Proceedings of the International Conference on Education, Vol. 11, Issue 1, 2025, pp.45-56

ISSN 2424-6700 online
DOI: https://doi.org/10.17501/24246700.2025.11104

FOSTERING STUDENTS' MATHEMATICAL LITERACY ABILITY THROUGH DIFFERENTIATED INSTRUCTION AND RME-APPROACH: AN ACTION RESEARCH

Yudha AS* and Susanti M

Mathematics education, Faculty of Mathematics and Natural Science, Universitas Negeri Yogyakarta, Indonesia

Abstract: Indonesian students' low math literacy is evident from the stagnant PISA trends and classroom observations in a Junior High School (JHS) in Bantul, Yogyakarta. The observed low math literacy is due to a lack of innovative teaching methods that do not align with students' learning needs. Specifically, in algebra, students struggle because lessons often introduce formal elements and operations without clear explanations. This research aims to improve math literacy in this JHS through differentiated learning with the Realistic Mathematics Education (RME) approach. Using classroom action research and an embedded-RTI model, the study focused on providing teaching materials tailored to students' needs, improving their literacy skills. The study was conducted over two cycles with 32 students, with the first cycle focusing on mathematical modeling for one-variable linear equation and the second on the one-variable linear equation equivalent. Data were collected through math literacy tests and learning observation sheets to gather both quantitative and qualitative data. Quantitative data showed improvements in students' math literacy scores, while qualitative data provided insights into the effectiveness of the learning process. Results indicated that RME-based differentiated learning significantly improved students' math literacy on one-variable linear equation. Math literacy improved from 12.5% to 62.5% in first cycle and 62.5% to 78.125% in second cycle which measured by three components of mathematical literacy ability, such as formulate, employ, and evaluate. Learning implementation also improved, from 74% to 84% in the first cycle, and from 80% to 88% in the second cycle. These findings suggest that differentiated instruction using the RME approach can enhance math literacy in Indonesian JHS students. However, it should be considered that this study had several limitations such as limited subject was only in a class of a school and occurred in six meetings for the intervention. For future researchers can adapt their intervention setting with this consideration

Keywords: algebra, action research, mathematics education, mathematical literacy ability, one-variable linear equation, realistic mathematics education

Introduction

Problem solving and mathematical reasoning abilities have a large concentration in mathematics education. This is reinforced by the presence of both as important aspects in PISA 2022 (OECD, 2023b). From a PISA perspective, an individual's capacity to formulate, use and interpret mathematical phenomena and try to find solutions is part of problem solving. Meanwhile, the ability to provide logical reasons, present arguments, develop and explain solutions is part of mathematical reasoning abilities. Furthermore, OECD (2022) states that mathematical reasoning involves several processes, namely evaluating situations, choosing strategies, determining strategies logically, developing solutions, and recognizing how these solutions can be implemented.

These abilities refer to mathematical literacy, which is important to assess and evaluate because mathematics can be used as a tool to solve problems in our lives (Maryani et al., 2023). With the PISA assessment by the OECD, one of them is used to measure the extent and depth of students' mathematical

*Corresponding Author's Email:*adindasalshabilla.2023@student.uny.ac.id

literacy abilities (OECD, 2023b, 2023a). This is because the use of questions in PISA that are formulated with real world context or everyday problems that students can solve.

However, in PISA 2022, the mathematics scores of Indonesian students are still far below the average PISA results of other countries (OECD, 2023c). In these results, the majority of students are at level 1, namely 82%; only 18% were at level 2; and only 9% are at level 5-6. Based on the description of the level of proficiency proposed by Schleicher (2023), we can conclude that the majority of Indonesian students are still at a low level of mathematical ability, limited to reading data in tables/graphs, using basic concepts for calculating, and determining solutions explicitly. according to the data presented. Meanwhile, the ability to interpret, analyse, evaluate, and reflect on phenomena in solving problems at level 5-6 is still rarely possessed by students (Schleicher, 2023). This means that, based on the PISA results, the problem solving and mathematical reasoning abilities of students in Indonesia are relatively low.

