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Senior High School Students' Numeracy in Solving Number Content AKM Problems in View of Adversity Quotient

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ABSTRACT

Numeracy is the ability of students to identify information, use mathematical facts and procedures, and evaluate results or mathematical ideas represented in various forms to solve problems in everyday life. Meanwhile, the Adversity Quotient (AQ) refers to a person's ability to endure and persevere through various events that cause difficulties or challenges. The aim of this study is to describe the numeracy skills of senior high school students in solving AKM (Minimum Competency Assessment) questions on number content, viewed from the perspective of Adversity Quotient (AQ). The type of research used is descriptive research with a qualitative approach. The research subjects consisted of one representative student for each AQ category, selected purposively to allow an in-depth exploration of numeracy processes. The research instruments included the ARP (Adversity Profile Response) questionnaire, AKM Number Content Questions (SAKB) (which consist of three contexts scientific, socio-cultural, and personal), and an interview guide. The analysis was based on numeracy indicators that included: identifying information and assessing the problem mathematically, using mathematical facts and procedures, and interpreting and evaluating the results. In this study, the student in the climber AQ category was able to fulfill all numeracy indicators across all question contexts. Meanwhile, the camper category student was unable to identify information and assess the problem mathematically in the scientific context. The student in the quitter AQ category met all numeracy indicators only in the personal context. These findings suggest that understanding students' numeracy skills by considering their Adversity Quotient can help teachers plan instructional strategies that meet students' needs. In the future, mathematics education should focus not only on improving numeracy skills but also on fostering students' persistence and resilience in problem-solving.

Keywords: *Numeracy, Number Content, AKM Problems, Adversity Quotient (AQ)*

Numerasi Siswa SMA dalam Menyelesaikan Soal AKM Konten Bilangan Ditinjau dari *Adversity Quotient*

ABSTRAK

Numerasi adalah kemampuan siswa dalam mengidentifikasi informasi, menggunakan fakta dan prosedur matematis, lalu mengevaluasi hasil atau ide matematis yang direpresentasikan dalam berbagai cara untuk menyelesaikan masalah dalam kehidupan sehari-hari. Sedangkan Adversity Quotient (AQ) adalah kemampuan yang dimiliki seseorang untuk dapat bertahan dalam menghadapi segala macam peristiwa yang menimbulkan kesulitan. Tujuan penelitian ini yaitu mendeskripsikan numerasi siswa SMA dalam menyelesaikan soal AKM konten bilangan ditinjau dari Adversity Quotient (AQ). Jenis penelitian yang digunakan yaitu penelitian deskriptif dengan pendekatan kualitatif. Subjek penelitian terdiri atas satu siswa yang mewakili setiap kategori AQ, dipilih secara purposive untuk memungkinkan eksplorasi mendalam terhadap proses numerasi. Instrumen penelitian ini antara lain angket ARP (Adversity Profile Response), Soal AKM Konten Bilangan (SAKB) yang terdiri dari 3 konteks yaitu saintifik, sosial-budaya, dan personal, dan pedoman wawancara. Analisis menggunakan indikator numerasi yang memuat proses mengidentifikasi informasi dan menilai masalah secara matematis, menggunakan fakta dan prosedur matematis, dan menginterpretasi serta mengevaluasi hasil.

Pada penelitian ini, siswa dengan kategori AQ climber dapat memenuhi semua indikator numerasi yang ada pada semua konteks soal. Sedangkan siswa dengan kategori AQ camper tidak dapat mengidentifikasi informasi dan menilai masalah secara matematis pada konteks saintifik. Siswa dengan kategori AQ quitter hanya memenuhi semua indikator numerasi pada konteks personal saja. Temuan ini menunjukkan bahwa pemahaman kemampuan numerasi siswa berdasarkan Adversity Quotient dapat membantu guru merencanakan pembelajaran yang sesuai dengan kebutuhan siswa. Di masa depan, pendidikan matematika sebaiknya tidak hanya berfokus pada peningkatan kemampuan numerasi, tetapi juga pada pengembangan ketangguhan dan kegigihan siswa dalam memecahkan masalah.

Kata Kunci**:** *Numerasi, Soal AKM, Konten Bilangan, Adversity Quotient (AQ)*

1. Introduction

Numeracy is one of the essential skills individuals and society need in various aspects of life in the 21st century. This statement is reinforced by the 2015 World Economic Forum, which agreed on six basic literacies: literacy, numeracy, scientific literacy, ICT literacy, financial literacy, cultural literacy, and citizenship. Numeracy is a person's ability to apply mathematical knowledge in everyday life (Fitriana, 2022). The Programme for International Assessment of Adult Competencies (PIAAC) in the OECD (2021) states about the importance of numeracy: "Adults with lower-level skills in numeracy are more likely to be unemployed

or require social assistance. Furthermore, sound numeracy skills are deemed essential for post-secondary education in many areas." The statement emphasizes that individuals with low numeracy are more vulnerable to unemployment or the need for social assistance. Furthermore, good numeracy is considered essential for advancing to higher levels of education in various fields. Rakhmawati (2021) also stated in her research that "Numeracy is an essential requirement for students. Numeracy skills are advantageous for student life, leading students to a good life." Numeracy is a skill students must possess because it is very beneficial to their lives and helps them lead better lives. Numeracy is a concept used to identify the knowledge and skills needed to accommodate the demands of mathematics in everyday problems (Geiger, 2015).

