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# Student's Problem Solving Process Reviewed from Adversity Quotient in Problem Based Learning Assisted by Volumath Website

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Abstract

Problem-Solving Ability (PSA) is one of the important competencies students must have. This study aims to describe students' problem-solving process based on their adversity quotient in Problem-Based Learning assisted by the Volumath website. The subjects of this study were students in class VIII F SMP Negeri 1 Jepon, who were selected using purposive sampling: 1 student in the climber category, 3 students in the camper category, and 1 student in the quitter category. The data collection techniques in this study were tests, questionnaires, interviews, observations, and documentation. The data analysis techniques were data collection, data reduction, data presentation, and concluding. The results showed that Problem-Based Learning assisted by the website produced variations in students' problem-solving abilities across different Adversity Quotient categories. Overall, students in the climber, camper, and quitter categories were able to carry out the orientation and planning phases well. Camper students with low PSA and quitter students with low PSA haven't performed optimally and need to be explored further in the execution phase. Meanwhile, camper students with medium PSA, camper students with low PSA, and quitter students with low PSA haven't performed optimally and need to be explored further in the review phase.

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## 1. Introduction

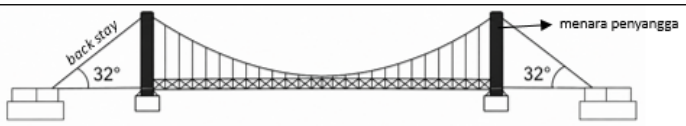
Mathematics is one of the subjects that plays an important role in developing students' thinking skills. According to the National Council of Teachers of Mathematics (2000), there are five core competencies that students need to have to meet math learning standards: problem-solving, reasoning and proving, communicating, making connections, and imagining. Among these various competencies, problem-solving ability is one of the important abilities that students must master.

Problem-solving is an important part of learning mathematics. Problem-solving is a process that combines concepts, principles, and skills that have been learned (Lahinda & Jailani, 2015). The National Research Council (2001) explains that one of the components of mathematical proficiency is strategic competence, which is a student's ability to formulate, represent, and solve problems accurately. Furthermore, Haylock & Thangata (2007) also add that in learning, problem-solving skills help students develop their analytical skills, creativity, and logical thinking abilities.

A preliminary study was conducted at SMP Negeri 1 Jepon on January 13, 2026, involving 32 eighth-grade students. Based on a problem-solving skills test, the results showed that students' problem-solving abilities need to be explored further. The problem-solving ability tested in the preliminary study referred to the Multidimensional Problem Solving Framework (MPSF) according to Carlson & Bloom (2005). According to Carlson & Bloom (2005), problem-solving skills consist of four phases: orientation, planning, execution, and checking. In addition, every phase involves several problem-solving attributes, namely

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resources, affect, heuristics, and monitoring. However, this study focused only on the phases of problem-solving ability and one attribute, namely resources. Therefore, the other attributes, namely affect, heuristics, and monitoring, were not explored, as they require long-term observation and more in-depth instruments, which could not be implemented due to time constraints. Preliminary study questions can be seen in Figure 1 below.




1. Jembatan Gantung Jatirunggo terletak di kecamatan Pringapus, Kabupaten Semarang. Jembatan ini dibangun sebagai infrastruktur penghubung antar wilayah dengan panjang 60 meter. Untuk menjaga kestabilan struktur, jembatan menggunakan kabel penyangga (*back stay*) yang dipasang dari puncak menara menuju permukaan jalan. Berdasarkan data perencanaan, panjang kabel penyangga adalah 15 meter dengan sudut kemiringan 32° terhadap permukaan jalan. Menara penyangga kabel memiliki tinggi 8 meter dan berdiri tegak lurus terhadap jalan. Berapa sudut yang terbentuk setelah kabel penyangga dipasangkan pada puncak menara penyangga?

a. Baca dan cermati urian di atas lalu sajikan informasi apa yang kamu dapatkan dalam bentuk tulisan dan gambar (menggunakan bahasamu sendiri) serta apa yang dipertanyakan? **(Fase Orientasi dengan aktivitas siswa memahami, mengorganisasi, dan mengkonstruksi informasi yang diberikan serta tujuan pemecahan masalah)**

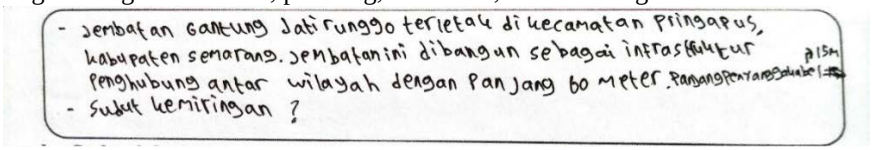
**b. Sudut dalam segitiga, sudut berpelurus, sudut sehadap, sudut bertolak belakang**
Dari empat konsep sudut di atas, manakah konsep yang akan kamu gunakan untuk menyelesaikan permasalahan pada soal? (berikan alasanmu memilih konsep tersebut) **(Fase Perencanaan dengan aktivitas siswa menduga konsep yang akan digunakan dan memeberikan alasan penggunaan konsep tersebut)**

c. Selesaikan permasalahan pada soal dengan konsep yang dipilih! (lengkapi dengan gambar) **(Fase Eksekusi dengan aktivitas siswa menghitung dan mengkonstruksi pemecahan masalah)**

d. Periksa kembali jawabanmu, apakah besar sudut yang diperoleh masuk akal? (jelaskan) **(Fase Pemeriksaan Kembali dengan aktivitas siswa memeriksa dan memverifikasi hasil pemecahan masalah)**

