# The Realistic Learning Model With Character Education And PISA Assessment To Improve Mathematics Literacy

*by* 62 Wardono

**Submission date:** 15-Apr-2023 05:01AM (UTC+0700)
**Submission ID:** 2064802181
**File name:** 62.pdf (68.16K)
**Word count:** 5002
**Character count:** 28777

# The Realistic Learning Model With Character Education And PISA Assessment To Improve Mathematics Literacy

**Dr. Wardono, M.Si**
Corresponding Author:
Mathematic Department, Mathematic and Natural and Sciences Faculty,
Semarang State University- Semarang 50229 - Indonesia
wardono.unnes@gmail.com
**+628156619462**

Co-Author
**Dr. Scolastika Mariani, M.Si**
Mathematic Department, Mathematic and Natural and Sciences Faculty,
Semarang State University- Semarang 50229 - Indonesia
scmariani.unnes@gmail.com
**+6281393785065**

**Abstract**

The result of the Programme for International Students Assessment (PISA) shows that the Indonesian students' performance in mathematics literacy ranks low compared by the performance of students in the other participant countries as well as in the OECD developed countries. This research raised problems: (1) How to develop valid learning devices of innovative realistic learning with character education and PISA assessment? (2) How to develop practical learning devices of innovative realistic learning with character education and PISA assessment? (3) Is the implementation of innovative realistic learning model with character education and PISA assessment able to improve the students' ability in mathematics problem solving literacy? (4) Does the quality of innovative realistic learning model with character education and PISA assessment meet at least good category?, and (5) Does the implementation of innovative realistic model with character education and PISA assessment impact on the improvement of students' character?

This research is an R&D research which developed learning devices of innovative realistic learning model with character education and PISA assessment. The learning devices include syllabus, lesson plan, students' worksheet, test of mathematics problem solving literacy, and observation sheet of students' character. The instruments used in this research are the validation sheets toward: syllabus, lesson plan, students' worksheet, test of mathematics problem solving literacy, observation sheet of students' character, observation sheet of teachers' practice, observation sheet of students' attitude, students' questionnaire, and teachers' questionnaire. The development model of learning devices refers to the modified 4-D model of Thiagarajan. The learning devices testing design used pretest-posttes control group design of true-experimental design. The population is VIII grade students of SMP N 2 Ungaran. The data analysis of validity, practicality, learning quality, and the improvement of students' character used descriptive statistics. The data analysis of effectiveness used proportion

testing and mean difference testing of students' mathematics problem solving literacy. The analysis of the improvement of students' mathematics problem solving literacy used normalized-gain (g) formula.

The research result shows that the learning devices of innovative realistic learning with character education and PISA assessment which has been developed could be categorized as valid, practical, and effective to improve the junior high school students' mathematics problem solving literacy. The result also suggests that the learning quality can be categorized as good and the students' character improves better.
Keywords: |Realistic|Education Character|PISA|Mathematics Literacy|

## 1. Introduction

The Indonesian human resource is currently in a low quality compared to the other countries. A report from Human Development Index (HDI) survey of United Nations Development Programme (UNDP) suggests that the Indonesian HDI was 0,600 in 2010 and it ranked 108 of 169 countries (Klugman, 2010: 154). The Indonesian society still face hard problems, especially related to education quality, relevance, and efficiency (Pusat Kurikulum, 2007).

One of the causes of the condition above is the low quality of education. The quality of education of a country is highly used to measure the country's development. Hall and Matthews (2008) suggests that education aspects have important role toward the progress of a country. Education is the one which promotes the quality of human resources. The Indonesian education quality, however, still has low quality compared to the other countries, as suggested in the following data: (1) The survey of Trends in International Mathematics and Sciences Study (TIMSS) ranked Indonesia at 34 of 45 countries (Rivai and Murni; 2009: 49); (2) The Programme for International Student Assessment (PISA) in mathematics ranked Indonesia at 39 of 40 countries in 2003, at 38 of 40 countries in 2006, and at 61 of 65 countries in 2009 (Kunandar; 2007: 2). This condition tells us that the ability of Indonesian students to solve problems which require the ability of analysis, reasoning, communicating effectively, and solving problems, and then interpreting the solution in various situations is still low.

