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# Development of Learning Style-Based Mathematics Problem Solving Instruments to Measure Elementary School Students' HOTS

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**Abstract:** Problem-solving skills can be enhanced through the development of measurement tools that integrate learning styles into both the learning process and the completion of Higher Order Thinking Skills (HOTS) tasks. Learning styles influence how students receive, process, and apply information, thereby shaping their strategies in solving mathematical problems. This study aims to analyze the content validity, empirical validity, reliability, and item characteristics of the developed instrument while aligning it with students' learning style preferences. A quantitative approach with an instrument analysis design was employed. The subjects included expert validators and elementary school students. Data were collected through validation sheets, a mathematical problem-solving test, and a learning style questionnaire to identify students' cognitive tendencies. Data analysis involved Aiken's V, Product Moment correlation, Cronbach's Alpha, test–retest, and item analysis using SPSS and Microsoft Excel. The results show that the instrument meets the criteria of validity, reliability, and good item quality. The instrument is not only aligned with problem-solving indicators but also accommodates variations in learning styles. Cognitive learning styles influence how students analyze and solve HOTS-based problems; thus, integrating them into assessment provides a more meaningful evaluation of students' mathematical problem-solving abilities.

**Keywords:** Mathematical Problem-Solving, Higher Order Thinking Skills (HOTS), Learning Styles, Instrument Development, Psychometric Evaluation

## 1. Introduction

Problem-solving skills are one of the essential competencies in mathematics learning that plays an important role in developing students' critical, analytical, and creative thinking skills. According to George Polya mathematical problem-solving involves four main stages, namely understanding problems, planning solutions, implementing plans, and re-evaluating (Budayasa & Rahaju, 2025). Therefore, an instrument that is able to measure these abilities comprehensively is needed. In addition to cognitive aspects, student characteristics such as learning styles also affect learning success. Learning styles show an individual's tendency to receive and process information so that it has implications for the learning strategies used (DePorter & Hernacki, 2015). Therefore, the measurement of problem-solving abilities and learning styles needs to be supported by valid and reliable instruments so that the data obtained is accurate and reliable (Azwar, 2019).

Quality assessment instruments must meet the criteria of validity and reliability. Validity indicates the extent to which the instrument is able to measure the constructs that should be measured, while reliability is related to the consistency of measurement results (Azwar, 2019). In addition, analysis of item characteristics such as difficulty level and differentiating power is needed to ensure the quality of each item. Untested instruments have the potential to produce

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biased data and do not reflect the actual ability of learners. However, practice in the field shows that the preparation of learning instruments in elementary schools is still not carried out optimally. Teachers tend to prepare questions without empirically analyzing the validity, reliability, or characteristics of the items (Retnawati, 2016). This condition causes the instrument to be less able to provide accurate information about students' abilities, especially in the aspect of problem solving.

In the context of elementary mathematics learning, one of the essential topics that requires problem-solving skills is geometry, particularly in the concept of composite figures. This material requires students to identify, analyze, and integrate several basic geometric shapes such as rectangles and parallelograms to determine the total area. Solving problems related to composite figures does not only involve applying formulas but also requires analytical thinking, strategy selection, and verification processes, which are closely related to Higher Order Thinking Skills (HOTS) (Kusumadewi & Wutsqa, 2022). Furthermore, students' success in solving such problems is influenced by their learning styles, as different cognitive preferences affect how students interpret visual information, decompose shapes, and construct solutions.

Mathematical problem-solving skills have a fairly important role. Teachers need to provide in-depth teaching in the mathematics learning process that can improve students' problem-solving skills. So, with this in-depth learning process, it is hoped that students can have better problem-solving skills. However, mathematics problem-solving skills in elementary school students are still relatively low. The low math problem-solving ability is influenced by several factors such as learning styles, teaching methods, and the materials taught. Mathematics learning can be done online. However, it is important to pay attention to learning objectives, one of which is problem-solving skills. Students' mathematics learning outcomes are still low. One of the obstacles is that they cannot solve problems in story problems, as well as learning styles and learning methods that are not suitable (Apriyani et al., 2022).

