The culture of numeric literacy with HOTS problems in mathematics learning

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Abstract *The purpose of this study is to describe the cultivation of numerical literacy with HOTS questions in mathematics learning. This research is a qualitative research conducted with the following stages: (1) identifying the problems that arise in the cultivation of numerical literacy, (2) determining the focus of the problems that arise in the cultivation of numerical literacy, (3) determining the subjects in the research, (4) collecting the required data, (5) analyze the research data, and (6) draw conclusions. The subjects in this study were teachers and 27 students of 4th grader in SDS PKMI Ephesus Aek Batu. Methods of data collection by interview, observation and documentation. The data analysis technique was carried out by qualitative analysis using an interactive flow model. The results of the research obtained are the cultivation of numerical literacy with HOTS questions in mathematics learning carried out in online learning activities, offline and home visits.* [THE CULTURE OF NUMERIC LITERACY WITH HOTS PROBLEMS IN MATHEMATICS LEARNING] ***(J. Math. Nat. Sci., 1(2): 52 - 55, 2021)***

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Introduction

Literacy skills can equip everyone to face the challenges of the 21st century. Basically, everyone must master six basic literacys, namely (1) language literacy, (2) numeracy literacy, (3) scientific literacy, (4) digital literacy, (5) financial literacy, (6) cultural and civic literacy. (Tim GLN, 2017a). Mastery of these six literacy needs to be trained and developed through education both at school, family and community.

Numerical literacy is one part of the six basic literacy that is important for everyone to master. Numerical literacy skills are needed to solve everyday problems using mathematical knowledge of both symbols and numbers (Wendy et al., 2021). Whether we realize it or not, many problems in everyday life are related to making decisions based on numbers and relevant mathematical data. The ability to use numbers, data, and mathematical symbols is related to numerical literacy. These skills can be used to help solve the problems of human life (Firtaning, 2018).

Based on the results of PISA and TIMSS, it is known that the numerical literacy ability of students in general in Indonesia is still low and has not met expectations. PISA results (OEDC, 2018) Indonesian students get an average math score of 386 from the highest score of 490. While the results (TIMSS, 2015) Indonesian students get a math score of 397 from the highest score achieved by Singapore students, which is 618. The low numerical literacy ability of students This also happened to the students of 4th grader in SDS PKMI Ephesus Aek Batu. This can be seen from the formative value and the value of the math quiz

that has not met expectations. Likewise, the learning process, whether conducted online, offline or at home visits, has not facilitated students in their numeracy skills.

This is because the teacher's ability to design mathematical problems in learning to encourage students' critical thinking skills is not optimal (Febrilia and Juliangkary, 2019). Another contributing factor is that students do not yet have a deep understanding of the material in the mathematics they are studying. The shallow understanding of students causes students to still be able to solve routine math problems but many students are unable to solve non-routine problems that have not been studied before.

It is necessary to understand that there are three basic principles of numerical literacy, namely (1) being contextual in accordance with geographical and socio-cultural conditions, (2) being in line with the scope of mathematics in the 2013 Curriculum, (3) being interdependent and enriching other elements of literacy. (Tim GLN, 2017b). Therefore, teachers need to give HOTS questions to students in learning mathematics related to the three basic principles of numerical literacy. In real situations of learning mathematics, teachers need to provide HOTS questions according to a tiered learning experience from easy to difficult and not stuck with something that everything has to be "difficult"(Firtaning, 2018).

Teachers need to design HOTS questions and apply them to mathematics learning (NCTM, 2000). This is important to train students to think in higher order through HOTS questions. According to the Direktorat Pembinaan SMA (2017) the characteristics of the HOTS questions are (1) measuring higher-order thinking skills, not only the ability to remember, know or repeat so that the answers to questions are not explicitly stated in the stimulus, (2) based on current contextual and actual problems (though not all of them), for example about the environment. , health, earth and space, as well as the use of science and technology in various aspects of life, (3) using various forms of questions as used in PISA aims to provide more detailed and comprehensive information about students' abilities.

Based on this description, it is necessary to cultivate numerical literacy with HOTS questions in mathematics learning, specifically for fourth grade students at the PKMI Ephesus Private Elementary School Aek Batu. Although in the early stages many students experience difficulties, with the guidance of the teacher students will be able to solve the HOTS questions. The need for civilizing numerical literacy with HOTS questions so that students are trained to think critically and creatively in everyday life.

Materials and Methods

This research is a qualitative research conducted with the following stages: (1) identifying the problems that arise in the cultivation of numerical literacy, (2) determining the focus of the problems that arise in the cultivation of numerical literacy, (3) determining the subjects in the research, (4) collecting the required data, (5) analyze the research data, and (6) draw conclusions.

This study examines more deeply about the cultivation of numerical literacy with HOTS questions in mathematics learning to the students of 4th grader in SDS PKMI Ephesus Aek Batu in Labuhan Batu Selatan District in Odd Semester T.A 2021/2022. The subjects in this study were teachers and 27 students of 4th grader in SDS PKMI Ephesus Aek Batu. Methods of data collection by interview, observation and documentation. The data analysis technique was carried out by qualitative analysis using an interactive flow model.

Results

Learning that takes place at the SDS PKMI Ephesus Aek Batu is carried out online, offline and at home visits. This is due to the pandemic situation which is troubling for students, parents, teachers and all school residents. Therefore, learning during the pandemic utilizes technology that makes it easy for learning to run well, especially in learning mathematics.

