Analysis of Mathematical Literacy Ability in Term of Student Learning Independence in Realistic Mathematics Education (RME) Learning with Ethnomathematics Approach

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Abstract

In learning mathematics, one of the fundamental abilities that students must have is mathematical literacy. The mathematical literacy ability of students can be influenced by several things, one of which is learning independence. One way to improve students' mathematical literacy skills and independent learning is to use the application of the RME model. This study aims to determine differences in mathematical literacy abilities in terms of student independence in RME learning with an ethnomathematics approach, compared to conventional learning. The method used in this research is Systematic Literature Review (SLR). The results of this study state that students' mathematical literacy abilities can be influenced by the level of learning independence, learning models and approaches used. The conclusion that can be drawn is that mathematical literacy skills can be improved effectively by using the RME learning model with ethnomathematics approach, which also has a positive impact on student learning independence.

Keywords: Mathematical Literacy, Learning Independence, RME, Ethnomathematics.

1. Introduction

Education is one way for humans to survive. This is evidenced by the fact that humans must adapt themselves to the accelerated development of the times. There are many branches of knowledge in the world of education, one of which is mathematics, which then can be used as a transfer of knowledge through mathematical learning. In learning mathematics, there are fundamental abilities which are one of the main goals of learning mathematics. One of these abilities is the mathematical literacy ability. The OECD in (Farida et al., 2021) explain that the definition of mathematical literacy is an ability of person to formulate, apply, also interpret mathematics knowledge to the various contexts, like the mathematical reasoning ability, apply concepts, procedures, facts and tools of mathematics to represent a phenomenon or incident. The importance of mathematical literacy ability is important for students to have. It is shown by the results of research by PISA (Program for International Student Assessment). In 2018, in the mathematics category, Indonesia was ranked 7th from the bottom followed by 73 countries (Talis, 2019).

The low acquisition of mathematical literacy scores in the PISA test is certainly influenced by many factors, one of which is student learning independence. Learning independence is an awareness activity for learning, not being coerced by the surrounding environment to carry out responsibility as a student when encountering a learning difficulty (Yanuarto et al., 2021). Indonesian students' learning independence is considered to be lacking or low, as shown by various studies conducted. Lack of independence (self-regulation) in students will result in various kinds of behavioral problems, such as being shy, not having motivation to go to school, and bad study habits. This situation is in accordance with the research result of (Johnson, 2018) that

students who have high learning independence are considered can achieve better results if compared to students who have low learning independence. To assist students in improving literacy skills and learning independence, it is important to apply an appropriate teaching method or model.

One way to improve learning is to use the application of the RME model. According to (Mustikasari, 2021), the RME model is a learning approach that is oriented towards mathematicizing everyday experiences and applying them to everyday life. Learning mathematics through the RME model begins with the teacher giving contextual problems to students, then they are given the opportunity to solve contextual problems with their own models and ways that are in accordance with their knowledge, so that it is possible for differences in student completion to one another. RME provides students with a clear understanding of the relevance of mathematics to everyday life and the uses of mathematics. In practice, RME learning places reality and student experience as the starting point of learning. The RME educational paradigm dominates all aspects of the learning process rather than teaching, and treats students as independent individuals (Rohaeti et al., 2019).

In the RME learning process, teachers and students can use culture-based learning resources. Learning that links between mathematics and culture is called ethnomathematics. Quoted from (Witha et al., 2021) ethnomathematics is a scientific discipline that links mathematics with culture and social values in life. Applying ethnomathematics as a learning approach will make it possible for the material being studied to be easily understood by students, because the material provided has a direct bearing on their culture which is also their daily activity in society. Ethnomatematics has the benefit of increasing students' mathematical literacy abilities. Based on the explanation previously presented, ethnomathematics can be defined as the application of the cultural wisdom concept to learn mathematics. The usefulness of this culture is in the form of creating a contextual learning atmosphere that is in accordance with the students' daily needs, so that the abstractness of mathematical concepts can be understood and remembered easily. So, with the help of ethnomathematics, students not only learn about math material but also learn about their own culture (Agustin et al., 2022).

From the description above, the researcher intends to examine "Analysis of Mathematical Literacy Ability in Term of Student Learning Independence in Realistic Mathematics Education (RME) Learning with Ethnomathematics Approach".

2. Method

This article was arranged by using the Systematic Literature Review (SLR) method. The SLR method is a literature review method which is in the steps include identifies, reviews, evaluates, also interprets all existing research related to the theme and title of this research. Using this method, researchers review and identify journals in a structured manner, which in each process follow the steps set by (Triandini et al., 2019). In completing this research, researcher collected journal articles from Google Scholar, with the keywords Mathematical Literacy Ability, Student Learning Independence, Realistic Mathematics Education (RME), and Ethnomatematics. The articles analyzed were only articles published from 2019 to 2023. From various articles, researcher selected 20 articles that were closely related to the keywords used.

