Development of Literacy and Numeracy-Based Assessment Instruments for Madrasah Ibtidaiyah Teacher Education Students

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Abstract: This study aims to develop a good literacy and numeracy-based assessment instrument and the implementation of instrument of the assessment is expected to measure the literacy and numeracy skills of Madrasah Ibtidaiyah Teacher Education UIN Walisongo students. The development procedure in this study adopts the Cennamo and Kalk development reseachr program (R&D) model with steps (1) defining phase, which includes literature study and preliminary observation; (2) the planning phase in the form of the preparation of 30 questions of literacy and numeracy-based assessment instruments; (3) the demonstration phase in the form of a theoretical test of the validity of the question by the expert; (4) the development phase in the form of improving questions based on validators' suggestions and conducting question implemented to number of 35 students to determine empirically valid questions; and (5) the phase of presenting theoretically and empirically valid question instruments as many as 19 questions on a broader scale with 42 students and determining the level of literacy and numeracy skills of students. The selected sample population was students of Madrasah Ibtidaiyah Teacher Education UIN Walisongo Semarang, third-semester class of 2020/2021. Sampling is carried out by purposive sampling technique. The result concludes that the assessment instrument developed meets the criteria of feasible and valid theoretically and empirically. The literacy and numeracy skills of PGMI UIN Walsiongo students in the low category are seen from the analysis of the six literacy and numeracy indicators.

INTRODUCTION

Students need to be trained in sensitivity to literacy and numeracy (*sense of number*) in everyday life.

Numeracy ability is an asset in student survival. One of them is in making decisions or actions, often students are

faced with numbers and graphs in solving daily problems. OECD suggests the realm of numeracy knowledge and skills, namely 1) the ability to use various kinds of numbers and symbols related to basic mathematics to solve problems in everyday life; 2) the ability to analyze information displayed in various forms such as tables, graphs, charts; 3) the ability to predict and make decisions based on data interpretation (OECD, 2016).

Six basic literacy,, namely literacy, numeracy, science, digital, finance, culture, and citizensh, must be developed to achievee 21st-century life skills. Literacy and numeracy skills are related to the skills to apply basic knowledge. Principle. And mathematical processes in everyday life (Lamada et al., 2019). Literacy and numeracy can be done by providing stimulus to students. The motivation provided must be contextual. Interesting and under the times to foster students' curiosity in learning (Perdana & Suswandari, 2021). Hendrawati believes that language literacy and numeracy will form a pattern of mathematical literacy. This can be done through cultural exploration activities around students (Hendrawati et al., 2020).

Understanding mathematical literacy and numeracy can be used in various problem solving such as economics. Science. Technique. Social and other fields. Literacy and numeracy skills have an impact on good thinking patterns and habits. Relating a number and calculation in solving problems so that problem-solving becomes easy and straightforward (Haerudin, 2019). Therefore. The relationship between literacy and numeracy paves the way to more complex reflections on skills (Bonifacci et al., 2022).

Literacy and numeracy skills are essential for students. Therefore, it is vital to ensure that educators understand both abilities. Educators with misconceptions about literacy and numeracy will teach students the wrong things (Maghfiroh et al., 2021). When students have the wrong understanding, the life skills of the 21st century cannot be achieved.

Madrasah Ibtidaiyah Teacher Education (PGMI) is one of the higher education programs that has an essential role in producing prospective teachers who are competent to teach in madrasah

ibtidaiyah, the primary education level in the Islamic education system (Pribudhiana et al., 2021). The quality of education at this level largely determines the foundation of children's character-building and religious understanding as well as their abilities in literacy (reading and writing skills) and numeracy (math skills) (Hannam et al., 2020). Therefore, it is important to ensure that PGMI students are adequately qualified and have high literacy and numeracy competencies to provide effective and quality teaching in madrasah ibtidaiyah (Munifah & Purwaningrum, 2022).

On the other hand, in measuring the literacy and numeracy competencies of PGMI students, valid, reliable, and relevant assessment instruments are needed. Good assessment instruments will help educational institutions identify students' weaknesses and strengths and design teaching programs that suit their needs (Ismail et al., 2020). However, currently, there are not many assessment instruments developed specifically to measure the literacy and numeracy of PGMI students, especially those based on the context of madrasah ibtidaiyah.

In addition, curriculum development and the ever-changing demands of education demand assessment instruments that are constantly updated and adjusted. Therefore, the development of literacy and numeracy-based assessment instruments under the PGMI curriculum and the characteristics of madrasah ibtidaiyah students is an urgent need (Grimus, 2020).

