forward by Rahmawati (2020), decision making is one of the cognitive processes that shape personality and determine a person's attitude. The difference in decision making made by each student when solving math problems is certainly caused by several causes, including affective factors. One of these affective factors is the adversity quotient. Adversity quotient is a very important process for students to have to solve a problem.Adversity quotient is one of the affective aspects that plays an important role in learning mathematics (Eta & Ariyanti, 2023). AQ is related to a person's decision making. This is in line with the opinion of Warapsari (2015) who stated that someone with a higher AQ level can control themselves when faced with a problem which will make it easier for them to make decisions. This was reinforced by Yuliantin who stated that AQ influences a person in making decisions (Rahma & Rahaju, 2020).

Adversity quotient is a process of a person's fighting power when facing problems. Adversity quotient is used by someone to overcome difficulties. This is in line with what Stoltz said that AQ is a psychological aspect in the form of a person's fighting power in facing obstacles (Rosikhoh et al., 2023). AQ possessed by students can encourage student success in the learning process. Therefore, AQ is very important

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to pay attention to in order to increase the success of learning outcomes (Aini & Mukhlis, 2020).

Research on decision making has been conducted by Hanik et al., (2023). The study aims to describe decision making in terms of gender. The results of this study showed that men can get more than one way to solve problems, while women only get one way to solve problems. Based on an interview conducted at SMP Negeri 14 Tasikmalaya with one of the educators, it was found that there were students who could not explain the process of working on story problems. There were students who answered correctly but could not explain the reasons for how to make decisions in answering the questions. Of course, the process of solving problems is more important than the results obtained. In line with Sumartini (2016) statement which states that problem solving is a process that prioritizes the importance of procedures, steps, strategies taken by students in solving problems and finally finding answers to the questions, not just the answers themselves. Previous research on decision making conducted by Mawarti (2020) found that students tend to use rational categories to answer TIMSS math questions. Therefore, researchers are interested in conducting further research on Student Decision Making in solving story problems in terms of Adversity Quotient.

METHODS

This study uses qualitative research that aims to describe students' decision making in solving mathematics problems reviewed from the adversity quotient. This study was conducted at SMP Negeri 14 Tasikmalaya class VII K. The selection of subjects was based on considering the type of AQ possessed by students and the decision-making process. The data collection technique used an adversity quotient questionnaire that refers to the ARP (Adversity Response Profile) by modifying the language to suit the school situation. In addition, the decision-making test is one of the data collections to determine the student's decision-making process. then interviews were conducted to carry out further verification of the data that had been obtained. Subjects were selected by purposive sampling based on considerations of the data that had been obtained and could communicate well. In addition, decision-making indicators were also considered by selecting students who achieved the most indicators from each type of AQ. This study used data analysis techniques by Miles and Huberman. Activities in data analysis techniques according to Miles and Huberman include data reduction, data presentation, drawing conclusions and verification (Sugiyono, 2013).

The decision-making test instrument in this study presented story questions in the form of a combination of multiple choices accompanied by a solution answer sheet with a total of 1 question. Multiple-choice questions aim to see the category of student decision-making used in choosing options in the question. In accordance with what was stated by Widiyawati et. al (2019) students are not used to providing logical reasons for the choices they consider correct. Therefore, students are given

answer sheets to provide reasons or methods obtained in choosing the options taken and to see indicators of student decision-making in solving the question. In addition, the decision-making test presents statements regarding student considerations in solving questions. In this statement, students can choose more than one category used in solving math problems. The decision-making categories include those in table 1 below.