3. Discussion

The research data included in this article are the analysis of published articles related to the relationship between Mathematical Literacy Ability and Learning Independence, Mathematical Literacy Ability with RME, Mathematical Literacy Ability with Ethnomathematics, Learning Independence with RME, Learning Independence with Ethnomathematics, and the relationship between RME and Ethnomathematics.

Table 3. 1 Result of research

Researchers	Journal	Result of Research
Wanda Nugroho Yanuarto, Laila Nur Qodariah (2020)	MATH LOCUS: Jurnal Riset dan Inovasi Pendidikan Matematika	This study found that students which have high learning independence tended to be able to formulate problems, use the concepts, facts, procedures and reasoning of mathematics, and were able to interpret, apply, and evaluate the results obtained.
Rizqi Kholifasar, Citra Utami, Mariyam (2020	Jurnal Derivat: Jurnal Matematika Dan Pendidikan Matematika	The results of this study can be concluded that the level of student learning independence affects their mathematical literacy ability.
Putri Wijayanti, Wardono (2020)	PRISMA: Prosiding Seminar Nasional Matematika	The level of student learning independence affects their mathematical literacy ability.
Nailil Muna Auliya, Amin Suyitno, Mohammad Asikin (2021)	Jurnal Kajian Pembelajaran Matematika	The results showed that there was an influence between the level of students' learning independence and their mathematical literacy ability.
Uke Ralmugiz, Mike Kusumawati (2020)	Math Educa Journal	The results stated that the RME approach was effective in increasing mathematical literacy abilitiy of students.
Muhammad Masyuri Irham (2020)	AlphaMath: Journal of Mathematics Education	Based on the results, it stated that RME learning has a positive effect on students' mathematical literacy ability and mathematical dispositions.
Marita Eka Istiana, Rarasaning Satianingsih, Via Yustitia (2020)	UNION: Jurnal Ilmiah Pendidikan Matematika	The results stated that there was a good impact of RME on the mathematical literacy ability of the second graders of SD Hang Tuah 10 Juanda.
Prastika Istiqomah, Kamid,	AKSIOMA: Jurnal Program	The results stated that the RME model can be influencing more

Muhammad Haris Effendi-Hasibuan (2021)	Studi Pendidikan Matematika	effectively in mathematical literacy ability if it is compared to conventional learning.
Irma Meika Wati, Ramadhan Nofriyadi, Nada Aviza Karmelia (2022)	ProSANDIKA UNIKAL (Prosiding Seminar Nasional Pendidikan Matematika Universitas Pekalongan)	The results showed that the PBL with scientific RME is considered effective to increasing mathematical literacy ability of students if it is compared to conventional learning.
Yohanes J Kehi, Zaenuri M, St. Budi Waluya (2019)	PRISMA: Prosiding Seminar Nasional Matematika	Ethnomatematics can affect students' mathematical abilities, especially mathematical literacy ability.
Tivani Sandra Witha, V. Karjiyati, Pebrian Tarmizi (2020)	JURIDIKDAS: Jurnal Riset Pendidikan Dasar	The results showed that there was an influence from the ethnomathematics-based RME model on the fourth grade students' mathematical literacy ability at SD Cluster 17 Bengkulu on plane figure material.
Neza Agusdianita, V. Karjiyati, Sriken Kustianti (2021)	MARTABE: Jurnal Pengabdian Masyarakat	The results indicate that the Tabut ethnomathematics-based RME model can create effective, innovative and meaningful mathematics learning, and can also be used as a vehicle for developing students' mathematical literacy ability.
Dewi Sesanti Qauliyah, Nizaruddin, Ali Shodiqin (2022)	Imajiner: Jurnal Matematika dan Pendidikan Matematika	Based on the results, it is stated that the ethnomathematics-based PBL model was effective on students' mathematical literacy ability.
Alifia Sri Agustin, Mentari Sekarwati, Muhammad Asdi Elvistoni, Nur Tsani Latifah (2022)	ProSANDIKA UNIKAL (Prosiding Seminar Nasional Pendidikan Matematika Universitas Pekalongan)	The results of this study are that the application of ethnomathematics in Javanese culture can develop students' mathematical literacy ability in the mathematics learning model.
Mirna Mustikasari (2021)	Disertasi Universitas Subang	The results of data analysis show that the Realistic Mathematics Education (RME) learning model has a positive impact on student learning independence.
Siti Maryatul Kiptiyah, Panca	Jurnal Pendidikan	The results of show that there is an enhancement in learning

Dewi Purwati, Uswatun Khasanah (2021)	Matematika Universitas Lampung	independence and students' mathematical literacy ability using a flipped classroom model with ethnomathematics nuances with the use of Elena in online learning, in the geometry and measurement material.
Rahmi Fauzana (2022)	Madaris: Jurnal Guru Inovatif	The results showed that the achievement of students' mathematical representation ability using ethnomathematics-based RME approach was different from the conventional learning.
Maimunatul Fadhila, Himmatul Ulya, dan Jayanti Putri Purwaningrum (2022)	Prosiding Seminar Nasional Pendidikan Matematika (SNAPMAT)	The results show that the average of students' mathematical concepts understanding when participating in RME learning assisted by ethnomathematics nuanced learning video is higher than the students' mathematical concepts understanding when participating in direct learning.
Singgih Utomo Aji (2023)	COMSERVA: Jurnal Penelitian dan Pengabdian Masyarakat	RME model when combined with highlighting the culture around students can increase students' interest as well as get over the abstractness of mathematics, since the learning is done in a real life context.