In response to the importance of numeracy in individuals' and students' lives, the Indonesian government has implemented the Minimum Competency Assessment (AKM) program. The AKM, administered by the Ministry of Education and Culture at the high school level, is for 11th-grade students (2nd grade). The purpose of the AKM is to measure students' literacy and numeracy skills (Pusmendik, 2023). The AKM is expected to provide valuable insights to educational institutions and local governments for conducting self-evaluations and planning to improve educational quality. By reviewing the AKM results, teachers can develop effective, high-quality learning strategies tailored to student achievement.

Numeracy AKM questions contain context and content. The context of numeracy AKM questions includes contexts close to the student's world, social, cultural, environmental, scientific, and mathematical sciences. According to the AKM Framework by Pusmendik (2023), the context of numeracy AKM is divided into three: personal, socio-cultural, and scientific. Meanwhile, the content of numeracy AKM questions according to the AKM Framework by Pusmendik (2023) is divided into 4: numbers, geometry and measurement, data and uncertainty, and algebra. One of the contents that must be mastered by students is number content. In the content or number domain, it consists of subdomains of representation, properties of order, and number operations. Many activities carried out in everyday life involve numbers and their operations, so mastery of the concepts of numbers and their operations is necessary to assist with various activities or to help someone faced with a daily problem related to numbers and their operations (Ekawati, 2013).

High school students' mastery of number content remains lacking. A study by Tuzahrah (2016) found that some students still lack mastery of the concepts, principles, and arithmetic operations of numbers. The number concept that students have not mastered, as explained in the study, is exponents. The number principle that students have not mastered, as explained in the study, is the properties of number operations, while the arithmetic operations that students have not mastered are operations on fractions and exponents. In addition, a study by Andika (2020) found that some high school students do not understand the concepts and principles of numbers, especially exponents and roots.

The challenges a person faces motivate them to try to solve the problem. They need to use various approaches, such as thinking, experimenting, and asking questions, to find a solution (Cahyani, 2016). Therefore, students must increase their passion or fighting spirit in facing difficulties or solving problems (Yuliatin, 2019). In this case, the passion or fighting spirit for overcoming problems is known as the Adversity Quotient (AQ) (Muslimah, 2019).

The Adversity Quotient (AQ) was introduced by American psychologist Paul G. Stoltz (Mawardhiyah, 2018). AQ indicates an individual's ability to persist until they reach their goals or solve problems, retreat midway, or avoid existing problems (Yuliatin, 2019). The level of AQ influences a student's willingness, desire, or fighting spirit in solving mathematical problems. The correlation between AQ and numeracy aligns with Syamsyiah (2023), who stated that when AQ is associated with numeracy, it reflects the expertise

students need to address numeracy-related challenges. AQ is also important for determining individual excellence across several domains, including mathematics learning (Menik, 2023).

Stoltz (2000) likened a person's AQ level to the process of climbing a mountain, which is divided into three levels based on their fighting spirit. First, there is the quitter, described as an individual who chooses to stop, avoid responsibility, or retreat. Second, there is the camper, namely someone who feels satisfied with their achievements and decides to stop camping. Finally, there is the climber, namely someone who dedicates his life to continuing to climb and struggle, regardless of background, advantages, disadvantages, or good or bad luck. In numeracy, students with the climber AQ category may be more persistent and optimistic when solving complex problems. Conversely, students with the quitter AQ category may be easily frustrated or give up when encountering complex problems. Thus, differences in students' AQ levels are suspected to affect students' numeracy in solving AKM problems with number content.

There are studies related to student numeracy viewed from the perspective of AQ. One study that discusses student numeracy from the perspective of AQ is Maharani's (2022) study. This study discusses student numeracy viewed from the perspective of AQ, but discusses student numeracy viewed from the perspective of AQ in working on PISA questions on the change and relationship content. In addition, there is also a study conducted by Putri (2023) that discusses social studies students' numeracy in solving AKM questions from the perspective of Adversity Quotient. However, the discussion in this study does not focus on high school students' numeracy when working on AKM questions on the number content. Although there have been several studies on student numeracy from the perspective of AQ, research on AQ in working on AKM questions, especially on number content, remains scarce. AKM questions on the number content and students' AQ levels are the limits of the scope of the questions in this study. The number content was taken based on the importance of understanding the concept of numbers and their operations in helping solve everyday problems related to them. Based on the description above, the researcher wishes to conduct a study titled "High School Students' Numeracy in Solving AKM Questions with Number Content Reviewed from the Adversity Quotient (AQ)".

2. Method

The purpose of this study is to describe the numeracy ability of high school students in solving AKM problems related to number material viewed from their Adversity Quotient (AQ). To this end, this study employs a descriptive, qualitative design. The study was conducted in grades XI-6 of SMA Negeri 1 Kebomas. The selection of research subjects used purposive sampling, based on the AQ categories of climber, camper, and quitter. Of the 31 students, three were selected as research subjects, with one representative from each AQ category (climber, camper, and quitter), based on the Adversity Response Profile (ARP) questionnaire results and without regard to gender. Data for these three subjects is presented in Table 1.