In this context, this study aims to develop an assessment instrument that focuses on literacy and numeracy for PGMI students. This instrument will be designed following the PGMI curriculum and the context of madrasah ibtidaiyah so that it can provide an accurate picture of student competence in literacy and numeracy. With an appropriate assessment instrument, it is expected that PGMI educational institutions can improve the quality of madrasah ibtidaiyah teacher education and contribute positively to improving the quality of Islamic education at the primary level.

Results of observations and intervofws conducted during the comprehensive examination of Pendidikan Guru Madrasah Ibtidaiyah

(PGMI) students. Students' literacy and numeracy skills are relatively low. This is shown by the number of PGMI students who cannot calculate fractions and decimals and unable to distinguish area and circumference, and are blocks and cubes. This indicator shows the need for action to determine students' literacy and numeracy skills earlier. Knowledge of mastering these abilities is essential so that preventive can be taken so that PGMI student graduates can teach students correctly and adequately, considering that literacy and numeracy skills are needed to develop 21st century life skills.

The PGMI study program has no instruments to measure students' literacy and numeracy skills. These uments are needed to ensure graduates have superior abilities and can eq21st-centuryudents later to have 21st-century life skills. Therefore, the research to be raised is "Development of Literacy and Numeracy-Based Assessment Instruments for Madrasah Ibtidaiyah Teacher Education Students".

METHOD

The research step this time is Research and Development. The development carried out is a matter of measuring students' literacy and numeracy skills. The development model used by the model from Cennamo and Kalk this model consists of five stages, namely: (1) Define phase, (2) Design phase, (3) Demonstrate phase, (4) Develop phase, and (5) Deliver phase (Cennamo & Kalk, 2005).

The development research procedure can be described as follows: Defining Stage (Define), the beginning of the needs assessment of the problem to be identified. In the Planning (Design) stage, literacy and numeracy problems are designed. Demonstration Stage: Drafts that have been made are then validated by experts. Development Stage: Testing questions are carried out to students. Presentation Stage (Deliver) is the last stage of development where questions are used to map students' literacy and numeracy skills.

The population of this study is PGMI UIN Walisongo Semarang students in the semester 3 class of 2021. The sample of this study was class 3B, as many as 35 students.

Data collection methods used in this study include Documentation, Observation, Interviews, Tests, and Questionnaires. Meanwhile, the data

collection instrument uses validation sheets for test questions and literacy and numeracy test questions. Data analysis techniques are carried out by analyzing literacy and numeracy test questions using the Microsoft Excel program. Analysis of literacy and numeracy skills is classified into several groups (Karim & Normaya, 2015).

Table 1 Percentage Categories of Literacy and Numeracy Ability

Interpretation (%)	Category
81,25<X≤100	Very high
71,25<X≤81,25	High
62,5<X≤71,5	Keep
43,75<X≤62,5	Low
0<X≤43,75	Very Low

RESULT & DISCUSSION

The research entitled "Development of Literacy and Numeracy-Based Assessment Instruments for Madrasah Ibtidaiyah Teacher Education Students" was carried out from July to September 2022 at the PGMI study program of Walisongo State Islamic University Semarang. The study was conducted on third-semester students. The development of literacy and numeracy-based questions is following the development model of Cennamo and Kalk in 2005. The development step consists of five phases starting from

define, design, demonstrate, develop, and deliver (Adriyani & Purwanti, 2018).

Define Phase

The define phase is a phase to conduct preliminary studies in literature studies, observations, and interviews with students to conduct a *need assessment*. Literature studies are carried out by studying previous research on literacy and numeracy problems to determinee which aspects can be developed.

Observation and interviews with students are carried out when conducting comprehensive examinations. A thorough exam is given when all courses have been taken and passed. This exam is a requirement for munaqosah or thesis exam. The result obtained when conducting a comprehensive exam is that students' literacy and numeracy skills are relatively low. Given that a thorough exam is a general description of a student's ability during lectures, some things must be done for the exam to be satisfactory. Therefore, instruments are needed to measure students' literacy and numeracy skills early so that students who have low scores can be

known before. This is a reasonable quality control of graduates and preventive measures to improve literacy and numeracy skills through enhanced learning. Therefore, the development of literacy and numeracy instruments is needed to measure students' abilities from an early age (Kahar, 2021).

Design Phase

The design phase is carried out after a needs assessment, and it is confirmed that test instruments are needed to measure literacy and numeracy skills. In this step, a test instrument product design document is generated. The test instrument is designed as a multiple-choice question with five answer choices and refers to standardized test criteria.

