Senior High School Students’ Lack of Truth-Seeking Behavior in Mathematics Problem Solving

Mira Rahmawati1, Dian Kurniati1*, Arika Indah Kristiana1, Susanto1, Ridho Alfarisi1, Sharifah Osman2

1Department of Mathematics Education, Faculty of Teacher Training and Education, Universitas Jember, Jember, 68121, Indonesia
2School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Johor Bahru, 81300, Malaysia

Abstract: The objective of this study is to discern the patterns of truth-seeking behaviors among students when tackling mathematics problems involving an unknown universe of discourse. Employing a qualitative descriptive approach, the research encompassed stages including instrument preparation and validation, data collection from two mathematics problems with no specified universal set, subject selection, data analysis, triangulation, and interpretation. The research group consisted of tenth-grade high school students who were considered to have ideal abilities in problem-solving. The instrument used was valid and reliable. The findings reveal that students tend to exhibit a lack of truth-seeking behavior when tackling problem-solving tasks. These behaviors include: (1) verifying the universal set, (2) articulating and defining the universal set, (3) documenting the formulas used to solve problems according to the objectives, (4) outlining the steps employed, (5) working through the questions in accordance with predetermined steps, and (6) evaluating the outcomes obtained to ensure their alignment with the established objectives. Their behavioral patterns unfold as follows: (1) comprehending questions to extract problem details and jotting down pertinent information during the problem identification phase, (2) identifying and documenting the queries posed in questions during the goal-setting stage, (3) utilizing all established information during the strategy implementation phase, and (4) formulating conclusions and conducting result verification during the review and evaluation stage. Future researchers can develop learning methods to familiarize students with truth-seeking behaviors.

INTRODUCTION

According to the US-Partnership for 21st Century Skills (P21), the essential competencies required presently are communication, collaboration, critical thinking, and creativity (often referred to as the 4C’s) (Nganga, 2019; Pratama et al., 2019; Rudianto et al., 2022; Tang et al., 2020; Tohani & Aulia, 2022). Critical thinking is among the competencies outlined in the standard graduate competency indicators set by the Indonesian government, spanning from elementary school to university education. This aligns with the Ministry of Education and Culture of the Republic of Indonesia’s assertion that a primary objective of education, from schools to
Senior High School Students’ Critical Thinking Dispositions in Solving Mathematical Problems

M. Rahmawati, D. Kurniati, A. I. Kristiana, Susanto, R. Alfarisi, S. Osman

Critical thinking is crucial for students to foster and instill critical thinking skills in students (Akib et al., 2020; Andrian et al., 2018; Mislia et al., 2019; Widiyatmoko & Shimizu, 2018). Critical thinking involves individual reasoning when confronted with a problem, wherein known evidence and facts are taken into account. The process of reflective and rational thinking related to what to do or believe is called critical thinking (Ennis, 1996). To meet the basic educational objectives, students must possess both the ability and inclination for critical thinking (Kizilhan & Demir, 2022; Seibert, 2021; Zain & Jumadi, 2018). Lai (2011) states that the definition of critical thinking is divided into ability and disposition. Critical thinking disposition is a facet of critical thinking that indirectly characterizes the abilities held by an individual (Asigigan & Samur, 2021; Fettahlıoğlu & Kaleci, 2018; Kuhn, 2019; Ren et al., 2020). Should students master the disposition of critical thinking, they would prioritize verifying the truth behind the problem and categorizing pertinent elements before proceeding to solve it (Kurniati & Zayyadi, 2018). The CCTDI (California Critical Thinking Disposition Inventory) instrument employs seven scales to assess an individual’s critical thinking disposition, one of which is truth-seeking (Facione et al., 2013).

