Introducing local wisdom by numbering and reading

I M Pratiwi1* and V A N Ariawan2

1Pendidikan Guru Madrasah Ibtidaiyah, Universitas Islam Negeri Sunan Gunung Djati, Jl. A.H. Nasution No. 105 Cibiru, Bandung 40614, Indonesia
2SDN Bantarmangu 01, Jl. Gunungtiga, Cimanggu, Cilacap, Indonesia

*Corresponding author’s email: inne.mp@uinsgd.ac.id

Abstract. Numeracy literacy deals with the application of mathematical concepts in daily life. In this study, the worksheets are designed to present mathematical concepts in daily life by using story problem. Students are presumed to be able to solve story problem if they can understand the meaning of the problem. Thus, students can find problem that need to be solved in the right way. This study aims to investigate the correlation between mathematical understanding skill with reading comprehension skill of elementary school students. The study implemented the correlation method by involving fourth grades students in two elementary schools. Data collection techniques used technical tests, then the data was analyzed by pearson-correlation test. The result of the study shows that there is correlation between mathematical understanding and reading comprehension skill of elementary school students. The students are not only to understand mathematical concept and gain reading comprehension skill but also know about Indonesian local wisdom. This is due to the concept of story problems which integrated with local wisdom.

1. Introduction
Calculating and recognizing letters is the first skill students introduce before they enter formal education. Similarly, compiling students transferring formal education, counting and reading became the first skills they learned [1]. The relationship between reading comprehension skill and mathematical understanding through student worksheets based on local wisdom. The researcher created a local wisdom based worksheet developed by Carlian & Pratiwi [2]. Worksheets consist of two mathematical problem questions and reading comprehension questions. First, student read questions about local wisdom in Indonesia and then they found mathematical questions in their daily lives to find a solution. In addition, students will also answer questions related to reading comprehension. Local wisdom worksheets specifically designed to introduce Indonesian culture that are increasingly difficult for elementary school students to understand. Local wisdom can be learned in social subjects or used for reading texts in language learning even though introducing local wisdom can be used with other subjects such as mathematics. In mathematics, there is the term ethnomatematics which is a place to internalize local wisdom through mathematics learning. According to Fasheh ethnomatematics can be one way to prove local wisdom through mathematics [3]. Local wisdom can not only be learned through reading or case studies on conflict resolution. Moreover, local wisdom can be an interesting mathematical problem for improving problem solving skill or mathematical understanding skill.

This study measures the relationship between mathematical understanding skill and reading comprehension skill. In mathematics there is material about solving story problems that require the role of reading comprehension. Students who can read a text do not necessarily understand the reading
carefully, especially if students are not used to reading. If students cannot understand the question well then it can have an impact on solving the story. Mathematical understanding is the ability to understand mathematical concepts to be able to apply these concepts in different situations and circumstances. There are two stages in mathematical understanding namely low and high stage mathematical understanding. Low level mathematical understanding has the characteristics of remembering, implementing formulas routinely, and calculating simply [4]. Meanwhile, high level mathematical understanding has the characteristics of being able to connect between concepts, do conscious calculations, and be able to prove the truth of the formula. Then, reading comprehension is the process of acquiring the meaning of reading actively by involving the knowledge and experience of the reader that is related to the contents of the reading. Reading comprehension aims to find and obtain information that is needed or not needed directly in a reading [5]. Furthermore, reading comprehension has two categories namely literal and inferential. Literal understanding is a category of low understanding while inferential understanding is a category of high understanding [6].

The study presents stories and mathematical problems that contain local wisdom. Every story matter is related to various local wisdoms such as regional dance, traditional food, and tourist attractions. In line with that, D’Ambrosio explained that mathematics learning can take into account cultural considerations because mathematics arises by understanding the reasoning and mathematical systems used [7]. Studying culture through mathematics can cover all fields such as architecture, weaving, traditional dance, or kinship relationships that are displayed in the form of everyday problems. Then, researchers write questions that aim to test students' mathematical understanding skills and reading comprehension skills. Furthermore, students are required to articulate, process and use mathematical concepts to solve problems in terms of mathematics and reading comprehension.