Table 1. Decision Making Categories

Choices	Category	Criteria
My feelings	Intuition	Based on which option is easier and more often heard, the tendency to speculate, and statements without evidence.
Experience from the learning process	Empirical	Based on trial and error, estimations or approximations, prior knowledge, or learning experience
Theories, Concepts and related information	Heuristics	Based on theories, concepts, and interrelated information.
Reasonable or logical thoughts and considerations	Rational	Based on a problem, considering the advantages and disadvantages, Reasonable or logical thoughts and considerations

Source: Novianawati & Nahadi (2015)

In addition to the decision-making categories that are considered in choosing options in multiple choices, there are measurements of decision-making indicators through student completion sheets to provide reasons for choosing the option. Decision-making indicators according to Wang & Ruhe (2007) include:

1. Identifying the problem
2. Identifying goals
3. Finding alternative answers
4. Solve the problem
5. Evaluating alternative answers
6. Can make decisions
7. Evaluating the results of decisions
8. Able to present the relationship between the problems faced and the things known in the questions and the decisions that have been taken.
9. Able to remember the relationship between the problem faced and what is known in the problem and the decisions that have been taken.

The following is a decision-making test instrument to obtain decision-making and decision-making categories. Blank answer sheets are provided to write down the ways to solve the answers obtained.

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Soal :

Nada ingin membeli tas dan sepatu untuk keperluan sekolahnya. Nada berencana untuk membeli tas Eiger dan Sepatu Nike. Ada 4 toko yang menjual tas dan sepatu dengan jenis yang Nada inginkan yaitu toko Anggrek, toko Bintang, Toko Ceria, dan toko Dahlia. Toko Anggrek menjual tas Eiger dengan harga Rp120.000,- dan sepatu Nike dengan harga 2 kali lipat dari harga tas Eiger di toko Anggrek. Toko Bintang menjual tas Eiger dengan harga Rp100.000,- dan sepatu Nike dengan harga 3 kali lipat dari harga tas Eiger di toko Bintang. Toko Ceria menjual tas Eiger dengan harga Rp150.000,- dan harga sepatu Nike setengah dari harga sepatu di toko Anggrek dengan potongan harga sepatu sebesar Rp20.000,-. Sedangkan toko Dahlia menjual tas Eiger dengan harga yang sama dengan tas di toko Bintang dan menjual sepatu Nike dengan harga Rp280.000,-. Dari keempat toko, Nada ingin membeli tas Eiger dan sepatu Nike tersebut di salah satu toko tersebut secara bersamaan. Namun Nada hanya memiliki uang sebesar Rp365.000,. Untuk itu, kira-kira toko manakah yang harus dipilih Nada untuk membeli tas dan sepatu dengan harga yang lebih hemat?

A.Toko Anggrek

B. Toko Bintang

C. Toko Ceria

D. Toko Dahlia

Ketika menjawab soal di atas, apa yang menjadi pertimbangan Anda?

○ Saya menjawab berdasarkan konsep yang sudah diajarkan

○ Saya menjawab berdasarkan pertimbangan yang masuk akal atau logis

○ Saya pernah mengerjakan soal seperti ini sebelumnya

○ Saya menjawab soal dengan perasaan saya

Figure 1. Decision Making Instruments

The validity test in this study used time triangulation for the AQ questionnaire with 3 questionnaires given to see the consistency of students' answers. In line with Ayuningrum (2017), to obtain consistent results, it is necessary to test the questionnaire at least 2 times at different times. In addition, technical triangulation is used by observing and seeing the conformity of the data, observing the conformity of the questionnaire results obtained, and interviews conducted with unstructured interviews. Technical triangulation is comparing data from interview results, questionnaire results, and test results (Putri et al, 2021).

FINDING AND DISCUSSION

The study was conducted on May 3, 20, and 21, 2024, at SMP Negeri 14 Tasikmalaya, class VIIK. Out of 30 students, 3 were excluded from the analysis due to inconsistent responses on the AQ questionnaire, which led to inconsistencies in AQ type classification. Therefore, the final analysis included 27 students whose AQ types were consistent. The classification of students' AQ types is shown in Table 2 below.

Table 2. Decision-Making Categories Based on AQ Questionnaire Scores

AQ questionnaire score	Category	Amount
0–59	Quitter	0
60–94	Transition from Quitter to Camper	4
95–134	Camper	16
135–165	Transition from Camper to Climber	5
166–200	Climber	2

After determining each student's AQ type, participants were given a decision-making test consisting of a single word problem on the topic of linear equations with one variable. The question format combined multiple-choice and open-ended components. Each student's responses were analyzed to identify their decision-making category. Figure 2 below shows the distribution of decision-making categories by AQ type.

