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# Developing Assessment Instrument of Literacy and Numeracy in Elementary School

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**Abstract:** The purpose of this study was to analyze the form of literacy and numeracy skill assessment instrument development that is in accordance with the level of thinking ability of grade 5 students of SD Negeri 01 Senduro. This research used Research and Development with the ADDIE model. Data analysis was carried out using qualitative data analysis consisting of data presentation, data reduction, data verification, and drawing conclusions. The results indicated that the literacy and numeracy assessment instruments developed for grade 5 students of SD Negeri 01 Senduro were proven to be relevant, contextual, and in accordance with the level of students' thinking abilities. In short, this development of literacy-numeracy instruments proved to be both relevant and effective, accurately capturing students' abilities through tasks that reflect their everyday experiences and educational environment, and suited to the level of students' thinking for improving the learning process.

**Keywords:** Developing assessment; Literacy assessment; Numeracy assessment

## Introduction

In regarding to the implementation of increasing the capacity and competence of educators and students, the Ministry of Education, Culture, Research and Technology through the Directorate of Schools strives to achieve the goal of increasing basic literacy skills in educators and all students in all subjects in schools (Ayuningtyas et al., 2023; Handayani et al., 2022). The Directorate of Elementary Schools (SD) also encourages the implementation of improvements and improvements in services to improve the quality of education in Indonesia. The main target in general and specifically developing this literacy program is to transform national exam with minimum competency assessment (Fitrianingrum & Murtiyasa, 2023; Afif et al., 2025).

The Minister of Education in Indonesia in the 21st century made changes to the national exam with the National Assessment, which consists of three parts, namely the Minimum Competency Assessment (AKM), Character Survey and Environmental Survey. This AKM measures students' literacy and numeracy skills (Hidayatullah et al., 2022; Khairi & Desnita, 2023). In literacy learning, which is closely related to numeracy, teachers as agents of change must be able to have good skills and self-development to continuously seek appropriate teaching techniques and methods to encourage students to build imagination in exploring science through literacy and numeracy in the subjects they teach (Ayuningtyas et al., 2023).

Elementary education is an important foundation in the formation of students' thinking, reasoning, and problem-solving abilities (Putri et al., 2021; Hasnawati et al., 2022). In the learning process, evaluation activities are an inseparable aspect because they function to determine the achievement of learning objectives (Ramdani et al., 2019). However, evaluation of learning outcomes at the elementary school level, especially in high grades such as grades 4, 5, and 6, is still dominated

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by summative assessments that tend to focus on questions with a low cognitive level (Yulianti, 2023). These questions are generally in the form of short answers or simple descriptions, which do not fully measure high-level thinking skills (HOTS) (Ali & Zaini, 2023).

The imbalance between the form of evaluation used and the demands of 21st century learning outcomes causes a gap between students' actual abilities and the grades obtained (Nazifah & Asrizal, 2022). In fact, currently there is a greater demand for students to have good literacy and numeracy skills as the main indicators of learning success. Literacy and numeracy are basic elements that are not only needed for academic success, but also for readiness to face various real-life challenges in the future (Febrila et al., 2024).

The development of assessment instruments is an urgent need to improve the quality of learning evaluation (Elfrida et al., 2022; Ariefiani & Laksono, 2024). Assessment is no longer sufficient to only measure memorization but must include students' critical and analytical thinking skills. HOTS-based instruments are able to represent learning outcomes more comprehensively (Jihannita et al., 2023). In addition, this type of assessment encourages teachers to create challenging and meaningful questions (Ali & Zaini, 2023; Hasnunidah et al., 2024). Thus, learning becomes more contextual and supports the development of students' thinking patterns in depth (Sari et al., 2023).