Table 1. Research Subject Data

No.	Name Initials	AQ Score	Category
1.	BAF	166	Climber
2.	FS	110	Camper
3.	NN	56	Quitter

The primary instrument in this study was the researcher, while supporting instruments included the ARP questionnaire to measure students' Adversity Quotient (AQ) and Numeracy

Content AQ (SAKB) questions, consisting of SAKB1 and SAKB2. Each SAKB consists of three questions covering personal, sociocultural, and scientific contexts, along with a semi-structured interview guide. Data collection was conducted by administering the ARP questionnaire to determine research subjects based on their AQ. Selected subjects then completed SAKB1, followed by a first interview related to SAKB1, and then completed SAKB2, followed by a second interview related to SAKB2. The time triangulation method was used to compare and verify data from the results of the AKM Numeracy Content test questions administered at different times. Data analysis followed the three steps proposed by Miles et al. (2014), namely data reduction, data presentation, and conclusion drawing.

3 Results and Discussion

The three research subjects were given AKM questions with number content that involved numeracy processes such as identifying information, using mathematical facts and procedures, and interpreting and evaluating results. After completing the questions, the researchers conducted in-depth interviews to gain a more detailed understanding of the students' thinking processes and problem-solving strategies. To facilitate data analysis and systematically describe students' numeracy skills, the researchers coded numeracy indicators based on the methods students used to solve the questions. The numeracy indicators used in this study are presented in the Table 2.

Table 2. Indicator Coding Numeration

Process	Indicator	Code
Identifying Information and Assessing The Problem Mathematically	1) Identifying available information to solve the problem.	A1
	2) Assessing the problem or situation mathematically.	A2
Using Mathematical Facts and Procedures	Using mathematical facts and procedures to solve the problem.	B
Interpreting and Evaluating The Results	1) Interpreting the results obtained in the context of real-world problems.	C1
	2) Evaluating and providing logical reasoning for the mathematical results obtained.	C2

3.1 Numeracy of Senior High School Students in Solving Numbers Content AKM Problems by Students with AQ Climber Category

Indicator A1 (Identifying available information to solve the problem). Refer to this indicator, in the AKM questions in the personal, socio-cultural, and scientific contexts, climber students were able to mention important information such as cholesterol limits and content in each ingredient (scientific context questions), the amount of waste in each area of DKI Jakarta (socio-cultural context questions), as well as the price of durian seeds, discounts, and conditions for purchasing durian seeds (personal). In addition, climber students understood exactly what was asked in the questions in each context. This aligns with Syamsyiah (2023), who stated that "Climber-type students can answer questions by writing down the information provided and the questions clearly and accurately". Students in the AQ climber category can answer questions by clearly and accurately writing down the information provided and the questions. In addition, according to Anwar (2024), "The climber student restated problems using their language, which indicated that she understood the problem," which means students with the AQ climber category understood the problem by rewriting it in their own language, which shows an understanding of the existing problem.

