



Mathematics Literacy Skill Seen from Learning Style in Discovery Learning Model with Realistic Approach Assisted by Schoology

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Abstrak

The purpose of this research is to describe students' mathematics literacy skill seen from learning styles in discovery learning with realistic approach assisted by schoology. This type of research used in this study is mixed methods model of sequential explanatory. The population in this study were VII graders of SMP Negeri 1 Bae. The subject of the research was from VII H of the school. The results showed that the discovery learning model with realistic approach assisted by schoology effective to mathematics literacy skill. Based on the analysis of written test data, observations and interviews, it was found that each type of learning style has different mathematics literacy skill. This is shown from 2 students diverger learning style categories there are 1 high category and 1 poor category, from 8 students assimilator category there are 3 high category, 3 moderate category and 2 poor category, from 9 students the converger category there are 4 high category and 5 moderate category and from 12 students accommodator category there are 1 high category, 5 moderate category and 6 poor category.

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INTRODUCTION

Mathematics literacy is defined as the ability to formulate, apply and assign mathematics in various contexts. This ability includes mathematical reasoning and using concepts, procedures, and facts to explain phenomena (PISA, 2012). This literacy supports the ability to analyze, reason and communicate ideas effectively. This literacy helps a person to determine the role of mathematics in life and helps in making decisions. There are seven components in mathematics literacy. The seven components are (1) communication, (2) mathematizing, (3) representation, (4) reasoning and argument, (5) using problem solving strategies, (6) using symbols, formal language and techniques, (7) using mathematics tools (Nolaputra et al., 2018). Thus mathematics literacy is interpreted as an understanding and application of mathematical concepts in daily life.

Literacy achievement of Indonesian students can be seen in the Program for International Student Assessment (PISA). PISA is organized by the Organization for Economic Cooperation and Development (OECD) to find out the students' mathematics literacy ability. PISA focuses on students' ability in identifying, understanding and using mathematical concepts in daily life. Indonesian students' mathematics literacy ranking in 2000 ranked 39th out of 41 countries. In 2003 ranked 38 out of 40 countries while 2006 ranked 50 out of 57 countries (Puspendik, 2012b). The achievement of Indonesian students' mathematics literacy in 2012 ranked 64 out of 65 countries (OECD, 2013). At PISA 2015 mathematics literacy of Indonesian students ranked 62 out of 70 countries (OECD, 2016). Literacy achievement at PISA 2018 students' mathematics literacy ranked 73 out of 79 countries (OECD, 2019). Based on these data, Indonesia's mathematics literacy rating is still low when compared to several other countries.

Based on the preliminary study, it was found that the tendency of some students to experience difficulty in solving literacy questions. The difficulty is seen from the mistakes in solving daily problems especially mathematics literacy problems. These results indicate that the mathematics literacy skills of Indonesian students are not optimal. Though the

ability to be achieved in the standard content of the objectives of learning mathematics is mathematics literacy. Seeing the importance of literacy skills in mathematics learning, students are expected to have this ability.

One effort to improve students' mathematics literacy skills is through mathematical learning innovations. The innovation requires collaborative activities of teachers and students to build learning components to develop mathematics literacy skills. The solution to solving this problem is the need for a learning model that can practice mathematics literacy skills. One learning model that can improve the ability of mathematics literacy is discovery learning. Discovery learning allows students to discover, direct, investigate basic concepts of knowledge (Purba et al., 2018). Thus students are able to explore and find their own knowledge in solving problem.

PISA's mathematics literacy assessment uses problems in a real-world context. To support this assessment, problems in discovery learning should be raised from daily problems. Students will more easily apply mathematics if they learn from daily experiences (Mustamin, 2017). The approach that fits that purpose is a realistic approach. This Realistic Mathematics Education (RME) approach uses contextual problems as a first step in the learning process (Nolaputra et al., 2018). RME approach will be more meaningful if in mathematics learning begins with the provision of contextual problems (Junaedi, et al., 2015). This approach guides students from concrete situations and uses the real world to develop mathematical concepts (Purwanti & Adriyani, 2018). Through realistic approach students are given real-world problems so that they will expand their world of life.

There are factors that influence the learning process. One of the factors that influence the progress of the learning process is learning style. Students more easily absorb information in the learning process if they know the learning styles of each student (Edimuslim, Edriati & Mardiyah, 2019). Learning styles relate to the way students understand lessons in school. Each student must have a way of learning that is different from each other. Therefore it is important for teachers to analyze their students' learning styles. So the teacher can better understand the differences in the classroom in carrying out learning.