Truth-seeking is the habitual practice of revisiting the truth inherent in a given problem to achieve the most comprehensive understanding, thereby establishing what can be relied upon as true (Kurniati et al., 2020). When specifically related to students exhibiting truth-seeking behavior in solving math problems, it includes (1) recognizing the truth within all information presented in math problems, (2) rectifying it by transforming illogical problems into logical ones, (3) seeking out all information pertinent to the given problem, and (4) maintaining honesty and objectivity when questioning the truthfulness of the information acquired (Kurniati et al., 2020; Nugroho et al., 2018).

There are eight types of mathematical problems that have the potential to enhance students’ thinking dispositions, and one of them is the problem with an unknown universe of discourse (As’ari et al., 2019). Mathematical problems involving unknown universes of discourse are designed to stimulate students’ thinking and elicit their responses (Szabo et al., 2020). These problems can stimulate students by helping them understand the problem, design mathematical models, solve models, and interpret the solutions obtained (Sekaryanti et al., 2022). Students often have the habit of directly tackling a mathematical problem without initially considering the problem’s universe and typically assume the universe encompasses all real numbers. This aligns with the observation that students’ truth-seeking behavior isn’t evident when working on math problems with an unknown universe of discourse, as they have not been instructed about the universe of discourse inherent in each math problem (Rahmawati et al., 2021).

The mathematical problems examined in this study pertain to the content of the Three Variable Linear Equation System. This system consists of equations featuring three distinct variables, and problems involving variables necessitate a specific universe of discourse. Critical thinking disposition is closely linked to proficiency in solving mathematical problems. One theoretical framework that can aid in solving such problems is the IDEAL problem-solving theory. The IDEAL theory of problem solving is valuable for enhancing thinking skills in addressing a given problem (Bransford & Stein, 1993). IDEAL is a strategy used to describe thinking abilities in the problem-solving process (Annizar et al., 2020). IDEAL Problem Solving can describe how students can solve problems...
and the steps used in procedural and conceptual detail (Rosyada & Wibowo, 2023). The term “IDEAL” in IDEAL problem solving derives from the following steps: I (Identify the problem, such as identifying problems; identifying information, questioning, visualizing situations, and making students critical thinking opportunities to determine the next stages), D (Define the goal, such as organizing information and questions, finding and selecting the necessary/essential information to answer the questions provided), E (Explore solutions, such as finding/creating possible strategies: patterns, tables, or models to solve the problem), A (Anticipate outcomes and act, such as using numeracy, algebra, or geometric capabilities to solve the problem given), and L (Look back and learn, such as rechecking answers, determining alternative solutions, discussing and developing answers to other situations) (Permata et al., 2018).

Based on this explanation, there is a need for research that specifically investigates students’ truth-seeking behavior when solving math problems with an unknown universe of discourse. The research problem formulated in this study is: “What is the tendency of students’ truth-seeking behavior in solving mathematical problems with an unknown universe within the material of a three-variable linear equation system, based on the IDEAL problem-solving theory?”

METHOD

The principles of qualitative research ensure that research findings and conclusions can be trusted and accurately reflect the reality of the phenomena studied (Hays & McKibben, 2021; Liao & Hitchcock, 2018; Nassaji, 2020). Qualitative research aims to uncover hypotheses that may develop into substantive theories and even formal theories (Atmowardoyo, 2018). This study employs descriptive qualitative research to describe the truth-seeking behavior of students when solving mathematical problems with an unknown universe within the material of a three-variable linear equation system, utilizing the IDEAL problem-solving theory.

Data were gathered from observation records, tests, and interviews, providing detailed explanations of the students’ truth-seeking tendencies in problem-solving. The study comprises several stages, including (1) instrument preparation and validation, (2) data collection, (3) subject selection, (4) data analysis, (5) triangulation, and (6) interpretation. Qualitative research is descriptive and interpretive, allowing researchers to provide interpretations that align with the research objectives (Hayashi et al., 2019; Moser & Korstjens, 2018; Tomaszewski et al., 2020; F. Yang et al., 2020). The steps of this study are detailed in Figure 1.

Figure 1. Research Diagram.
The participants in this study were tenth-grade science students from SMA Negeri 1 Jember who had been exposed to the Three Variable Linear Equation System material. A total of 42 students were tasked with solving math problems involving the universe set.