One of efforts that teachers can do to promote the students' literacy to solve problems is by encouraging innovation in mathematics learning and by developing the learning assessment instrument. As recommended by Ausubel (Russefendi, 2006), mathematics learning is better conducted by using problem solving method, inquiry, and methods which can promote the critical and creative thinking. These methods enable students to relate the problem solving in mathematics, the other subjects, as well as in the real situation. The mathematics learning innovation is implemented by selecting learning method which is suitable with the material and students characteristics. This method shall be able to develop students character and to encourage students motivation in mathematics learning. One of mathematics learning model which positively impacts the students literacy in problem solving is Indonesian Realistic Mathematics Education which promotes character education. Indonesian usually call it PMRI Pendikar.

One of advantages of implementing PMRI, as quoted by Wijaya (2012: 20) is the emphasizing of learning by doing. It is suitable with the realistic mathematics learning concept suggested by

Freudenthal that "….mathematics as a human activity …" (Van Den Heuvel-Panhuizen: 1998). Students are not directly served with the abstract concepts of mathematics, but they are brought to the abstract concept through the real situation first. In PMRI, students have chance to reinvent the mathematics ideas or concepts through activities guided by teachers. The guided reinvention principle can be started from the informal problem solving, and then the reinvention process can use the formal mathematics procedures.

Beside the development of learning innovation, the development of assessment is also required in a form of test instrument. PMRI measures the students ability by using problems raised from the real situation as the learning sources. This way is in line with the way of assessment in PISA. PISA assessment use real situation based problems. PISA refers to a philosophy that mathematics is not an isolated science from human life. It emerges from and is useful for human daily life (Wijaya, 2012: 2).

PISA is a study of international students assessment organized by the *Organisation for Economic Cooperation and Development* (OECD). PISA aims to assess how well the 15 year old students possess the knowledge and skills which are important as responsible and contributing citizens (Wardhani, 2011). The subjects assessed in PISA are mathematics literacy, reading literacy, science literacy, and finance literacy. The PISA assessment is an assessment using PISA test instrument or its modification which has the same quality and orientation. The contexts also adapt the tradition, culture, and nature of Indonesia.

Indonesia has join the PISA since 2000 (Stacey, 2010b). There are eight characteristics of mathematics cognition in PISA problems, namely mathematical thinking and reasoning, mathematical argumentation, modelling, problem posing and solving, representation, symbols and formalism, communication, and the use of aids and tools (OECD, 2003). According to Hayat and Yusuf (2010), PISA assessment differs from the other assessment in terms of the following conditions: (1) PISA has orientation towards policy that design and methods of assessment and reporting are tailored to the needs of each of the participating countries in order to enable them to learn about policies through the comparison of data provided; (2) PISA uses an innovative literacy approach, it is a concept related to the learning capacity of students to apply knowledge and skills in the main subjects along with the ability to review, giving the reason and communicate them effectively, and then solve problem and interpret solutions in various situations; (3) The concept of learning in PISA is suitable with the concept of lifelong learning, namely the concept of learning that is not limited to assess student competence based on curriculum and concepts of across curriculum, but also the motivation to learn, their self-concept, and learning strategies; (4) The regular implementation of the PISA assessment allows the participating countries to monitor their progress in accordance with the learning objectives that they set.

PISA has three main dimensions, namely content, process, and situation (OECD, 2009c). The purpose of PISA is to assess the ability of students in solving the real problems, then the strategy to determine the range of content that will be assessed shall use a phenomenological approach to describe the concepts, structure, or ideas of mathematics. It means that the content and phenomena used within assessment shall relate to the type of problems that occur. This approach ensures that the focus of assessment is consistent with the definition of mathematical literacy, includes various

contents commonly found in the other mathematics assessments as well as in the national curriculum of mathematics.