Based on the results of observations and interviews, in online mathematics learning (synchronous) the teacher explains the material using a virtual zoom meeting room, google meet or whatsapp video call. In this learning interaction occurs so that students can understand the material explained by the teacher even though students do not face to face with the teacher. While in asynchronous learning, students learn independently by utilizing various learning resources, learning

materials and learning portals that can be accessed online.

The offline mathematics learning and home visits are given to students who do not have gadgets or facilities for online learning. In this learning, the teacher still explains the material and makes numerical literacy habituation to the students. This is so that students' numerical literacy skills can increase even during a pandemic.

In learning mathematics online, offline and at home visits, the teacher makes numerical literacy habituation to fourth grade elementary school students to understand the concept of operations on numbers. Students' numerical literacy ability in learning mathematics can be seen in the following figure:

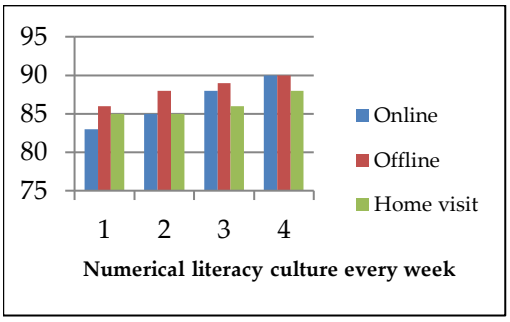

Figure 1. Student's numerical literacy ability.

In Figure 1 it can be seen that the cultivation of numerical literacy of students with HOTS questions in mathematics learning is carried out from the 1st week to the 4th week. Students who take online, offline and home visits have increased their numerical literacy skills. Students score above 75 (higher than the KKM score).

Discussion

As it is known that numerical literacy is defined as the ability to apply the concept of numbers and arithmetic operations skills in everyday life. Of course, numerical literacy is different from mathematical competence. Knowledge related to mathematics does not guarantee students have numerical literacy skills. Students can take advantage of knowledge related to mathematical concepts in solving everyday problems that show students have numeracy skills.

Therefore, it is important to familiarize numerical literacy in mathematics learning. In explaining the material, the teacher often gives HOTS questions which can be a means of practicing for students' numeracy skills. This is in line with the application of HOTS questions in mathematics learning because they can support the habituation of numerical literacy. Through HOTS questions, teachers can measure students' higher-order thinking skills.

This can be observed in the following example, as students know, from the concept of multiplying an integer by an integer that two times one is two, the result is the same even though it is changed to one times two. However, it will be different when given in a situation of taking medication. In terms of the rules for taking medicine as shown in Figure 1, students generally understand that $2 \times 1 = 2$ means 2 tablets to be taken at once. Of course this is not correct. The rule in taking medicine, twice one with one time two will give a different absorption effect of healing drugs. By mastering the concept of multiplication of integers and good numeracy skills, students will be able to explain why the effect of drug absorption is different.

Another example of a question in a different situation, the teacher and students will do a study tour using a school bus. The bus that will be used for the study tour has a capacity of 44 people. If there are 170 study tour participants, then how do you make bus costs more efficient? Through this question, students understand the results of 170: 44 = 3.86, so 4 buses are needed to be able to take all the participants of the study tour. The concept of rounding numbers is not used in solving this problem.

Then in order to be cost efficient, the capacity of the fourth bus was chosen according to the shortage of seats instead of using four buses to have a capacity of 44 people. This means that for 3 buses with a capacity of 44 people, the remaining 38 people take the 4th bus. Costs are calculated based on the 38 people. In this case it is understood that numeracy requires knowledge of mathematics that is learned in the school curriculum. However, learning mathematics does not necessarily develop numeracy skills if the learning material is not directed to it.

The application of HOTS questions in learning mathematics can train students to think at higher levels, namely analyzing, evaluating and creating. HOTS questions can be designed based on the level of difficulty and adapted to a variety of mathematical

material. Problems categorized as difficult are not necessarily HOTS questions that require high-level thinking skills in solving them. For example, to calculate 2022 to the fifth power without using a calculator, it may have a high level of difficulty and accuracy but the ability to answer the question does not include HOTS.

Therefore, the cultivation of numerical literacy with HOTS questions in mathematics learning is very good to carry out. The technique that can be used by teachers to cultivate numerical literacy is to develop numerical literacy in learning mathematics by introducing students to HOTS questions in stages from easy to difficult questions. Preferably before giving HOTS questions, teachers need to know the initial abilities and readiness of students. Teachers can also develop routine questions into HOTS questions by adding a stimulus which is the basis for making high-level questions. The selected stimulus should be interesting, up-to-date, and close to the students' daily lives so as to arouse students' curiosity. Through this technique, students learn to solve HOTS questions as well as a vehicle for growing confidence that students are able to think at higher levels.

Conclusion

Numerical literacy culture with HOTS questions in mathematics learning must be developed from elementary school. It aims to make students accustomed to higher-order thinking which will be useful for themselves in the future. Numerical literacy culture with HOTS questions in mathematics learning is also applied to students who take online, offline and home visits so that they experience an increase in numerical literacy skills. Teachers can also develop other techniques to develop numerical literacy in mathematics learning based on their teaching experience and adapted to the characteristics of students. The habit of solving HOTS questions in mathematics learning should be done consistently and continuously so that students' numerical literacy skills are increasing.

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