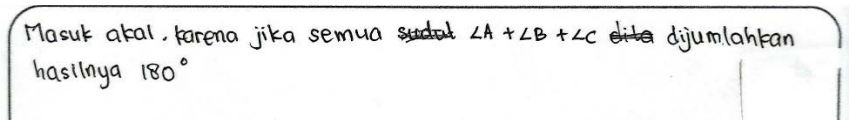
**Figure 1.** Preliminary Study Questions for Problem-Solving Ability

The question in Figure 1 is about lines and angles, specifically the interior angles of a triangle. It talks about the Jatirunggo Suspension Bridge, which has support cables attached from the top of the support towers down to the road surface. Students are asked to calculate the angles formed after the support cables are attached to the top of the towers using the concept of interior angles of a triangle, assuming the support towers stand perpendicular to the road. To solve this problem using problem-solving skills, students need to go through orientation, planning, execution, and checking.


- jembatan Gantung Jatirunggo terletak di kecamatan Pringapus, kabupaten semarang. jembatan ini dibangun sebagai infrastruktur penghubung antar wilayah dengan panjang 60 meter. Panjang
- Sudut kemiringan ?

**Orientation Phase**

-The Jatirunggo suspension bridge is located in the Pringapus district, Semarang regency. The bridge was built as connecting infrastructure between areas, with a length of 60 meters. The cable support length is 15 m.
- What is the angle of inclination?


Masuk akal. karena jika semua ~~sudut~~ ∠A + ∠B + ∠C ~~dita~~ dijumlahkan hasilnya 180°

**Cheking Phase**

Makes sense, because if all the ∠A+∠B+∠C are added up, the result is 180°

**Figure 2.** Student Results in the Orientation and Cheking Phase

Preliminary study results at SMP Negeri 1 Jepon through problem-solving ability tests on students showed that out of 32 eighth-grade students, only 6 students were able to complete the orientation phase correctly and thoroughly, 27 students were able to complete the planning phase, 24 students managed to complete the execution phase, and 13 students were able to complete the review phase correctly. Below is Figure 2 showing students' work that was less accurate during the orientation phase.

Based on Figure 2, the student hasn't fully completed question 1a, which is the orientation phase. In Figure 2, the student identified relevant information, including the location of the bridge in Semarang Regency, its function as connecting infrastructure between two areas, the bridge length of 60 meters, and the cable support length of 15 meters. The student then formulated the question, “What is the angle of inclination?” The answer is still not correct because the student hasn't included information about the slope angle = 32° and the height of the support tower = 8 m. The student also didn’t represent the provided measurements in the form of a right triangle as stated in the question, which mentioned that the support tower is perpendicular to the road. This means the student needs to work on understanding, organizing, and constructing the information given as well as the problem's objective.

Based on Figure 2, the student also hasn't fully maximized their work on question 1d, especially in the review phase. In Figure 2, the student wrote "makes sense" for the answer they got during the execution phase, reasoning that "if the three angles are added, the final result is 180°." Even though the student has validated their answer, the result is not entirely correct because they didn't double-check their work from the execution phase. This shows that students need to be guided more in checking and verifying problem-solving results.

Based on the facts above, students' problem-solving processes need to be explored in math learning. Especially in the two phases with the lowest achievement levels, which are the orientation and review phases, because field results show that students struggle the most with these phases. The importance of focusing on these two phases aligns with the view of the National Council of Teachers of Mathematics (2000), which states that problem-solving skills are a fundamental ability in math learning that emphasizes a comprehensive understanding of the problem as well as reflection on the process and outcomes of the solution.

Considering the importance of students’ problem-solving abilities and the need to develop these abilities, as indicated by the preliminary study described above, efforts are needed to stimulate and improve students’ problem-solving skills. One initial effort that can be made is to identify students’ characteristics, particularly how they respond to, face, and overcome problems. This is in line with Ginting’s (2024) statement that success in mathematics learning is influenced not only by cognitive aspects but also by students’ ability to persist and overcome various challenges encountered during the learning process. Therefore, understanding students’ characteristics is essential as a basis for teachers in determining appropriate learning strategies.