According to PISA study, a portrait of students' mathematical abilities can be clearly recorded, especially problem-solving abilities and mathematical reasoning as part of mathematical literacy. This has become an impetus for Indonesia to implement an assessment known as AN (National Assessment), one of which measures cognitive abilities in the AKM (Minimum Competency Assessment). The National Assessment is carried out to evaluate the education system to obtain representative and comprehensive results regarding the condition of education in Indonesia (Kemendikbudristek RI, 2023). In AKM Numeracy, there are several aspects that are measured, namely content, cognitive level, and context (Kemendikbudristek RI, 2022). It is clearly observed that these aspects have similarities with the components measured in PISA, such as content/domain (number, algebra, geometry & measurement, and data & uncertainty); cognitive level (comprehension, application, and reasoning); as well as contexts that are close to students, such as personal, socio-cultural, work and scientific contexts (Kemendikbudristek RI, 2022; OECD, 2023b).

The use of real-world contexts that are close to students' lives refers to a learning approach known as realistic mathematics education (RME) (Akbas & Alan, 2022). The realistic mathematics approach (RME) begins with real world problems that help students to solve them with mathematical concepts (Akbaş & Yildirim, 2024). Having mathematics learning activities that relate to realistic contexts can help students find the relationship between mathematics and the real world. RME also provides students with opportunities to use mathematics to solve real world problems (Lerman, 2014; Van Den Heuvel-Panhuizen & Drijvers, 2020).

According to several studies, RME is believed to have a positive influence on students. This is reinforced by the research of Listiawati et al. (2023) stated that students involved in RME-based learning can demonstrate higher mathematical representation and communication skills than those learning in conventional teaching methods. Akbaş & Yildirim (2024) stated that positive responses were obtained from students when using RME in learning because learning felt fun, increased participation and self-confidence while learning mathematics. Using real-world contexts in mathematics learning can also improve problem-solving abilities and make it easier for students to understand concepts and procedures in solving mathematical problems (Sumirattana, 2017).

To optimize students' abilities in learning, it is important for teachers to present learning that suits students' needs. This learning refers to differentiated learning which is seen as a proactive approach and presents a variety of approaches to learning instruction (C. Tomlinson, 2001; C. A. Tomlinson, 2017). With differentiated learning, teachers have a role in getting to know students regarding their learning readiness, interests and learning profile (Andriyani et al., 2024). Based on these characteristics, classroom learning will be more flexible and meet the needs of students in the classroom. Several studies state that differentiated learning can improve understanding of mathematical concepts, critical thinking skills, and make participants actively involved in learning (Anggareni & Juandi, 2023). Kamarulzaman et al. (2022) stated in their research that differentiated learning can improve students' mathematical thinking processes.

However, in practice teachers have not really mastered the application of differentiated learning to accommodate students' needs. Teachers still interpret that differentiated learning is a complex and individualized approach (C. A. Tomlinson, 2017). Teachers have not been able to manage preparations for differentiated learning (Nusrat, 2017). While Salleh et al. (2022) summarizes four findings of challenges in implementing differentiated learning according to teachers, namely serving students' needs, preparing and delivering learning, teaching support and skills, and time challenges.

In learning mathematics, there is one topic that is important for students to learn, especially at the start of junior high school, namely linear equations. Linear equations are a material that has many applications in everyday life and various fields (Karlina et al., 2019). However, students experience many difficulties and obstacles when studying this material. Based on research from Haji et al. (2017), students have particular difficulty in solving story problems on linear equations because they are unable to understand and write down the problems in the questions, and cannot create models and complete the process. Students still lack understanding of algebra concepts and are not used to solving story problems. Ratnamutia & Pujiastuti (2020) also stated that students still have difficulty understanding concepts, principles and skills in solving linear equation story problems. Based on several studies, it turns out that students still experience difficulties in solving word problems on linear equations.

In specific setting, researcher found the overall problems in one of the school in Yogyakarta, Indonesia. Students had low of mathematical literacy and struggled in one-variable linear equation problems. The teacher did not implement differentiated-instruction and also RME-approach when taught them. The teacher also did not employ a modest or small scale of research in her classes. Thus, researcher took this condition as an opportunity to employ classroom action research.

Foregoing, both Putri et al. (2024) and Syarifuddin & Nurmi (2022) implemented differentiated-instruction for enhancing mathematics achievement. These two researches conducted classroom action research for specific class and showed a good impact of differentiated-instruction for enhancing students' mathematics achievement. Instead, Erlina & Sutarni (2024) much focussed on implementing RME-approach for improving mathematics activity. It could be found that enganging students with real-world context as a characteristic of RME-approach was impactful for students' participation. However, there is no significant research which integrating differentiated-instruction and RME-approach collectively, especially for improving mathematical literacy.

