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TEACHERS' PERSPECTIVE OF NUMERACY LITERACY IN VOCATIONAL HIGH SCHOOLS

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Abstract: The relevance of education to the goals of national development under the characteristics of vocational education is to prepare graduates who can compete in the world of work and technological developments. Utilization of national assessment results in the numeracy aspect as an effort to improve the quality of learning. This qualitative research with a case study design aims to explore teachers' knowledge and understanding of numeracy literacy, aspects, and the process of assessing numeracy literacy in the Minimum Competency Assessment. The respondents involved in this study were 14 teachers at one of the State Vocational High Schools in Ciamis Regency, West Java Province. The instruments used were questionnaires and interview guidelines. The data collected were then analyzed descriptively. The results of this study indicate that: (1) respondents stated that numeracy literacy is related to basic mathematics in everyday life, (2) respondents understand the cause of low numeracy literacy skills in students due to the lack of interest in learning about arithmetic subjects, (3) respondents know that numeracy literacy skills are not only developed in mathematics lessons, (4) respondents do not understand the content and context aspects that can be used in learning to strengthen students' numeracy literacy skills, and (5) respondents do not know the classification of students' numeracy literacy skills based on the Minimum Competency Assessment assessment process. Strengthening numeracy literacy skills needs to be done across subjects systematically, structured, and massively through programs that are integrated into the curriculum. This is done so that teachers have a clear focus in improving numeracy literacy skills as provisions for students to face increasingly complex future demands.

Keywords: minimum competency assessment; numeracy literacy; teacher perspective; vocational education

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INTRODUCTION

Vocational education in secondary schools focuses on equipping students with practical skills and work expertise in specific fields. Students who have graduated are prepared to work directly, become entrepreneurs, or continue to applied higher education. Students are expected to become skilled workers, have an entrepreneurial spirit, and have skills-based abilities. This shows that vocational education is very important in improving

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human resources (Amri et al., 2020). The quality of human resources is the main benchmark for a country's progress in the current era of globalization. Efforts that can be made to produce quality Indonesian human resources are correlated with the efforts of the world of education to produce a golden generation (Hadiyanti et al., 2021).

The curriculum structure in Vocational High Schools (SMK) consists of productive programs, normative programs, and adaptive programs (Vebriani et al., 2024). These three programs support each other and form a complete unity in the SMK curriculum. Mathematics is one of the adaptive programs that provides basic knowledge and skills to support learning in various productive programs (Handayani et al., 2018). Mathematics is not only about the ability to count but also about understanding numbers, symbols, and quantitative data analysis such as graphs, tables, and diagrams to be used to solve every problem in life. Students are able to apply mathematical knowledge practically in the real world, which is called numeracy literacy skills.

The Center for Assessment and Learning states that numeracy literacy is the ability to use mathematical concepts, procedures, facts, and tools to solve everyday life problems (Kemdikbud, 2020). Numeracy literacy skills are very important for students to have because they have a key role in supporting the development of life skills, education, and future careers (Kemdikbud, 2021). This indicates that students need to be equipped with the ability to interpret mathematics in various contexts and recognize situations where mathematical reasoning can be applied to solve problems. So that numeracy literacy skills can be improved in mathematics learning.

Literacy is a major issue in the international survey study PISA (Program for International Student Assessment) conducted by the OECD (Organization for Economic Co-operation and Development). This test aims to measure the ability of students in various countries in reading, mathematics, and science to solve complex problems, think critically and communicate effectively. The results of PISA 2022 for Indonesia in mathematics scored 366 from an international average of 472 (OECD, 2023). These results show that student achievement in essential competencies is still lacking, and the quality of learning is not optimal.