The results of previous studies indicate that there is a strong relationship between mathematics learning outcomes and literacy skills in low grade students in elementary schools [8]. The results of the study explained that students with high literacy levels also obtained high mathematics learning outcomes. In research, students with high literacy levels can answer the questions in the reading correctly. Students with a high level of literacy also get high mathematics learning outcomes. Students can answer math questions in the form of simple story questions. Referring to the results of previous studies, the researchers conducted the study with the aim of investigating the relationship between reading comprehension and mathematical understanding in high school students in elementary school.

2. Methods
The study used a type of correlation research to review the relationship between reading comprehension skills and mathematical understanding skills. Correlation research is a study that involves the act of collecting data to determine the presence or absence of relationships and the level of relations between two or more variables [9]. The research samples were fourth grade elementary school students which numbered 54. The sample selection was determined by random sampling technique. The researcher chose two elementary schools as the first step to test the local wisdom-based worksheet and review the relationship between reading comprehension skill and mathematical understanding skill. The technique of collecting data uses a test of mathematical understanding and reading comprehension. The researcher provided a story problem test to measure two skills that are assumed to be related.

3. Results and Discussion
The study aims to obtain an overview of the relationship of reading skill to mathematical understanding skill through local wisdom worksheets. Data on reading comprehension skill are taken through reading test of local wisdom worksheets. Meanwhile, data regarding mathematical understanding skill were taken based on test of mathematical understanding skill through story problem based on local wisdom. The type of story problem will be shown below.
Story Problem
A tailor will make clothes from Batik Mega Mendung. Batik Mega Mendung is one of Cirebon batik motifs. This motif illustrates the form of clouds in the sky with cloudy weather. Batik Mega Mendung contains philosophical values related to culture and history the spread of Islam in Cirebon. To make clothes more beautiful with Batik Mega Mendung, tailor add decorations made of ribbon. He has ribbons throughout 7/8 meter. The ribbon is used to make decorations throughout 3/8 meter and brooch throughout 2/8 meter.

a. What is the length of the ribbon that is not used by the tailor?
b. Where is Batik Mega Mendung come from?
c. Do you have Batik? What is typical Batik that you have?

Then, descriptive statistics of the reading comprehension and mathematical understanding skill scores can be seen in Table 1.

Table 1. Descriptive Statistic of Reading Comprehension and Mathematical Understanding Skill Scores

|                       | Total of students | Min Score | Max Score | Average |
|-----------------------|-------------------|-----------|-----------|---------|
| Reading Comprehension | 54                | 60        | 95        | 78.43   |
| Mathematic Understanding | 54              | 25        | 100       | 67.41   |

Table 1 shows the results of reading comprehension skill and mathematical understanding skill of 54 fourth grade students in two elementary schools. The test results obtained an average reading comprehension skill score of 78.43 and the average score of mathematical understanding skill was 67.41.

Furthermore, the researchers looked at the relationship between scores of reading comprehension skill and mathematical understanding skill through correlation tests. Before conducting a correlation test, the researcher conducts the normality test as a prerequisite test. The researcher found that the results of the prerequisite test for the two groups were normally distributed, so the next step was to test the correlation with the product moment correlation technique or Pearson correlation technique. The results of correlation testing are listed in Table 2.

Table 2. Correlation Test Results

|                       | Mathemathic Understanding | Reading Comprehension |
|-----------------------|---------------------------|-----------------------|
| Mathematic Understanding | Pearson Correlation 0.772"   | 1.000                 |
|                       | Sig. (2-tailed)            |                       |
|                       | N                          | 54                    |
| Reading Comprehension | Pearson Correlation 0.772"   | 1.000                 |
|                       | Sig. (2-tailed)            |                       |
|                       | N                          | 54                    |

Based on the results of the data analysis in Table 2 that has been done, the value of Sig. (2-tailed) 0.000 at the 0.01 significance level. It can be concluded that there is a significant relationship between reading comprehension skill and mathematical understanding skill through local wisdom worksheets. The value of the correlation (r) obtained is 0.772 with high or strong interpretation. The value of 0.772 shows the direction of a positive relationship which means that an increase in the score of comprehension reading skill is directly proportional to the increase in the score of mathematical understanding skill. Likewise, the decline in the reading comprehension skill score is proportional to the decrease in the mathematical understanding score. The coefficient of determination is 59.6%, it means the magnitude of the influence of reading comprehension skill and mathematical understanding skill of 59.6%, the remaining 40.4% is influenced by other factors.