In this study, the truth-seeking indicators have been adapted to fit the IDEAL problem-solving theory based on previous research (Kurniati et al., 2019). The indicators of truth-seeking behavior in this study are detailed in Table 1.

Table 1. Truth-Seeking Indicator Based on IDEAL Problem Solving.

<table>
<thead>
<tr>
<th>IDEAL’s Problem Solving</th>
<th>Truth-Seeking Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying problems</td>
<td>Identify the information provided in the problem.</td>
</tr>
<tr>
<td>Determining or defining goals</td>
<td>Search for the problems presented in the questions.</td>
</tr>
<tr>
<td>Looking for various strategies that might be used in solving a problem</td>
<td>Document the formula or formulas utilized to solve the problem as per the objective.</td>
</tr>
<tr>
<td>Implementing strategies that will be used in a problem</td>
<td>Utilize all the gathered information and defined universe of discourse.</td>
</tr>
<tr>
<td>Review and evaluate the results obtained</td>
<td>Record all the solutions based on the identified universes of discourse.</td>
</tr>
</tbody>
</table>

The instruments utilized in this study comprised mathematics problems and observation sheets. The mathematics problems consisted of two problems involving an unknown universe related to the material on systems of equations with three variables. The observation sheet was employed to directly observe students as they tackled the given problems. Validation tests were conducted on both the questionnaire and observation sheet, with evaluation performed by two lecturers from the Mathematics Education Department at the University of Jember. Below are the two mathematical problems with an unknown universe related to the material on systems of equations with three variables that have been validated:

a. Determine the values of $x$, $y$, and $z$ that satisfy the system of equations:

$$
\begin{align*}
2x - y + 2z &= -10 \\
x + 4y + 10z &= -5 \\
-x + 5y + 4z &= 7
\end{align*}
$$

b. Determine the values of $p$, $q$, and $r$ that satisfy the system of equations:

$$
\begin{align*}
p - 2q &= r + 1 \\
- \frac{p}{3} + 2 &= q + 4r \\
\frac{3p + 4r}{3} &= 2q + 8
\end{align*}
$$

The two questions were presented to 12 students from the tenth-grade science class at SMA Negeri 1 Jember. During problem-solving sessions, all student activities were meticulously recorded to provide evidence for statements during data analysis. Additionally, direct observation was conducted by four observers. Students were instructed to verbalize their thought processes (“think-aloud”) while solving the problems and to record them. Subsequently, in-depth interviews were conducted with the students based on interview guidelines to verify the outcomes of their problem-solving efforts involving mathematical problems with unknown universes of discourse.

The stages outlined in the IDEAL (Identify, Define, Explore, Anticipate, Look) problem-solving approach were
employed to analyze the obtained data (Bhadargade et al., 2020; Pedaste et al., 2019; Setyadi et al., 2019; Son et al., 2020; Zirconia et al., 2018). An analysis was then conducted on the results of solving test questions and observations. Three research subjects were selected based on their ability to meet the indicators of solving test questions according to the IDEAL problem-solving theory and demonstrating truth-seeking behavior in solving mathematical problems with an unknown universe, although not all truth-seeking behavior indicators were met. Interviews were conducted with these three students who fulfilled the indicators of completing test questions based on the IDEAL problem-solving theory to validate the test results and observations.

The subsequent research stage involves analyzing the tendency of students’ truth-seeking behavior in solving mathematical problems with an unknown universe of discourse in the material on systems of equations with three variables, based on the IDEAL problem-solving theory. The triangulation stage ensures the validity of the data obtained (Fusch et al., 2018; Vogl et al., 2019). In this research, method triangulation was employed. Method triangulation involves corroborating data collected from observations and tests and then comparing and validating it through the interview method (Dzwigol, 2020; Santos et al., 2020). The conclusions drawn in this study are based on the outcomes of the data triangulation process that has been conducted.