The contents used in PISA are suitable with the school curriculum, namely yaitu *space and shape*, *change and relationship*, q*uantity* a*nd* u*ncertainty* (OECD, 2009c). One of the important aspects in mathematics literacy is the engagement of students in employing and doing mathematics in various situations. The methods and representation used to solve problems depend on the problem situation given. The modern mathematics education realizes that the school mathematics is closely related to the culture and tradition of local society. The context of mathematics in PISA is categorized into four groups, namely personal context, education and work related to the students activities at school and work, general context related to the use of mathematics in larger scale in daily life, and scientific context related to the scientific activities which are more abstract and require theories to solve mathematics problems.

PISA also categorized the process competence of mathematics literacy into three groups, namely reproduction, connection, and reflection (OECD, 2009c). The mathematics ability of students also categorized in six levels, from 1 as the lowest possession to 6 as the highest possession (OECD, 2009c).

The mathematics literacy is defined as the one's ability to formulate, to employ, and to interpret mathematics in various context, including the ability to reason mathematically, to use concepts, procedures, and facts in order to describe, to explain, and to predict certain phenomena. The definition of literacy is in line with the Content Santard (Standar Isi) of mathematics subject in Indonesian curriculum.

Based on the explanation above, the assessment in this research, which focus on the mathematics problem solving literacy in the development of PMRI Pendikar learning, used the PISA test instrument and its modification. The PISA problems in PMRI learning is expected to improve the students' mathematics problem solving literacy, and in the end, the achievement of Indonesian students in the future PISA will be better.

The Indonesian Ministry of Education and Culture regards the character development as the purpose and integral part of education. Character education can be developed through social interaction based on good conduct which consists of values, moral, and norms. The development of character education needs to be done in an integrated way in the educational process that does not isolate the students from the social environment. The question that arises is how to improve the ability of mathematics problem solving literacy of junior high school students' through innovative PMRI learning model with character education and PISA assessment? These are the things that show the importance of doing this research.

Preliminary study of the results of research relevant to this study as follows; (1) Sugiman and Kusumah, Y.S. (2010) has observed that there is a positive impact of learning realistic (PMRI) to increase literacy mathematical problem solving on junior high school students; (2) The results

Novita,R.(2012) has researched that learnimg by giving exercises similar PISA potential effects students in solving problems has category good; (3) A realistic learning curriculum materials (PMRI) is a supporting component development and success PMRI in support of teachers and students in a basic activity of learning mathematics (Sembiring, 2008); (4) Suherman, E.(2003: 92) has observed that "children are given a lot of problem-solving exercises have higher scores on tests of problem solving compared with a little more practice"; (5) Wardono et al (2012) have observed that the collaboration of PTK-based on innovative learning-Pendikar and realistic-PMRI can increase the competence of junior high school math teacher professionalism; (6) Carpenter, T. (1989) has observed that the studying mathematics began from the very well known concept towards the unknown, from the well known structured towards complex; (7) Nesher, P. (1886) have examined eight types of learning can be done procedurally / hierarchy in learning mathematics, the highest hierarchy are learning problem solving; (8) Ashcraft, M.H. and Elizabeth, P. K.(2001) have examined the core issue of learning to solve math problem lies in how the information obtained is stored in memory so that on the moment required easily invoked; (9) Robert, L.S. and Susan, A.R. (1979) has observed that there is a correlation between mathematical reasoning with analytical skills space. Children who have low ability in the analysis of space tend to be weak in developing mathematical concepts related to add, less, and for the times. Consequently, in interpreting the image, measure, evaluate the size, even the writing, arranging, and putting less precise figures.

Based on the background, we formulate research questions as follows: (1) How to develop the valid learning devices of innovative PMRI with character education and PISA assessment? (2) How to develop the practical learning devices of innovative PMRI with character education and PISA assessment? (3) Is the implementation of innovative PMRI with character education and PISA assessment able to improve the mathematics problem solving literacy of junior high school students? (4) Is the quality of innovative PMRI with character education and PISA assessment categorized as good? (5) Is there any improvement of students' character?

