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# Correlation Of Differentiated Learning Management to Students' Numeracy Literacy Ability in Realistic Mathematics

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## Abstrak

Penelitian korelasional ini bertujuan menyelidiki hubungan antara manajemen pembelajaran diferensiasi dan kemampuan literasi numerasi siswa dalam konteks pembelajaran matematika realistik di SMP Negeri 4 Ciamis. Melalui pendekatan deskriptif kuantitatif dengan sampel siswa kelas VII, penelitian mengungkap hubungan signifikan yang sangat kuat antara kedua variabel tersebut. Temuan utama menunjukkan bahwa manajemen pembelajaran diferensiasi memberikan kontribusi sebesar 66% terhadap peningkatan kemampuan literasi numerasi siswa. Hasil analisis statistik memperlihatkan korelasi yang positif dan signifikan, mengindikasikan bahwa implementasi pembelajaran diferensiasi yang efektif berperan penting dalam pengembangan literasi numerasi. Selain itu, penelitian mengidentifikasi faktor-faktor lain yang berkontribusi sebesar 34% terhadap variasi kemampuan literasi numerasi. Kesimpulannya, penelitian ini menegaskan pentingnya penerapan manajemen pembelajaran diferensiasi yang terstruktur sebagai bagian dari strategi untuk meningkatkan literasi numerasi siswa dalam pembelajaran matematika realistik.
Kata Kunci: korelasi; manajemen pembelajaran diferensiasi; kemampuan literasi numerasi; matematika realistik

## Abstract

This correlational study aims to investigate the relationship between differentiated learning management and students' numeracy literacy skills in the context of realistic mathematics learning at SMP Negeri 4 Ciamis. Through a quantitative descriptive approach with a sample of seventh-grade students, the study revealed a powerful and significant relationship between the two variables. The main finding shows that differentiated learning management contributes 66% to the improvement of students' numeracy literacy skills. Statistical analysis results show a positive and significant correlation, indicating that the implementation of effective differentiated learning plays an important role in the development of numeracy literacy. In addition, the study identified other factors that contribute 34% to the variation in numeracy literacy skills. In conclusion, this study emphasises the importance of implementing structured differentiated learning management as part of a strategy to improve students' numeracy literacy in realistic mathematics learning.
Keywords: correlation; differentiated learning management; numeracy literacy ability; realistic mathematics


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## I. INTRODUCTION

The effort to achieve educational goals is to understand how students carry out the learning process and how teachers provide experience in learning activities (Ali & Ratnaningsih, 2023). Teachers should not only explain or transfer knowledge in the learning process, but teachers should change student behavior for the better. Education plays a very important role in the development and realization of students and their character, therefore one of the goals of education depends on the implementation of the learning process (Priatna, 2013; Saputra et al., 2022).

The development of the world of education today has begun to lead to the learning process, not only relying on results. Hartati (2015) in his journal stated that learning outcome-oriented learning becomes learning that emphasizes the learning process. Alongside the learning process in the execution of instruction and educational tasks in the classroom, it is not spared from the implementation of classroom differentiation learning management carried out by teachers. Classroom differentiation learning management is a key aspect of education that often becomes the primary concern when initiating a learning activity. This includes prospective teachers, new teachers, and learning administration, encompassing materials such as syllabi, learning Implementation Plans, Student Activity Sheets, assessment instruments, assessment rubrics, and test analysis results (Haelermans, 2022).

Classroom management encompasses all efforts aimed at creating conditions and situations that facilitate effective and enjoyable teaching and learning activities, thereby motivating students to learn well according to their abilities (Rachman, 1999; Ismail et al., 2022). The objectives of classroom management according to Rachman 1999 (Ridwan et al., 2022) are: a) creating classroom circumstances and factors, both as a source of education surroundings and as a group focused on learning, which enables students to enhance their skills to the maximum extent; b) remove different barriers that may obstruct the achievement of learning interactions; c) supply and organize resources and educational tools or materials that assist and empower students to acquire knowledge in line with the social, emotional, and cognitive atmosphere of learners in studying; d) fostering and guiding students in accordance with their social, economic, cultural background and individual characteristics.

Differentiated instruction is not a program, method, or strategy (Ayuningtyas & Nurafni, 2025). This is a way of thinking, a philosophy of how to respond to student differences. According to Heacox (in Suwartiningsih 2021), differentiated learning responds explicitly to students' learning progress continuously, taking into account what they already know and what they have learned. If it is likened to a food menu, in differentiated learning, each individual will get a learning menu that suits their tastes. Learning is designed to allow students to enjoy their favorite learning menu while still meeting all necessary nutrition and learning objectives (Sumer, 2021).


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Judging from the curriculum changes that are currently being implemented, the realistic mathematics approach is one of the learning approaches that is in accordance with these changes. According to Nuraida (2019) and Hamid and Afriansyah (2024), Realistic Mathematics Education (RME), a realistic mathematical approach, was developed by Freudenthal, who believed that mathematics is a human action that emphasizes student initiatives to explore, discover, and develop essential understanding for effective learning. This approach focuses on students.