Referring to the results of the study, the researchers found that there was a correlation between initial reading skills and mathematical understanding skills through local wisdom-based student worksheets. The results of this study are in line with previous studies conducted by Bjorna, Aunola, and Nurmi that...
there is a relationship between mastery of reading comprehension skills and mathematical understanding of fourth grade students in elementary schools in Finland [1]. The researcher previously conducted a reading test of mathematical understanding and understanding through story problems. The results of previous studies showed a significance value of 0.01. Knowledge vocabulary is one skill that is significantly correlated with algebraic scores and various problem solving abilities in mathematics [10]. Skills to find key ideas and make conclusions are skills needed to understand and solve mathematical problems [11].

In this study, students were asked to solve the mathematical questions based on local wisdom presented. Students read the story problem, write down important things that are known and ask questions by writing in the form of mathematical sentences, and solving problems to produce answers. There are several ways that students can use to solve story problems, such as changing, comparing, combining, and equating [12]. Completion of mathematical questions made by students is similar to the findings of the research by Pratiwi, Rachman, and Ariawan who found ways to solve student story problems in the form of mathematical sentences [13]. The method used to answer the questions given to students (question number 3) is to compare.

Students answer shows that students do not understand the problem well. Students have not been able to determine the main ideas and important things that are known on the question in order to answer the questions well. Seeing this condition, reading skill are needed if you want to improve mathematical understanding skill. The ability to read the beginning in the first year of school opens the way to achievement in other fields such as mathematics [14]. Reading is considered an inseparable part of mathematical knowledge [15]. Reading and mathematics work together, namely increasing students' abilities in mathematics requires an increase in students' reading skills [16]. In this study, most students' of reading comprehension is still at the literal level. When associated with mathematical understanding skill, they are at a low level of mathematical understanding. Students can answer questions whose answers are listed in the reading comprehension skill, meanwhile in mathematical understanding students can answer questions related to simple problem solving such as addition and subtraction.

Pramono, Astuti, and Purwaningrum explained that reading comprehension skills are always needed in solving mathematical story problems because students must understand the reading and find the right solution [17]. The connection of reading comprehension in mathematics learning is the ability of students to interpret questions in story problems to find problems and solutions. Mahmud and Pratiwi added that integrating basic arithmetic operations into the form of story questions aims to make students better understand the concept of using arithmetic operations [18]. Through story problem, children not only learn to practice their numerical literacy skills but also learn to practice basic literacy in the form of reading comprehension. Although most students can answer literal questions, there are a few students who can answer inferential questions. Students with inferential categories can reading table. However, in this study also found students who had low reading comprehension scores but had a fairly good mathematical understanding. The student answers inferential questions with incorrect answers so they have a low reading comprehension score. In contrast to the score of his mathematical understanding, he obtained a fairly high score. Students can answer questions with coherent completion steps and the right answers.

Conceptual understanding in teaching mathematics is very meaningful when used in various fields by linking between concepts [19]. Thus, understanding is a prerequisite for mastering the next material or concept. In order for students to understand math problems, they must have good reading skills. In line with that, Verner, Massarwe, and Bshouty explained that one of the factors to improve students' mathematical understanding ability is mastering comprehension reading skills because without reading students will not understand mathematical sentences, mathematical problems, and cannot draw a conclusion [20]. In mathematics learning, especially the story matter students need to understand the mathematical problems instructed by the teacher. The teacher usually gives examples of verbal questions then asks students to solve the questions presented [21]. If students cannot understand the words the teacher explains, they will have difficulty understanding mathematical problems. Usually elementary
school students better understand simple mathematical sentences and immediately mention the mathematical symbols used.