The purposes of this research are: (1) to develop innovative PMRI learning model with character education and PISA assessment which can be implemented in junior high school; (2) to develop innovative PMRI learning model with character education and PISA assessment which is valid; (3) to develop innovative PMRI learning model with character education and PISA assessment which is practical; (4) to develop innovative PMRI learning model with character education and PISA assessment which is effective; (5) to improve the skill of mathematical problem solving literacy of junior high school students by implementing innovative PMRI learning model with character education and PISA assessment; (6) to improve the quality of innovative PMRI learning with character education and PISA assessment for junior high school students to be categorized at least good; (7) to improve the students' character of discipline, creative, careful, tolerance, curiosity and honest.

The benefits of this research are the use of innovative PMRI learning model with character education and PISA assessment in order to improve the skill of mathematical problem solving literacy in junior high school, and also the use of handbook (teaching materials) that can be used for quality improvement of mathematics learning and improvement of mathematics problem solving literacy in junior high schools in Semarang regency.

## 2. Method

This is an R&D research to develop learning devices of innovative PMRI with character education and PISA assessment. The learning devices include: syllabus, lesson plan, students' worksheet, test of mathematics problem solving literacy, and observation sheet of students' character education. The research instruments include: validation sheet of syllabus, lesson plan, worksheet, test, and observation sheet of students character, observation sheet of learning quality, observation sheet of class organization, questionnaire of students responses and teacher responses.

### Research Variables

The variables within this research are: learning devices, mathematics problem solving literacy, students character, teacher ability in organizing class, students' response, teacher response, and quality of learning.

### The Development Model

The development model in this research refers to the modified development model of 4-D Thiagarajan. The modification here is the absence of the last step of 4-D model. The 4-D Thiagarajan consists of 4 steps, define, design, develop, and disseminate. This research only use the 3 steps, define, design, and develop. The define step includes front-end analysis, students analysis, topics/material analysis, task analysis, and formulate the learning purposes. The design step aims to prepare the prototype of learning devices including syllabus, lesson plan, students' worksheet, and test of mathematics problem solving literacy. The develop step includes validation and testing. The purpose of testing is gaining inputs in a form of all responses, reactions, and comments from students, teacher, and observer in order to revise the product draft. The testing design used true-experimental design with pretest-posttes control group design as shown in Table 1.

In this design, there are two groups selected randomly. He first group (X) was taught by using innovative PMRI learning model with character education and PISA assessment and we called it experiment group, while the second group (Y) was taught by using conventional learning (expository) and we called it control group.

The population in this research was the students of VIII grade of SMP N 2 Ungaran, Semarang Regency. The sample was taken by using cluster random sampling. The testing of learning devices involved two observers from mathematics teachers who observed the student

**Table 1**. Testing Design of Learning Devices

| Group | Pretest | Treatment | Posttesr |
|---|---|---|---|
| Experiment | X | PMRI with character education and PISA assessment | T<br>X' |
| Control | Y | | Y' |

involvement during the learning process. The result of the testing is then analyzed. Once we find the learning devices have not been practical and effective then there should be revision and testing again. These activities shall be repeated until we gain the effective and practical learning devices as a final product.

**Data Collection**

The data was collected by using several methods: (1) check list method, the instruments are validation sheet of syllabus, lesson plan, and test of mathematics problem solving literacy. The data is in a form of experts' statement about learning devices aspects. We gave the draft of learning devices to experts along with the validation sheet which enable experts to give responses by giving check list (√) in the appropriate column; (2) observation method, the observation sheet was used to assess the implementation of the learning, learning quality, and students character. We gave observation sheets to observer in order to give the responses based on what they observe during learning; (3) questionnaire method, this method was used to know the students and teacher responses; (4) test method, the test of mathematics problem solving literacy was made with PISA orientation in order to know the improvement of students ability in mathematics problem solving literacy.