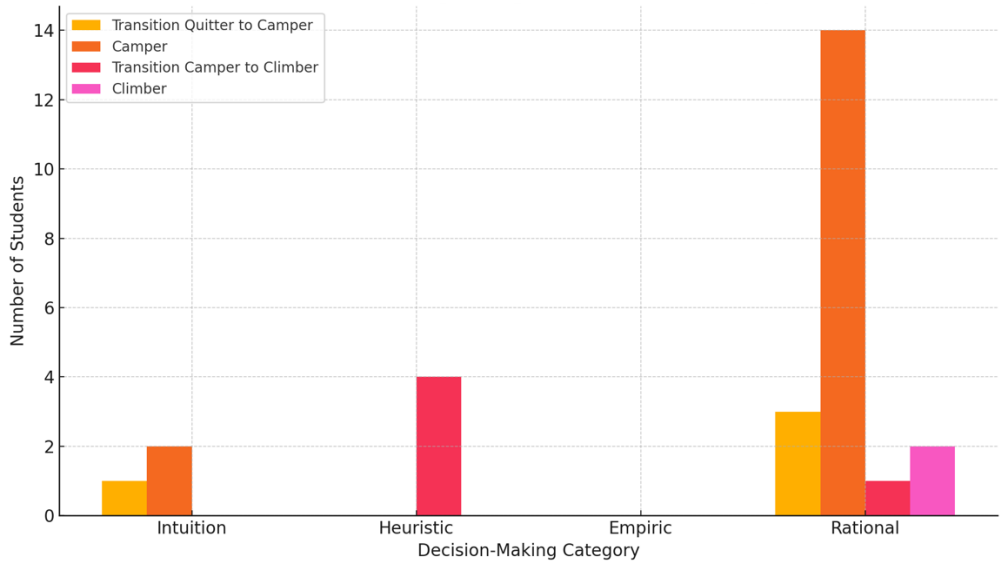

Figure 2. Distribution of Decision-Making Categories Across AQ Types

To gain deeper insights, one student was selected from each AQ type and decision-making category based on the number of indicators achieved. A total of 7 subjects were selected for further analysis, as presented in Table 3.

Table 3. Research Subjects

Subject	AQ Type	Decision-Making Category	Code
S-20	Climber	Rational	SCR
S-26	Transition from Camper to Climber	Heuristic	SPCAH

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Subject	AQ Type	Decision-Making Category	Code
S-12	Transition from Camper to Climber	Rational	SPCAR
S-24	Camper	Intuition	SCAI
S-17	Camper	Rational	SCAR
S-21	Transition from Quitter to Camper	Rational	SPQR
S-1	Transition from Quitter to Camper	Intuition	SPQI

Each subject's decision-making process was analyzed by reviewing their answers on the provided test sheet and through unstructured interviews to explore deeper insights. The detailed findings for each AQ type—Climber, Transition from Camper to Climber, Camper, and Transition from Quitter to Camper—are elaborated narratively in the sections that follow.

Decision Making of Climber-Type Students

Students categorized as climbers tend to rely on rational thinking and logical reasoning when solving mathematical problems. This tendency is supported by Pribadi et al. (2023), who found that climber-type students typically base their answers on well-reasoned analysis. Wulandari (2019) further emphasized that these students consistently demonstrate a high level of rationality, allowing them to evaluate each part of the problem logically until a solution is found. The subject identified as a climber in this study (SCR) exemplified these characteristics by thoroughly stating all known information in the problem and restating it in their own words, which aligns with the findings of Mahareni and Wijayanti (2018).

In addition to identifying the known elements, SCR successfully articulated the problem's objective clearly and completely, showing a deep understanding of what was being asked. This corresponds with Eta and Ariyanti (2023), who reported that climber students are able to comprehend the structure of a problem and reformulate it using their own language. While identifying alternative solutions, SCR initially struggled but continued to explore various approaches until a suitable strategy was found—demonstrating a persistence that reflects the climber's hallmark resilience and willingness to face challenges (Septianingtyas & Jusra, 2020).