RESULT AND DISCUSSION
Student Truth-Seeking Behavior when Solving Question Number 1

The research subjects were presented with mathematical problems featuring unknown universes of discourse. The first problem is as follows: Determine the values of \( x, y \), and \( z \) that satisfy the system of equations.

\[
\begin{align*}
2x - y + 2z &= -10 \\
x + 4y + 10z &= -5 \\
-x + 5y + 4z &= 7 \\
\end{align*}
\]

The three students engaged in the four stages outlined in the IDEAL problem-solving theory when solving problem number 1. These stages included identifying problems, determining goals, implementing strategies, and reviewing and evaluating results. Based on the test results and observations, students initiated the problem identification stage by deciphering all the information provided in the problem. Initially, students read the problem statement and proceeded to note down the known system of equations. Students S01 and S03 first reviewed the instructions before examining the given questions, while student S02 immediately delved into reading question number 1. The variation in students’ approaches stemmed from their habits in solving math problems based on the IDEAL problem-solving theory (Setyadi et al., 2019; Son et al., 2020). Student S01 typically tackles math problems structured as narratives according to the IDEAL theory of problem solving. On the other hand, student S03 is accustomed to engaging in the problem identification stage but not in setting goals, hence they prioritize reviewing the work instructions first.

None of the three students checked the universe of discourse contained in question number 1 during the problem identification stage. The problem identification stage is the first stage in IDEAL problem solving. This omission occurred because the students were unaware of the concept of the universe of discourse. Moving on to the goal-setting stage, or the second stage in IDEAL problem solving, the truth-seeking indicator demonstrated by the three students involved identifying the problems posed in the questions. They did not document or determine the universe of discourse in the questions due to their
lack of familiarity with the concept, as revealed in previous interviews. According to Palavan (2020), truth-seeking is an insightful way of thinking and making judgments, so they do not make decisions easily. Instead, the students determined the objective of the questions, which entailed finding the values of the variables $x$, $y$, and $z$ in question number 1.

In the third stage, the three students did not proceed to the stage of searching for possible strategies. They did not document the formulas or methods used to solve the problems as per the objectives, nor did they record the steps employed. Although the students were aware of four potential methods—elimination, substitution, mixture, and determinant—they immediately opted for the mixture method when solving the test questions. Student S02 specifically mentioned that the mixture method came to mind during problem-solving, and they did not jot down the other three methods, despite being familiar with all of them.

In the fourth stage of the IDEAL problem-solving theory, which involves implementing the strategy to solve the mathematics problems, the truth-seeking indicator demonstrated by the three students was utilizing all the information established during the problem identification stage. However, since the students did not determine the universe of discourse in the questions, they did not incorporate it into their calculations. Furthermore, the students did not follow the predetermined steps while working on the questions, as they did not document the steps to be used during calculations.

The research subjects documented all the solutions obtained from the calculations in alignment with the predetermined objectives of the questions. However, the students did not draw conclusions based on the universe of discourse because they still did not comprehend this concept. Students S01 and S02 attempted to solve the questions independently without seeking assistance from peers or the teacher. These two students did not assess whether the obtained results were appropriate or aligned with the set goals. Conversely, student S03 sought validation from peers regarding the correctness of their answers and strategies. This student endeavored to evaluate the results by consulting peers. The two students who refrained from evaluating the results felt that the allocated time for the question was insufficient, prompting them to immediately proceed to question number 2.

The research subjects only completed four stages in the IDEAL problem-solving theory: identifying problems, determining goals, implementing strategies, and reviewing and evaluating results. The stage that was omitted is searching for possible strategies. Each student conducted the review and evaluation stage individually. The difference lies in how students S01 and S02 demonstrated truth-seeking behavior by writing conclusions or solutions based on the calculation results obtained in accordance with the predetermined goals. On the other hand, student S03 evaluated the results obtained with the help of friends after writing conclusions. The findings of this study support the results of previous research conducted by Mulyanto et al. (2018) that there is a significant difference between students who have high critical thinking and those with low critical thinking. There is a pattern of student tendencies in solving problem number 1 based on the IDEAL problem-solving theory as shown in Figure 2.
Figure 2. Patterns of Truth Seeking Behavior of Students When Solving Problem Number 1.