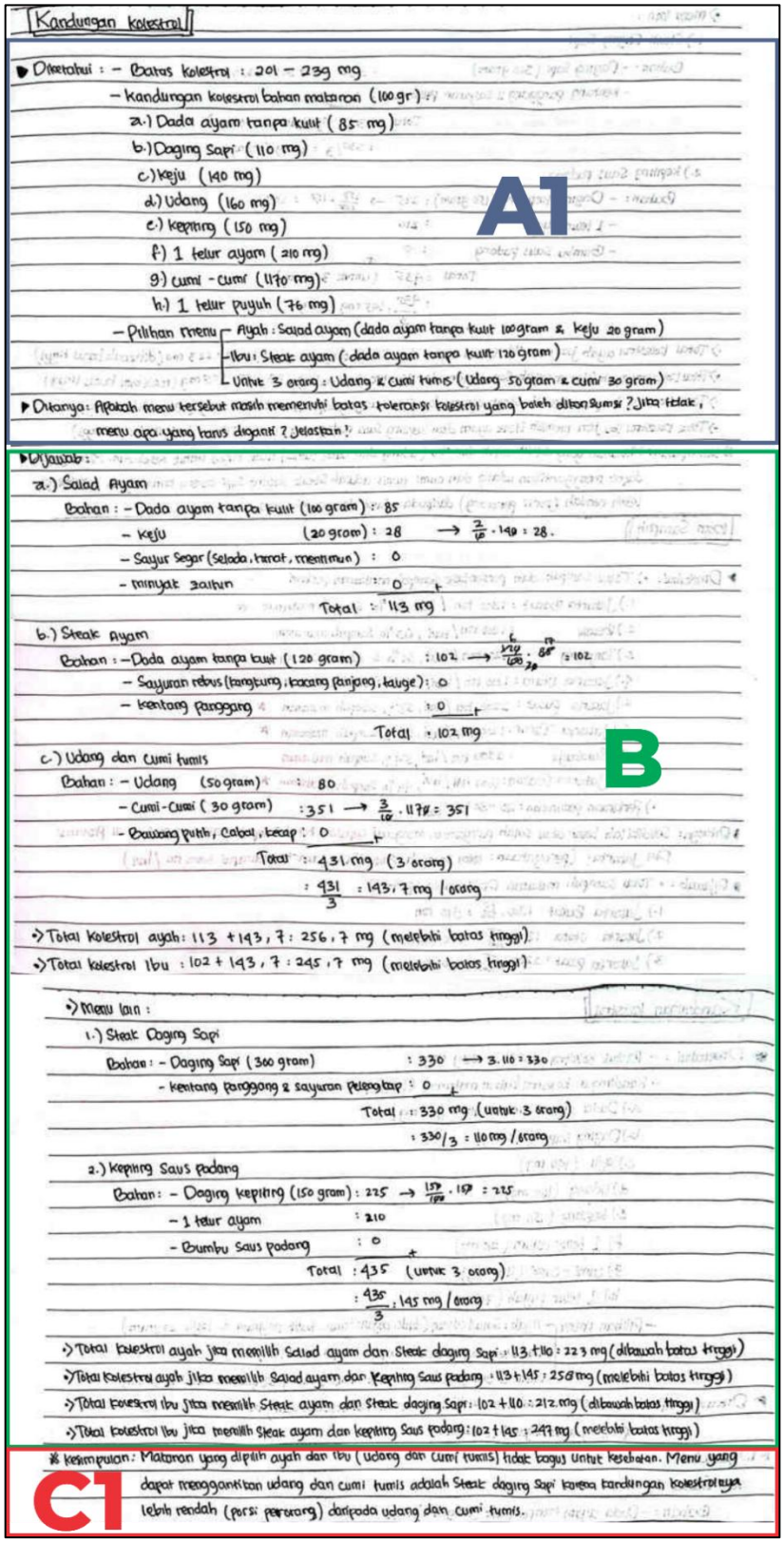

Figure 1. SAKB1 Test Results in the Scientific Context by a Student in the Climber AQ Category

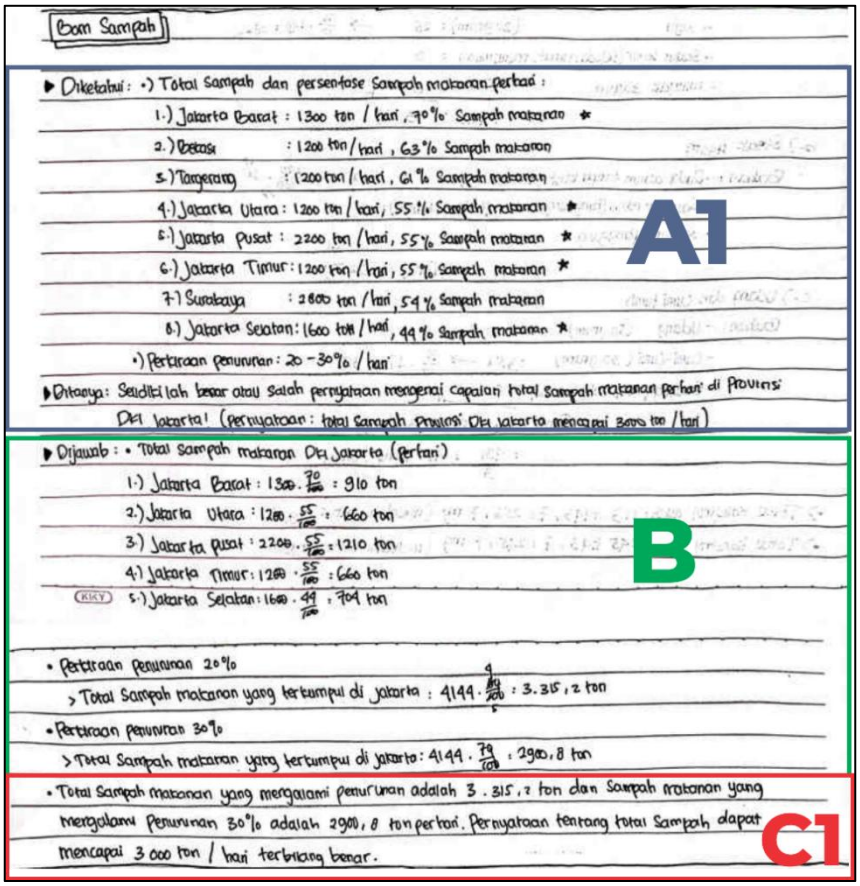

Figure 2. SAKB1 Test Results in the Socio-Cultural Context by a Student in the Climber AQ Category

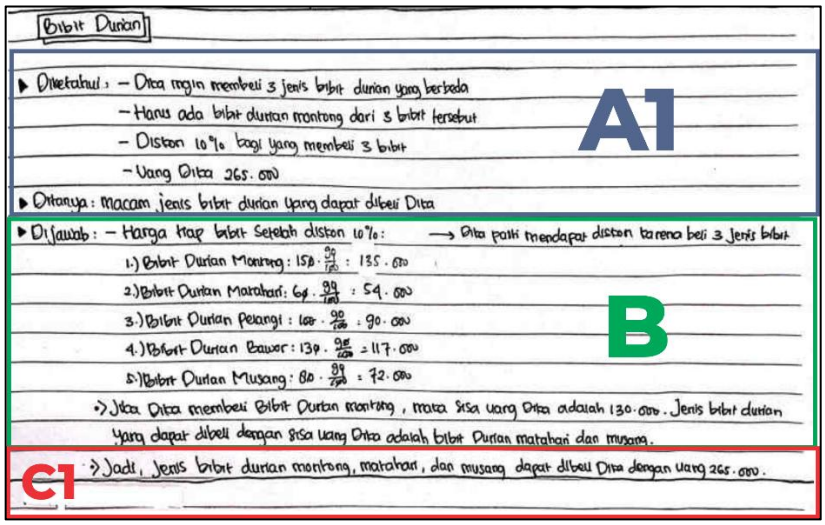

Figure 3. SAKB1 Test Results in the Personal Context by a Student in the Climber AQ Category

Indicator A2 (Assessing the problem or situation mathematically). Refer to this indicator, in the AKM questions in the scientific, socio-cultural, and personal contexts, climber students systematically compile problem-solving steps. Climber students calculate total cholesterol and compare the results (scientific context questions), calculate total food waste and reduction, then compare them with the problem statement (socio-cultural context questions), and calculate durian seed discounts and determine the appropriate combination with the amount of money (personal context questions). In line with Widyastuti's (2015)

findings, climber students can systematically compile strategies or steps to solve mathematical problems.