This way of learning is also called learning style. Learning style is a way for someone to concentrate, process, and master new information during learning

(Cavas, 2010). Kolb bases on four stages of learning (Eyyam et al., 2011). These stages are in the order of concrete experiences, reflective observation, abstract conceptualization, and active experimentation. This means that students have real experiences, then observe and reflect on them from various points of view. Then generalize abstract concepts into theory and test what has been learned. Learning styles based on these four things include converger, diverger, accommodator, and assimilator.

Teachers are expected to have the ability to develop learning. Learning models that integrate web-based technology can be developed with e-learning, e-modules or blended learning. One alternative learning media is the use of blended learning. Schoology is a fun media that is in accordance with the times. This is in line with Rosalina's research (2018) that students are happy and motivated by blended learning using schoology because it is easy, attractive and challenging to complete tasks. Students can learn in classrooms and unlimited time with media schoology (Wardono, et al., 2018). Schoology is a site that combines social networking features and Learning Management System (LMS). The media has features that facilitate the management of learning such as making assignments, quizzes and group formation.

Based on the background above, the formulation of the problem in this study is (1) whether the discovery learning model with realistic approach assisted by schoology effectively improves mathematics literacy skills? (2) how is the description of students' mathematics literacy ability in terms of learning styles in discovery learning with realistic approach assisted by schoology? While the purpose of this study is (1) to find out the effectiveness of discovery learning models with realistic approach assisted by schoology, and (2) to describe students' mathematics literacy skills in terms of learning styles in discovery learning with realistic approach assisted by schoology.

METHOD

This type of research uses combination method (mix method) with sequential explanatory model. According to Creswell (2016), sequential explanatory is combination research method that uses quantitative data collection and analysis in the first stage and is followed by the collection and analysis of qualitative

data in the second stage, to strengthen the results of quantitative research conducted in the first stage.

The study was conducted at SMP N 1 Bae Kudus, the material taken was quadrilateral. The subjects of the study were students of class VII SMP N 1 Bae Kudus. The research sample in quantitative research is the experimental class (VII H) and the control class (VII G). In qualitative research, the research subjects used are only classes that obtain discovery learning with realistic approach assisted by schoology namely the experimental class (VII H).

Sources of data in this study were students obtained from the results of students' mathematics literacy ability tests, namely the initial and final tests, interview results sheets, and observations. The research instrument consisted of test and non-test research instruments. The research instrument of the test is test of mathematics literacy ability. Non-test research instruments include interview and observation guidance sheets. Every research instrument was validated and tested. The interview and observation guidelines sheet were not tested. Analysis of data in quantitative research there are two analyzes namely prerequisite test analysis and research data analysis. Analysis of the prerequisite tests include normality tests, homogeneity tests and average similarity tests. Analysis of research data includes normality test, homogeneity test, classical completeness test and average difference test. Based on the results of the initial data analysis (prerequisite test), it was found that the two classes of samples came from normally distributed populations, had the same or homogeneous variance, and there were no differences in the average mathematics literacy ability between two samples. This means that the sample comes from the same condition.

RESULT AND DISCUSSION

The research results are broken down into two stages of research, namely the quantitative research stage and the qualitative research stage. In the quantitative research phase, testing the effectiveness of discovery learning with realistic approach assisted by schoology to students' mathematical literacy skill through classical completeness test and average difference test.

Based on the results of classical completeness test, the number of students who completed was 29 out

of 31 students so that the z_{count} value was $2.33850 > 1.64$ (z_{table}) with a 5% confidence level, H_0 was rejected. This means that the proportion of students completeness that is subjected to discovery learning models with realistic approach assisted by schoology is more than 75%. The calculation results of classical completeness are presented in Table 1 below.

Table 1. Classical Completeness Test

x	n	π_0	z_{table}	z_{count}
29	31	0.75	1.64	2.3850

Based on manual calculations from the average difference test, the value of $t_{count} = 3.823$. Because the value of t_{count} is $3.823 > 1.671$ then H_0 is rejected. The results of the calculation of the average difference test manually are presented in Table 2 below.