One of the affective aspects that plays an important role in the problem-solving process is the Adversity Quotient (AQ). Students' Adversity Quotient can be used by teachers to recognize differences in how students face difficulties, their resilience in handling challenges, and how they overcome challenges (Bawono & Santoso, 2025). This aligns with Stoltz's (1997) opinion, which states that individuals with a good adversity quotient have the ability to endure and bounce back from difficulties, making them more capable of solving problems effectively. Similarly, Arfi (2018) states that there is a relationship between the level of adversity quotient and students' resilience in problem-solving.

Based on an interview conducted on February 16, 2026, with one of the 8th-grade math teachers at SMP Negeri 1 Jepon regarding classroom learning processes, it was found that the teacher has applied several learning models such as Problem-Based Learning, Discovery Learning, and Project-Based Learning. However, in reality, after applying these models, there are still aspects that need improvement, particularly in the problem-solving stages. In addition, the use of technology in learning also needs to be increased. So far, the technology often used in learning is only Quizizz. Therefore, there is a need to further develop the implementation of technology in 8th-grade math learning at SMP Negeri 1 Jepon.

Problem-Based Learning (PBL) is one of the learning strategies that has the potential to develop and stimulate students' problem-solving skills. Problem-Based Learning is a learning model that creates an active learning environment by guiding students to collaboratively solve real problems as a context for developing their problem-solving abilities (Yanti, 2017). Through this model, students are encouraged to learn both independently and in groups, allowing them to actively plan, monitor, and evaluate their own

learning process (Aziza et al., 2025). In addition, presenting problems at the beginning of learning also gives students a push to investigate, analyze information, and find various alternative solutions to the problems given (Ardianti et al., 2021). The learning process aligns with the problem-solving skill indicators because students are actively involved in understanding the problem, planning for it, solving it according to the plan, and checking back on the solutions they have found (Ionita, 2020). Therefore, the activities in Problem-Based Learning can stimulate students' problem-solving abilities, especially in terms of explanations.

Besides the learning model, the technology involved in learning also affects students' problem-solving abilities (Zahara & Ningtiyas, 2025). One technology that can support learning is a learning website. Learning websites have become one of the innovations in modern math education because they can facilitate understanding, make learning easier, and encourage interest and motivation to actively solve problems (Mangelep, 2018). This aligns with Riska et al. (2025), who stated that websites, as multimedia tools, support the learning process by providing diverse and interactive content and offering an effective platform for more flexible, interactive, practical, and personalized learning. In addition, through websites, students can actively explore the material, which helps in gathering information during individual or group inquiry guidance stages. This is in line with the statement by Zulkifli & Praherdhiono (2024) that learning through websites makes it easier for students to take an active role in learning activities, because students are required to find the material through their own effort and initiative. Therefore, a learning website integrated with the problem-based learning model can optimally facilitate students in both independent and group investigations.

Based on its relation to the things explained above, the research problem in this study is how to describe the process of students' problem-solving viewed from the Adversity Quotient in Problem-Based Learning assisted by the Volumath website. This study aims to describe the students' problem-solving process from the perspective of the adversity quotient in Problem-Based Learning assisted by the Volumath website. The results of this study are expected to enrich the literature on the problem-solving process viewed from the Adversity Quotient, expand literature related to the implementation of website learning media, and serve as a source of innovation for teachers in implementing the problem-based learning model assisted by technology.

## 2. Methods

The research method used in this study was the descriptive qualitative method because the research results emphasize meaning rather than generalization (Sugiyono, 2013), and it describes events that are heard, felt, and made in narrative or descriptive statements (Strauss & Corbin, 2013). Descriptive research was conducted to provide a systematic, factual, and accurate picture of the facts and characteristics of a particular population. This aligns with Fathoni (2006), who stated that descriptive research was research aimed at examining and measuring certain phenomena to produce a systematic, factual, and accurate description of facts, characteristics, and the relationships between the investigated phenomena. The facts described in this research were used to describe students' problem-solving abilities in terms of their adversity quotient. The qualitative method in this study was used to describe students' problem-solving abilities viewed from the adversity quotient in Problem-Based Learning using the Volumath website. Data collection techniques in this study include tests, questionnaires, interviews, observations, and documentation. The research instruments used include the learning website, problem-solving ability tests, adversity quotient questionnaires, interview guides, and observation sheets. The analysis technique used refers to the Miles & Huberman (1984) model, which includes data collection, data reduction, data presentation, concluding, and verification.

The location of this research is at SMP Negeri 1 Jepon, which is located at Jl. Raya Jepon No 93 A, Seso Village, Jepon District, Blora Regency, Central Java. This study was conducted in class VIII F. The subjects in this study were chosen using purposive sampling, selected based on tendencies in the climber, camper, and quitter categories with additional criteria, namely subjects who could represent students' problem-solving abilities with the same adversity quotient category, good communication skills, and consistency of students' adversity quotient based on the results of the initial and final questionnaires regarding students' adversity quotient.