Moreover, preliminary observation in SD Negeri 01 Senduro showed that the evaluation process still focuses on collecting summative scores alone, with questions that tend to be low in weight. This has an impact on the lack of student readiness in facing evaluations that measure critical thinking and problem-solving skills, such as those tested in Minimum Competency Assessment (AKM). In fact, ANBK and AKM are national instruments designed to capture students' literacy and numeracy skills (Yamtinah et al., 2022). The results of this assessment are used as the basis for compiling an education quality report card that is used as an indicator of the success of an educational institution. In this regard, it is necessary to develop literacy and numeracy skills assessment instruments that are not only appropriate to the characteristics of grade 5 students but also reflect the HOTS levels gradually starting from the low level (low), currently (middle), to high (high). Therefore, it is important for schools to prepare students to be able to work on quality AKM questions, according to their ability level (Nuri et al., 2025).

The development of this instrument aims to stimulate students' thinking skills, so that students become accustomed to facing HOTS-based questions from an early age (Ayubi et al., 2023). In addition to being a learning measurement tool, this instrument can also be an important reference for teachers and schools in evaluating the learning process holistically (Elfrida et al., 2022). If the ANBK results show a low education quality report, then the school has a basis for tracing and identifying the location of the problems in the learning process, both in terms of learning strategies, teaching materials, and forms of evaluation used so far. In addition, this research is important to be conducted as a response to the still low quality of assessment instruments used in evaluating student learning outcomes at the elementary school level, especially in the upper grades. In fact, literacy and numeracy skills are important indicators in assessing the quality of education (Oktariya et al., 2023).

There have been preliminary studies dealing with the development of literacy and numeracy assessment. Wulandari et al. (2024) stated developing a Minimum Competency Assessment (AKM) was able to measure students' scientific literacy and numeracy abilities. In addition, Adriyani et al. (2023) found that the assessment instrument developed meets the criteria of feasible and valid to support improving literacy and numeracy and improve the learning process that adjust student characteristics.

The development of HOTS-based assessment instruments is urgently needed so that students are accustomed to thinking logically and critically in solving complex problems (Hidayatullah et al., 2022; Sari et al., 2023). This instrument not only helps teachers in conducting higher quality learning evaluations but also becomes one of the strategies in improving students' readiness to face AKM (Nuri et al., 2025). That way, the assessment results will better reflect the real abilities of students and the success of the learning process.

Previous studies above have shown that developing literacy and numeracy assessments was valid to measure and improve students' literacy and numeracy abilities in a Minimum Competency Assessment. However, based on these studies, it showed primarily emphasize general feasibility and validity without sufficiently addressing the contextual needs of learners in specific school environments. Hence, this study fills the gap by developing a scientifically grounded assessment instrument tailored to the local context of SD Negeri 01 Senduro, integrating real-life scenarios to support meaningful learning that foster responsive teaching practices.

Therefore, this study aims at developing the form of literacy and numeracy skills assessment instrument development that is appropriate to the level of thinking ability of grade 5 students of SD Negeri 01 Senduro and analysing the effectiveness of literacy and numeracy skills assessment instruments in describing the learning success and readiness of grade 5 students of SD Negeri

01 Senduro in facing the Computer-Based National Assessment (ANBK) or Minimum Competency Assessment (AKM).

## Method

This study uses a qualitative approach with a type of development research that aims to develop literacy and numeracy assessment instruments. This study focuses on mapping the needs and characteristics of fifth grade students of SD Negeri 01 Senduro to produce instruments that are in accordance with student characteristics.

Research design Research design using the ADDIE model in the context of developing literacy and numeracy assessment instruments is a systematic approach that aims to produce valid, reliable, and applicable instruments in the field (Waruwu, 2024). This included systematically five stages: analyzing, designing, developing, implementing, and evaluating (Sugiyono, 2019). Dick & Carey (1996) developed the ADDIE Model for conceptualizing learning systems.

The research design used is an instrument development design that is carried out through three main stages, namely: analysis of student needs and characteristics, development of literacy and numeracy assessment instruments, and testing the instrument in small groups to obtain feedback. After the instrument is tested and improved, the instrument will be applied in class as an assessment.