Table 2. Manual Average Difference Test

Data	t_{count}	t_{table}
Postest Value	3.823	1,671

The above calculation is strengthened by calculating the average difference test using SPSS 16, namely the Independent Sample T-Test, sig (1-tailed) value is 0,000. Because sig (1-tailed) value is $0,000 < 0.05$, H_0 is rejected. This means that the average mathematics literacy ability of students in the class with discovery learning model with realistic approach assisted by schoology is higher than the ability of students in the classroom of problem based learning with scientific approach. The calculation results from the average difference test using SPSS are presented in the following Table 3 as follow.

Table 3. SPSS Average Difference Test

Data	Sig.	Decision
Postest Value	0,000	H_0 is rejected

Description of Mathematics Literacy Skill Seen From Learning Style

Analysis of mathematics literacy ability taught by discovery learning with realistic approach assisted by schoology is divided into four types based on learning styles namely diverger, assimilator, converger and accommodator. The research subjects consisted of 31 students of VII H SMP Negeri 1 Bae. The results of the learning style assessment scale based on

mathematics literacy skills in the experimental class students can be seen in Table 4 below.

Table 4. Student Categories Seen From Learning Styles

Type	Category	Total student	Percentage
Diverger	High	1	3.23
	Moderate	0	0
	Poor	1	3.23
Assimilator	High	3	9.68
	Moderate	3	9.68
	Poor	2	6.45
Converger	High	4	12.90
	Moderate	5	16.13
	Poor	0	0
Accommodator	High	1	3.23
	Moderate	5	16.13
	Poor	6	19.34
Total		31	100

Based on Table 4, from 2 students diverger learning style categories there are 1 high category and 1 poor category, from 8 students the assimilator category there are 3 high category, 3 moderate category and 2 poor category, from 9 students the converger category there are 4 high category and 5 moderate category and from 12 students accommodator category there are 1 high category, 5 moderate category and 6 poor category. Based on an analysis of the learning style assessment scale, 8 research subjects were chosen to be further investigated regarding mathematics literacy skills. The following description of mathematics literacy skills in terms of learning styles.

Subjects with diverger learning styles can write information that is known and asked into pictures, can write mathematical models in solving problems and write unit symbols appropriately, can present pictures and formulas appropriately and can write unit symbols appropriately, can explain any drawing conclusions complete and clear, can write strategies for solving problems, can use symbols, formal and technical

language, and operations to formulate, solve or interpret problems, can present kite-shaped images that do not use a ruler and do not draw with the right size. Based on the description above, identifying that a subject with a diverger learning style in solving problems encountered students who are able to achieve the seven components of mathematics literacy even though they are less than optimal in presenting images with assistive devices.

Subjects with assimilator learning style can rewrite information that is known and asked even if there is not written in the answer sheet, can write a mathematical model in solving problems, can present a picture of the problem but sometimes the size is not right, can explain every conclusion but there is something not quite right, can write a strategy in solving problems but not in full, can use symbols in solving problems that is giving broad and diagonal symbols but not writing unit symbols, can present kite images but do not use mathematical tools and do not provide information in presuppose points on picture. Based on the description above, identifying that subjects with learning style assimilators in solving problems encountered students who are able to achieve the seven components but are not careful in measuring and incomplete in solving problems in the components of devising strategies for solving problems and do not use mathematics tools in drawing.

Subjects with converger learning style can rewrite information that is known and asked even if it is incomplete, can write mathematical models in solving problems, can present formulas and pictures of problems but the size is not right, not yet able to explain and provide an explanation at each conclusion, can write a strategy in solving problems in full, can use symbols in solving problems that is giving broad and diagonal symbols but not writing unit symbols, can present a kite image but do not use mathematical tools and do not provide information in presuppose points in the picture. Based on the description above, identifying that subjects with converger learning styles in solving problems encountered students who are able to reach the seven components but are not careful in measurement, do not write the unit symbol, are incomplete in solving problems in the reasoning and argument components and do not use mathematical tools in draw.

Subjects with accommodator learning styles are able to rewrite information that is known and asked even if it is not written on the answer sheet, some have

not been able to write mathematical models in solving problems, can present formulas and pictures of problems but the size is not right, some have not been able to link concepts problems with concepts that have been learned, some have not been able to write a strategy in solving problems in full, can use symbols in solving problems that are broad symbols, diagonals and unit symbols, can present kite images but do not use mathematical tools and do not provide information in presuppose points in the picture. Based on the description above, identifying that subjects with accommodator learning styles in solving problems are encountered students who experience difficulties in the mathematics component, reasoning and argument and devising strategies for solving problems. The subject also did not re-check the results of his calculations so the calculation of problem solving was incorrect. In addition, the subject did not use a mathematics tool that resulted in an incorrect size in the picture.