**Table 1.** Results of the Adversity Quotient Questionnaire for Students of Grade VIII F SMP Negeri 1 Jepon

| Adversity Quotient Category | Problem-Solving Ability | Many Students | Percentage (%) |
|---|---|---|---|
| Climber | High | 2 | 6.25% |
| | High | 6 | 18.75% |
| Camper | Medium | 9 | 28.125% |
| | Low | 13 | 40.625% |
| Quitter | Low | 2 | 6.25% |
| Total | - | 32 | **100%** |

## 3. Results & Discussions

### *3.1. Result*

This research was carried out using a Problem Based Learning (PBL) model assisted by the Volumath website. The website was used as a supporting in learning activities, especially during the investigation stage, to help students explore and understand the concepts needed to solve problems. The display of the Volumath website used in learning is shown in Figure 3.

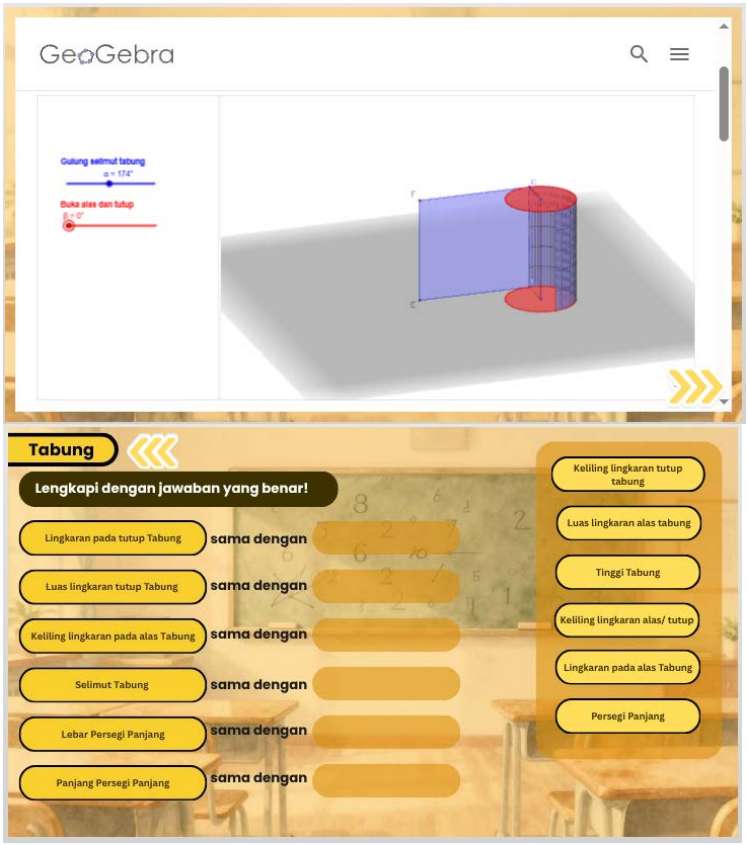



**Figure 3.** Volumath Website Appearance

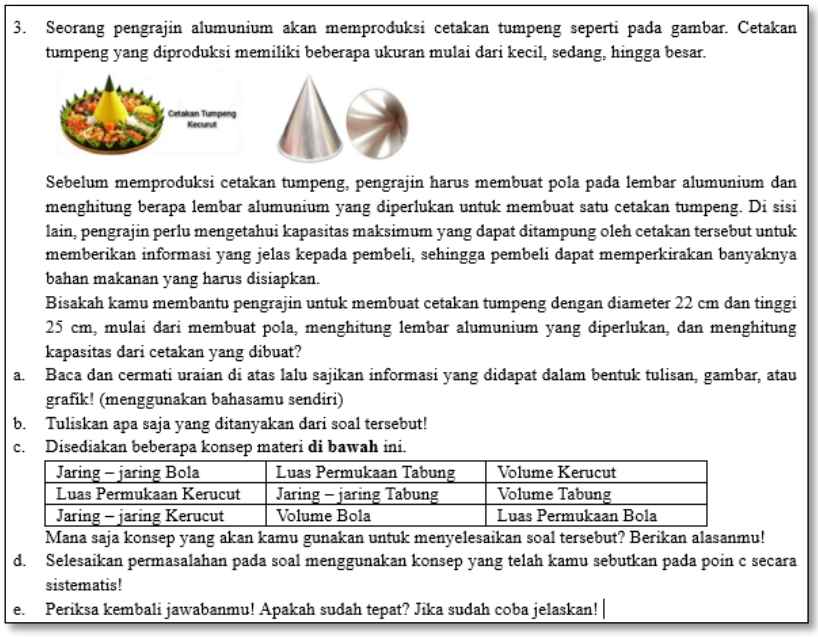
Based on the results of purposive sampling that were carried out based on the results of students' problem-solving, the subjects in this study consisted of 1 student representing the climber category with high PSA (E-32), 3 students in the camper category with each representing high (E-24), low (E-28), and medium (E-5) PSA, and 1 student representing the quitter category with low PSA (E-1).