Data analysis in this study was carried out using qualitative data analysis by Miles and Huberman. Miles and Huberman stated that activities in qualitative data analysis are carried out interactively and continue continuously until complete, so that the data is saturated. The size of data saturation is indicated by no longer obtaining new data or information. Activities in data analysis according to Miles and Huberman include (Lasiyono & Alam, 2024): data presentation (data display), data reduction (data reduction), data verification (data verification), drawing conclusions (conclusion drawing).

## Results and Discussion

*Analysis*

The analysis stage is the initial step in the ADDIE development model which aims to identify learning needs, student characteristics, learning objectives, and the context of the learning environment. The goal is to ensure that the solutions developed, namely literacy and numeracy assessment instruments, are truly in accordance with the real needs and conditions of students at SD Negeri 01 Senduro, especially class V.

*Identify Problems and Needs*

Based on direct observation conducted during three days of learning in grade V, it was found that some students still had difficulty in understanding the contents of the reading and solving context-based math problems. The results of the observation showed that: During joint reading activities, around 40% of students were unable to answer inferential questions from simple reading texts; In math lessons, students seemed to have difficulty solving story problems that required logical reasoning and unit conversion; and Teachers only used practice questions from textbooks without adjusting them to the local conditions of students.

*Characteristics of Students*

Fifth grade students at SD Negeri 01 Senduro generally come from lower-middle economic backgrounds, and most parents work as farmers. Access to additional reading materials and digital learning resources is very limited. This has an impact on low exposure to literacy outside of school.

The following are the results of an interview with a grade 5teacher:

> *"...The children here are enthusiastic about learning, but when it comes to long readings or math story problems, they tend to get confused. Sometimes they don't know where to start..."* (Interview with Mrs. S, as a fifth-grade teacher at SD Negeri 01 Senduro)

The interview excerpt above shows that fifth grade students have a spirit of learning, but when faced with questions with long readings or math story problems, it seems that students are still often confused. Sometimes students also do not know where to start.

The following are the results of an interview with one of the students:

> *"...When it comes to stories, it's hard, Sis. Sometimes I don't know what it means. When it comes to simple additions, I can..."* (Interview with D, a fifth-grade student at SD Negeri 01 Senduro)

The interview excerpt above shows that students admit to having difficulty when faced with story problems.

*Learning Objectives Analysis*

The learning objectives of literacy and numeracy in grade 5of elementary school refer to the Merdeka Curriculum which emphasizes critical thinking skills, understanding information, and solving contextual problems. However, there are no assessment instruments that can measure these skills comprehensively and according to the local context.

*Learning Environment Context*

The context of the learning environment at SD Negeri 01 Senduro has limitations in terms of resources,

but teachers and students are highly motivated. The school has a limited internet network and the collection of reading materials in the library is still minimal.

Based on the analysis of needs, student characteristics, and learning conditions in grade 5of SD Negeri 01 Senduro, literacy and numeracy assessment instruments are needed that: Contextual to students' lives in the village; Using simple and easy-to-understand language; Integrating local values and students' real experiences; Used by teachers to measure learning outcomes authentically and provide meaningful feedback.

*Design*

After learning needs, student characteristics, and challenges in literacy and numeracy are identified in the analysis stage, focusing on the preparation of the format and content of the assessment instrument that is in accordance with the curriculum and local context. The design of this instrument aims to produce a valid, reliable measuring instrument that has good discriminatory power in measuring the literacy and numeracy skills of fifth grade students.

*Preparation of Instrument*

The preparation of the blueprint is carried out as a basis for developing test items, both for literacy and numeracy. The blueprint includes basic competencies referred to from the independent curriculum; competency achievement indicators; types of questions (multiple choice, short answers, essays); cognitive level (referring to Bloom's taxonomy: C1 - C3 for elementary to intermediate levels); and local context (linking questions to students' daily lives in Senduro Village).