Discovery learning assisted by schoology leads to an understanding of Vgotsky's theory where students discuss with group members in solving real problems. The link between this learning and Vygotsky's theory is to develop students' mathematics literacy skill through interactions with others. This is in line with Vygotsky's theory in Utami (2016) stating that individual knowledge and cognitive development comes from social sources. Vygotsky emphasized the important role of students in constructing their knowledge. Learning according to Vygotsky begins when students are in the development of the proximal zone, which is a level that is reached when performing social behavior (Hasan & Qaddafi, 2015).

The results of this research reinforce the results of previous research, including Delfita, et. al. (2017) and Ula, et. al. (2019) concluded that the application of discovery learning can improve student mathematics learning outcomes. In addition, the results of the study of Rosita et al. (2018); Khoir, Masrukan & Wiyanto (2019); Kusumadewi (2019) concluded that discovery learning can develop students' mathematics literacy skill. Babys research (2016) states that discovery learning has an influence on improving mathematics literacy ability and student independence. The results of research conducted by Ulva et al. (2017) states that the application of schoology media can increase motivation and have a positive effect on student learning outcomes (Choirudin, 2017). This is in line with Aminoto and Pathoni's (2014) research that the application of media

schoolology can improve student activities and learning outcomes.

CONCLUSION

Based on the analysis and discussion the following conclusions are obtained: (1) discovery learning with realistic approach assisted by schoolology effective to students' mathematics literacy skill; (2) each type of learning style has different mathematics literacy skill. Therefore, effective learning needs to focus on the learning process. To improve mathematics literacy skills, students need to provide reinforcement in the form of exercises in mathematics literacy questions so that students are accustomed and trained to solve mathematics literacy problems.

REFERENCES

- Aminoto, T. dan Pathoni, H. 2014. Penerapan Media E-Learning Berbasis Schoolology untuk Meningkatkan Aktivitas dan Hasil Belajar Materi Usaha dan Energi di Kelas XI SMA N 10 Kota Jambi. *Jurnal Sainmatika*. 8 (1). 13-29.
- Babys, U. 2016. Kemampuan Literasi Matematis Space and Shape dan Kemandirian Siswa SMA pada Discovery Learning Berpendekatan RME-PISA. *Jurnal Pendidikan Matematika Indonesia*. 1 (2). 43-49.
- Cavas, B. 2010. A Study on Pre-service Science, Class, and Mathematics Teachers's Learning in Turkey. *Science Education International Journal*. 21 (1). 47-61.
- Choirudin. 2017. Efektivitas Pembelajaran Berbasis Schoolology. *Jurnal Matematika dan Pendidikan Matematika*. 1 (2). 101-126.
- Creswell J.W. 2016. *Penelitian Kualitatif & Desain Riset*. Yogyakarta: Pustaka Pelajar.
- Delfita, O., Kartini & Sakur. 2017. Penerapan Model Discovery Learning Untuk Meningkatkan Hasil Belajar Matematika Siswa Kelas X MIA 4 SMA Negeri 5 Pekanbaru. *Jurnal Online Mahasiswa*. 4 (2). 1-13.
- Edimuslim, Edriati, S., Mardiyah, A. 2019. Analisis Kemampuan Literasi Matematika ditinjau dari Gaya Belajar Siswa SMA. *Suska Journal of Mathematics Education*. 5 (2). 95-110.
- Eyyam, R., Menevis, I., & Dogruer, N. 2011. An Investigation of The Learning Style of Prospective Educators. *The Online Journal of New Horizons in Education*. 1 (3). 1-6.
- Hasan, N. K. dan Qaddafi, M. 2015. Perbandingan Pendekatan Konstruktivisme antara Model Pembelajaran Discovery Learning dan Reception Learning terhadap Kemampuan Berpikir Kritis dan Hasil Belajar Peserta Didik Kelas X SMA Negeri 3 Takalar. *Jurnal Pendidikan Fisika*. 3 (2). 150-156.
- Junaedi, I., Asikin, M., & Masrukan. 2015. Penerapan Realistic Mathematics Education (RME) dengan Konteks Karakter dan Konservasi untuk Meningkatkan Kemampuan Mahasiswa dalam Menyusun Proposal Penelitian. *Jurnal Matematika Kreatif-Inovatif*. 6 (2). 177-190.
- Khoir, N.L., Masrukan & Wiyanto. 2019. Mathematics Literacy based on Visual-Spatial Intelligence 7th Grade Students on Discovery Learning with Performance Assessment. *Unnes Journal of Mathematics Education Research*. 8 (1). 111 - 117.
- Kusumadewi, R. F. 2019. Efektivitas Model Pembelajaran Discovery Learning terhadap Kemampuan Literasi Matematika di Sekolah Dasar. *Sekolah Dasar: Kajian Teori dan Praktik Pendidikan*. Tahun 28 (1). 11-16.
- Mustamin, S. H. 2017. Pembelajaran Matematika dengan Pendekatan Realistik. *Lentera Pendidikan*. 20 (2). 231 – 239.
- Nolaputra, A.P., Wardono & Supriyono. 2018. Analisis Kemampuan Literasi Matematika pada Pembelajaran PBL Pendekatan RME Berbantuan Schoolology Siswa SMP. *PRISMA 1. Prosiding Seminar Nasional Matematika*. 18 – 32.
- OECD. 2013. *PISA 2012 Results: What Students Know and Can Do: Student Performance in Mathematics, Reading and Science*. (Volume 1). Paris: PISA-OECD Publishing.
- OECD. 2016. *PISA 2015 PISA Results in Focus*. Paris: PISA, OECD Publishing.
- OECD. 2019. *PISA 2018 Results Combined Executive Summaries Volume I, II & III*. Paris: PISA, OECD Publishing.
- Purba, G.I.D., Surya, E., Manullang, M., & Asmin. 2018. The Effect of Students' Worksheet in the Model of Discovery Learning Against the Students' Ability of Reasoning and Mathematical Communication in the Faculty