The subject then applied appropriate methods to carry out calculations accurately, and at every step, they checked their work for potential mistakes. This meticulousness illustrates their focus on the process, a quality also observed by Darojat and Kartono (2016), who noted that climbers select and implement solution strategies independently and effectively. In evaluating the results, SCR reviewed each step and calculation carefully and even used comparative strategies—such as analyzing price differences across store options—to validate their decision. This

method of cross-checking is in line with findings from Hidayat and Saringnih (2018) and Rosikhoh et al. (2023), who described climber students as thorough evaluators who employ diverse verification techniques.

Moreover, SCR demonstrated the ability to explain the entire problem-solving process with clarity and coherence, including the connection between given information, reasoning steps, and the final decision. Septianingtyas and Jusra (2020) also highlighted this ability as a defining feature of climber-type students, who not only solve problems correctly but can also justify their choices logically. The written work and decision-making process of SCR can be seen in Figure 3, which illustrates the student's response and completion in line with the rational category.

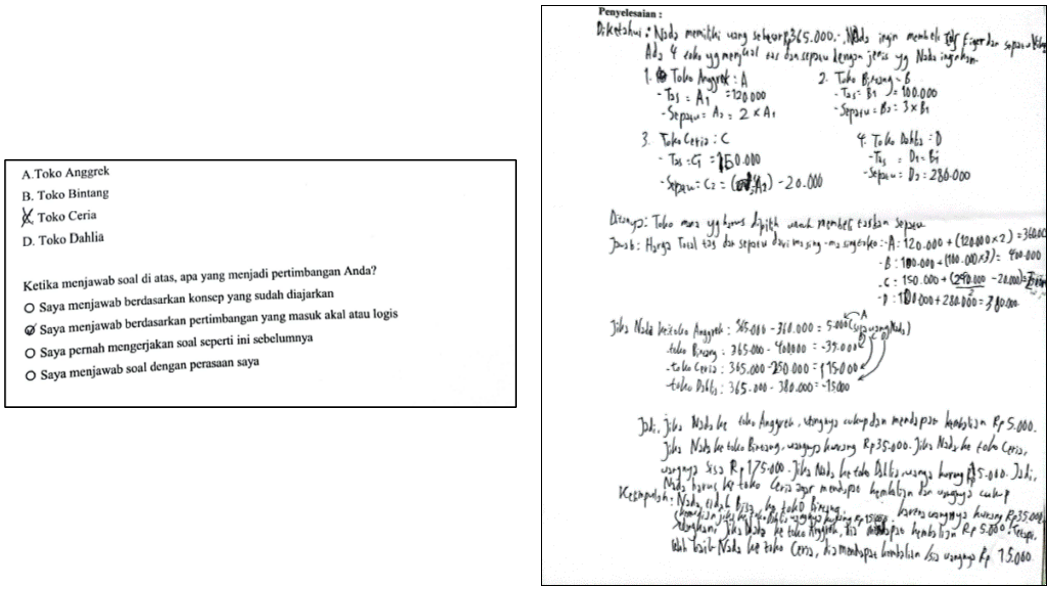

Figure 3. Rational Climber Student's Response and Completion Steps

In conclusion, SCR exhibited a comprehensive and highly effective decision-making process, characterized by logical analysis, persistence, self-correction, and strong explanatory ability. These attributes enabled the subject to meet all indicators of decision-making success associated with the climber profile.

Decision Making of Students Transitioning from Camper to Climber

Students with the camper-to-climber transition AQ type exhibit characteristics that blend both camper and climber traits. As noted by Septianingtyas and Jusra (2020), this group may behave like climbers in some situations and like campers in others. In this study, two subjects represented this category: SPCAH, who showed heuristic decision-making, and SPCAR, who applied rational strategies. SPCAH tended to rely on familiar concepts previously taught, while SPCAR used logical reasoning to work through the problem.