**Table 2.** Results of Triangulation Review of Students' Problem-Solving Process Based on Adversity Quotient

| AQ Levels | Climber | Camper | | | Quitter |
|---|---|---|---|---|---|
| PSA | High | High | Medium | Low | Low |
| Orien-tation | Able | Able | Able | Able | Able |
| | Students with AQ climber and high PSA in the orientation phase engage in activities of understanding, organizing, and constructing the given information, as well as problem-solving goals. Students are able to **(understand the meaning by reading and presenting the reading results in the form of questions, accompanied by mathematical terms and symbols)** | Students with AQ camper and high PSA in the orientation phase engage in activities of understanding, organizing, and constructing the given information, as well as problem-solving goals. Students are able to **(understand the meaning by reading and presenting the reading results in the form of questions, accompanied by mathematical terms and symbols)** | Students with AQ camper and medium PSA in the orientation phase engage in activities of understanding, organizing, and constructing the given information, as well as problem-solving goals. Students are able to **(understand the meaning by reading and presenting the reading results in the form of questions, accompanied by mathematical terms and symbols)** | Students with AQ camper and low PSA in the orientation phase engage in activities of understanding, organizing, and constructing the given information, as well as problem-solving goals. Students are able to **(understand the meaning by reading and presenting the reading results in the form of questions, accompanied by mathematical terms and symbols)** | Students with AQ quitter and low PSA in the orientation phase engage in activities of understanding, organizing, and constructing the given information, as well as problem-solving goals. Students are able to **(understand the meaning by reading and presenting the reading results in the form of questions, accompanied by mathematical terms and symbols)** |
| Plan-ning | Able | Able | Able | Able | Able |
| | Students with AQ climber with high PSA during the planning phase engage in activities such as guessing the concept that will be used and giving reasons for using the concept, the students are able to **(identify the concept used and give reasons for choosing the concept).** | Students with AQ camper with high PSA during the planning phase engage in activities such as guessing the concept that will be used and giving reasons for using the concept, the students are able to **(identify the concept used and give reasons for choosing the concept).** | Students with AQ camper with medium PSA during the planning phase engage in activities such as guessing the concept that will be used and giving reasons for using the concept, the students are able to **(identify the concept used and give reasons for choosing the concept).** | Students with AQ camper with low PSA during the planning phase engage in activities such as guessing the concept that will be used and giving reasons for using the concept, the students are able to **(identify the concept used and give reasons for choosing the concept).** | Students with AQ quitter with low PSA during the planning phase engage in activities such as guessing the concept that will be used and giving reasons for using the concept, the students are able to **(identify the concept used and give reasons for choosing the concept).** |
| Exe-cuting | Able | Able | Able | Unable | To Be Explored |
| | Students with AQ climber with high PSA in the execution phase in activities such as calculating and constructing problem-solving, and students are able to **(calculate and solve problems by applying the identified concepts)** | Students with AQ camper with high PSA in the execution phase in activities such as calculating and constructing problem-solving, and students are able to **(calculate and solve problems by applying the identified concepts)** | Students with AQ camper with medium PSA in the execution phase in activities such as calculating and constructing problem-solving, and students are able to **(calculate and solve problems by applying the identified concepts)** | Students with AQ camper with low PSA in the execution phase in activities such as calculating and constructing problem-solving, and students are unable to **(calculate and solve problems by applying the identified concepts)** | Students with AQ camper with low PSA in the execution phase in activities such as calculating and constructing problem-solving, and students need to be explored **(calculate and solve problems by applying the identified concepts)** |

| | | | | | |
|---|---|---|---|---|---|
| Che-king | Able | Able | Unable | To Be Explored | To Be Explored |
| | Students with climber AQ and high PSA in the cheking phase carry out activities such as checking and verifying problem-solving results, where students are able to **(recalculate the solutions obtained in the execution phase and verify them in the form of a concluding sentence)** | Students with camper AQ and high PSA in the cheking phase carry out activities such as checking and verifying problem-solving results, where students are able to **(recalculate the solutions obtained in the execution phase and verify them in the form of a concluding sentence)** | Students with camper AQ and medium PSA in the cheking phase carry out activities such as checking and verifying problem-solving results, where students are unable to **(recalculate the solutions obtained in the execution phase and verify them in the form of a concluding sentence)** | Students with camper AQ and low PSA in the cheking phase carry out activities such as checking and verifying problem-solving results, where students need to be explored **(recalculate the solutions obtained in the execution phase and verify them in the form of a concluding sentence)** | Students with quitter AQ and low PSA in the cheking phase carry out activities such as checking and verifying problem-solving results, where students need to be explored **(recalculate the solutions obtained in the execution phase and verify them in the form of a concluding sentence)** |

Based on Table 3, due to page limitations, only a few subjects were selected to be explained in detail regarding the problem-solving process. The questions used were question number 3, focusing on parts (a) and (b) for orientation, part (c) for planning, part (d) for execution, and part (e) for review.