In Indonesia, currently numeracy literacy is the main component in the Minimum Competency Assessment (AKM). The numeracy skills measured include logical-systematic thinking skills, reasoning skills using mathematical concepts and knowledge that have been learned, and skills in sorting and processing quantitative and spatial information (Kemdikbud, 2020). In AKM, the assessment is designed so that learning is oriented towards developing reasoning, not just memorization. The results of the evaluation of the education system are included in the education report card, which contains information on student learning outcomes, the learning process, equal distribution of service quality, quality of school management, and the quality of human resources involved. The numeracy skills of vocational high school students in 2024 based on the Indonesian Education Report Card are included in the moderate category, namely 59,82% of students achieving minimum numeracy competencies. This result increased by 20,36% from 2023, but is still not satisfactory because it is not included in the good category. Therefore, efforts are needed to strengthen the numeracy skills of vocational high school students.

The government's attention to improving numeracy skills has been carried out, namely by determining the type and quality of basic education services regulated in

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Permendikbudristek Number 32 of 2022. The components of the quality of learning outcomes of vocational school students include: (a) literacy competencies; (b) numeracy competencies; (c) work culture; and (d) absorption of graduates in the world of work, entrepreneurship, and/or continuing to higher education. Efforts to fulfill the quality and equality of student learning outcomes include through activities to form learning communities and the active involvement of school principals, school supervisors, and teachers. In this case, teachers have a very important role in improving students' numeracy skills. So it is important to conduct a study that first explores teachers' understanding of the mathematical content taught in schools to support increasing students' numeracy literacy skills.

This study was conducted as a reflection material for teachers in improving the learning process and student learning outcomes, especially in essential skills that are important for students to have, namely numeracy. This can be done if respondents know about what and how mathematics is taught in class specifically and the role of mathematics in general (Umbara & Suryadi, 2019). This study is a reference for respondents to be able to optimize the quality and equality of learning outcomes based on national assessment data, namely by identifying problems, reflecting on their roots, and then contributing to improving the learning process related to numeracy literacy.

METHOD

This qualitative research with a case study design aims to explore teachers' knowledge and understanding of numeracy literacy, especially regarding the Minimum Competency Assessment. Several aspects observed are teachers' knowledge and understanding of mathematical content, use of context, and cognitive level. The sampling technique used purposive sampling, with considerations adjusted to the needs of the researcher. The research respondents consisted of 14 teachers at one of the State Vocational High Schools in Ciamis Regency, West Java Province.

The collected research data were obtained from questionnaires and interview guidelines. The questionnaire used was an open questionnaire, while in-depth interviews were conducted to verify answers or complete the questionnaire data. The questions asked in the questionnaire and interviews were about knowledge of numeracy literacy in the Minimum Competency Assessment, both in terms of understanding the aspects and processes of numeracy literacy assessment and the learning process carried out in the classroom. The collected data were then analyzed descriptively. The detailed stages of this research process are presented as follows. First, the researcher conducted a document analysis on numeracy literacy sourced from the Ministry of Education and Culture of the Republic of Indonesia. In this study, document analysis was carried out by analyzing aspects of content, context, cognitive level of numeracy ability, and exploring why numeracy ability is low, and the principles of numeracy reinforcement. Second, the researcher developed an instrument based on document analysis. Third, the researcher gave questionnaires to respondents and conducted in-depth interviews to confirm the answers to the questionnaire results. The final stage is the presentation of data obtained from the analysis of research data.

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RESULT AND DISCUSSION

The research respondents consisted of teachers in each program in SMK, namely productive programs, normative programs, and adaptive programs. Respondent data based on length of teaching and gender are presented in Table 1.

Table 1. Respondents Data

No	Program Name	Teaching Period (Years)	Gender
1	Productive	12	Man
2	Productive	17	Woman
3	Productive	17	Woman
4	Productive	2	Woman
5	Productive	20	Woman
6	Productive	9	Man
7	Normative	16	Woman
8	Normative	15	Woman
9	Normative	16	Man
10	Normative	7	Man
11	Adaptive	9	Woman
12	Adaptive	12	Woman
13	Adaptive	17	Woman
14	Adaptive	14	Woman

To find out the respondents' understanding of numeracy literacy in the Minimum Competency Assessment, aspects and processes of numeracy literacy assessment, and the learning process carried out in class, data was obtained from the open questionnaire summarized in Table 2.