- of Mathematics and Natural Science of State University of Medan. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*. 37 (3). 70 – 82.
- Purwanti, K. L. & Adriyani, A. 2018. Kemampuan Literasi Matematika pada Discovery Learning Pendekatan RME Berdasarkan Gaya Belajar Siswa Kelas V. *Jurnal Pendidikan Dasar Islam*. 5 (2). 183 – 195.
- Pusat Penilaian Pendidikan Balitbang Kemdikbud. 2012b. Kemampuan Membaca Siswa Kelas IV Sekolah Dasar di Provinsi Kalimantan Timur dan D.I. Yogyakarta. Jakarta: Pusat Penilaian Pendidikan.
- Rosalina, M. 2018. Analysis The Use of Schoology E-Learning Towards Students' Learning Motivation Enhancement in STKIP Surya. *Indonesian Journal of Science and Education*. 2 (1). 89-95.
- Rosita, A., Wardono & Kartono. 2018. Discovery Learning-PMRI in Improving Mathematics Literacy of Junior High School Students. *Unnes Journal of Mathematics Education Research*. 7 (1). 35-39.
- Ula, M., Kristanti, F., & Mursyidah, H. 2019. Efektivitas Pembelajaran Discovery Learning dengan Media Komik pada Pembelajaran Garis dan Sudut di SMP Negeri 7 Surabaya. *Jurnal Matematika dan Pendidikan Matematika*. 4 (1). 17 – 28.
- Ulva, N.L., Kantun, S., & Widodo, J. 2017. Penerapan E-Learning dengan Media Schoology untuk Meningkatkan Motivasi dan Hasil Belajar Siswa pada Kompetensi Dasar Mendeskripsikan Konsep Badan Usaha dalam Perekonomian Indonesia. *Jurnal Pendidikan Ekonomi: Jurnal Ilmiah Ilmu Pendidikan, Ilmu Ekonomi, dan Ilmu Sosial*. 11 (2). 96-102.
- Utami, I.G.A.L.P. 2016. Teori Konstruktivisme & Teori Sosiokultural: Aplikasi dalam Pengajaran Bahasa Inggris. *PRASI*. 11 (1). 4-11.
- Wardono, Waluya, S.B., Kartono, Mulyono & Mariani, S. 2018. Literasi Matematika Siswa SMP pada Pembelajaran *Problem Based Learning* Realistik Edmodo Schoology. *PRISMA, Prosiding Seminar Nasional Matematika*. Vol. 1. 477-497.