Learning style also helps students in improving students' problem-solving skills, especially in solving mathematical story problems. By considering the development of students' skills and cognitive character during the implementation of the mathematics learning process, it can improve the quality of students' mathematical problem-solving skills. Thus, students' learning styles are also one of the factors that affect success in solving mathematical problems, especially in story problems (Pradiarti & Subanji, 2022). The difficulty of solving math problems is also influenced by the test instruments used that have not been able to fully improve problem-solving skills such as questions with multiple-choice models that are less able to measure high-level abilities. So, students experience difficulties when solving math story problems. This is also one of the factors that affect students' ability to solve mathematical problems tends to be low.

The Merdeka Curriculum hopes that learning outcome assessment can help students improve their higher order thinking skills (HOTS). This is due to the fact that high-level thinking skills can encourage students to consider the subject matter thoroughly and deeply. In addition, currently the problem-solving skills test has never been used by teachers in learning. In addition, the multiple-choice test is not strong enough to measure high-level skills. Therefore, there is a need for a test instrument that can support to improve problem-solving skills for students (Lestari et al., 2019).

This research is important to be carried out because it is through the process of developing measuring tools that can help improve problem-solving skills by integrating learning styles into the student learning process and in the process of working on HOTS questions. Thus, this research is important to be carried out because it involves several in-depth aspects as a means of improving problem-solving skills in elementary school mathematics learning.

Previous research that has been conducted entitled Mathematical Problem-Solving Abilities of Junior High School Students was reviewed from the Cognitive Style, explaining that in this study students are less able to solve mathematical problems correctly and few students can answer mathematical problems. Thus, it is necessary to find solutions to mathematical problems contained in the Association material based on Field Dependent (FD) and Field Independent (FI) cognitive styles (Pradiarti & Subanji, 2022). The second research entitled Development of Guided Inquiry-Based Mathematics Learning Tools and Learning Trajectory Oriented to Problem-Solving Abilities explained that the research was carried out by developing mathematics learning tools in the form of lesson plans and worksheets that can help improve students' mathematical problem-solving skills (Kurniawati & Rizkianto, 2018). Then, the third research discusses the Development of Problem-Solving Skills Test Instruments on the Concepts of Business and Energy in High School explaining that this research develops valid and reliable student problem-solving skills test instruments on the concepts of business and energy. This research was conducted with a 4D development model consisting of define, design, develop, and disseminate stages (Lestari et al., 2019).

Based on these issues, this research offers a novel contribution by integrating several aspects, such as learning styles and the development of instruments to enhance mathematical problem-solving in HOTS tasks. Previously, no one had discussed these three aspects in one research article. In addition, in the three studies that have been carried out, variables are discussed as a whole in three different studies. The first research discusses the problem solving of junior high school students with Cognitive Style, the second research discusses the development of learning tools to improve problem-solving skills, and the third research discusses the development of test instruments regarding problem-solving skills in the scope of high school material. Meanwhile, this study focuses on problem solving within the context of elementary schools. Therefore, this research offers a novel contribution and is important to be examined in greater depth. Various previous studies have examined the validity and reliability of instruments, but most of them still focus on only one aspect and have not integrated the analysis of item characteristics thoroughly. This shows that there is a research gap in the

development of comprehensive instruments, especially in the mathematical problem-solving ability and learning styles of elementary school students. This study aims to analyze the content validity of the instrument, examine its empirical validity and reliability, and describe the characteristics of the test items.

## 2. Method

This study employs a quantitative approach with an instrument analysis design. Instrument analysis is conducted by examining validity, reliability, and item characteristics as the basis for determining the feasibility of the instrument (Azwar, 2019). The sampling technique used is purposive sampling (Sugiyono, 2019). The research subjects comprised two groups: six expert validators, including lecturers in mathematics education and elementary school education practitioners, and 30 fifth-grade elementary school students from four schools in Nguntoronadi District as trial respondents. Data were collected using expert validation sheets, a mathematical problem-solving test, and a learning style questionnaire. For the mathematical problem-solving test, examples of the developed items are presented below.