Table 2. Questionnaire Result Data

No	Questionnaire Indicators	Respondent Comments
1	Definition of numeracy	○ Ability to understand, use and apply basic mathematical concepts in everyday life ○ Ability to process numbers ○ Ability to understand and use numbers to apply to everyday life ○ Numeracy is the ability to understand, use, and manipulate numbers, and apply basic mathematical concepts in everyday life ○ Use of mathematics in everyday life ○ The ability to apply the concept of numbers and symbols in basic mathematics to solve problems in everyday life

		○ The ability to understand, interpret, and work with numbers and mathematical concepts in everyday life ○ The ability to understand and use various numbers and symbols related to basic mathematics and analyze information displayed in various forms (graphs, tables, charts, etc.) to solve practical problems in various contexts of everyday life ○ Numeracy is the ability to understand basic or initial mathematical symbols ○ The ability to understand, use, and manipulate numbers, and apply basic mathematical concepts in everyday life ○ Understand symbols related to numbers
2	Numeracy skills are important for students to have	○ Having numeracy literacy skills will better prepare you to live your daily life ○ Numeracy skills are important for students because they play a major role in developing critical thinking and problem-solving skills that they need in various aspects of life ○ Because with numeracy students can think critically and rationally in making decisions ○ Because with numeracy, students learn estimation, with patterns, measurements, and data analysis so that students can solve everyday life problems ○ Because with numeracy skills students will find it easier to solve problems, especially logical cases related to calculations ○ Numeracy is how children can solve everyday life through mathematics. The existence of numeracy makes children invited to learn estimation ○ Because in life it will never be free from numbers, for example buy and sell transaction ○ Students will be able to think rationally, systematically and critically in solving existing problems. Students can also make decisions carefully in various contexts. For vocational high school students, of course numeracy literacy skills can be a provision for them when they graduate in facing community life and the world of work. With the hope that vocational school students who have good numeracy literacy skills can be quickly absorbed into the world of work and industry so that the unemployment rate in Indonesia will decrease

3	Causes of low student numeracy skills	○ Low student interest in learning mathematics, lack of introduction and practice questions, lack of facilities and infrastructure and students' social environmental factors ○ Motivation to understand problems related to calculations ○ Teachers' content knowledge is still lacking in terms of teaching mathematics, which affects teaching methods, lack of practice, and also using rote techniques to understand mathematics ○ Lack of student interest in subjects that use calculations ○ Students are lazy about studying ○ Students' low numeracy abilities can be caused by various factors, both originating from within the students themselves and from the surrounding environment. One factor is anxiety about mathematics. which results in them tending to avoid mathematics subjects, which often makes it difficult for students to focus and understand numeracy concepts ○ Lack of habit in solving problems ○ Students lack enthusiasm in reading and practicing counting ○ The enthusiasm for learning begins to decline due to the impact of playing games
4	Content used in strengthening students' numeracy skills	○ Workshops ○ Mathematics education ○ If possible, all the learning ○ To strengthen students' numeracy skills, learning activities must be designed to be relevant, interesting and contextual ○ Can be used in daily life learning ○ Mathematics, math games, recognition of letters and numbers ○ Use of numeracy in daily activities ○ Create products ○ Number content
5	Context used in strengthening students' numeracy skills	○ Realistic with real life ○ Context of analysis ○ Contexts that are close to everyday life, social, cultural, environmental, scientific and mathematical knowledge. The context is categorized into three, namely personal, socio-cultural and scientific ○ Learn to count quickly