**Student Truth-Seeking Behavior when Solving Question Number 2.**

The research subjects were presented with mathematical problems featuring unknown universes of discourse. The first problem is as follows: Determine the values of \( p, q, \) and \( r \) that satisfy the system of equations.

\[
\begin{align*}
4p - 2q &= r + 1 \\
3p + 2q &= 4r \\
3p + 4r &= 2q + 8
\end{align*}
\]  

The research subjects engaged in the four stages outlined in the IDEAL problem-solving theory when solving problem number 2. These stages included identifying problems, determining goals, implementing strategies, and reviewing and evaluating results. The positive impact of these steps is that students are more careful in solving problems, work in a detailed manner, and create the best strategy in solving problems. However, the negative impact is that students take longer to work on problems because they have to identify the problem correctly and consider the best strategy.

Based on the test results and observations, students initiated the problem identification stage by deciphering all the information provided in the problem. Students read the problem statement first and then noted down the known system of equations. Student S01 read the problem statement four times in an attempt to comprehend it thoroughly. The students mentioned that question
number 2 was rarely encountered in the material on systems of equations with three variables, so they endeavored to recall how to formulate the system of equations presented in the problem into a set of general equations.

In the problem identification stage, the three students did not verify the universe of discourse contained in question number 2. Consequently, during the problem identification stage or the second stage of IDEAL problem solving, the students did not check the universe of discourse, which led them to not document or determine the universe of discourse in the goal-setting stage. Instead, the students focused on identifying the problems posed in question number 2, namely the values of the variables $p$, $q$, and $r$.

Students did not proceed to the third stage of the IDEAL problem-solving theory, which involves searching for possible strategies. They did not engage in two truth-seeking behavior indicators during this stage. These indicators include documenting the formulas or methods used to solve the problem according to the purpose and recording the steps used. Although the students were aware of four potential methods for solving questions related to systems of equations with three variables, they opted to use mixed methods instead. Student S03 perceived the mixed method as the easiest approach. It is easier for students to work on systems of linear equations with three variables using one method.

It has been observed that when utilizing mixed methods for calculations, students do not take into account the universe of discourse. Additionally, they do not adhere to the predetermined steps while working on the questions. Each student approaches the calculations to determine the variable value in a distinct manner, despite all three students employing the same method, namely the mixed method, to solve problem number 2. The results obtained from the three students are the same, i.e., $p = 3$, $q = -2$, and $r = \frac{3}{4}$. The three students initially converted the system of equations presented in the problem into the general form of a three-variable system of linear equations before proceeding with the calculations.

In the final stage of the IDEAL problem-solving theory, students looked back and evaluated the results. They documented all the solutions obtained from the calculation results in problem number 2. However, students did not draw conclusions based on the universe of discourse because they still did not fully comprehend this concept. After receiving some explanation about the universe of discourse, students gained a basic understanding of it. They could mention in their conclusions that the solution they provided corresponds to a universe of real numbers.

Students S01 and S02 did not review their work after writing their conclusions and promptly submitted their assignments. However, student S03 took the time to review the results obtained as they had more time to make corrections to their work.

In summary, the research subjects only completed four stages in the IDEAL problem-solving theory, namely identifying problems, determining goals, implementing strategies, and reviewing and evaluating results. The stage that was not carried out is searching for possible strategies. Each student independently conducted the review and evaluation stage. The difference lies in how students S01 and S02 demonstrated truth-seeking behavior by writing conclusions or solutions based on the results of the calculations obtained in accordance with the predetermined goals, while student S03 evaluated the results obtained after writing the conclusions.