Indicator B (Using mathematical facts and procedures to solve the problem). Refer to this indicator, in all AKM question contexts, climber students use facts and apply correct procedures. For example, climber students can calculate the cholesterol content of each ingredient based on grammage (scientific context questions), calculate the amount of waste and compare it with existing statements (socio-cultural context questions), and calculate the discount price of durian seeds and choose a combination according to the amount of money (personal context questions). This is reinforced by a statement by Fatma (2019) that climber students solve problems according to plan and perform calculations correctly.

Indicator C1 (Interpreting the results obtained in the context of real-world problems). Refer to this indicator, in questions with scientific, socio-cultural, and personal contexts, climber students demonstrated the ability to relate their calculation results to real-world contexts. Climber students concluded that the shrimp and squid menu needed to be replaced because it exceeded the cholesterol limit (scientific context question), stated that the waste reduction was approaching 3,000 tons, so that the question statement was correct (socio-cultural context question), and chose a combination of durian seeds that was in accordance with the provisions (personal context question). In line with the findings by Riswang (2021), namely "... the climber subject tends to apply and relate the concepts he has learned and think about how to re-examine the correctness of the answers he wrote".

Indicator C2 (Evaluating and providing logical reasoning for the mathematical results obtained). Refer to this indicator, in all three problem contexts, climber students showed confidence in their answers. Climber students assessed that the answer was appropriate because it answered what was asked in the problem regarding cholesterol (scientific context problem), the result obtained of 3,000 tons was within the tolerance range (socio-cultural context problem), and stated that the combination of seeds was in accordance with the requirements of the problem (personal context problem). This is in line with Widyastuti's (2015) findings, which showed that climber students could believe in the truth of the answers they had given.

3.2 Numeracy of Senior High School Students in Solving Numbers Content AKM Problems by Students with AQ Camper Category

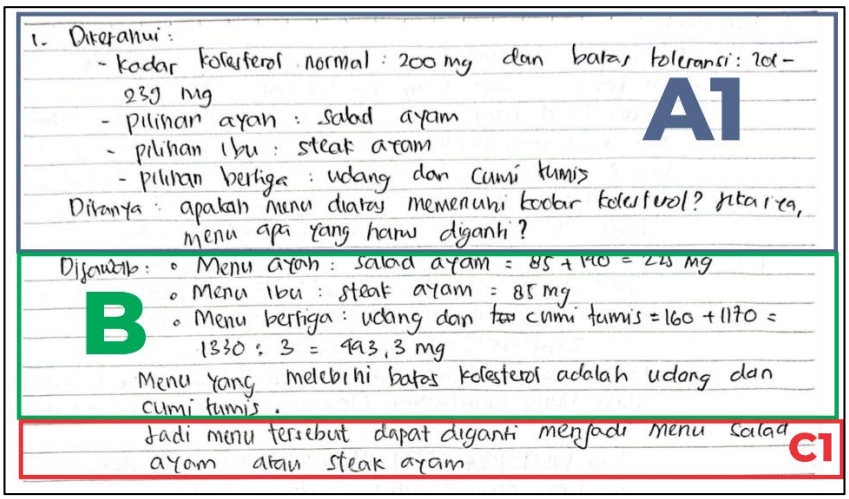

Figure 4. SAKB1 Test Results in the Scientific Context by a Student in the Camper AQ Category

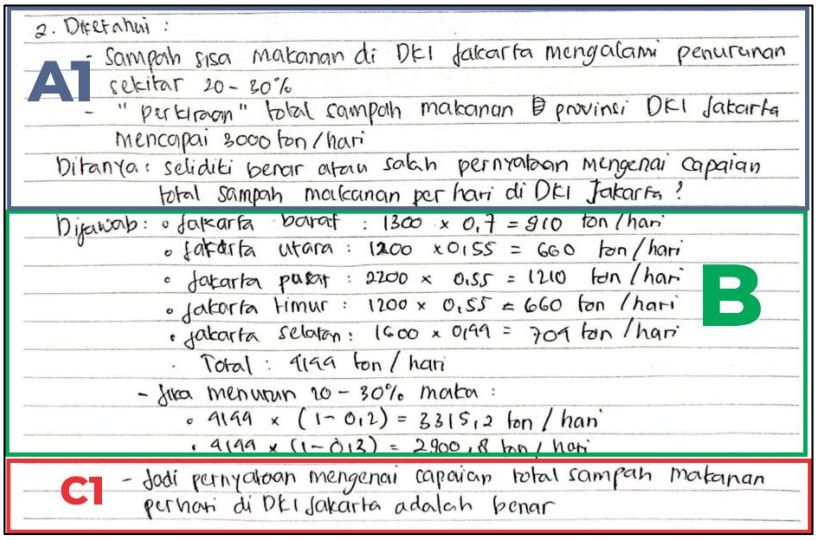

Figure 5. SAKB1 Test Results in the Socio-Cultural Context by a Student in the Camper AQ Category