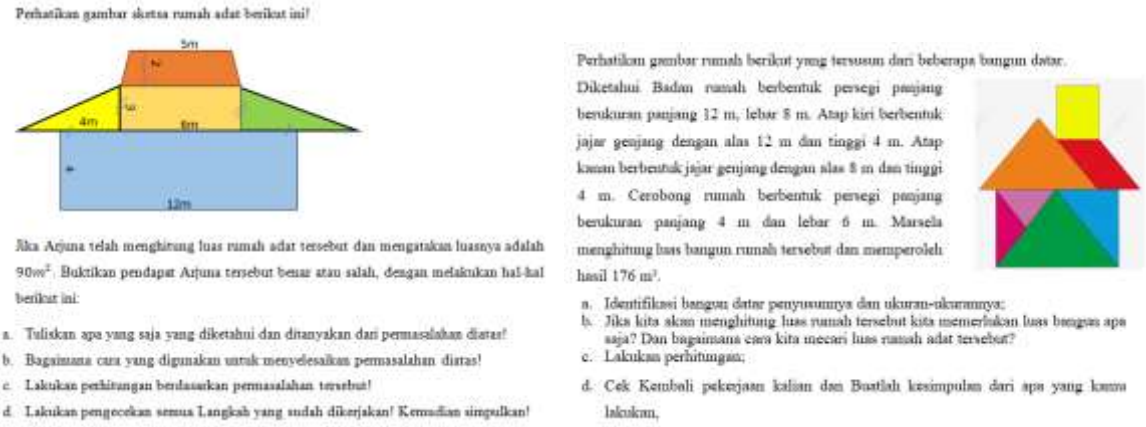


**Fig. 1. Example of problem-solving test item**

The items require students to identify the components of composite shapes, determine appropriate solution strategies, calculate areas, and verify the correctness of their answers. These processes reflect higher-order thinking skills and indicate that the instrument accommodates differences in students' learning styles in solving mathematical problems. The research procedure consists of several stages: (1) developing the instrument blueprint based on indicators of mathematical problem-solving skills and learning styles; (2) constructing instrument items in accordance with the blueprint; (3) conducting expert validation to assess content relevance and clarity; (4) administering the instrument to elementary school students; and (5) analyzing the data to evaluate validity, reliability, and item characteristics. Content validity was analyzed using Aiken's V (Aiken, 1985), while empirical validity was examined using Pearson's Product Moment correlation. Test reliability was measured using Cronbach's Alpha (Azwar, 2019), and questionnaire reliability was evaluated using the test–retest method (Fraenkel et al., 2012). Item characteristics, including difficulty and discrimination indices, were analyzed using Microsoft Excel.

## 3. Results and Discussion

### Result

### Content Validity (Aiken's V)

The results of the analysis of the validity of the content of the mathematical problem-solving ability instrument based on the assessment of 7 expert validators, are presented in Table 1.

**Table 1. Results of the Validity of the Test Instrument Content**

| Aspects | Indicator | V | Category |
|---|---|---|---|
| Content | Questions according to the flat building material for grade V elementary school | 0,85 | Very valid |
| | Questions measuring math problem-solving skills | 0,83 | Very valid |
| | Questions according to indicators of mathematical problem-solving ability | 0,84 | Very valid |
| | Questions require mathematical problem-solving skills, not just memorization | 0,81 | Very valid |
| | Pretest and post-test questions are conceptually equivalent | 0,86 | Very valid |

| | | | |
|---|---|---|---|
| Construction | The questions are formulated clearly and do not give rise to double interpretations | 0,81 | Very valid |
| | The information in the question is enough to answer | 0,84 | Very valid |
| | The form of description problems is suitable for measuring mathematical problem-solving ability | 0,81 | Very valid |
| | Assessment rubric according to indicators of mathematical problem-solving ability | 0,86 | Very valid |
| Language | Language according to the level of development of elementary school students | 0,84 | Very valid |
| | Sentences that are easy for students to understand | 0,84 | Very valid |
| | The term mathematics is used appropriately | 0,81 | Very valid |