Overall, the results of the study reported that reading comprehension skill were positively correlated with mathematical understanding skill. It was also found that reading comprehension skill influenced the mathematical understanding skill of 59.6%. This shows that there are other factors outside of research that can enhance mathematical understanding skill in addition to reading comprehension skill. In addition to reviewing the relationship between mathematical understanding skills and reading comprehension, this study uses local wisdom worksheets. The researcher used the worksheet with the aim of introducing local wisdom in mathematics learning. Mathematical learning that is integrated with the introduction of local wisdom is better known as ethnomathematics. The existence of mathematics learning that integrates local wisdom is expected not only to make students understand mathematical concepts but to recognize and appreciate the existing local culture [22]. In this study, students are involved in the activity of counting, measuring, playing, and designing buildings. Ethnomathematics is a way to recognize that there are different ways of solving mathematics by considering mathematical knowledge developed in various sectors of society and by considering different ways in community activities such as grouping, counting, measuring, or playing [23].

The introduction of local wisdom in mathematics learning has been carried out by previous research who developed a number card based on local wisdom in number material. The researcher made a number card media with traditional dances and Batik motifs [24]. Media card numbers are implemented in learning in grades one and two. Before students use the media, the teacher asks students about the type of local wisdom shown in the picture and the teacher gives a little explanation of the types of local wisdom in the number card. Then, the introduction of local wisdom through ethnomathematics comics was also developed by research before which carried the theme of traditional food. The researcher made a comic about traditional food in mathematics learning two linear variables [25].

Practically, the use of local wisdom-based teaching materials provides activities that are attractive to students. Hence, to learning mathematics, the existence of teaching materials based on local wisdom can be used as a means to introduce Indonesian culture to students indirectly. This is as described by D ’Ambrosio that social and cultural values are not only studied in a specific subject but can be integrated with other subjects such as mathematics [26]. The integration of the content of learning with local wisdom is more easily accepted by students because it is presented with interesting reading. The integration of local wisdom with mathematics can help mathematical concepts that are considered abstract can be more concrete.

4. Conclusion
Introducing local wisdom not only through social science learning. Mathematics also has a section in the introduction of local wisdom in education. The knowledge that studies mathematics with local wisdom is known as ethnomathematics. Ethnomathematics integrate local wisdom with the problems of everyday life in the context of mathematical problems or concepts. Besides involving mathematics, ethnomathematics also involve the role of reading comprehension as a successful factor in the completion of mathematical problems. This study carries out the theme of local wisdom that is presented in student worksheet with the form of story problem. The research explained that there is a positive relation between reading comprehension skill and mathematical understanding skill. Moreover, the reading comprehension skill have a considerable active knowledge on students to improve their mathematical understanding skill.

5. References
[1] Bjorn P, Aunola K and Nurmi J E 2014 Primary school text comprehension predicts mathematical word problem-solving skills in secondary school Educational Psychology: An International Journal of Experimental Educational Psychology 36 2 362-377
[2] Carlian Y and Pratiwi I M 2018 Mengembangkan pemahaman matematis siswa madrasah ibtidaiyah melalui lembar kegiatan siswa berbasis kearifan lokal 2 1 74-86
[3] Fasheh M 1982 *Mathematic, Culture, and Authority For the Learning of Mathematics* (Albany: State University of New York press)

[4] Sugandi A I and Benard M 2018 Penerapan pendekatan kontekstual terhadap kemampuan pemahaman dan komunikasi matematis siswa *Jurnal Analisa* 4 1 16-23

[5] Ariawan V A N, Utami N T and Rahman 2018 Peningkatan keterampilan membaca pemahaman siswa sekolah dasar melalui implementasi model CIRC berbantuan media cetak *Al-Aulad Journal of Islamic Primary Education* 1 2

[6] Dalman 2016 *Keterampilan Membaca* (Jakarta: Grafindo Persada)