Both SPCAH and SPCAR were able to identify the known elements in the problem and articulate them appropriately. This aligns with Mawardhiyah and Manoy (2018),

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who found that students at this AQ level can recognize relevant problem details to construct solutions. However, although they could verbally express the goal of the problem, neither subject wrote it down—suggesting a lack of attention to detail that is common among campers, as discussed by Mena (2016) and supported by Stoltz (2000), who noted that campers often feel satisfied too early in the problem-solving process.

In generating alternative solutions, both subjects identified logical steps and attempted appropriate calculations. While SPCAH's solution was valid, SPCAR demonstrated clearer reasoning and more detailed work. Based on the analysis, SPCAR showed stronger climber-like qualities in structuring and executing their problem-solving process. The written response and solution steps of SPCAR can be seen in Figure 4, which illustrates the student's rational and systematic approach to the task.

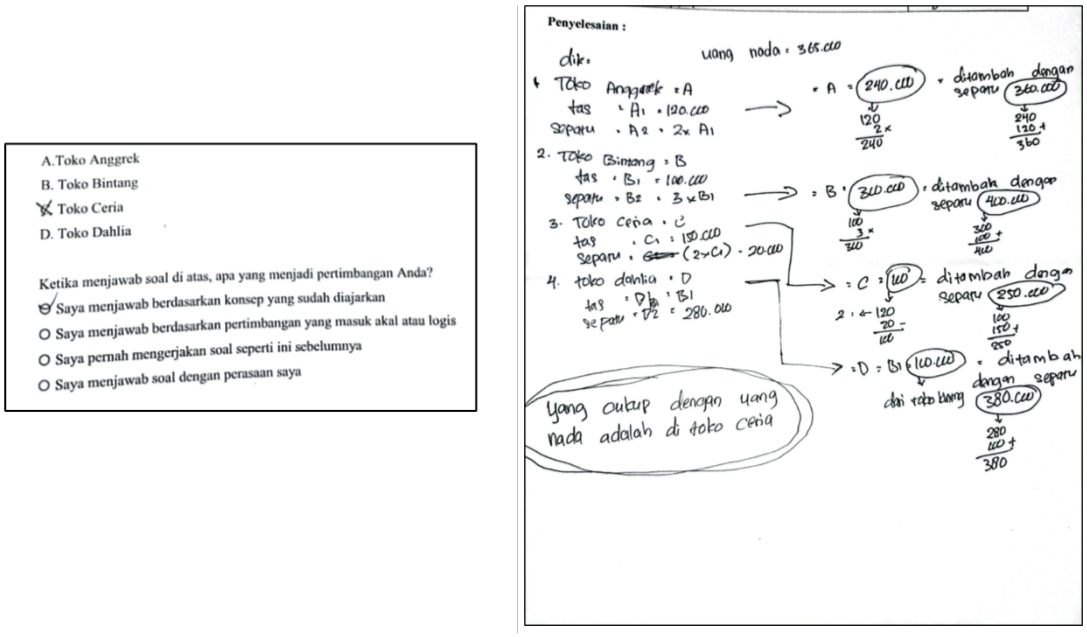

Figure 4. Problem-Solving and Response of a Camper-to-Climber Transition Student Using Rational Decision-Making (SPCAR)

When evaluating their answers, both SPCAH and SPCAR reviewed their processes, but minor errors still occurred. SPCAR miswrote a number, and SPCAH used an incorrect variable—both indicative of the camper's limited focus on precision (Mena, 2016). Despite this, they reached correct final decisions. In terms of evaluating results, SPCAR went a step further by reconsidering each stage of their calculations, although without applying alternate strategies. This behavior reflects a student transitioning toward climber characteristics, as suggested by Chabibah et al. (2019). In contrast, SPCAH only checked their work during the process and did not review it

once a solution was obtained, which aligns more with camper tendencies (Almubarokah et al., 2024).

Both subjects were able to explain the steps they took, but neither could recall or articulate the connections between the information given and the decisions made. Notably, the rational subject (SPCAR) provided more structured and coherent explanations than the heuristic subject (SPCAH).