The results of the analysis showed that all question items had an Aiken's V value of ≥ 0.80 so they were included in the Very valid category. This shows that the instrument has a high conformity with the measured indicators and is suitable for further testing.

The results of the analysis of the validity of the content of the mathematical problem-solving ability instrument based on the assessment of 7 expert validators, are presented in Table 2.

**Table 2. Results of Validity of Learning Style Questionnaire Instrument Contents**

| Aspects | Indicator | V Calculate | Category |
|---|---|---|---|
| Content | Compatibility with indicators | 0,81 | Very valid |
| Construction | The questions written are able to reveal the informant's analysis in presenting the questions asked | 0,81 | Very valid |
| Language | The intent of the statement is formulated briefly and clearly | 0,81 | Very valid |
| | Unambiguous question sentences | 0,83 | Very valid |

The results of the validity of the questionnaire content show that all items are in the Very valid category.

**Empirical Validity**

The results of the empirical validity test using Product Moment correlation with 31 respondents are presented in Table 3.

**Table 3. Empirical Validity Results of Test Instruments**

| Question No. | r count | r table | Remarks |
|---|---|---|---|
| 1 | 0,78 | 0,361 | Valid |
| 2 | 0,85 | 0,361 | Valid |
| 3 | 0,85 | 0,361 | Valid |
| 4 | 0,83 | 0,361 | Valid |
| 5 | 0,85 | 0,361 | Valid |
| 6 | 0,79 | 0,361 | Valid |
| 7 | 0,95 | 0,361 | Valid |
| 8 | 0,95 | 0,361 | Valid |
| 9 | 0,95 | 0,361 | Valid |
| 10 | 0,64 | 0,361 | Valid |

All items have a calculated r value > r table, so all items are declared to be empirically valid. This shows that each item is able to accurately measure the construct of problem-solving ability.

**Test Instrument Reliability**

The results of the reliability test of the test instrument using Cronbach's Alpha with the help of SPSS are presented in Table 4.

**Table 4. Reliability of Test Instruments**

| Case Processing Summary | N | % |
|---|---|---|
| Valid | 31 | 100.0 |
| Excludeda | 0 | .0 |
| Total | 31 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .936 | 10 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| SOAL1 | 120.29 | 1099.813 | .750 | .935 |
| SOAL2 | 116.55 | 1074.189 | .836 | .931 |
| SOAL3 | 114.94 | 949.662 | .812 | .926 |
| SOAL4 | 116.55 | 901.523 | .761 | .932 |
| SOAL5 | 113.81 | 860.695 | .778 | .934 |
| SOAL6 | 120.29 | 1108.613 | .761 | .936 |
| SOAL7 | 114.45 | 946.856 | .931 | .920 |
| SOAL8 | 114.45 | 946.856 | .931 | .920 |
| SOAL9 | 114.45 | 946.856 | .931 | .920 |
| SOAL10 | 107.68 | 1035.426 | .556 | .939 |

Cronbach's Alpha value of 0.936 indicates that the instrument has high internal consistency. Thus, the instrument can be used consistently in measurements.

**Table 5. Reliability of Questionnaire (Test-Retest)**

| An example of a column heading | A (*t*) | B (*t*) |
|---|---|---|
| And an entry | 1 | 2 |
| And another entry | 3 | 4 |
| And another entry | 5 | 6 |

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

The results of the test-retest showed a correlation value of 0.754 which was in the reliable category. This shows that the questionnaire has good stability in measurements at different times.