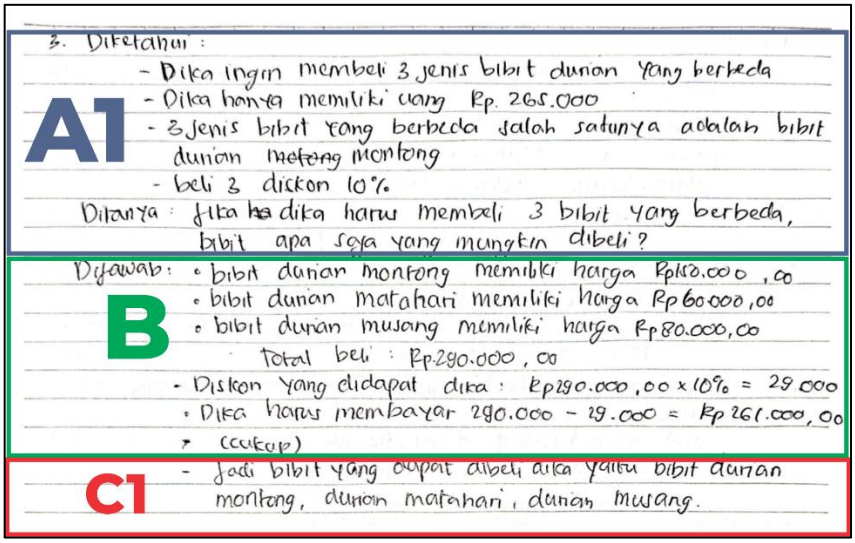

Figure 6. SAKB1 Test Results in the Personal Context by a Student in the Camper AQ Category

Indicator A1 (Identifying available information to solve the problem). Refer to this indicator, in the AKM questions in the scientific, socio-cultural, and personal contexts, camper students were able to mention relevant basic information, such as cholesterol limits, the content of each ingredient, and menu options (scientific context questions), information about the reduction in food waste and the target figure of 3,000 tons (socio-cultural context questions), as well as the requirements for purchasing durian seeds, Dika's amount of money, and discounts (personal context questions). Camper students also understood what the questions asked in all three contexts. In line with Mawardhiyah's (2018) opinion, students in the camper category attempted to find the necessary solutions, then explored the information in the questions to obtain them. However, in the scientific context, students did not mention information about the grammage of the materials. This is suspected because the scientific context is less familiar and requires additional knowledge beyond their daily experiences. This finding aligns with Ramdhani et al. (2025), who found that students tend to find it easier to solve questions in personal and socio-cultural contexts but have difficulty with scientific questions.

Indicator A2 (Assessing the problem or situation mathematically). Refer to this indicator, in all question contexts, camper students can plan procedures to solve existing problems. Camper students develop procedures to calculate total cholesterol content and compare it to the limit (scientific context questions), calculate a 20–30% reduction in food waste and compare it to the numbers in the question (socio-cultural context questions), and calculate the price of seeds after discounts and evaluate Dika's financial sufficiency (personal context questions) in line with what was stated by Rahmawati (2015), that students with the AQ camper category can explain the steps that will be used to solve the problem in the question. However, the steps compiled to solve the scientific context questions are based on insufficient information, namely the omission of the material's grammage.

Indicator B (Using mathematical facts and procedures to solve the problem). Refer to this indicator, camper students showed varying results. In the scientific context, the cholesterol calculation procedure was incorrect because it ignored the material's grammage. In contrast, in the socio-cultural and personal context, the camper students were able to correctly apply the procedure to calculate the reduction in total food waste and the total price of seeds with a discount. The errors in the scientific context were not caused by the students' inability to perform mathematical operations, but rather by important information that was missed in the previous stage, namely, the identification of existing data to solve the problem. This statement is in line with the findings of Wijaya (2014), who stated that "Out of the total amount of errors, 38% of them have to do with understanding the meaning of the context-based tasks. These comprehension errors particularly involve selecting relevant information", which means that the majority of student errors (38%) occurred at the stage of understanding the problem, not during the implementation of mathematical calculations.

Indicator C1 (Interpreting the results obtained in the context of real-world problems). Refer to this indicator, camper students attempt to connect their calculation results to the problem's context. For example, camper students state that the shrimp and squid menu needs to be replaced (scientific context question), and the problem statement is correct because the results are close to 3,000 tons (socio-cultural context question). Three durian seeds can be purchased according to the amount of money available (personal context question). This aligns with Selan's (2023) statement that students in the AQ camper category can interpret results well. However, in the scientific context, the interpretation is based on incorrect calculations because it ignores information about the grammage of the material, which affects the accuracy of the conclusion.

Indicator C2 (Evaluating and providing logical reasoning for the mathematical results obtained). Refer to this indicator, the camper student stated that his answer was correct in all contexts. This assessment emerged from comparisons of his calculation results with cholesterol limits (scientific context questions), with statements about reducing food waste (socio-cultural context questions), and with his calculation of the combination of discounted durian seedling prices (personal context questions). However, in the scientific context, the conclusion was based on an inaccurate calculation due to incomplete information. This is in line with the statement by Azmi (2025), who stated that "AQ campers show their efforts but will quickly feel satisfied when solving problems because they do not want to take risks" which means that students with the AQ camper category tend to feel satisfied with their initial answers without rechecking or validating, even though there are errors in the calculations due to incomplete information understood.