In conclusion, students transitioning from camper to climber generally demonstrate effective decision-making abilities and fulfill most indicators. However, minor mistakes related to accuracy and reflection are still apparent, particularly in those who lean more toward camper behaviors. This observation supports the findings of Putra et al. (2022), who noted that students in this transition stage are capable problem-solvers but may struggle with consistent attention to detail.

Decision Making of Camper-Type Students

Students classified as having the camper-type AQ exhibited two categories of decision making in this study: intuitive and rational. Rational decision making refers to the use of logical, step-by-step reasoning based on analysis, while intuitive decision making tends to rely on subjective feelings or prior familiarity with a type of question.

Both SCAI (Intuition) and SCAR (Rational) successfully identified the known information in the given word problem and stated the objectives of the task clearly. These findings are in line with Wahab et al. (2022) and Rahma & Rahaju (2020), who noted that camper students are generally capable of recognizing and restating the goals and known elements of mathematical problems.

In formulating alternative solutions, SCAI and SCAR showed a willingness to solve the problem—though their approaches were not entirely independent. Both students sought support or confirmation before completing their responses. Nevertheless, their efforts indicate a moderate level of self-regulation and willingness to engage with the task.

Their computational work was relatively accurate, and both were observed to evaluate their alternative solutions by reviewing each calculation stage. This aligns with previous studies (Darojat & Kartono, 2016; Mahareni & Wijayanti, 2018), which found that camper students tend to recheck their work during problem solving. However, once the solution was reached, neither SCAI nor SCAR rechecked their final answer, reflecting a typical camper behavior—confidence without full verification—consistent with findings by Astiantari et al. (2022) and Pribadi et al. (2023).

Regarding their ability to explain the process, SCAI demonstrated difficulty articulating the reasoning behind their solution steps, often writing calculations without understanding the origin of the numbers. This supports Silvatama et al. (2023), who reported that camper students commonly struggle with conceptual articulation. In contrast, SCAR showed a better ability to explain their steps, although

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still limited in identifying the connections between known data and decisions made. This limitation is consistent with Hidayah & Setianingsih (2024), who found that camper students generally fail to reflect on the relationships between concepts and the procedures they apply.

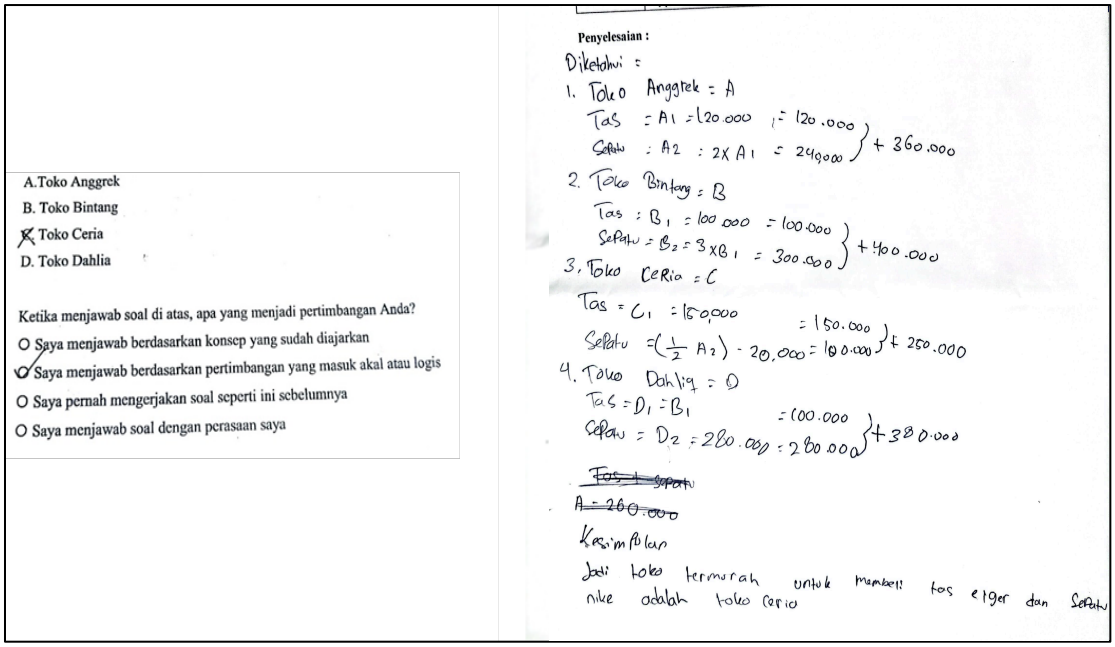

Figure 5. Problem-Solving and Response of a Camper-Type Student Using Rational Decision-Making (SCAR)