**Analysis of Characteristics of Question Items**

The results of the analysis of the level of difficulty and differentiating power are presented in Table 6.

**Table 6. Analysis of Question Items**

| No Question | P | Category | D | Category | Verdict |
|---|---|---|---|---|---|
| 1 | 0,79 | Easy | 0,44 | Excellent | Worn |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 0,77 | Easy | 0,96 | Excellent | Worn |
| 3 | 0,66 | Medium | 0,94 | Excellent | Worn |
| 4 | 0,58 | Medium | 0,94 | Excellent | Worn |
| 5 | 0,57 | Medium | 0,89 | Excellent | Worn |
| 6 | 0,79 | Easy | 0,98 | Excellent | Worn |
| 7 | 0,69 | Medium | 0,97 | Excellent | Worn |
| 8 | 0,69 | Medium | 0,97 | Excellent | Worn |
| 9 | 0,69 | Medium | 0,97 | Excellent | Worn |
| 10 | 0,68 | Medium | 0,80 | Excellent | Worn |

Most of the questions are in the category of moderate difficulty and have sufficient to very good differentiating power. This shows that the question items are able to measure the ability of students proportionally and distinguish the level of students' ability. The difficulty index is calculated based on the proportion of students who answered correctly on each question item. Meanwhile, the differentiating power is calculated by comparing the proportion of correct answers between the upper and lower groups. The results of the analysis show that most of the questions are in the medium category and have sufficient to good differentiating power.

## Discussion

The results of the study showed that the developed instrument had met the criteria of validity, reliability, and good grain quality. The high validity of the content showed that the instrument was in accordance with the indicators of mathematical problem-solving ability. This is in line with George Polya's opinion which emphasizes the importance of compatibility between indicators and problem-solving processes in mathematics learning.

The empirical validity obtained shows that each item of the instrument is able to measure the construct in question appropriately. This is supported by the theory of educational evaluation which states that an empirically valid instrument will produce accurate and reliable data. In addition, the high reliability value indicates that the instrument has good consistency in measurements, so it can be used repeatedly without producing significant differences.

Analysis of the characteristics of the items showed that most of the questions were in the medium category with adequate differentiating power. This condition showed that the instrument was able to measure students' abilities proportionately and effectively in distinguishing students' abilities. This result is in line with previous research which stated that a good instrument must have a moderate level of difficulty and high discriminating power in order to provide accurate information about students' abilities.

The developed test items are presented in the context of traditional house structures, which are mathematically represented as composite plane figures. Students are required not only to apply formulas but also to analyze the structure of the shapes, decompose them into simpler geometric forms, determine appropriate solution strategies, and verify the correctness of their results. These processes reflect Higher Order Thinking Skills (HOTS) and align with Polya's stages of problem solving.

Furthermore, the contextual nature of the items allows students to engage more meaningfully with the problem, while also revealing variations in their learning styles. Students with different cognitive preferences tend to use different approaches in interpreting visual representations, identifying geometric components, and constructing solutions. This indicates that the instrument is not only capable of measuring mathematical problem-solving ability but also sensitive to differences in students' learning styles.

## Test Instruments

The results of student evaluations can be used to measure the quality of the learning process. The results of the evaluation can encourage teachers and students to learn more and better. Evaluation is carried out with measuring tools or test instruments. Students' problem-solving abilities can be measured through tests. Teachers must ensure that the exam qualifies as a good exam. An exam can be considered good as a test instrument if it meets the criteria of validity, reliability, objectivity, practicality, and integrity. Then, the test instrument that has been created needs to be validated by several experts to be valid and reliable to use (Fitrianty et al., 2022).

Learning evaluation assessment instruments are very important for evaluating learning outcomes and the level of student learning motivation in elementary school. It is hoped that the selection of good and varied tools will encourage student motivation to study well. There are four elements or factors needed to develop an instrument, namely the drive to achieve something, commitment, initiative, and optimism. This shows that the instrument can meet valid criteria, both from the point of view of factor loading, convergent validity, and discriminatory validity (Febrianti et al., 2023).