**Data Analysis**

The data was analysis by using several techniques as follows: (1) the validation result was analyzed by using descriptive statistics; (2) the test of mathematics problem solving literacy was analyzed to determine the validity of items, reliability, discriminating power of items, and diificulty level; (3) the data of practicality was analyzed by using descriptive statistics; (4) the data of effectiveness was analyzed by using normality testing, homogeinity, one sample t-test for mathematics problem solving literacy mastery testing, and independent sample t-test for mathematics problem solving literacy of experiment and control group; (5) analysis for the improvement of mathematics problem solving literacy by using normality-gain score (*g*) (Hake, 1999: 1); (6) the analysis of learning quality by using the mean score of observation during the learning process; (7) the analysis of students character improvement by using percentage descriptive.

## 3. Result

**Result of Learning Device Validation of Innovative PMRI with Character Education and PISA Assessment**

The result of validation suggests that each of the learning devices is categorized as excellent with a little revision. The test of mathematics problem solving literacy has been revised and tested several times and finally we gain a valid, reliable, has a significant discriminating power, and a normal level of difficulty.

**Result of Practical Testing**

The results of the development of learning devices can be car=tegorized as practical, because the testing in experiment group results: (1) positive student response, it can be seen by the questionnaire result which suggest that students responded positively by 80.15% (above 75%); (2) The teacher gives a good response, it can be seen from the average results of the questionnaire responses of

teachers to the learning device is 4.06 and it can be categorized as good; and (3) The ability of teacher to organize the learning is good with a total average teacher's ability to manage the learning of 4.14 and it can be categorized as good.

**Result of Effectiveness of PMRI with Students Character and PISA Assessment**

The results of the development of learning devices can be regarded effective, because the testing results the following conditions: (1) The results of students' mathematics problem solving literacy test showed an average value of 79.66. the classical completeness test gives the result that the proportion of students who passed the test is 74.5%; (2) The mean difference test results of students' mathematics problem solving literacy test in experiment group is better than the control group.

**Result of Mathematics Problem Solving Literacy Improvement**

The calculation of gain normality shows the improvement of 0,37 in average category. It means that the students' mathematics problem solving literacy is improved from the previous performance.

**Result of Students' Character Improvement**

The results of the analysis by using descriptive statistics about the students' character which includes disciplined, creative, careful, tolerance, curiosity and honest character is increasing as shown in the percentage from the first meeting until the forth meeting respectively: 65.6% (Average), 68.8% (Average), 74% (Good) and 84.4% (Good).

## 4. Discussion

The learning devices of innovative PMRI with character education and PISA assessment is valid and practical while the learning model is effective to improve the students' mathematics problem solving literacy. These phenomena can be explained by the benefits of PMRI, as quoted by Wijaya (2012: 20), that emphasize the learning by doing. It is also suitable with the basic concepts asserted by Freudenthal that mathematics is considered as human activity (Van Den Heuvel-Panhuizenthe: 1998). The students are not directly served by the abstract concept of mathematics, but they are brought to the abstract through the interaction with the real world. Students are given opportunities to reinvent the mathematics ideas or concepts through activities under the teachers' guidance. The guided reinvention process can be started through the informal problem solving, and then move to the formal mathematics.

The PISA oriented assessment contributes to the improvement of students' mathematics problem solving literacy since PISA use the real world problems. PISA refers to the philosophy that mathematics is not an isolated science from human life, it emerges and is useful for daily life (Wijaya, 2012: 2).

PISA aims to assess how well the 15 year old students possess the knowledge and skills which are important as responsible and contributing citizens (Wardhani, 2011). The contexts of PISA also adapt the tradition, culture, and nature of Indonesia. There are eight characteristics of mathematics cognition in PISA problems, namely mathematical thinking and reasoning, mathematical

argumentation, modelling, problem posing and solving, representation, symbols and formalism, communication, and the use of aids and tools (OECD, 2003). According to Hayat and Yusuf (2010), PISA assessment differs from the other assessment in terms of the following conditions: (1) PISA has orientation towards policy that design and methods of assessment and reporting are tailored to the needs of each of the participating countries in order to enable them to learn about policies through the comparison of data provided; (2) PISA uses an innovative literacy approach, it is a concept related to the learning capacity of student to apply knowledge and skills in the main subjects along with the ability to review, giving the reason and communicate them effectively, and then solve problems and interpret solutions in various situations; (3) The concept of learning in PISA is suitable with the concept of lifelong learning, namely the concept of learning that is not limited to assess student competence based on curriculum and concepts of across curriculum, but also the motivation to learn, their self-concept, and learning strategies; (4) The regular implementation of the PISA assessment allows the participating countries to monitor their progress in accordance with the learning objectives that they set.