According to these problems and findings, classroom action research with focusing on implementing differentiated-instruction and RME-approach collectively for fostering students' mathematical literacy will be conducted. This classroom action research will be carried out using Arikunto et al. (2010) which have four stages, namely planning, implementing, observing, and reflecting. The research was employed in one of junior high schools in Bantul, Yogyakarta, Indonesia. This research was carried out when several initial problems were discovered, namely students who experienced-difficulty in solving story problems, learning that tended more towards conventional methods, teachers who had not carried out learning diagnostics as a first step in implementing learning differentiation, as well as presenting real-world contexts that had not been presented in the classroom. class during mathematics learning. In this research, researchers will conduct classroom action research in differentiated learning with a realistic mathematical approach to improve junior high school students' mathematical literacy skills in one-variable linear equations.

Materials and Methods

This research is classroom action research which used stages by Arikunto et al. (2010), namely planning, implementing, observing, and reflecting. In planning stage, researcher analyzed situation and problem in classroom and planned solution for solving the problem. After that, teaching planning was implemented through implementing stage. During implementation of the lesson, researcher monitoring the learning processes based on differentiated instruction and RME-approach in observing stage. Furthermore, researcher reflected the overall learning and classified by each cycle in relfecting stage. The selection of the classroom action research model was carried out to accommodate personalized learning through regular evaluation of the research being developed. The subjects of this research were 7-grade students in one of schools in Bantul, Yogyakarta. The number of students in this class is 32 people.

Data and research data sources were obtained from instruments developed for data collection. The data sources were obtained from (1) diagnostic tests, to determine the level of students' understanding of the concepts contained in linear equations: algebra and its operations; (2) a mathematical literacy test was developed to determine the level of mathematical literacy of students at each tier; (3) This learning implementation observation sheet aims to see the percentage of learning implementation according to the planned activities.

Furthermore, the data which were collected would be analyzed both of quantitative and qualitative methods. By quantitative method, descriptive statistics was utilized to analyze the improvement of pre-test and post-test for each cycle. Descriptive statistics provides general achievement of students' performance in mathematical literacy and also the learning implementation achievement overall. Also, classroom action research was determined as succeed if it acquired 75% students achieved standard score of mathematical literacy ability which is 75. By qualitative method, triangulation data process was conducted such as describing learning implementation, unstructured interview, and learning observation.

Results and Discussion

Learning activities during classroom action research

In implementing classroom action research, there were four stages based on the model of Arikunto et al. (2010), namely planning, implementing, observing, dan reflecting which is done repeatedly until the specified criteria are reached. In this study, classroom action research was conducted in 2 cycles and each cycle consisted of 3 meetings. The learning activities carried out used differentiated learning and the RME approach. Differentiated learning carried out here refers to the differentiation of content and process (C. A. Tomlinson, 2017). For learning with RME, five characteristics are used, which were the use of context, the use of models for progressive mathematics, the use of student construction, interactivity, and intertwinned (Treffers, 1987; Wijaya, 2012).

In the first meeting of the first cycle, the researcher planned the learning design. This learning design is based on an analysis of the situation and needs of the targeted class. The analysis of the situation and needs is based on interviews with teachers, diagnostic tests of early algebra and mathematical literacy materials, and classroom observations. After collecting initial data, the researcher analysed the problems that arise, including the prerequisite material for linear equations in one variable and the students' mathematical literacy skills. In this activity, it was found that there were still many students who were lacking in algebraic calculation operations and their simplifications, as well as analyzing mathematical literacy questions. The results obtained show that the diversity of students' abilities in solving diagnostic questions needs to be facilitated for learning (Ketterlin-Geller & Yovanoff, 2009; Shim et al., 2017). Therefore, researcher design differentiated learning based on interest in the topics they wanted to study with the theme of buying ice cream and tourist tickets. The use of personal context was a characteristic of RME, namely the use of context (Van Den Heuvel-Panhuizen & Drijvers, 2020). Based on the plan that has been prepared, the researcher implements initial learning with classical discussions on two topics which will be the main themes that will be discussed according to students' interests. At this meeting, the researcher invited students to actively discuss in class the application of linear equations in a realistic context. These activity were identified as interactivity characteristic of RME (van den Heuvel-Panhuizen & van Zanten, 2020).