Test instruments that are considered reliable do not mean that their value must be the same for each measurement. On the contrary, the test must be able to show how the student's position is comparable to others in his group (Murti & Sunarti, 2021). Then, to determine the feasibility of the test instrument, it is necessary to carry out an instrument validation on several experts who have been appointed according to their field of expertise. Validation of material elements, construction, and language is included in the expert validation sheet used to determine the theoretical feasibility of the test instrument (Maulida & Sunarti, 2021).

There needs to be a test question that can accommodate or provide opportunities for students to think broadly by creating a HOTS-based test instrument. Assessment instruments are specifically designed to train HOTS, so HOTS-based instruments must be developed in the form of descriptions that are used to measure students' ability to answer using the answers they choose themselves. Therefore, the HOTS-based tools created will help students improve their ability to reason, analyze, evaluate, and create.

The instrument tested problem-solving skills based on validity tests by experts and practitioners. The results showed that the material, construction, and language elements received a positive response. With a reliability coefficient value of 0.839805 and a high reliability category in the limited test, the experiment was considered valid and reliable. Thus, the test instrument can be valid and reliable if it shows the appropriate results, materials, and constructions (Lestari et al., 2019).

Effectiveness evaluation is an effort to develop learning that aims to improve problem-solving skills. Problem-solving skills must have validity and reliable test tools. To provide an accurate and thorough evaluation, this research must emphasize the actual aspects of research and research skills, namely specific and general aspects (Nurlaelah et al., 2021).

## Math Problem-Solving Skills

Mathematical problem-solving skills are important skills that students must have (Apriyani et al., 2022). Problem-solving skills are very important skills for students in mathematics learning are problem-solving skills. Therefore, every student must have this ability (Mukarromah et al., 2025). The ability to solve mathematical problems, it is necessary to have a critical thinking attitude by interpreting, analyzing, evaluating, and making decisions based on data (Rufaidah & Ismail, 2021). Teaching students to think critically, creatively, and be able to solve problems with relevance to daily life.

Problem-solving abilities suggest that conventional assessments may focus more on memorization than improving adaptive problem-solving skills (Larenio & Futalan, 2025). Mathematical problem-solving abilities are demonstrated by the ability to understand problems, create strategies or procedures to solve problems, and evaluate the correctness of answers or results produced (Purnamasari & Setiawan, 2019). The ability to solve problems is essential for dealing with challenges and difficulties that arise in daily life (Wahyuni et al., 2024).

Logical problem-solving is a way to help students improve their skills. However, problem-solving is essential for students because it plays an important role in daily life and academic success (Musengimana et al., 2025). Mathematical problem-solving abilities are also often associated with high-level thinking or critical thinking abilities. High-level thinking skills are thinking abilities that involve the ability to remember many things at once. However, it requires further skills such as critical thinking, creativity, problem-solving, and decision-making.

Mathematical problem-solving skills are very important for students in the process of solving mathematical problems (Laelatul, 2021). Problem-solving skills must be possessed by every student, especially in solving math problems and HOTS problems. Thus, the ability to solve mathematical problems is inseparable from several factors that come from within students. An important aspect of basic education is mathematical problem solving, which builds students' ability to use their conceptual knowledge in new situations. The purpose of this study is to predict the performance of students in Indonesian elementary schools in tasks that measure Low-Level Thinking Skills (LOTS) and Higher-Level Thinking Skills (HOTS).

Mathematical problem-solving skills have been considered an important component of mathematics, mathematics teaching, and mathematics learning. It has long been embedded in mathematics curricula around the world with the slogan "mathematics learning through problem-solving" (Santos-trigo, 2020). It is essential for social development for problem-solving abilities, especially in complex environments. In mathematics education, problem-solving enhances creativity, logic, and analytical skills, all of which contribute to the progress of society (Tien-Trung et al., 2025).