PISA has three main dimensions, namely content, process, and situation (OECD, 2009c). The contents used in PISA are suitable with the school curriculum, namely yaitu *space and shape*, *change and relationship*, *quantity* and *uncertainty* (OECD, 2009c). One of the important aspects in mathematics literacy is the engagement of students in employing and doing mathematics in various situations. The methods and representation used to solve problems depend on the problem situation given. The modern mathematics education realizes that the school mathematics is closely related to the culture and tradition of local society.

The context of mathematics in PISA is categorized into four groups, namely personal context, education and work related to the students activities at school and work, general context related to the use of mathematics in larger scale in daily life, and scientific context related to the scientific activities which are more abstract and require theories to solve mathematics problems.

PISA also categorized the process competence of mathematics literacy into three groups, namely reproduction, connection, and reflection (OECD, 2009c). The mathematics ability of students also categorized in six levels, from 1 as the lowest possession to 6 as the highest possession (OECD, 2009c).

## 5. Consclusion

The development of learning devices by using modified Thiagarajan has resulted the learning devices of innovative PMRI with character education and PISA assessment which is valid and practical. The innovative PMRI learning model character education and PISA assessment effectively improves the students' ability in mathematics problem solving literacy. The quality of innovative PMRI learning model with character education and PISA assessment can be categorized as good and the students' character is more developed better.

In order to improve the ability of mathematics problem solving literacy of VIII grade students of junior high school, it is recommended that teacher implements the innovative PMRI model with

character education and PISA assessment. The junior high school mathematics teacher is recommended to keep creating innovation in mathematics learning and to socialize the PISA oriented assessment so that it can help to improve the Indonesian students rank in the future PISA assessment.

**References**

Ashcraft, H. Mark dan Elizabeth ap. Akirk, 2001, "The Realitionships Among Working Memory, Math Anxiety, and Performance", *Journal of Experimental Psychology: General, Selected Article*.Th. 2001, Vol. 130. No. 2, hlm. 224-237.

Carpenter, Thomas, 1989. "Model of Problem Solving: A Study of Kindergarten Children's Problem-Solving Processes",*Journal for Research in Mathematics Education,*th 24, No. 5, Mey 1989, hlm. 428-441

Hake, R. R. 1999. *Analysing Change/Gain Score Woodland Hills Dept. of Physics*. Indiana University. http://www.physics.indiana.edu/-sdi/AnalyzingChange-Gain.pdf.

Hall, J. dan Matthews, E. 2008. The Measurement of Progress and The Role of Education. *European Journal of Education. Vol. 43 No. 1.*

Hayat, B., & Yusuf, S. 2010. *Mutu Pendidikan*. Jakarta: Bumi Aksara.

Klugman, J. 2010. *Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development*. Newyork: United Nations Development Programme, hal 154.

Kunandar. 2007. *Guru Profesional. Implementasi Kurikulum Tingkat Satuan Pendidikan (KTSP) dan Sukses dalam Sertifikasi Guru*. Jakarta : PT Raja Grafindo Persada.

Nesher, Pearla, 1986, "Learning Mathematics A Cognitive Perspective",*Journal American Psychologist,*th 41, No. 10, October 1986, hlm. 1114-1122.

Novita, Rita. 2012. Exploring Primary Student's Problem Solving Ability by Doing Tasks Like PISA'Question. *IndoMS J.M.E Vol.3 No.2 Juli 2012 hal. 133-150*

OECD. 2003. *PISA 2003 Assessment Framework*. http://www.oecd.org (16 Oktober 2012)

--------. 2009c. *PISA 2009 Assessment Framework*. http://www.oecd.org. (16 Oktober 2012)

Pusat Kurikulum. 2007. *Naskah Akademik Kajian Kebijakan Kurikulum SMK*. Departemen Pendidikan Nasional: Badan Penelitian dan Pengembangan.