In second meeting of first cycle, the researcher activated the planning by implementing learning design. Learning was conducted by differentiated instruction and RME activities. Researcher divided the students into small groups of 3-4 students. Student organization is based on topic interests and a homogeneous distribution of initial abilities. Students are asked to solve problems on students' worksheet which focuses on mathematical literacy skills in two contexts: buying ice cream and buying ride tickets. During group discussion, students promoted their own model construction and used them. These indicated characteristics of RME, which are the use of model and the use of student construction (Wijaya, 2012). Based on the activities designed, the collection of student performance data is based on the students' worksheet as a formative evaluation. Apart from students' worksheet, student performance assessments are taken from their activeness during learning and demonstration of discussion results in their groups.

Based on students' performance in group discussion, it was found that students were aiming for good understanding but had not yet carried out presentations. Thus, in the third meeting, students were asked for presenting their work discussion, then continued by concept reinforcement, and a final mathematical literacy test. Presentations are made by group representatives to discuss the results in front of the class. Other students who are not presenting give opinions or ask students who are presenting if there is something that is not appropriate and needs further discussion. After that, the teacher and students conclude together regarding the learning in cycle 1 that has been carried out. Then, the learning is closed with a post-test to measure students' mathematical literacy abilities which will then be compared with a pre-test which is integrated with a diagnostic assessment. From the results of students' performance during presentations and discussions as well as mathematical literacy tests, they are analyzed again to determine the activities that will be carried out in cycle 2. This analysis is based on reflection, regarding the things that need to be addressed regarding existing deficiencies. In general, the results show a positive, although not significant, increase in understanding the concept of linear equations contained in a realistic context. So, in cycle 2 we will continue to strengthen evidence of the effectiveness of using realistic contexts in improving mathematical literacy skills.

The second cycle was conducted by the result of first cycle. Based on the analysis of the pre-test and post-test results in cycle 1, it was found that there was an increase in mathematical literacy, although not very significant. Apart from that, there was reflection that needed to be improved in learning activities, especially to bring out the lack of interactivity. Therefore, teacher design learning based on the heterogeneous distribution of initial abilities so that students who have high abilities can help students whose initial abilities are less to be dynamic in discussions. It framed a differentiated instruction which was planning for second cycle. Based on RME-approach, the context that used for was regarding balance in the scales. The researcher provided a context to focus on the equivalence of one variable linear equation. This activity was carried out by measuring objects on a balanced scale. At the beginning the researcher gave a realistic problem regarding the weight of 2 people's groceries of the same size, then the students are asked to identify the weight of 1 unknown object. This discussion was carried out classically before small groups were formed and formed in heterogeneous groups which reflected the interactivity characteristic (van den Heuvel-Panhuizen & van Zanten, 2020).

Students are grouped according to interest to measure vegetables/fruit on a scale or measure the weight of corned beef groceries. In cycle 2, students are grouped heterogeneously according to their abilities because in homogeneous learning there are difficulties in accessing peer tutors. After 60 minutes of discussion, the researcher asked students in groups to present the results of their discussion in front of the class. Due to time constraints, the results presentation was carried out at the next meeting. From the results of the discussion and presentation of results, a good understanding was obtained for finding and using equivalence for linear equations in one variable. Seeing the results of the discussion which showed positive value, the teacher designed learning third meeting in focusing on individualization and strengthening the understanding of the properties that apply to the operation of linear equations in one variable. In addition, the teacher will assess students' mathematical literacy skills through a final test.

From the learning activities, it could be seen the percentage of learning achievement. In the first cycle, it obtained the enhancement of 74% to 84% and from 80% to 88% in the second cycle. The observation

was based on several indicators, which were aperception and motivation, core activities according to RME characteristics, and closing activities.

The result of fostering students' mathematical literacy ability

Mathematical literacy skills in the first cycle were measured based on the results of the diagnostic test (pre-test) and post-test results. In this study, the data obtained were analyzed using descriptive statistics, namely learning achievement. This refers to the opinion of Sugiyono (2022) who used descriptive statistics in the pre-experimental design class setting which was also used in this class research action. The results of the achievement of mathematical literacy completeness in cycle 1 are presented in the following table.

Table 1: The Result of Math Literacy Ability in Cycle 1

Data *Pre-test*		Data *Post-test*	
Completeness (%)	Incompleteness (%)	Completeness (%)	Incompleteness (%)
12.5%	87.5%	62.5%	37.5%
Score Minimum	Maximum Score	Score Minimum	Maximum Score
0	76	68	93
Average		Average	
53.53125		75.1875	
Standard deviation		Standard deviation	
19.60227		7.230307	

Based on Table 1 above, it is obtained that the level of achievement of completeness in mathematical literacy skills increased from 12.5% to 62.5%. Although there was an increase, further intervention is needed in the second cycle because it has not met the minimum criteria for classical completeness achievement, which is 75%.