**Table 1.** Literacy blueprint

| Basic competencies | Indicators | Cognitive level | Question | Local context |
|---|---|---|---|---|
| Analysing information in reading texts | Summarizing the contents of non-fiction text | C2 (Understanding) | Multiple choice | Text about potato farming |
| Determining the meaning of vocabulary | Finding the meaning of difficult words in context | C1 (Remember) | Description | Text about village life |

**Table 2.** Numeracy blueprint

| Basic competencies | Indicators | Cognitive level | Question | Local context |
|---|---|---|---|---|
| Integer arithmetic operations | Solve story problems by addition or subtraction | C3 (Implement) | Short fill | Questions about vegetable harvest results |
| Measurement of units of length and weight | Converting units of length to other units | C2 (Understanding) | Multiple choice | Measuring the area of the garden |

*Validity of Content*

The questions are adapted to the basic competencies in the curriculum and have been consulted with local elementary education experts and class teachers.

*Reliability*

Questions are designed consistently so that they can be used repeatedly in similar contexts and still produce stable data.

*Different Power*

Each test item has varying levels of difficulty and is able to differentiate between students with high and low abilities.

*Question Structure*

Literacy instruments include: 10 questions (6 multiple choices, 2 fill in the blanks, 2 short essays). Numerical instruments include questions (5 multiple choices, 3 short answers, 2 descriptive story questions).

**Table 3.** Validation

| Aspects | Curriculum | Teacher | Assessment developer | Average score | Category |
|---|---|---|---|---|---|
| Suitability of question content with basic competencies | 4 | 4 | 4 | 4 | Valid |
| Clarity of language and sentence structure | 3 | 4 | 4 | 3.66 | Quite valid |
| Relevance of questions to students' daily lives | 4 | 3 | 4 | 3.66 | Quite valid |
| The level of difficulty is appropriate to the abilities of grade 5 students. | 3 | 3 | 4 | 3.33 | Quite valid |
| Readability and question instructions | 3 | 4 | 4 | 3.66 | Quite valid |

*Development (Instrument Development)*

The development stage aims to produce valid, practical, and effective literacy and numeracy assessment instruments. The development process is carried out through the following three sub-stages.

*Instrument Validation by Experts*

After the instrument is prepared based on the results of the analysis and design, the next stage is validation by experts to ensure the validity of the content and suitability with the curriculum and student characteristics. The following are the results of interviews with experts:

*"...Some literacy questions need to be simplified in their sentences to make them easier to understand for students whose reading skills are still developing..."* (Interview with curriculum expert)

*"...Numeracy question number 3 is too complex; it would be better to provide additional instructions so that students are not confused..."* (Interview with grade 5teacher)

Both interview excerpts show that in literacy questions, the sentences need to be simplified to make them easier for students to understand. In addition, additional instructions need to be provided so as not to confuse students.

*Trial of the Instrument on Small Groups*

After being validated and revised, the instrument was tested on 10 random fifth grade students from SD Negeri 01 Senduro. It was to assess the practicality of the instrument (easy to use, not confusing); observe students' reactions and understanding. The results of the trial observations showed that; the majority of students can complete the questions within the time allocated (45 minutes); some students have difficulty with story numeracy questions (contextual based); students said they were happy because the questions felt close to everyday life.

The following are the results of interviews with several students of Grade 5of SD Negeri 01 Senduro:

*"...I like the potato garden topic because it is like my home..."* (Interview with X, a fifth-grade student at SD Negeri 01 Senduro)

*"...The math story questions are a bit difficult, but if explained first, I can do it..."* (Interview with A, a fifth-grade student at SD Negeri 01 Senduro)

The two interview quotes above show that students like questions that are close to the environment or everyday life. In addition, it appears that there are students who feel that math questions are considered a little difficult if not explained by the teacher first.

*Analysis of Trial Results and Instrument Revision*

After the instrument was tested on 10 fifth grade students of SD Negeri 01 Senduro, an analysis was conducted to evaluate the effectiveness of each question. The purpose of this stage is to assess the level of suitability of the instrument to students' abilities and to adjust the complexity of the questions to maintain a balance between literacy and numeracy aspects.