Robert, L. Solso and Susan, A. Raynis, 1979 " Prototype Formation From Imaged, Kinesthetically, and Visually Presented geometric Figured, *Journal of Experimental Psychology: Human Perception and Performance,*th. 1979,Vol.5,No.4, page 701-712.

Rivai, V. dan S. Murni. 2009. *Education Management*. Jakarta : Rajawali Pers.

Russefendi, H. E. T. 2006. *Pengantar Untuk Membantu Guru Mengembangkan Kompetensinya dalam Pengajaran Matematika untuk Meningkatkan CBSA*. Bandung: Tarsito.

Sembiring, et al. 2008. *Reforming Mathematics Learning in Indonesian Classrooms through RME*. ZDM Mathematics Education (2008) 40: 927-939.

Stacey, K. 2010b. Mathematical and Scientific Literacy Around The World. *Journal of Science and Mathematics Education in Southeast Asia 2012, Vol. 33 No.1:1-16*.

Sugiman dan Kusumah, Yaya S. 2010. Dampak Pendidikan Matematika Realistik Terhadap Peningkatan Kemampuan Pemecahan Masalah Siswa SMP. *IndoMS J. M. E Vol. 1 No. 1 Juli 2010 Hal. 41-51*.

Sugiyono. 2009. *Metoda Penelitian Pendidikan*. Bandung: Alfa Beta.

Suherman, Erman. 2003. *Strategi Pembelajaran Matematika Kontemporer*. Bandung: Jurusan Pendidikan Matematika FPMIPA Universitas Pendidikan Indonesia.

Thiagarajan, S., dkk. 1974. *Instructional Development for Training Teachers of Exceptional Children, A Source Book*. Blomington: Center of Inovation on Teaching the Handicapped

Minnepolis Indiana University. Tersedia http://www.eric.ed.gov/PDFS/ED090725.pdf.(Diunduh:8 September 2010)

Van den Heuvel-Panhuizen, M. 1998. *Realistic Mathematics Education*. Work in Progress. Retrivied 11 Januari, 2013, from http://www.fi.uu.nl/en/rme.

Wardhani, S., & Rugmiati. 2011. *Instrumen Penilaian Hasil Belajar Matematika SMP: Belajar dari PISA dan TIMMS* . Yogyakarta: P4TK Matematika.

Wardono, et al 2013. *Peningkatan Literasi Matematika Melalui Pembelajaran Inovatif Berpenilaian Programme For International Student Assessment*. Makalah SNEP I disajikan pada 13 Juli 2013

Wijaya, Ariyadi. 2012. *Pendidikan Matematika Realistik: Suatu Alternatif Pendekatan Pembelajaran Matematika*. Yogyakarta: Graha Ilmu.

# The Realistic Learning Model With Character Education And PISA Assessment To Improve Mathematics Literacy

ORIGINALITY REPORT

| 18% | 11% | 16% | 2% |
|---|---|---|---|
| SIMILARITY INDEX | INTERNET SOURCES | PUBLICATIONS | STUDENT PAPERS |

PRIMARY SOURCES

| | | |
|---|---|---|
| 1 | Wardono, S Mariani, Sunarmi. "Improved professionalism of teachers through CAR based thematic integrative learning with realistic-scientific approach using e-schoology", Journal of Physics: Conference Series, 2019<br>Publication | 3% |
| 2 | ecampus.iainbatusangkar.ac.id<br>Internet Source | 2% |
| 3 | repository.lppm.unila.ac.id<br>Internet Source | 2% |
| 4 | K L Purwanti, Sukestiyarno, B Waluya, Rochmat. "Mathematical literacy ability with RME (realistic mathematics education) approach in fifth grade students", Journal of Physics: Conference Series, 2019<br>Publication | 1% |
| 5 | Khaerunisak Khaerunisak, Kartono Kartono, Isti Hidayah, Ahmad Yusril Fahmi. "THE ANALYSIS OF DIAGNOSTIC ASSESMENT | 1% |