Table 2: The Result of Math Literacy Ability in Cycle 2

Data *Pre-test*		Data *Post-test*	
Completeness (%)	Incompleteness (%)	Completeness (%)	Incompleteness (%)
62.5%	37.5%	78.125%	21.875%
Score Minimum	Maximum Score	Score Minimum	Maximum Score
68	93	72	100
Average		Average	
75,1875		83,46875	
Standard deviation		Standard deviation	
7,230307		8,035019	

Table 2 above shows the results of the pre-test and post-test compared during cycle 2. The results showed that the percentage of mathematical literacy scores increased from 62.5% to 78.125%. This achievement shows the significance of increasing students' mathematical literacy which exceeds 75% as the set standard score.

In addition to being analysed based on the achievement of mathematical literacy results in each cycle, the data was analyzed based on competencies in mathematical literacy, namely formulate, employ, and evaluate. This data recorded all achievements from cycle 1 and cycle 2.

Table 3 Overall Result of Mathematical Literacy

	Competencies/Skills of the Republic of Indonesia 4.0, society 5.0			
Parameter statistics	***Formulate***	***Employ***	***Employ***	***Evaluate***
	Students can formulate realistic problem solutions on the topic of one-variable linear equations	Students can choose strategies in solving realistic problems on the topic of one-variable linear equations	Students can use the concept of a one-variable linear equation to solve realistic problems	Students can explain the reasons related to the solution provided

Total students	32	32	32	32
Average	40.21875	72.875	69.9375	29.59375
Standard deviation	9.841666	7.577722	9.017128	9.996435
Maximum possible score	55	84	85	50
Minimum possible score	20	54	47	6

Based on three competencies of mathematical literacy, it could be found that evaluate competency was the lowest result. In this research, evaluate competency refers to give reason, compare, and evaluate the appropriate strategies to solve the problems. This gave evidence from several studies that students' still lack of giving reason and evaluating strategies (OECD, 2023c, 2023d).

Differentiated-instruction in this research settings could give personal experience for students. The problems for students engaged with were provided according to their interest. It could enhance their motivation and could engange them personally. It was evidenced by Tomlinson (2017)'s which differenting learning content by students' interest, readiness, or learning styles could enhance their motivation for learning and mastering mathematical concepts. It aligned with utilization of RME-approach which using real-world context based on their interest could enhance students' engagement of learning. So, their performance could be fostered. By integrating these two strategies, gave impactful effect especially for their mathematical literacy.

By comparing with previous researches, it could not be found yet about providing much result in fostering students' mathematical literacy by integrating differentiated-instruction and RME-approach. It could be found that most research focus on one of the teaching strategies instead of integrating them. Classroom action research by Putri et al. (2024) and Syarifuddin & Nurmi (2022) stressed of utilizing differentiated-instruction for enhancing mathematics achievement. Furthermore, classroom action research by Erlina & Sutarni (2024) much focussed on implementing RME-approach for improving mathematics activity. According to these researches especially in Indonesia, integrating differentiated-instruction and RME-approach is still limited to be explored. Also, it could not be found that each of these strategies was utilized for improving mathematical literacy. So that, this research could provide much insights with several consideration of research settings.

Conclusions

Based on classroom action research which was carried out in one of the junior high schools in Bantul, Yogyakarta, it can be concluded that this classroom action research was carried out in two cycles with

each cycle consisting of three meetings. The learning activities are carried out in class VII-E on one-variable linear equations using a differentiated approach and RME (Realistic Mathematics Education). Learning activities in each cycle are carried out in differentiation of content and process. Furthermore, in this research RME-approach implemented by five characteristics, namely the use of context, the use of model, students' construction, interactivity, and intertwinned. The result showed that in cycle 1, mathematical literacy ability was increased from 12.5% to 62.5% but still did not achieve the minimum criteria. After following second cycle, it could be found that mathematical literacy ability was increased from 62.5% to 78.125% and fulfilled the minimum criteria. Thus, the classroom action research was stopped.