		○ Numbers ○ Contexts that are close to everyday life, social, cultural, environmental, scientific and mathematical knowledge ○ Use of numeracy in daily learning ○ By using varied contexts, numeracy learning becomes more interesting and relevant for students. ○ Numbers or numbers ○ Social, cultural, environmental, scientific, mathematical sciences ○ Know what is included in numeracy ○ Contexts that are close to the students' world, for example the number of days in a month. ○ Cultural and scientific context ○ Personal, socio-cultural and scientific
6	Numeracy competencies that students must have	○ Understanding numbers, understanding mathematical concepts, being able to solve problems, being able to understand statistics, and being able to think critically about numerical information ○ Logic ○ Understanding symbols and numbers ○ The numeracy competencies that students must have are: Understanding numbers and basic mathematical operations, such as addition, subtraction, multiplication, and division. Understanding complex mathematical concepts, such as fractions, percentages, ratios, proportions, geometry, statistics, and probability. Being able to solve mathematical problems in everyday life, such as calculating the price of groceries, managing a budget, etc. Being able to understand statistics and probability, such as reading and interpreting graphs, tables, or diagrams. Able to think critically about numerical information, such as analyzing and evaluating numerical information and its truth or relevance in a particular context ○ In accounting, the ability to manage finances ○ The ability to understand and use numbers ○ The numeracy competencies that students must have include: understanding numbers, measuring mathematical problem solving, understanding the relationship between numbers, the ability to interpret quantitative information, the ability to analyze information displayed in various forms (graphs, tables, charts, and so on)

	○ The ability to read symbols and use them in teaching and learning activities ○ The numeracy competencies that students must have include several important aspects that enable them to understand, interpret, and use mathematical concepts in everyday life. Some of the main numeracy competencies are: understanding numbers, such as arithmetic operations (addition, subtraction, multiplication, and division), and relationships between numbers (factors, multiples, and so on) ○ Critical thinking ○ Basic numeracy ○ Analytical thinking ○ The ability to understand, strengthen, and manipulate numbers, and apply basic mathematical concepts in everyday life

Based on Table 2, it is known that there are differences in respondents' understanding of numeracy literacy. This can be seen from the answers about the meaning of numeracy, there are answers with the keyword using numbers in everyday life. This shows that respondents already have an understanding of numeracy. Although there are still respondents who do not have a good understanding of numeracy, it can be seen from the answers given that they have not connected the usefulness of mathematics in everyday life. Numeracy skills are important to meet the needs of today's society, namely being able to use numeracy and quantitative information to support various daily activities (Jablonka, 2003). This is reinforced by (Goos & O'Sullivan, 2022) that numeracy is the ability to use mathematical understanding and skills to solve everyday life problems in a complex social environment.

The next search results show that most respondents already know and understand the reasons why numeracy skills are important for students to have. This shows that respondents are already aware that numeracy is important to be developed and owned by students as a material to improve competency for students' future provisions. There are even respondents who state that vocational high school students who have good numeracy literacy skills will be easy to compete in the business world of the industrial world (DUDI) so that they can reduce unemployment in Indonesia. Dougherty (2003) in his research concluded that numeracy skills are essential skills and have a significant impact on income.

Further information generated from this study is about the factors causing low student numeracy skills based on the AKM results. Several respondents gave different answers, some saw the causal factors as coming from within the students and outside the students. Some of the answers given by respondents about the causal factors from within the students were low student interest in learning arithmetic material, lack of motivation, laziness to learn, the impact of playing online games, and math anxiety. The results of this study are in line with the results of research which shows that affective factors greatly influence numeracy skills (Utami et al., 2021). In addition, individuals need to be

confident in their own ability to use mathematics and explore quantitative ideas (de Lange, 2003). The emergence of this affective factor can be caused by students not being used to solving non-routine problems, not being used to thinking through mathematical modeling, interpreting solutions, reasoning, interpretation, and analysis (Umbara & Suryadi, 2019). The habituation of students to think analytically, critically, provide evidence, and make temporary assumptions in solving problems is still not optimal. Meanwhile, factors external to students include teachers' lack of content knowledge, lack of introduction and practice on questions, minimal facilities and infrastructure, as well as students' social environmental factors. These results show that teachers have challenges in developing numeracy skills with limited facilities, preparation of materials and resources requires sufficient time (Hidayah et al., 2025).

