

Mathematical Literacy in Setting Model Eliciting Activities Nuanced Ethnomathematics

Zaenuri
Universitas Negeri Semarang
zaenuri.mipa@mail.unnes.ac.id

S B Waluya
Universitas Negeri Semarang
s.b.waluya@mail.unnes.ac.id

Wardono
Universitas Negeri Semarang

Yohanes J Kehi
Universitas Timor,
Kefamenanu
kehijohanes@gmail.com

Putik Dwindi Hapsari
Universitas Negeri Semarang
putikdwindi@gmail.com

Suryandaru P Jati
Universitas Negeri Semarang
suryandaru15@gmail.com

Abstract: Mathematical literacy in the era of disruption is one of the main demands for students in developing new literacy. Mathematical literacy as the capacity of individuals to formulate, apply, and interpret mathematics in various contexts. In this case, it will be easier for students if mathematics learning is bridged between mathematics in daily life based on local culture and school mathematics. Local culture taken as a problem sheet are objects that are in Malaka District, NTT. Model eliciting activities (MEAs) are one of the solutions in developing collaboration capabilities, building connection capabilities between mathematics and real life. The purpose of this study was to find out the MEAs learning with ethno-mathematical power is better than DL learning. This research is quantitative research. Data collection methods in this study were observation, tests, documentation and literature studies. Analysis of the data used was the proportion test and independent t test. The researcher chose the class used by random sampling obtained by class VIII G as the experimental class that received MEAs learning with an ethnomatematics nuance consisting of 32 students and class VIII B as a control class that received Discovery Learning (DL) learning consisting of 32 students. The results showed that the mathematical literacy skills of students who received MEAs learning with ethnomatematic nuances were completed individually and classically, this was indicated by the value of $Z_{hitung} = 1,78$ and $Z_{hitung} \geq Z_{(0,5-\alpha)} = 1,64$, where H_0 is rejected. The average and proportion of mathematics literacy abilities of the experimental class students with an average of 78.38 is better than the control class of 71.38. Starting from the perspective of ethnomatematics, literacy is best understood as the integration of schools and cultural contexts through cultural dynamics.

Keywords: *model eliciting activities (MEAs), etnomatematics, discovery learning, mathematical literacy*

I. INTRODUCTION

In the current era of disruption, it takes people who have the skills to develop concepts, have the ability to communicate, collaborate, think critically, creatively and innovatively. To arrive at this, mathematical literacy skills become one solid foundation. This, as revealed by [5] that teachers and educational institutions must be able to strengthen educational institutions from various aspects such as curriculum, systems, management, models, strategies and learning approaches by strengthening 21st century mathematical literacy skills. One of them is strengthening literacy skills to teachers and educational institutions from old literacy (counting, writing, counting) with new literacy (data, technology, human resources / humanism).

Mathematical literacy ability can be defined as the ability of students to formulate, use and interpret mathematics in various contexts of solving everyday life problems effectively, [13]. This answers the demand that students in mathematics are not only capable of counting, but have logical reasoning skills, are critical in solving problems, because problem solving is not just routine questions in textbooks but rather leads to problems faced everyday.

The results of a student in Programme for International Student Assesment (PISA) mathematics literacy in Indonesia is still low, which ranks 64 out of 72 countries, meaning that in 2012 to 2015 the PISA score for mathematical skills rose 11 pins from 375 to 386 This means that Indonesia is below the international average. The results shown by the international study are not much different from what was revealed by the mathematics teacher at Junior High School, Malaka Regency, East Nusa Tenggara. Difficulties found that most students have difficulty in solving story problems, are less able to interpret questions and model in mathematical contexts, and have difficulty connecting mathematical problems related to daily life, consequently the perceptions that arise in solving problems are not appropriate as

expected. It is clear that it has a huge impact in developing mathematical literacy, especially in strengthening the old literacy towards new literacy. The lack of students' mathematical literacy skills can be seen in [8] study of PISA that personal and contextual factors influence the performance of the PISA math test where questions are related to mathematical literacy.

The aspects of mathematical literacy skills used are based on PISA 2012 (1) *Communication*, (2) *mathematising*, (3) *Representation*, (4) *Reasoning and Argument*, (5) *Devising Strategies for Solving Problems*, (6) *Using Symbolic, Formal and Technical Language and Operation* dan (7) *Using Mathematics Tools*. The observations show that learning never associates with the daily lives of students in this case the local culture associated with mathematics and rarely develops group learning which is one of the recommendations in the curriculum 2013.