For future research, classroom atmosphere is the most factors for considered condition in integrating differentiated-instruction and RME-approach. For some condition, implementing these two strategies may be a challenging process because of complicated environment. By choosing an appropriate real-world context also should be considered in term of engaging students' interest. Furthermore, fluency of teacher for these integration also should be dwelled on.

Acknowledgements

The author is grateful for the LPDP Scholarship from the Ministry of Finance of the Republic of Indonesia which sponsored the preparation of this paper as well as the parties involved in carrying out this action research.

Declaration of Interest Statement

The authors declare that they have no conflict of interests.

References

Akbas, E. E., & Alan, K. (2022). Examining 6th Grade Students' Learning of the Subject of Volume with GeoGebra Software Within the Framework of RME Approach. Open Journal for Educational Research, 6(1), 89–104. https://doi.org/10.32591/coas.ojer.0601.07089e

Akbaş, E. E., & Yildirim, L. (2024). Examining 5th Grade Students' Learning on Surface Area Calculations with Realistic Mathematics Education Approach. International E-Journal of Educational Studies, 8(16), 14–31. https://doi.org/10.31458/iejes.1354835

Andriyani, Z. D., Wijayanti, D., Ubaidah, N., Lutfi, A., & Meng, D. (2024). Does the use of differentiated instruction through project-based learning in mathematics classroom settings facilitate the students' collaborative skills? Jurnal Elemen, 10(3), 460–478. https://doi.org/10.29408/jel.v10i3.24381

Anggareni, P., & Juandi, D. (2023). THE EFFECT OF IMPLEMENTATION DIFFERENTIATED INSTRUCTION FOR ENHANCING MATHEMATICAL COMPETENCE IN THE LAST DECADE. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 12(2), 2608. https://doi.org/10.24127/ajpm.v12i2.6665

Arikunto, S., Suhardjono, & Supardi. (2010). Penelitian Tindakan Kelas. Bumi Aksara.

Erlina, D. A., & Sutarni, S. (2024). Peningkatan Aktivitas Belajar Siswa Melalui Pembelajaran Realistic Mathematics Education (RME). Jurnal Cendekia : Jurnal Pendidikan Matematika, 8(1), 454–463. https://doi.org/10.31004/cendekia.v8i1.2409

Haji, S., Abdullah, M. I., Maizora, S., & Yumiati, Y. (2017). Developing Students' Ability of Mathematical Connection through Using Outdoor Mathematics Learning. Infinity Journal, 6(1), 11. https://doi.org/10.22460/infinity.v6i1.234

Kamarulzaman, M. H., Kamarudin, M. F., Sharif, M. S. A. M., Esrati, M. Z., Esrati, M. Z., & Yusof, R. (2022). Impact of Differentiated Instruction on the Mathematical Thinking Processes of Gifted and Talented Students. Journal of Education and E-Learning Research, 9(4), 269–277. https://doi.org/10.20448/jeelr.v9i4.4253

Karlina, A., La Masi, L. M., & Kodirun, K. (2019). Analisis Kesalahan dalam Menyelesaikan Soal-Soal Bentuk Persamaan dan Pertidaksamaan Linear Satu Variabel pada Siswa Kelas VII SMP Negeri 2 Kendari. Jurnal Penelitian Pendidikan Matematika, 6(2), 1. https://doi.org/10.36709/jppm.v6i2.9112

Kemendikbudristek RI. (2022). Keputusan Kepala Badan Standar, Kurikulum, dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Nomor 008/H/Kr/2022. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Badan Standar, Kurikulum, dan Asesmen Pendidikan. https://kurikulum.kemdikbud.go.id/kurikulum-merdeka/capaian-pembelajaran

Kemendikbudristek RI. (2023). Buku Saku Adiksimba Asesmen Nasional. Pusat Kurikulum dan Pembelajaran Badan Standar, Kurikulum, dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi.

Ketterlin-Geller, L. R., & Yovanoff, P. (2009). Diagnostic Assessments in Mathematics to Support Instructional Decision Making. 14(16), 1–11.