3. Seorang pengrajin alumunium akan memproduksi cetakan tumpeng seperti pada gambar. Cetakan tumpeng yang diproduksi memiliki beberapa ukuran mulai dari kecil, sedang, hingga besar.

Cetakan Tumpeng Kecurut

Sebelum memproduksi cetakan tumpeng, pengrajin harus membuat pola pada lembar alumunium dan menghitung berapa lembar alumunium yang diperlukan untuk membuat satu cetakan tumpeng. Di sisi lain, pengrajin perlu mengetahui kapasitas maksimum yang dapat ditampung oleh cetakan tersebut untuk memberikan informasi yang jelas kepada pembeli, sehingga pembeli dapat memperkirakan banyaknya bahan makanan yang harus disiapkan.

Bisakah kamu membantu pengrajin untuk membuat cetakan tumpeng dengan diameter 22 cm dan tinggi 25 cm, mulai dari membuat pola, menghitung lembar alumunium yang diperlukan, dan menghitung kapasitas dari cetakan yang dibuat?

a. Baca dan cermati uraian di atas lalu sajikan informasi yang didapat dalam bentuk tulisan, gambar, atau grafik! (menggunakan bahasamu sendiri)

b. Tuliskan apa saja yang ditanyakan dari soal tersebut!

c. Disediakan beberapa konsep materi **di bawah** ini.

| | | |
|---|---|---|
| Jaring – jaring Bola | Luas Permukaan Tabung | Volume Kerucut |
| Luas Permukaan Kerucut | Jaring – jaring Tabung | Volume Tabung |
| Jaring – jaring Kerucut | Volume Bola | Luas Permukaan Bola |

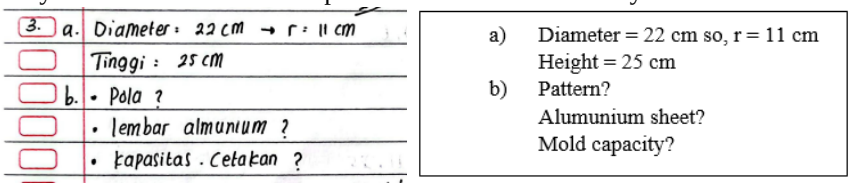
Mana saja konsep yang akan kamu gunakan untuk menyelesaikan soal tersebut? Berikan alasanmu!

d. Selesaikan permasalahan pada soal menggunakan konsep yang telah kamu sebutkan pada poin c secara sistematis!

e. Periksa kembali jawabanmu! Apakah sudah tepat? Jika sudah coba jelaskan!

**Figure 4.** Problem-Solving Ability Question Number 3

In questions number 3a and 3b, the subject in the camper category with a high PSA (E-24) was able to carry out the orientation phase. This is shown by the work results in Figure 5 below.



3. a. Diameter : 22 cm → r = 11 cm
Tinggi : 25 cm
b. • Pola ?
• lembar almunium ?
• kapasitas . Cetakan ?

a) Diameter = 22 cm so, r = 11 cm
Height = 25 cm
b) Pattern?
Alumunium sheet?
Mold capacity?

**Figure 5.** Work Results of Subject E-24 Numbers 3a and 3b

Based on Figure 5, in questions 3a and 3b, subject E-24 was able to perform the orientation phase by understanding the meaning of the questions by reading and writing down the information known as well as

stating the problem-solving goals, that is, what is being asked, using their own words and complete mathematical symbols. The student wrote down the information known using their own words and mathematical symbols in question 2a, which is diameter = 22 cm, r = 11 cm, and height = 25 cm, and wrote the problem-solving goals, that is, what is being asked, by listing them as three points in question 3b, namely pattern, aluminum sheet, and mold capacity.

Excerpts from the interview with subject E-24 regarding the orientation phase in questions 3a and 3b are as follows.

G : *"What information do you know from question number 3?"*
E-24 : *"Production of a tumpeng mold with d = 22 cm and h = 25 cm"*
G : *"So, what is being asked in question number 3?"*
E-24 : *"To make a pattern for the tumpeng mold, determine the aluminum sheet needed, and calculate the mold's capacity"*

Based on excerpts from the interview results, subject E-24 was able to carry out the orientation phase on question number 3 by understanding the meaning of the question through reading and writing down the information they knew, as well as stating the goal of solving the problem, that is, what was being asked, using their own words and complete mathematical symbols. The student provided the information they knew, which was about making a tumpeng mold with a diameter of 22 cm and a height of 25 cm, and stated the goal of solving the problem, which was to create a pattern for the tumpeng mold, determine the aluminum sheets needed, and calculate the mold's capacity.

Based on the test results and interview results, it can be concluded that subject E-24 is able to carry out the orientation phase on questions 3a and 3b. The activities done by subject E-24 during the orientation phase are that the student is able to understand the meaning by reading, and the results are presented in the form of a text containing mathematical terms with measurements, and is able to understand the meaning by reading and then presenting the results in the form of a question sentence with mathematical terms and symbols.