The observed pattern among the students in solving problem number 2 based on the IDEAL problem-solving
theory indicates that students S01 and S02 did not conduct a thorough review of their work after composing their conclusions. Instead, they promptly collected their assignments. Conversely, student S03 took the initiative to review the obtained results, utilizing the additional time available to make corrections based on their work’s outcomes. There is a pattern of student tendencies in solving problem number 2 based on the IDEAL problem-solving theory as shown in Figure 3.

Figure 3. Patterns of Truth-Seeking Behavior of Students when Solving Problem Number 2.

The research subjects solely engaged in four stages of the IDEAL problem-solving theory: identifying problems, determining goals, implementing strategies, and reviewing and evaluating results. Notably, they did not conduct the stage of seeking possible strategies. Each student independently carried out the review and evaluation stage, marking a notable difference among them.

Students engage in several stages outlined in the IDEAL problem-solving theory, including identifying problems, determining goals, implementing strategies, and reviewing and evaluating results. However, they rarely document the implementation of strategies as they are primarily focused on completing calculations and arriving at answers. Students are accustomed to applying the stages of the IDEAL problem-solving theory specifically to solve word problems and are less familiar with solving math problems in other formats unless accompanied by explicit instructions. Consequently, they only record the system of equations presented.
in test questions without considering the universe of discourse necessary for solving such questions.

It is worth noting that students lack awareness and understanding of the concept of the universe of discourse, as they have never been introduced to it during their mathematics education. Students typically do not pre-determine the universe of discourse used in problem-solving, as they often assume that mathematical problems inherently employ a universe of discourse represented by the set of real numbers. Moreover, students have not received detailed instruction on problem-solving methodologies, especially regarding mathematical problems that require consideration of the universe of discourse. This behavior is influenced by the stimulus-response mechanism observed in the learning process, aligning with the principles of behaviorism theory (La Barbera & Ajzen, 2021; J. Yang et al., 2021).

The absence of truth-seeking behavior among the research subjects when confronted with questions featuring an unknown universe of discourse can be attributed to individual attitudes and subjective norms. This aligns with the perspective put forward by Ajzen (2020), who suggests that truth-seeking behavior may not manifest in individuals influenced by three components: attitudes, subjective norms, and controlled behavior. Individual attitudes are closely linked to students’ established habits in approaching the problems they encounter. Students consistently presume that the universe of discourse utilized in problem-solving encompasses the set of real numbers. Consequently, they refrain from actively seeking the truth of the facts presented in the problem, supported by accurate evidence.

The subjective norm at play here is shaped by the teacher’s failure to familiarize students with the process of solving non-routine problems (Darby & Rashid, 2017). During interviews, it was observed that students were unfamiliar with the concept of the universe of discourse. However, upon receiving an illustration that related the universe of discourse to a set of numbers, students demonstrated comprehension. In solving problems, students typically only note the variables presented in the question without considering multiple universes of discourse that could yield various possibilities for the variables in question.

Two of the research subjects recorded the objectives of the test questions, indicating that they read the question instructions. Conversely, when students neglect to read the instructions, they tend not to document the goal-setting stage. Encouraging students to delve into details of the information and questions provided can foster critical thinking behavior, particularly truth-seeking. This practice can be instilled through exposure to problems featuring unknown universes of discourse. Such habituation aligns with the principles of operant conditioning, suggesting that consistent stimulus and response can induce behavioral changes in students over time (Manik, 2023; Ni & Lu, 2020; Rozi et al., 2023; Thorndike, 1927).

Critical thinking fosters collaboration and effective communication in society. Critical thinkers are open to hearing different points of view, engaging in constructive dialogue, and collaborating with others to overcome shared challenges (Loes et al., 2012). Several methods can be used to improve critical thinking dispositions, namely explicit (infusion) and implicit (immersion) learning (Ennis, 2013). In infusion learning, students are asked to make the principles of critical thinking explicit, while teachers make these principles clear and explicit. Critical thinking typically operates at higher
levels of Anderson’s taxonomy, including remembering (recalling or recognizing information without understanding it in depth), understanding (demonstrating understanding of the meaning and importance of the information), applying (using knowledge and understanding to solve problems or complete tasks in familiar contexts), analyzing (breaking information into its component parts and examining the relationships between them), evaluating (making judgments about the quality, relevance, and credibility of information or arguments), and creating (generating new ideas, products, or solutions) (Ichsan & Rahmayanti, 2020).