In summary, while both intuitive and rational camper students demonstrate basic problem-solving ability, rational students like SCAR tend to show clearer reasoning, better structure, and more accurate explanations. These findings are in line with Darmadi (2019), who concluded that rational decision making tends to yield more effective outcomes compared to intuition-based approaches.

Decision Making of Students Transitioning from Quitter to Camper

Students in the quitter-to-camper transition category exhibit characteristics that fall between the quitter and camper AQ types. These students may possess minimal persistence and tend to apply limited strategies, often without deep understanding. In this study, two students represented this group: SPQI (intuition) and SPQR (rational). Although both attempted the problem, their approaches and performances differed significantly.

SPQI was unable to identify the known elements in the problem and did not write any relevant information on the answer sheet. Meanwhile, SPQR, although also failing to record key information, could at least recall and state some aspects verbally, albeit incompletely. These findings support Chabibah et al. (2019), who observed that quitter students generally struggle with identifying problems, formulating strategies, and verifying results.

In terms of identifying the problem's goal, SPQI could not articulate what the question was asking, while SPQR could state the goal but failed to write it explicitly. This behavior reflects the inconsistency and lack of persistence that typifies quitter-type behavior, as also described by Chabibah et al. (2019). Both subjects were able to formulate alternative solutions and perform calculations; however, neither could explain the reasoning behind their strategies. They relied solely on arithmetic procedures without a clear understanding of the concepts involved. Rosikhoh et al. (2023) noted that students transitioning from quitter to camper tend to lack structured planning, which affects their ability to implement solutions effectively.

Despite reaching an answer, neither SPQR nor SPQI evaluated or verified their results. They did not re-check calculations or consider alternative methods, which is consistent with findings by Astiantari et al. (2022) and Mahareni & Wijayanti (2018), who found that quitter-type students are typically confident in their first answer and rarely self-correct. In the final decision-making stage, SPQI provided an incorrect answer but believed it was correct. SPQR chose the correct answer but admitted to copying from a peer, highlighting a preference for shortcuts over critical thinking. This behavior aligns with Stoltz (2000), who characterized quitter students as individuals who often give up easily and seek the path of least resistance. Neither SPQI nor SPQR could explain the reasoning behind their chosen answers. They were unable to demonstrate how the known information in the question related to the final decision made. As noted by Mena (2016) and Putra et al. (2022), quitter students struggle to make meaningful connections between mathematical concepts, procedures, and outcomes.