Lerman, S. (Ed.). (2014). Encyclopedia of Mathematics Education. Springer Netherlands. https://doi.org/10.1007/978-94-007-4978-8

Listiawati, N. (2023). Analysis of implementing Realistic Mathematics Education principles to enhance mathematics competence of slow learner students. Journal on Mathematics Education, 14(4), 683–700. https://doi.org/10.22342/jme.v14i4.pp683-700

Maryani, C. S., Fauzi, Kms. M. A., & Mulyono, M. (2023). Pengembangan Bahan Ajar Berbasis RME untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis dan Self-Efficacy Siswa. Jurnal Cendekia : Jurnal Pendidikan Matematika, 7(3), 3122–3137. https://doi.org/10.31004/cendekia.v7i3.2663

Nusrat, D. (2017). Overcoming the Challenges Faced in a Mixed Ability Classroom. IOSR Journal Of Humanities And Social Science (IOSR-JHSS), 22(7), 9–14.

OECD. (2022). PISA 2022 Technical Report. TECHNICAL REPORT.

OECD. (2023a). Innovating Assessments to Measure and Support Complex Skills (N. Foster & M. Piacentini, Eds.). OECD. https://doi.org/10.1787/e5f3e341-en

OECD. (2023b). PISA 2022 Assessment and Analytical Framework. OECD. https://doi.org/10.1787/dfe0bf9c-en

OECD. (2023c). PISA 2022 Results (Volume I): The State of Learning and Equity in Education. OECD. https://doi.org/10.1787/53f23881-en

OECD. (2023d). PISA 2022 Results (Volume II): Learning During – and From – Disruption. OECD. https://doi.org/10.1787/a97db61c-en

Putri, S. J., Kusuma, A. E., & Suciati. (2024). Improving Students' Mathematics Achievement through Differentiated Learning. Jurnal Borneo Humaniora, 32–41.

Ratnamutia, S. A., & Pujiastuti, H. (2020). Analisis Kesulitan Siswa SMP dalam Mengidentifikasi dan Menyelesaikan Soal Cerita Persamaan Linear Satu Variabel. Didaktis: Jurnal Pendidikan Dan Ilmu Pengetahuan, 20(2). https://doi.org/10.30651/didaktis.v20i2.4785

Salleh, M. F. M., Rauf, R. A. A., Saat, R. M., & Ismail, M. H. (2022). MALAYSIAN CHEMISTRY TEACHERS' CHALLENGES TO PRACTICE DIFFERENTIATED INSTRUCTION IN CLASSROOM.

Schleicher, A. (2023). PISA 2022: Insights and Interpretations. OECD.

Shim, G. T. G., Shakawi, A. M. H. A., & Azizan, F. L. (2017). Relationship between Students' Diagnostic Assessment and Achievement in a Pre-University Mathematics Course. Journal of Education and Learning, 6(4), 364–371.

Sugiyono, S. (2022). Metode Penelitian & Pengembangan Research and Development (5th ed.). Penerbit Alfabeta.

Sumirattana, S. (2017). Using realistic mathematics education and the DAPIC problem-solving process to enhance secondary school students' mathematical literacy. Kasetsart Journal of Social Sciences, 38(3), 307–315. https://doi.org/10.1016/j.kjss.2016.06.001

Syarifuddin, S., & Nurmi, N. (2022). Pembelajaran Berdiferensiasi dalam Meningkatkan Hasil Belajar Matematika Siswa Kelas IX Semester Genap SMP Negeri 1 Wera Tahun Pelajaran 2021/2022. JagoMIPA: Jurnal Pendidikan Matematika Dan IPA, 2(2), 35–44. https://doi.org/10.53299/jagomipa.v2i2.184

Tomlinson, C. (2001). How to Differentiate Instruction in Mixed Ability Classrooms.

Tomlinson, C. A. (2017). How to differentiate instruction in academically diverse classrooms. Alexandria, VA: ASCD.

Treffers, A. (1987). Three dimensions: A model of goal and theory description in mathematics instruction—The Wiskobas Project. D. Reidel ; Sold and distributed in the U.S.A. and Canada by Kluwer Academic Publishers; WorldCat.

Van Den Heuvel-Panhuizen, M., & Drijvers, P. (2020). Realistic Mathematics Education. In S. Lerman (Ed.), Encyclopedia of Mathematics Education (pp. 713–717). Springer International Publishing. https://doi.org/10.1007/978-3-030-15789-0_170

van den Heuvel-Panhuizen, M., & van Zanten, M. (2020). Realistic Mathematics Education: A Brief History of a Longstanding Reform Movement. Mediterranean Journal for Research in Mathematics Education, 17, 65–73.

Wijaya, A. (2012). Pendidikan Matematika Realistik: Suatu Alternatif Pendekatan Pembelajaran Matematika (1st ed.). Graha Ilmu.