RESULT IN PISA MATHEMATICAL LITERACY BASED ON STUDENTS SELF-EFFICACY IN RME LEARNING", Infinity Journal, 2017
Publication

| | | |
|---|---|---|
| 6 | www.e-iji.net<br>Internet Source | 1 % |
| 7 | www.semanticscholar.org<br>Internet Source | 1 % |
| 8 | I Zulkarnain, T Hidayanto, Kamaliyah. "Students mathematical literacy in solving wetlands contextual problems", Journal of Physics: Conference Series, 2021<br>Publication | 1 % |
| 9 | R Mauladaniyati, I Ramadina, MA E Cahya. "Students' mathematical problem solving ability on the subject of function limits", Journal of Physics: Conference Series, 2020<br>Publication | 1 % |
| 10 | W A Rahmawati, B Usodo, dan L Fitriana. "Mathematical Literacy Skills Students of the Junior High School in Solving PISA-Like Mathematical Problems", Journal of Physics: Conference Series, 2021<br>Publication | 1 % |
| 11 | Emi Suryani Putri. "The Developing Guided Discovery-Based Learning Device for Improving Middle School Students' | 1 % |

Mathematics Problem-Solving Ability", Jurnal Gantang, 2023
Publication

| | | |
|---|---|---|
| 12 | repo.uinsatu.ac.id<br>Internet Source | 1 % |
| 13 | S I Masrura, N Indrawati, A A Syahri, Subanji, Sukoriyanto. "Development of Metacognitive Learning Model Device oriented by HOTS to Improve Students Mathematical Literation", Journal of Physics: Conference Series, 2021<br>Publication | 1 % |
| 14 | 123dok.com<br>Internet Source | 1 % |
| 15 | Hongki Julie, Febi Sanjaya, Ant. Yudhi Anggoro. "The students' ability in the mathematical literacy for uncertainty problems on the PISA adaptation test", AIP Publishing, 2017<br>Publication | <1 % |
| 16 | Lia Aris Tantya, Syaifudin Latif Darmawan. "THE INFLUENCE OF USING THINK PAIR SHARE AND PAIRS CHECK TEHNIQUE TOWARD STUDENTS' WRITING ABILITY IN RECOUNT TEXT AT THE STUDENTS OF SMP N 2 PEKALONGAN ACADEMIC YEAR 2013/2014", PREMISE JOURNAL:ISSN online: 2442-482x, ISSN printed: 2089-3345, 2017<br>Publication | <1 % |

| | | |
|---|---|---|
| 17 | Wiwit Damayanti Lestari, Yaya Sukjaya Kusumah, Stanley Dewanto. "Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa SMP Melalui Pembelajaran Group Investigation Berbantuan Proyek", IndoMath: Indonesia Mathematics Education, 2019<br>Publication | <1 % |
| 18 | Ari Wijayanti. "Developing Learning Materials in Addition and Subtraction of Fractions with Realistic Mathematics Approach for Students Grade 4", Southeast Asian Mathematics Education Journal, 2017<br>Publication | <1 % |
| 19 | Gail E. Fitzsimons. "What Counts as Mathematics?", Springer Science and Business Media LLC, 2002<br>Publication | <1 % |
| 20 | journals.researchsynergypress.com<br>Internet Source | <1 % |
| 21 | staffnew.uny.ac.id<br>Internet Source | <1 % |
| 22 | I K Sari, A Nasriadi, M Salmina. "Students' understanding of charts: the study of PISA's problem-solving in the content of data", Journal of Physics: Conference Series, 2018<br>Publication | <1 % |

| | | |
|---|---|---|
| 23 | Y Afiyati, K Warniasih, N W Utami. "Problem-solving with guided inquiry learning: An analysis of student's problem-solving ability", Journal of Physics: Conference Series, 2020<br>Publication | <1% |

| | | | |
|---|---|---|---|
| Exclude quotes | On | Exclude matches | < 10 words |
| Exclude bibliography | On | | |