Students tend to overlook various strategies that could be employed in solving test questions, despite being aware of multiple available strategies. Their focus primarily lies on executing calculations and obtaining correct results. Although students possess knowledge of four potential strategies, such as mixed, elimination, and substitution methods, they uniformly opt for mixed or elimination and substitution strategies to complete the test questions. These habits among students are indicative of behavioral control exerted by each individual. Even student S03 perceives the mixed strategy as the most straightforward compared to the other three strategies. This perception suggests that students’ understanding of concepts tends to favor rote learning over meaningful comprehension. Consequently, students often approach questions by applying memorized formulas rather than engaging in deeper conceptual understanding.

Students utilize all available information from the problem, namely the system of equations. However, each student employs a different calculation method. They approach the calculations meticulously to ensure obtaining the correct values aligning with the problem’s objectives. At this stage, students’ behavior is influenced by their understanding of concepts, indicating a degree of behavioral control. The research subjects, however, demonstrate a partial understanding of the concept of systems of equations with three variables. They encounter some difficulty when dealing with questions featuring systems of equations that deviate from the general form. This difficulty stems from past experiences when solving similar problems, which aligns with previous research indicating that attitudes toward truth-seeking behavior are influenced by past experiences (Kurniati et al., 2020).

Students refrain from reviewing questions or calculations under the impression that the allotted time is insufficient. Despite this, they provide conclusions aligned with the objectives of the given questions, albeit without conducting a reevaluation. Interestingly, students engage in the stage of reviewing and evaluating results when given ample time for homework, yet omit this stage when working on questions during school hours. One student, however, engages in reviewing and evaluating results and occasionally revisits calculations twice, albeit limited to specific aspects rather than the entire problem. This behavior reflects students’ truth-seeking tendencies, influenced by their inherent doubts (Kurniati et al., 2019; Kurniati & Zayyadi, 2018; Rahmawati et al., 2021). The inclination to harbor doubt when confronted with something, thereby refraining from immediate acceptance, serves as a key indicator of students’ critical thinking (P. A. Facione et al., 1995). At times, the outcome of problem-solving may not align with the predefined objectives set in earlier stages, necessitating a review of the computations or calculations undertaken. Each student undertakes the
step of revisiting and assessing the results, deriving conclusions based on the pre-established goals.

CONCLUSION

Students demonstrate the ability to tackle problem-solving tests featuring unknown universes of discourse within the realm of three-variable linear equations material, as guided by the IDEAL problem-solving theory. Their behavioral patterns unfold as follows: (1) comprehending questions to extract problem details and jotting down pertinent information during the problem identification phase, (2) identifying and documenting the queries posed in questions during the goal-setting stage, (3) utilizing all established information during the strategy implementation phase, and (4) formulating conclusions and conducting result verification during the review and evaluation stage. Truth-seeking behavior exhibited by students includes identifying problem information, identifying posed questions, utilizing established information, and documenting all solutions in alignment with predetermined objectives. However, truth-seeking behaviors not observed include verifying the universe of discourse, defining and documenting the universe of discourse, noting or determining formulas for problem-solving congruent with objectives, outlining utilized steps, adhering to predefined steps during problem-solving, and evaluating results against established objectives. Future researchers can develop learning methods to familiarize students with truth-seeking behavior through both infusion learning and immersion learning. This approach can help students become accustomed to working on non-routine questions using truth-seeking behavior.

REFERENCES


https://doi.org/10.1002/jts5.83


Given Student Learning Styles. 

AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 12(1), 1332–1343.


Vogl, S., Schmidt, E. M., & Zartler, U.