*Analyse the Level of Difficulty and Discrimination of Questions*

Based on the students' scores, it is calculated how many students can answer each question correctly. Questions with too high or too easy difficulty levels and questions that cannot distinguish students with low and high abilities are given special attention.

*Assess the Empirical Validity of the Questions*

Students' responses to the questions were analysed descriptively, seen from the distribution of scores and responses to each question item. Researchers also paid attention to students' comments and expressions during the trial.

*Adjust the Number and Complexity of Questions*

The number of literacy and numeracy questions is reviewed to keep them proportional. Questions with high complexity that are not relevant to the local context are removed or simplified.

**Table 4.** Summary of revision

| Aspects Analyzed | Findings | Revision Action |
|---|---|---|
| Differences in numeracy | 2 numeracy questions have low discrimination power | Revised by simplifying sentences and problem steps |
| Level of difficulty of questions | 1 question is too difficult and confusing | The question was deleted |
| Students' understanding of contextual questions | Questions with illustrations are easier to understand | Added illustrations to 2 questions |
| Proportion of literacy and numeracy | It's balanced after 1 numeration question is removed | No additional revisions |

*Implementation*

After the final instrument is prepared through the stages of analysis, design, development, validation, and revision, the next stage is the implementation of the instrument in a real context in the classroom.

The final instrument was tested on all fifth-grade students of SD Negeri 01 Senduro in an assessment session that lasted for 45 minutes. The assessment was carried out in a conducive learning atmosphere so that students could show their true abilities. The class teacher and researchers accompanied the assessment process to ensure order and provide explanations if necessary (without leaking the answers).

The assessment results are collected and analysed to see the distribution of scores, identify students' strengths and weaknesses in literacy and numeracy aspects. Teachers use the assessment results as reflection material and a basis for designing remedial or

enrichment learning activities. Some students who show weaknesses in contextual numeracy questions are given additional learning opportunities with contextual and visual approaches.

Students are given individual feedback in the form of explanations of correct answers and reasons why their answers are less than perfect. Teachers are given reports of class assessment results to be used in planning future learning programs.

The results of the research at the implementation stage showed that: most students were able to solve the questions with confidence; questions based on local contexts (for example, about potato farming) increased student interest; and teachers stated that the instrument helped identify gaps in student understanding more accurately compared to conventional questions.

*Evaluation*

The evaluation stage aims to measure the effectiveness and impact of the assessment instruments that have been developed and implemented in the learning process, as well as to refine the instruments based on field findings. The purpose of the evaluation is to assess the extent to which the instrument can measure students' literacy and numeracy skills accurately; identify weaknesses in the instrument and its implementation; and prepare recommendations for improving the instrument and learning strategies based on the assessment results. Evaluation is carried out through analysing students' score data to observe score distribution and general trends.

**Table 5.** Evaluation results

| Evaluation Components | Findings |
|---|---|
| Student understanding level | Most students can understand literacy questions; contextual numeracy is still challenging |
| Processing time | 85% of students finished on time; the rest needed a little extra time. |
| Clarity of language | It's good enough, but some questions still need to be adjusted in their sentences. |
| Visual support | Simple pictures or illustrations help students' understanding (especially in numeracy) |
| Relevance of the question | The questions are considered relevant and close to students' daily lives. |
| The role of instruments in learning | Teachers find it helpful to know students' basic ability levels more specifically. |

*Form of Literacy and Numeracy to the Level of Thinking Ability of Fifth Grade Students*

The development of literacy and numeracy skills assessment instruments was carried out systematically using a methodological approach. Instructional design based on the ADDIE model, namely through the stages of Analysis, Design, Development, Implementation, and Evaluation. This model was chosen because it provides a structured framework for designing, developing, and evaluating instruments to suit the learning needs at the elementary school level, especially for fifth grade students at SD Negeri 01 Senduro. In this context, assessment is not only intended to measure learning outcomes, but also as a diagnostic and reflection tool to improve the quality of learning.