3.3 Numeracy of Senior High School Students in Solving Numbers Content AKM Problems by Students with AQ Quitter Category

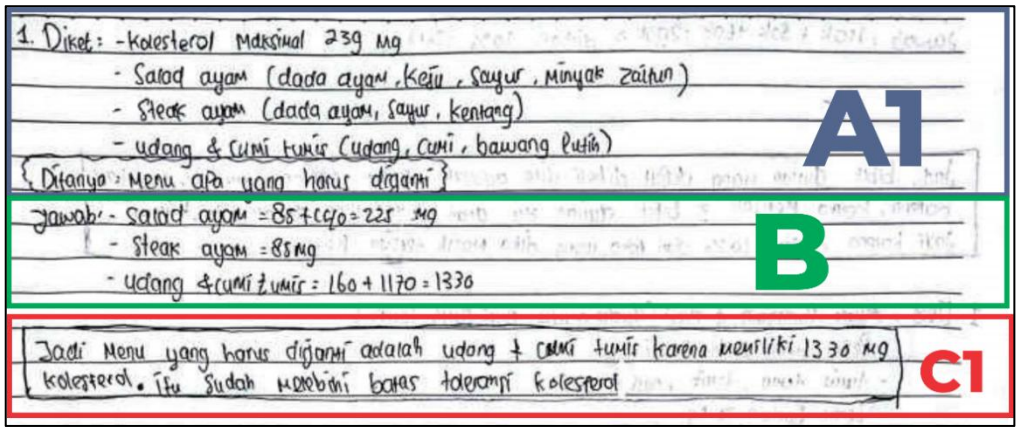

Figure 7. SAKB1 Test Results in the Scientific Context by a Student in the Quitter AQ Category

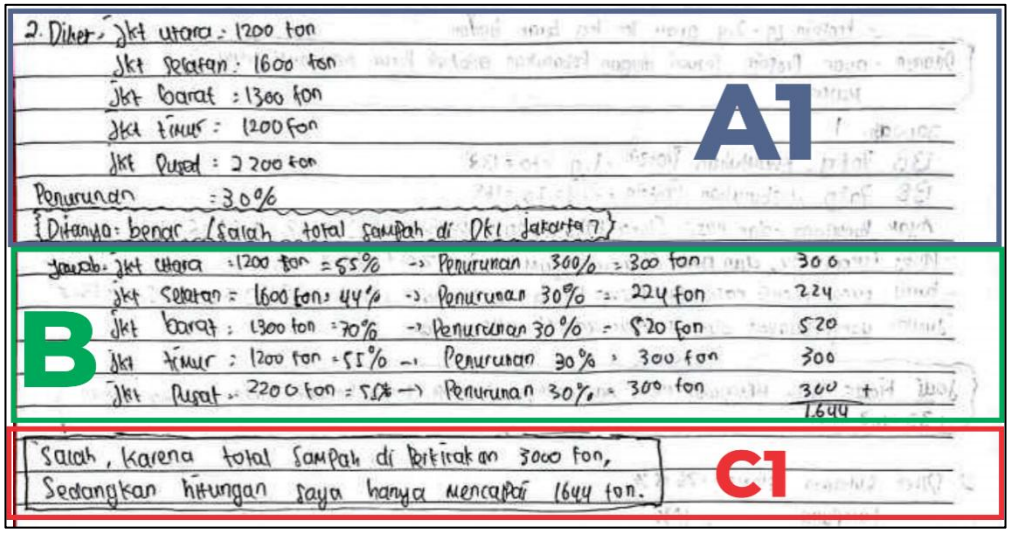

Figure 8. SAKB1 Test Results in the Socio-Cultural Context by a Student in the Quitter AQ Category