Problem-solving skills must be improved at various levels of education. Because education is the basis of the state for nation-building, it especially applies to mathematics lessons (Iolanessa et al., 2020). Mathematical problem-solving skills are abilities in which students try to find solutions to specific goals. These abilities require readiness, creativity, knowledge, and abilities, as well as their application in daily life. If students do not have these skills, the process of teaching and learning mathematics will not achieve the expected results (Rosyada & Wibowo, 2023). Mathematical problem-solving can help students solve problems, allowing them to be more critical and

analytical in determining concepts that fit the problem. Therefore, this method can motivate students to learn mathematics.

## Learning Style

Learning styles of understanding, and remembering information determine their learning style. As several previous studies have shown, this study shows that students have different learning style preferences (Madhu & Bhattachryya, 2023). Learning style refers to an individual's tendency to adapt certain learning strategies through experimentation and exploration (Arni et al., 2024). Cognitive learning styles have the ability to prove that a student's position as a productive learning subject is not something passive and static during the learning process (Septantiningtyas & Subaida, 2023).

Learning style is a way of thinking, processing, and understanding something that everyone likes. They must also have problem-solving skills, which are essential for solving math problems (Soebagyo et al., 2022). Critical thinking skills are excellent cognitive abilities that include self-regulation, interpretation, analysis, evaluation, inference, and explanation (Khairunnisa et al., 2026).

The main goal of mathematics education is mathematical problem-solving skills (MPSA). MPSA is essential and should be demonstrated during the math learning process. MPSA helps with problem-solving both in school and in the real world (Yuanita et al., 2025). Students' cognitive learning styles can be used as a consideration in increasing students' potential in learning. Therefore, an analysis of students' metacognitive levels based on students' cognitive styles should be carried out to assist teachers in determining better learning models and teaching strategies (Zakiah, 2020).

Cognitive learning styles in mathematics learning play an important role in helping students solve math problems in HOTS questions. The goal of mathematics learning is to increase the cultural identity and engagement of students' cognitive learning ways, which can support reflective thinking processes. In addition to specific findings, the study also provides an understanding of the role of reflective thinking as an important part of metacognitive awareness, which can be associated with culture-based mathematics learning in different student profiles (Serang et al., 2025). Learning strategies based on learning styles can be identified and applied to maximize students' academic potential and make the learning process more meaningful (Novinovrita, 2025).

Overall, the results of this study show that the developed instrument has met the quality standards of good instruments. This instrument can be used as a measuring tool in advanced research, especially in measuring the effectiveness of learning models on the mathematical problem-solving ability and learning styles of elementary school students.

## 4. Conclusion

Based on the results of the analysis, the developed mathematical problem-solving ability instrument and learning style questionnaire had good quality in terms of validity, reliability, and item characteristics. The content validity test showed that all items were in the category of being very valid and in accordance with the indicators measured, while the empirical validity test showed that the correlation coefficient of each item met the criteria so that it was able to measure constructs accurately. In terms of reliability, the test showed high internal consistency and the learning style questionnaire was stable based on the test-retest test, so that both had adequate reliability. The analysis of the item characteristics showed that most of the questions were at a moderate difficulty level with sufficient to very good differentiating power, which indicates that the instrument was able to measure students' abilities proportionally and effectively distinguish the level of students' ability. Thus, the instrument was declared feasible to be used to measure mathematical problem-solving abilities and identify the learning styles of elementary school students. However, this study is still limited to a relatively small number of trial samples and has not been conducted a more in-depth construct analysis, so it is recommended in the next study to test the instrument on a wider sample and develop instruments with a more comprehensive approach in order to obtain more accurate and applicable measuring tools in various learning contexts.

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## Conflict of Interest

The authors declare no conflicts of interest.

## Appendix A: An Example

Authors including an appendix section should do so before the References section. Multiple appendices should all have headings in the style used above. They will automatically be ordered A, B, C etc.

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