The initial stage, namely needs analysis, is carried out by reviewing the curriculum, especially basic competencies related to literacy and numeracy in the Independent Curriculum, as well as the characteristics of students. Fifth grade students are generally at the concrete operational stage towards formal operations according to Piaget's theory, so the form of questions developed must reflect logical, structured thinking, and be directly related to real life. For this reason, the content of the questions is made based on the students' local environment, such as potato farming and goat farming which are indeed part of life in Senduro. This analysis also includes teachers' needs for practical and easy-to-use assessment instruments in the teaching and learning process.

Next, at the design stage, the assessment instrument is prepared by referring to the revised Bloom's taxonomy, which includes cognitive levels C1 (remembering), C2 (understanding), and C3 (applying). The form of the questions consists of two main parts: literacy questions in the form of multiple choices that test the ability to understand contextual reading, retrieve information, interpret meaning, and recognize main sentences; and numeracy questions in the form of story questions and fill-in questions that require the application of basic mathematical concepts in everyday contexts. The question design also pays attention to the use of simple language and light visual illustrations to help students' understanding.

At the development stage, the designed instrument was then validated by three experts, namely an elementary education lecturer (curriculum expert), a grade 5teacher, and an educational assessment practitioner. Validation was carried out to assess aspects of content, question construction, language suitability, contextual relevance, and level of difficulty. The experts provided input, including that some literacy questions need to have their sentence structure simplified to make them easier to understand, and numeracy questions need to have instructions or illustrations added so as not to confuse students. Based on the validation results, the instrument was then revised according to expert advice.

After validation and revision, the instrument was tested on 10 grade 5students randomly to determine the

practicality, understandability, and student responses to the questions. The results of the trial showed that most students were able to complete the questions within the specified time, but there were obstacles in the story-based numeracy questions. Some students found it difficult to understand math problems if they were not guided first. Student feedback showed that they were more enthusiastic when working on questions that were contextual and close to their daily lives. This became the basis for further revisions to the presentation of numeracy questions, namely by adding illustrations and arranging the flow of questions in a more structured manner.

In the process of analysing the trial results, an assessment was made of the level of difficulty and the discriminating power of the questions based on the results of the students' answers. Questions that were too difficult and had low discriminating power (could not distinguish between high and low-ability students) were then deleted or simplified. Two numeracy questions were identified as having low discriminating power, so the presentation format was revised and one question with a high level of difficulty was removed. An empirical validity analysis was carried out simply based on the distribution of student scores. In addition, interviews and observations during the trial were used as qualitative data to determine the effectiveness of the instrument practically and pedagogically.

The final instrument is then implemented directly in classroom assessment activities. Teachers use this instrument not only to assess learning outcomes, but also as a tool to provide formative feedback. The assessment results are used as a basis for reflecting on learning, identifying student learning difficulties, and designing remedial learning actions. Teachers also get important information about students' literacy and numeracy skills in a more complete and data-based manner.

At the evaluation stage, a comprehensive reflection was conducted on the entire process of developing and implementing the instrument. This evaluation showed that the instrument was able to reflect student needs, was relevant to the local context, and was able to facilitate the measurement of literacy and numeracy skills comprehensively. The evaluation results showed that student engagement increased, understanding was better, and teachers felt helped in assessing the learning process. However, it was also realized that instrument development needs to be an ongoing process, so that it continues to be adjusted to the dynamics of learning and student needs in the future.

## Conclusion

In this regard, the conclusions of this study include that the literacy and numeracy assessment instruments developed for fifth grade students of SD Negeri 01 Senduro have proven to be relevant, contextual, and appropriate to the level of students' thinking abilities. Firstly, the implementation results show that these instruments are effective for use in learning and assist teachers in providing feedback and improving the quality of learning. Secondly, the literacy and numeracy skills assessment instruments developed have proven to be effective in describing the learning achievements and readiness of fifth grade students of SD Negeri 01 Senduro to face the Minimum Competency Assessment (AKM) In short, the development of localized assessment instruments for literacy and numeracy in elementary schools represents a strategic and educationally imperative step toward elevating foundational learning outcomes.

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The authors declare no conflict of interest.

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