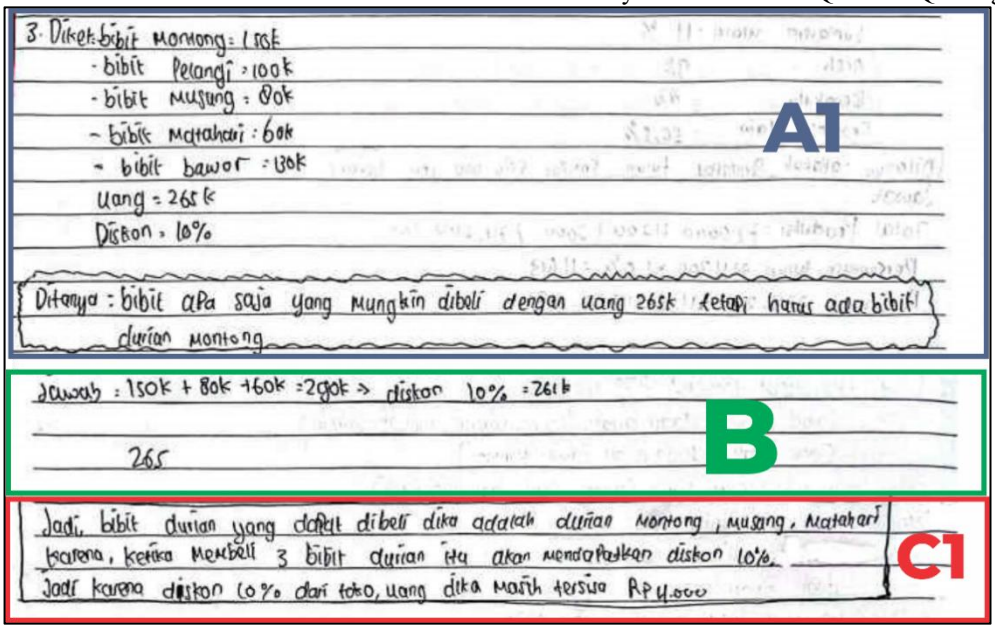

Figure 9. SAKB1 Test Results in the Personal Context by a Student in the Quitter AQ Category

Indicator A1 (Identifying available information to solve the problem). Refer to this indicator, in AKM questions with scientific, socio-cultural, and personal contexts, quitter students demonstrated an initial understanding of what was asked. Students mentioned cholesterol limits and understood the question about changing menus. Still, students did not mention information about existing grammage. They did not write or explain information about menus for three people to eat (scientific context questions), mentioned waste data and a 30% reduction figure, but ignored the 20–30% range (socio-cultural context questions), and mentioned the price of seeds, Dika's money, and discounts (personal context questions). Although students could identify basic information, they did not always pay attention to complete information, even when it was important, such as the value range in the context or other in-text provisions. This is in line with Siregar's (2022) statement that quitter students do not write what they know from the questions, thus illustrating their incomplete understanding of the information.

Indicator A2 (Assessing the problem or situation mathematically). Refer to this indicator, quitter students attempted to develop solution steps in all three contexts, but these steps were based on incompletely identified information in the scientific and socio-cultural contexts. Students calculated cholesterol content and compared it to the cholesterol limit (scientific context questions); students calculated a 30% reduction for each region and added them together (socio-cultural context questions); students calculated the price of three seeds, including montong seeds, and then used the available discount (personal context questions). Although there were visible attempts to develop steps, findings from Riswang (2021) showed that "Quitter-type students cannot express the information presented in problem-solving tasks," meaning they only grasped part of the information in the problem. This reflects a shallow understanding of the previous stage.

Indicator B (Using mathematical facts and procedures to solve the problem). Refer to this indicator, In the indicator of using mathematical facts and procedures to solve problems, quitter students showed varying results in each context. Quitter students ignored information about the grammage of ingredients and the menu eaten by three people, resulting in inaccurate cholesterol calculations (scientific context questions); the procedure for calculating the amount of food waste was also incorrect (socio-cultural context questions); students used the correct procedure in calculating seed prices and discounts (personal context questions). The findings in the scientific context are in line with those reported by Irianti (2016), namely that students have actually engaged in accommodative thinking. Still, the information they know is insufficient to find a solution. Then, the findings in the socio-cultural context are in line with those stated by Aisyah (2021), that quitter students experience difficulties in solving mathematical problems, one of which is difficulty in carrying out the solution steps correctly, or using incorrect procedures.

Indicator C1 (Interpreting the results obtained in the context of real-world problems). Refer to this indicator, quitter students who attempted to conclude from the results obtained. For example, students stated that the menu exceeded the cholesterol limit and needed to be replaced (scientific context question), stated that the problem statement was incorrect because the decrease was only 1,644 tons (socio-cultural context question), and concluded that three seeds could be purchased according to Dika's conditions and money (personal context question). However, two of these three interpretations were built from inaccurate calculations (scientific and socio-cultural), so the conclusions were invalid. This indicates that although students attempted to relate the results to real-world contexts, the interpretation process was still weak due to incorrect calculation bases or procedures.

Indicator C2 (Evaluating and providing logical reasoning for the mathematical results obtained). Refer to this indicator, quitter students demonstrated evaluation efforts in

all contexts. They stated their answer was correct because they suggested a substitute menu (in the scientific context), stated the question statement was incorrect because the results were inconsistent (in the socio-cultural context), and evaluated the combination of seeds available for purchase (in the personal context). However, in both scientific and socio-cultural contexts, these evaluations were invalid because they relied on incorrect steps. Only in the personal context was the evaluation supported by correct procedures.

4 Conclusion

Based on the findings, students in the climber AQ category demonstrated consistent numeracy performance across all indicators and AKM number content contexts. Students in the camper AQ category showed varying levels of numeracy performance depending on the context, with more indicators fulfilled in the socio-cultural and personal contexts compared to the scientific context. Students in the quitter AQ category showed limited fulfillment of numeracy indicators, primarily in the personal context, while fulfillment was not consistently observed in the scientific and socio-cultural contexts. These findings indicate differences in students' numeracy performance based on their respective Adversity Quotient (AQ) categories.

This study has several limitations. The research involved only three students, each representing one Adversity Quotient (AQ) category (climber, camper, and quitter), so the findings cannot be generalized to a wider population. In addition, the participants were selected purposively from a single school, which may not reflect the diversity of students in different schools or regions. The analysis was also based only on written responses and interviews, which might not fully capture other factors influencing students' numeracy skills, such as classroom interactions or prior learning experiences. Future studies should involve a larger and more varied sample and consider additional data collection methods to provide a more comprehensive understanding of students' numeracy skills.

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