Based on the results of the research that has been done as listed in Table 1, it shows that according to (Kholifasari et al., 2020) and (Wijayanti & Wardono, 2020) mathematical literacy ability can be influenced by the level of student learning independence. This is supported by research of (Agustiani et al., 2021) which states that there are some differences in the achievement of indicators of mathematical literacy thinking ability in students with low, medium, also high learning independence categories. Students that have high learning independence considered be able to formulate problems, use the concepts, facts, procedures and reasoning of mathematics, and were able to interpret, apply, and evaluate the results obtained (Yanuarto et al., 2021). Students with a high learning independence are able to solve the questions related to low and medium levels of mathematical literacy ability. Students with this category have not been able to solve high-level mathematical literacy questions. Students in the medium learning independence category were able to solve low and medium level mathematical literacy questions, although there were still some errors in the calculations. Whereas students in the low learning independence category were only able to solve low-level mathematical literacy questions, while mid-level questions still contained errors (Auliya et al., 2021). From this study results, it can be seen that it is necessary to apply an appropriate learning model so that it can improve students' mathematical literacy ability and learning independence.

Mathematical literacy ability can be improved effectively by applying the RME learning model (Ralmugiz & Kusumawati, 2020), which also has a positive impact on student learning independence (Mustikasari, 2021). RME learning can have a positive impact on students' mathematical literacy ability and students' mathematical disposition (Irham, 2020). (Istiqomah et al., 2021) also revealed that the RME model can be influencing more effectively in mathematical literacy ability if it is compared to conventional learning. This is supported by research of (Istiana et al., 2020), which results that the mathematical literacy ability of students who are taught using the RME model are better than the mathematical literacy ability of students who are taught using the TPS learning model. Through the application of the RME model, students can be encouraged to make connections between their knowledge and apply it in everyday life. Another study by (Wati et al., 2022) also concluded that there was an enhancement in student learning outcomes and mathematical literacy using the PBL learning model and the RME scientific approach rather than using conventional models and approaches.

The level of mathematical literacy ability can also be influenced by the approach used. One approach that can improve students' mathematical abilities, especially mathematical literacy ability, is the ethnomathematics approach (Kehi et al., 2019). Learning that uses ethnomathematics as its approach is considered effective in increasing students' mathematical literacy ability (Qauliyah et al., 2022). This is supported by research of (Agustin et al., 2022) which states that the application of ethnomathematics in Javanese culture can develop students' mathematical literacy ability in the mathematics learning model. Another study conducted by (Witha et al., 2021) also showed that there was an influence from the ethnomathematics-based RME model on the fourth grade students' mathematical literacy ability at SD Gugus 17 Bengkulu on plane figure material. In addition, (Kiptiyah et al., 2021) also conducted research on the level of learning independence and students' mathematical literacy ability by implementation of flipped classroom model with ethnomathematics nuances. The results show that there is an enhancement in learning independence and students' mathematical literacy ability using a flipped classroom model with ethnomathematics nuances with the use of Elena in online learning, in the geometry and measurement material.

In 2020, (Agusdianita et al., 2021) held training activities regarding the application of the Tabut ethnomathematics-based RME model to develop literacy ability of elementary school students, from which the researchers drew the conclusion that the Tabut ethnomathematics-based RME model is an alternative in realizing effective, innovative and meaningful mathematics learning. Besides that, it can also be a vehicle to develop students' mathematical literacy ability. In research conducted by (Rahmi, 2022) and (Fadhilah et al., 2022) it was shown that the ability to represent and understand mathematical concepts of students using the RME model with an ethnomathematics approach was higher when compared to conventional learning. This is because the RME learning model combined with elevating the surrounding culture can attract students' interest as well as get over the abstractness of mathematics, since the learning is done in a real-life context (Aji, 2023).

4. Conclusion

Based on the discussion that has been described above, it can be concluded that students' mathematical literacy ability can be influenced by the level of learning independence, because there are some differences in achievement indicators of mathematical literacy thinking ability in students with low, medium, and high learning independence categories. In addition, the learning models and approaches used can also affect the level of literacy ability of students. Mathematical literacy ability can be improved effectively by using the RME learning model, which also has a positive impact on student learning independence. One approach that can increase students' mathematical abilities, especially mathematical literacy ability, is ethnomathematics. The ethnomathematics-based RME model can be used as an alternative in realizing effective, innovative and meaningful mathematics learning. RME combined with raising the surrounding culture can attract students' interest as well as get over the abstractness of mathematics, since the learning is done in a real life context. Besides that, it can be a vehicle to develop students' mathematical literacy ability.

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