[7] Fitroh W, 2015 Identifikasi pembelajaran matematika dalam tradisi melemang di Kabupaten Kerinci Provinsi Jambi *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika* (Universitas Muhammadiyah Surakarta: Surakarta)

[8] Koponen T, Aunola K Ahonen T and Nurmi J E 2007 Cognitive predictors of single digit and procedural calculation skills and their covariation with reading skill *Journal of Experimental Child Psychology* 97 3 220-241

[9] Effendi, Mursilah and Mujono 2018 Korelasi tingkat perhatian orang tua dan kemandirian belajar dengan prestasi belajar siswa *Titiyan Ilmu: Jurnal Ilmiah Multi Science* 10 1 17-23

[10] Zepp R 1981 Relationships between Mathematics achievement and various english language proficiencies *Educational Studies in Mathematics* 12 1 59-70

[11] Imam O A 2016 Effects of reading skills on students’ performance in science and mathematics in public and private secondary schools *Journal of Education and Learning* 10 2 177-1876

[12] Tuohima P M V, Aunola K and Nurmi J E 2008 The association between mathematical word problems and reading comprehension *Educational Psychology* 28 4 409-426

[13] Pratiwi I M, Rachman S P D and Ariawan V A N 2019 Students’ mathematical understanding reviewed by gender through discourse learning assisted by mathematical bet line strategy *IOP Conf. Series: Journal of Physics* 1157 4 042103

[14] Snow C E, Burns MS, and Griffin P 1998 *Preventing Reading Difficulties in Young Children* (Washington DC: National Academy Press)

[15] Imam O A, Mastura M A and Jamil H 2013 Correlation between reading and comprehension skills and students’ performance in mathemetics *International Journal of Evaluation and Research in Education* 2 1 1-8

[16] Fuentes P 1998 Reading comprehension in mathematics *The Clearing House* 72 2 81-88

[17] Pramono R B, Astuti R D and Purwaningrum J P 2019 The improvement of verbal capability as one of the mathematical comprehension factors on the students of primary school *Jurnal Pendidikan Sekolah Dasar* 5 1 22-36

[18] Mahmud M R and Pratiwi I M 2019 Literasi numerasi siswa dalam pemecahan masalah tidak terstruktur *KALAMATIKA Jurnal Pendidikan Matematika* 4 1 69-88

[19] Orhun N 2013 Assessing conceptual understanding in mathematics: Using derivative function to solve connected problems *Turkish Online Journal of Distance Education* 14 3 138-151

[20] Verner I, Massarwe K, and Bshouty D 2013 Constructs of engagement emerging in an ethnomathematically-based teacher education course *Journal of Mathematical Behavior* 32 3 494-507

[21] Chow J C and Ekholm E 2018 Language domains differentially predict mathematics performance in young children *Early Childhood Research Quarterly* (Amsterdam: Elsevier Inc)

[22] Rosa M and Gavarrete M E 2017 *An ethnomathematics overview: An introduction Ethnomathematics and It’s Diverse Approaches for Mathematics Education* (Germany: Springer)

[23] Fouze A Q and Amit M 2017 Development of mathematical thinking through integration of ethnomathematically folklore game in math instruction *EURASIA Journal of Mathematics, Science and Technology Education* 14 2 617-630
[24] Ekowati D W, Kusumaningtyas D I and Sulistyani N 2017 Ethnomathematica dalam pembelajaran matematika (pembelajaran bilangan dengan media batik madura, tari khas trenggal, dan tari khas madura) *Jurnal Pemikiran dan Pengembangan SD* 5 2 716-72

[25] Dahlan J A and Nurrohmah 2018 Integrasi budaya masyarakat dalam pembelajaran matematika: Contoh dalam pembelajaran sistem persamaan linear dua variabel *PELITA Jurnal Penelitian dan Karya Ilmiah* 18 1 15-31

[26] D’Ambrosio U 1985 Ethnomathematics and its place in the history and pedagogy of mathematics *For the Learning of Mathematics* 5 1 44-48