Model Eliciting Activities (MEAs) can be one solution to the problems faced. MEAs is a learning approach to understanding, explaining and communicating concepts contained in one presentation through mathematical modeling, [11]. Then [1] explains that MEAs are appropriate for building mathematical connection skills between mathematics and real life. Model eliciting activities provide increased attention to expand students' ability to be actively involved collaboratively in rich mathematical experiences. Model eliciting activities consists of 4 main parts, namely problemsheets, readiness questions, problems and sharing solutions through presentation activities, (Yu & Chang, 2011). The results of [4] the ability of students' mathematical representation in learning activities eliciting models is better than the ability of mathematical representation of students given learning with scientific approaches. In creating learning that is meaningful, creative and easy to understand the mathematical concepts of mathematics learning, it should be associated with the contextual life of students, namely the use of local culture that is directly in touch with students. This is in accordance with what was stated by [7] that school mathematics needs to expand its parameters and become more inclusive of mathematics in the world inhabited by students. One way to do this is to include aspects of ethnomatematics, culture-based mathematics. Another thing is mathematics must be seen as a cultural product. Furthermore, explained by [15] learning mathematics is very necessary to provide content / bridge between mathematics in the everyday world based on local culture and school mathematics. The same was expressed by [3] that cultural values contribute greatly to student learning processes, help them better understand study material, increase motivation and ultimately improve their achievement in mathematics. This study aims: (1) to find out the proportion of completeness of the experimental class reached 75%, (2) knowing the average mathematical

literacy ability of students who receive MEAs learning with ethnomatematic nuances is better than students who receive discovery learning.

II. METHODS

This research is quantitative research. Research conducted at Junior High School in Central Malaka, Malaka Regency, NTT Academic Year 2018/2019. The problem on the problem sheet given uses local cultural objects as contextual problems related to students' daily lives in the Malaka District. Collection of local cultural objects or ethnomatematics based on documentation and from various media sources. Research at the school takes place in April-May 2019. Data collection methods used in this study were observation, tests, documentation and literature studies. Classes are selected by random sampling provided that the population is homogeneous, normally distributed and the average of the two classes has the same statistically before being given treatment. The researcher determined the class based on mid-semester test results at school and made the experimental class that received MEAs learning with ethnomatematic nuances and a control class that received discovery learning. The researcher determined the class based on mid-semester test results in school and made the experimental class that received MEAs learning with ethnomatematic nuances and control classes that received discovery learning. Complete limits or (KKM) based on the average value achieved by student groups [14]. KKM in this study is $\bar{X} + 2 SD$, obtained a complete limit is 69. Then proceed with the normality test using the Kolmogrov-Smirnov Test and the homogeneity test using the Levene Test. Individual completeness tests using one sample t test, classical completeness test using the proportion test, the difference test on average using the independent t-test.

III. RESULTS AND DISCUSSION

Ethnomatematics exploration in Malaka district is used as a sheet of problems in MEAs learning with ethnomatematics. The object used is the shape of the building in the traditional house building, the place of siri pinang (Kabi and Koba) which is used to entertain guests and school bags made of woven palm leaves. Some of the objects used as problems in MEAs learning with ethnomatematic nuances are as follows.



Figure 1 The Place of siri pinang "Koba"



Figure 2 School Bags made of woven palm leaves



Figure 3 The Place of Sirih Pinang "Koba"



Uma Maromak

Figure 4 Traditional House



Figure 5 A dancer holds a cube shaped 'koba' (source: Instagram Explore Malaka)

The researcher performed the data and obtained the final data on tests of mathematical literacy abilities that were normally distributed and homogeneous. Experimental class students obtained an average of 78.38 with 28 students who scored above the minimum completeness criteria (KKM). The control class students obtained an average mathematical literacy ability of 71.38 with 19 people who scored above the KKM. The results of individual completeness tests are obtained values. t count 2.02 and $t_{0,95}$ with $dk\ 31 = 1.69$, because t count $>$ t table then H_0 is rejected and It was concluded that the average mathematical literacy ability of students who received the MEAs learning model with ethno-mathematical nuances reached KKM. The classical completeness test results were obtained $z_{hitung} = 1,78$ and $z_{table} \geq z_{(0,5-\alpha)} = 1,64$ because $z_{hitung} > z_{table}$ then H_0 is rejected and it can be concluded that the proportion of students in the class taught with the model of ethical accessibility that has the value of mathematics literacy that reaches mathematical literacy abilities reaches KKM exceeding 75%. The results of the comparison test for the average difference between classes show that t count is 2.69. Acceptance criteria for H_0 are accepted if $t_{hitung} \leq t_{(n_1+n_2-2)}$ with a significance level of 5% or 0.05 $t_{(n_1+n_2-2)}$ from the t distribution list with a probability of 0.950, $dk = 62$ obtained 1.67 and at SPSS output using the independent test sample t-test obtained a significance value of 0.009 where $0,009 < 0,05$ It can be concluded that H_0 is rejected. The results of this study are supported by the research of [6], learning Model Eliciting Activities that have ethnomatematic nuances are effective in learning.