In this phase, lecture materials are also mapped to make a grid The material taken is temperature, heat, and the digestive system. The grid that has been obtained is lowered again to contain literacy and numeracy criteria, including finding information (access and retrieve), understanding (interpret and integrate), evaluating and reflecting (evaluate and image), being able to use various kinds of numbers and symbols related to basic mathematics, analyzing

information displayed in multiple forms (graphs, tables, charts, diagrams and so on), and Interpret the results of such analysis to predict and make decisions. The first draft was produced after lowering the literacy and numeracy criteria with the learning objective of becoming a multiple-choice numeracy literacy question.

Demonstrate Phase

The demonstrate phase is characterized by a validated first draft to experts to test their ththeoretical feasibility. The results of expert validation show that the questions that have been made are feasible to be tested on a limited basis in the development phase or development phase but with revisions.

Develop Phase

The develop hase begins by piloting theoretically feasible and revised questions from experts to students. The selected students nd the digestive system. have received temperature, heat material The trial results will be used to empirically determine the quality of the questions.

This phase is also the phase where the quality of the questions is empirically analyzed (Wibowo &

Faizah, 2021). Analysis is carried out to determine the validity of the problem. There are nineteen valid questions after being tested out of thirty questions developed. Nineteen questions then become the final product in the *build* phase. Next, the questions will measure students' literacy and numeracy skills.

Deliver Phase

The *deliver* phase is a step to present test instrument products in a broader scale. The presentation was to test questions that were already valid theoretically and empirically, as many as 19 questions. Recapitulation of useful questions.

Extensive trials using literacy and numeracy questions found that students' abilities can be seen in picture 1.
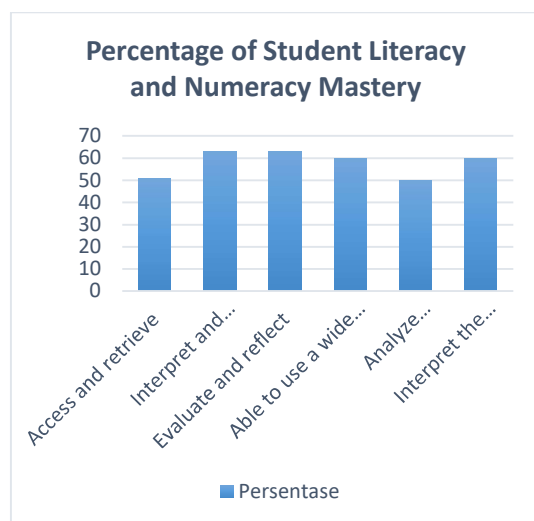

Figure 1 Percentage of Student Literacy and Numeracy Mastery

Following figure 1 presented, the literacy and numeracy skills of 42 students can be mapped using the percentage category in table 1. Student literacy skills at the cognitive level understand (*interpret and integrate*) and evaluate and reflect indicators with *a* percentage of 63% each and can be classified in the medium category. The literacy indicator found information in the text (*access and retrieve*) was in the low class with a percentage of 51%.

The literacy indicator with a percentage of 63% is the lower limit of the criteria set, so it can be concluded that, in general,, the literacy ability of PGMI UIN Walisongo students is still low. This is possible because of students' lack of interest in reading reading questions in the form of long narratives. So that understanding the existing problems is less comprehensive and results in the ability to think critically, this aligns with Annisa's statement that the lack of interest in reading students and Indonesian society in general will affect their necessary thinking skills (Anisa et al., 2021).

All numeracy indicators fall into the low category, namely the ability to use

various kinds of numbers and symbols related to basic mathematics to solve problems in various contexts of daily life, the ability to analyze information displayed in various forms (graphs, tables, charts, diagrams and so on) and the ability to interpret the results of the analysis to predict and make decisions with a percentage of 60% each. 50%, and 60%.

This is following the results of initial observations that PGMI students still struggle to use numbers and symbols and reading information in the form of graphs and tables. It turns out that these results align with the findings of Basri et al. that prospective teacher students do not yet have sensitivity to numbers (Basri et al., 2021). Based on the results of unstructured interviews with students, it was found that most students already feel pessimistic and down when they see the problem smelling of numbers, considering that the essential or background of PGMI students varies, not all of them come from high school majoring in science. With this pessimistic attitude, it turns out that it dramatically affects the thinking power of students in solving numeracy problems. The findings from

Salvia also stated that there was mathematical anxiety. Students already felt panic if they saw numbers and felt unable to do the problem (Salvia et al., 2022).

CONCLUSION

The development of test instruments is carried out using five steps proposed by Cennamo and Kalk, including the phases of define, design, demonstrate, develop, and deliver. The forged question instrument is feasible and valid (theoretical and empirical). Students' literacy and numeracy ability is still low, as can be seen from the analysis of the six existing literacy and numeracy indicators. Lecturers need to develop lesson plans that support improving literacy and numeracy and improve the learning process that adjust student characteristics.

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