Furthermore, most respondents already know that numeracy literacy skills are not only developed in mathematics lessons, but all teachers have the responsibility to develop students' numeracy skills in every subject they teach. However, teachers and mathematics teachers can develop numeracy skills in learning by maximizing the reasoning and communication processes by designing learning that supports numeracy literacy aspects (Draper, 2002; Nurvicalesti et al., 2025).

For the content and context aspects of numeracy literacy skills, respondents still have insufficient knowledge. This can be seen from the answers given that respondents have not fully understood and mastered the content and context aspects used in strengthening students' numeracy skills. Teachers are the spearhead in improving the quality of learning and student learning outcomes, including numeracy literacy (Draper, 2002; Nel, 2012). Furthermore, respondents' knowledge and understanding vary about the numeracy competency aspects that students must have. These results indicate that respondents have different perspectives in understanding numeracy literacy.

For the utilization of student numeracy assessment results, respondents did not yet know the classification of students' numeracy literacy abilities. We asked whether respondents knew the classification of numeracy literacy abilities based on the results of the AKM assessment. The interview results on this indicator showed that all respondents did not yet know the technicalities of classifying student numeracy. Follow-up questions about whether the AKM assessment results had been used as a basis for improving the learning process. The interview results in this section obtained information that most respondents had used problem contexts that were close to students in the learning and assessment process. However, there were still obstacles faced by respondents, namely in presenting creative ideas for developing teaching materials. This is because respondents are accustomed to using available teaching resources, and the delivery of material in class is still limited to the stage of remembering and understanding a concept or formula and then using it to solve problems that are similar to the examples given by the teacher in class. This contradicts the demands of 21st century learning which needs to prepare students to face the future and careers (Zakiah & Fajriadi, 2020). So there needs to be learning practices with exploration strategies, solving problems and reflecting on the use of mathematical tools in real problems (Colwell & Enderson, 2016).

After being analyzed, the length of teaching time factor did not provide a significant difference in terms of understanding of numeracy literacy. This is indicated by the results of the questionnaire and interviews with respondents. The difference is that during the learning process in class, respondents who have longer teaching time are able

to be more adaptive in using various contexts in classroom learning. Respondents' understanding of numeracy literacy is still limited to the ability to read, write, count, and use mathematics in everyday life. Another fact is that there is no special program to strengthen numeracy literacy in schools. It is important to have a curriculum that facilitates numeracy literacy with a focus on authentic and relevant real-life contexts in learning (Botha & Van Putten, 2018; Suharta & Suarjana, 2018). In addition to using real-life contexts, numeracy literacy is related to other disciplines (de Lange, 2003). So it is necessary to design numeracy literacy strengthening through cross-subjects that are integrated into the curriculum. (Zakiah, 2020)

CONCLUSION

Based on the research results that have been explained, it can be concluded that: (1) most respondents stated that numeracy literacy is related to basic mathematics in everyday life. Although there are still respondents who have not correlated mathematics in everyday life; (2) respondents agree that numeracy skills are important for students to have, but the existing conditions are known that students' numeracy literacy skills are still low. Some of the causes come from factors within students and factors outside students; (3) respondents' understanding is uniform that numeracy literacy skills are not only developed in mathematics lessons, teachers who teach other than mathematics have the same responsibility to improve students' numeracy literacy skills; (4) respondents have insufficient knowledge in the content and context aspects of numeracy literacy skills. In addition, respondents have different knowledge and understanding of the numeracy competency aspects that students must have. (5) respondents do not know and understand the classification aspects of students' numeracy literacy skills based on the Minimum Competency Assessment. Furthermore, the results of the AKM assessment have not been the basis for improving the learning process.

Some suggestions based on the conclusions above, including: (1) respondents need to increase their knowledge of numeracy literacy which is used to measure student learning outcomes in AKM; (2) there needs to be involvement from all elements in the school as an effort to improve the learning process and learning outcomes, namely through the integration of numeracy across curricula, provision of facilities and infrastructure, minimizing various inhibiting factors, and a school culture that makes numeracy a habit to be applied in the school environment; (3) further researchers can conduct research with broader study aspects and a greater number of respondents.

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