For question 3c, the camper subject with a moderate PSA (E-28) is able to carry out the planning phase. This is shown by the work results in Figure 6 below.

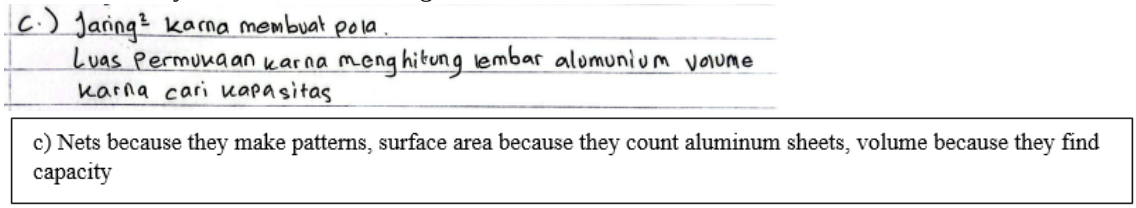



**Figure 6.** Work Results of Subject E-28 Number 3c

Based on Figure 6, in question number 3c, subject E-28 was able to carry out the planning phase by guessing the concept to be used along with the reason for choosing that concept. The student identified the net concept because they were making patterns, surface area because they were calculating aluminum sheets, and volume because they were looking for capacity.

Here is an excerpt from an interview with subject E-28 regarding the planning phase in question number 2c.

G : *"Why did you choose those concepts or materials?"*
E-28 : *"I used nets to make the pattern, volume to find the capacity, and surface area to find out how many sheets of aluminum are needed."*

Based on the excerpt from the interview above, subject E-28 was able to carry out the planning phase on question number 3c by predicting the concepts to be used along with the reasons for choosing those concepts. The student identified which concepts were needed for question 3c by stating he used the concepts of nets, volume, and surface area, and gave reasons for choosing those concepts, with nets used for making the mold pattern, volume for finding the capacity, and surface area for determining the number of aluminum sheets.

Based on the test results and the interview, it can be concluded that subject E-28 was able to carry out the planning phase on question number 3c. The activity performed by subject E-28 in the planning phase

on question number 3c was identifying the concepts used and providing the reasons for choosing those concepts.

In question number 3d, the camper with a low PSA hasn't fully carried out the execution phase. This is shown by the work results in Figure 7 below.

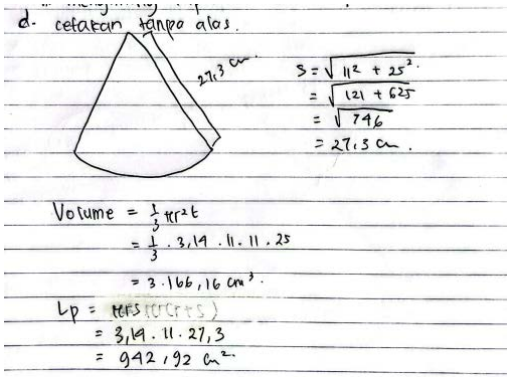



**Figure 7.** Work Results of Subject E-5 Number 3d

Based on Figure 7 in question number 3d, subject E-5 has not fully mastered the execution phase in solving problems by applying the identified concepts. The student drew the nets, continued calculating the slant height, and then determined the cone's volume using the formula 1/3 πr^2 t and found the surface area without the base using the formula πrs. Subject E-5 was not fully successful in making the nets because they did not calculate the size of the central angle.

Take a look at the interview results with subject E-5 regarding the execution phase in question number 3d as follows.

*G : "What steps did you take to solve the problem in point d?"*

*E-5 : "First I made a pattern, then found the volume, then found s to get the surface area."*

Based on the excerpt from the interview above, subject E-5 hasn't been performing optimally in the execution phase for question 3d. The student mentioned solving the problem by applying the concept that had been identified, which is drawing the pattern first and then calculating the volume, followed by finding the value of s to determine the surface area.

Based on the test results and the interview, it can be concluded that subject E-5 hasn't been performing optimally in the execution phase for question 3d. The activity carried out by subject E-5 in question 3d was solving the problem by applying the concept that had been identified.

In question number 3e, subject E-1 needs to be explored during the planning phase. This is shown by the work results in Figure 8 below.

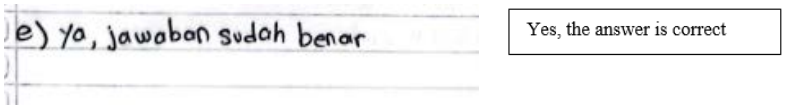



**Figure 8.** Work Results of Subject E-1 Number 3e

Based on Figure 8 in question number 3e, subject E-1 needs to dig deeper when performing the review phase by recalculating the solution obtained in the execution phase and verifying it in the form of a conclusion sentence. The student only verifies whether the solution obtained is correct or not without rechecking the solution that has been found.