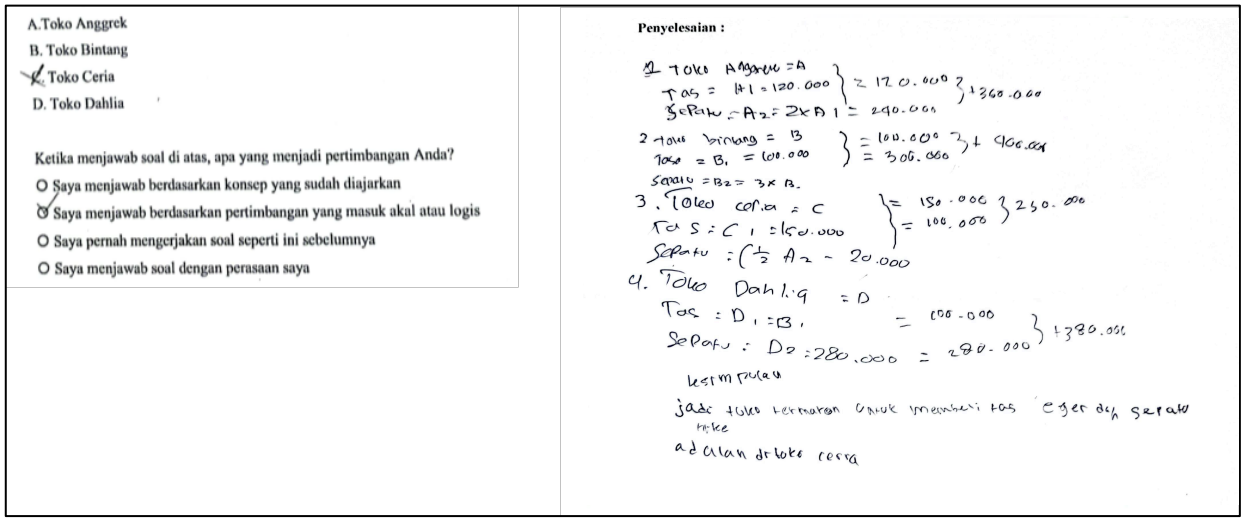

Figure 6. Problem-Solving and Response of a Rational Student Transitioning from Quitter to Camper (SPQR)

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In summary, students in the quitter-to-camper transition group displayed significant weaknesses in their decision-making processes. While SPQR performed slightly better in recognizing the problem goal and completing calculations, both students lacked the ability to explain their thinking or verify their results. This supports the notion that students in this category require further support to develop metacognitive and reasoning skills essential for effective problem solving.

SPQI made an incorrect decision, while SPQR selected the correct answer but admitted to copying from a peer. This reflects the quitter trait of avoiding difficulty (Stoltz, 2000). Both failed to explain their reasoning and could not describe the relationship between the problem, known information, and decision taken—confirming earlier findings by Mena (2016) and Putra et al. (2022). In summary, students transitioning from quitter to camper demonstrated weak decision-making abilities across most indicators.

Table 4. Differences in Decision-Making Categories by AQ Type

AQ Type	Rational	Intuition	Heuristic
Climber	The subject performed the solution well and was able to describe the process and stages in making decisions with reasonable explanations.	–	–
Transition from Camper to Climber	Minor calculation errors occurred, but the subject could clearly and reasonably explain the process.	The subject understood the concepts taught but did not re-check the answers, leading to minor errors.	The subject solved the problem using previously learned concepts but did not re-check the solution.
Camper	The subject did not re-check the answer, lacked clarity in presenting the solution, and failed to recall information connections.	The subject did not re-check answers, could not communicate results effectively, and did not see the connection between information.	–
Transition from Quitter to Camper	The subject failed to identify objectives, could not explain the solution process, and did not verify the answers.	The subject failed to identify both the problem and objective, did not re-check answers, and lacked accuracy in decision making.	–

CONCLUSIONS AND RECOMMENDATIONS

Based on the research results, it can be concluded that the climber-type subject (SCR) tends to use rational decision-making and is able to fulfill all decision-making indicators. Subjects in the camper-to-climber transition category meet eight indicators, with those inclined toward heuristic approaches (SPCAH) achieving seven indicators. Camper-type students who tend to respond rationally (SCAR) fulfill six indicators, as do intuitive camper students (SCAI). In the quitter-to-camper transition category, rational respondents (SPQR) meet four indicators, while intuitive respondents (SPQI) fulfill only three. These results show that the higher the subject's AQ level, the more decision-making indicators they tend to achieve. Furthermore, students who use rational decision-making fulfill more indicators than those who rely on intuition. Intuitive decision-makers are generally less able to explain their thought process and often make inappropriate decisions.

Based on these findings, teachers are encouraged to design learning experiences that emphasize the importance of the decision-making process over merely obtaining correct answers. Students should be guided to integrate various decision-making strategies in solving mathematical problems. Those who tend to make intuitive decisions are encouraged to explore and apply alternative approaches. Future research is expected to investigate each decision-making category in greater detail and consider other contributing factors that influence students' decision-making processes.

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