[12] States that starting from a mathematical point of view, literacy is best understood as the integration of schools and cultural contexts through the process of cultural dynamics. This approach allows students to exchange academic knowledge obtained at school with information from their own cultural context. Then [2] explained that mathematics learning based on ethnomatematics is one of the ways that can be expected to make learning more interesting, meaningful and contextual.

IV. CONCLUSION

Learning Model Eliciting Activities with ethnomatematic nuances is effective to be applied in learning in the classroom. Success indicators can be seen from first, classical and individual completeness, second, the average and proportion of mathematical literacy abilities of students who receive MEAs learning with ethnomatematics nuances better than students who receive discovery learning defenses. Ethnomatematics can be integrated in mathematics learning in the classroom.

REFERENCES

- [1] Doruk, B. K. "Realistic Real World Contexts: Model Eliciting Activities". *International Journal for Mathematics Teaching and Learning*. 17(2). pp33 (2016)
- [2] Fitriawanati, M., et.al. "Skema Pengembangan Subject Spesific Pedagogic (SSP) Berbasis Etnomatematika Untuk Meningkatkan Literasi Matematika Siswa Sekolah Dasar (SD)". *Prosiding Seminar Nasional Etnomatnesia*. pp 360-366. (2018).
- [3] Fouze, A. Q., & Amit. M. "On the impotance of an etnomatehmatical curriculum in mathematics education". *Eurasia Journal of Mathematics, Science and Technology Education*. 14(2). pp 561-567. (2018).
- [4] Hanifah. "Penerapan pembelajaran model eliciting activities (MEAs) dengan pendekatan saintifik untuk meningkatkan kemampuan representasi matematis siswa". *Kreano*. 6(2). pp 191-198. (2015).
- [5] Ibda, H. "Penguatan Literasi Baru Pada Guru Madrasah Ibtidaiyah Dalam Menjawab Tantangan Era Revolusi Industri 4.0". *Journal of Research Thought of Islamic Education*. 1(1). pp 1-21. (2018).
- [6] Ilyyana, K., & Rochmad, R. Analysis of Problem Solving Ability in Quadrilateral Topic on Model Eliciting Activities Learning Containing Ethnomathematics. *Unnes Journal of Mathematics Education Research*. 7(1) pp 130-137. (2018).
- [15] Zaenuri., & Dwidayanti, N. "Menggali Etnomatematika: Matematika Sebagai Produk Budaya. *Prosiding Seminar Nasional Pendidikan Matematika UNNES*. pp 471-476, (2018).
- [7] Ju, M-K., et.al. "History of Mathematics in Korea Mathematics Textbooks: Implication for Using Etnomathematics in Culturally Diverse School". *International Journal of Science and Mathematics Education*. 14: pp1321. (2015).
- [8] Lazarevi, L. B & Orli, A. "PISA 2012 Mathematics Literacy in Serbia: A Multilevel Analysis of Student and School". *Psihologija*. pp 1-20. (2018).
- [9] OECD. *PISA 2012 Assesment and Analytical Framework Mathamatics, Reading, Science, Problem Solving and Financial Literacy*. OECD Publishing. (2013).
- [10] OECD. *Result in Focus*. OECD Publishing. (2016)
- [11] Permana. *Tesis*. Universitas Pendidikan Indonesia. (2010)
- [12] Rosa, M., & Orey, D C. "A Trivium Curriculum for Mathematics Based On Literacy, Matheracy, and Technoracy: An Etnomathematics Persperctive". *ZDM: The Internasional Journal on Mathematics Education*. 47(4). pp 587-598 (2015)
- [13] Sari, R. H. N. "Literasi Matematika: Apa, Mengapa, dan Bagaimana?". *Seminar Nasional Matematika dan Pendidikan Matematika UNY*. pp 713-720. (2015)
- [14] Sudjana, N. *Penilaian Hasil Proses Belajar Mengajar*. Bandung: Remaja Rosdakarya. (2009)