Take a look at the results of the interview with subject E-1 regarding the review phase in question number 3e as follows.

G : *"Did you double-check the answer you found earlier?"*

E-1 : *"No ma'am, because I think point d is already correct."*

Based on the excerpt from the interview above, subject E-1 needs to be probed more during the re-evaluation phase for question 3e by recalculating the solution obtained in the execution phase and verifying it in the form of a concluding sentence. The student said they did not recalculate or verify the results obtained because they felt point d was already correct.

Based on the test and interview results, it can be concluded that subject E-1 needs to be explored further in performing the re-evaluation phase for question 3e. The activity carried out by subject E-1 for question 3e was recalculating the solution obtained in the execution phase and verifying it in the form of a concluding sentence.

Overall, students with climber, camper, and quitter adversity quotient categories are able to carry out the orientation and planning phases properly. However, based on the results presented, most students face challenges in the execution and review phases. In the execution phase, students are supposed to be able to solve problems by applying the concepts that have been identified. Students in the climber category with high PSA, campers with high PSA, and campers with medium PSA are able to perform the execution phase well, while campers with low PSA and quitters with low PSA are not yet performing at their best and need more support during the execution phase.

In the execution phase, you can see from the answers and interviews that students in the camper category with low PSA and students in the quitter category with low PSA show different results. Students in the camper category with low PSA got the pattern making of the tumpeng mostly right, but their calculations for the pattern size weren't complete, while students in the quitter category with low PSA made mistakes in creating the tumpeng pattern and also didn't have complete calculations for the pattern size.

In the checking phase, students in the climber category with high PSA and campers with high PSA were able to handle the checking phase well, while camper students with medium PSA, camper students with low PSA, and quitter students with low PSA were not yet optimal and need more guidance in performing the checking phase. Based on the answers and interviews, it was found that quitter students with low PSA only verify the answers without recalculating to check the answers found during the execution phase.

### *3.2. Discussion*

Based on the results presented, students in the climber category with high problem-solving ability were able to carry out all activities in each phase of problem-solving skills, namely orientation, planning, execution, and review. This fact is supported by Baharullah et al. (2022), who stated that students in the climber category have excellent problem-solving abilities and are capable of fulfilling all four indicators: understanding, planning, executing problem-solving, and reviewing. Students' ability to complete all these phases shows that they continue to strive to solve problems given in a systematic way, allowing them to find the right solutions. This aligns with Stoltz (1997), who stated that individuals with a climber AQ category have high perseverance, see difficulties as challenges, and never give up.

Unlike climber-category students, camper-category students show problem-solving abilities that vary according to their skill level. Overall, camper students perform fairly well in the orientation, planning, and execution phases, but they face difficulties in the review phase. This aligns with the research by Baharullah et al. (2022), which states that camper-category students have enough ability to understand problems, carry out solutions using a pre-made plan, and achieve the correct final result, but they are not yet able to evaluate the results or answers they have obtained. This suggests that camper students are satisfied with the answers they get and are less motivated to review them. This fact is supported by Sutisna et al. (2023), who stated that students with camper characteristics are able to follow the steps to complete tasks even if not perfectly and quickly feel satisfied with the results they get.

Students in the quitter category with low problem-solving skills show the most limited problem-solving abilities compared to other categories. Students in the quitter category still need guidance during the execution phase and in rechecking their calculations, as they have not fully completed their computations nor reviewed the results. This shows that these students haven’t fully tried to complete all stages of problem-solving. This fact is supported by Stoltz (1997), who states that individuals in the quitter category tend to have lower perseverance when facing difficulties, so their efforts to solve problems are often less than optimal.

## 4. Conclusion

The research results show that implementing Problem-Based Learning supported by the Volumath website results in variations in students' problem-solving abilities across different Adversity Quotient categories. Students in the climber category with high PSA were able to complete the orientation, planning, execution, and review phases well. Students in the camper category with high PSA were also able to complete the

orientation, planning, execution, and review phases well. Camper students with medium PSA were able in the orientation, planning, and execution phases, but not fully in the review phase. Camper students with low PSA were able in the orientation and planning phases, but not fully in the execution and need further exploration in the review phase. Meanwhile, quitter students with low PSA were able in the orientation and planning phases, but need further exploration in the execution and cheking phases.

One of the reasons for the low ability of students in the camper and quitter categories with low PSA during the execution phase is mistakes in calculations and incomplete answers from the students. Teachers should remind students about the goal of problem-solving, whether the results from the execution phase have met all the objectives or not. In addition, one of the reasons for the low ability of students in the camper category with medium PSA, campers with low PSA, and quitters with low PSA during the checking phase is that students are not used to doing it as part of the solution process. Students usually recheck just by looking at the results from the execution phase, and if they think there are no mistakes, they immediately conclude that the answer is correct. Teachers should get students used to rechecking by recalculating, either using the same strategy or a different one, and verifying the results at the end.

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