Mathematics education that employs a practical approach (Khairani et al., 2024). The mathematical method does not begin with formal mathematics instruction; instead, it values and recognizes the significance of math as a human activity (Afriansyah et al., 2023). The learning process occurs step by step, utilizing the foundational understanding of mathematics that learners already possess. This process showcases issues and outcomes achieved through vertical and horizontal mathematization, referred to as mathematical progression. In the fundamentals of realism mathematics education, lateral Mathematization involves three tiers, specifically: (1) mathematical realm direction; (2) substance framework; (3) construction relation of stone numbers. Vertical mathematization is an activity that uses formal mathematical notation, with its level described by Frans Moerlands as shown in the following:

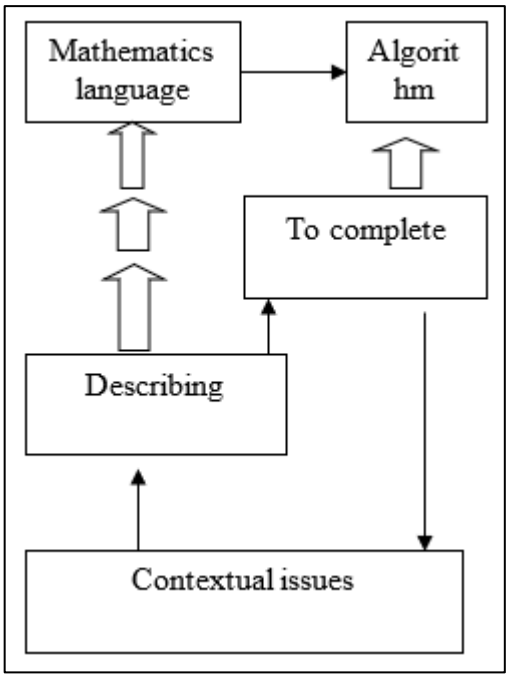

Figure 1. Vertical mathematization by Frans Moerlands

Each contextual problem is designed to involve students in mathematical discourse, exploring, and developing their own strategies in solving problems through appropriate mathematical tools, working collaboratively, and discovering mathematical concepts and objects on their own through a guided discovery process.

RME is an instructional method that begins with aspects that are 'genuine' for learners, highlighting procedural abilities, talking about and working together, debating with peers, so that they may discover their personal ideas within resolving mathematical equations (Latifah et al., 2022). One of the primary principles of RME includes Guided Reinvention or directed creation. In line with the principle of transformation in mathematics education, it is essential to work hard to ensure that students possess expertise in


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uncovering different ideas, principles, or methods independently, alongside the direction of educators. (Nuraida, 2017).

Differentiated instruction is not a curriculum, approach, or tactic. This is a way of thinking, a philosophy of how to respond to student differences. According to Heacox (in Candra Ditasona 2017: 45), differentiated learning responds explicitly to students' learning progress continuously, taking into account what they already know, and what they have learned. If it is likened to a food menu, in differentiated learning, each individual will get a learning menu that suits their tastes. Learning is designed to allow students to enjoy their favorite learning menu while still meeting all necessary nutrition and learning objectives.

Based on the above discussion about differentiated learning management and realistic mathematics, the researcher aims to explore the relationship between differentiated learning management and student numeracy literacy. This study examines the correlation between classroom differentiated learning management and students' numeracy literacy ability. Numerical literacy here is numeracy literacy in learning mathematics. Mathematical Literacy skills refer to students' capacity to create, use, and understand mathematical concepts. Mathematics is applied across various situations, incorporating mathematical reasoning and utilizing mathematical ideas, methods, and information.

Exploring mathematical literacy skills in students is crucial during the mathematics learning process, as it significantly impacts their mathematical literacy. This requires students to examine, think critically, and convey concepts effectively in response to the mathematical challenges they encounter (OECD, 2009).

Literacy closely related to daily life is numeracy literacy. Numeracy refers to the ability to understand and work with numbers. Knowledge and expertise (a) utilizing a range of numerals and signs associated with fundamental mathematics for addressing real-world issues in different everyday life situations (b) examining data presented in different formats (graphs, tables, charts, etc.) (c) utilizing these explanations to forecast and make choices (OECD, 2016). The definition of numeracy, as quoted from the 2020 Ministry of Education and Culture Assessment and Learning Center, refers to the ability to think using concepts, procedures, facts, and mathematical tools to solve everyday problems in various contexts relevant to individuals as Indonesian citizens and citizens of the world. Therefore, numeracy and mathematics are two inseparable subjects that can be used to solve human life problems. For instance, when shopping or planning the construction of a house, numeracy is essential for making informed decisions. (Ayuningtyas, 2020).

Numeracy includes three components that encompass numeracy relationships, counting, and arithmetic operations (Purpura, 2009). These three elements are fundamental aspects of learning mathematics that should be introduced early on until children reach the lower grade levels. (Jordan, et al., 2009).

Literacy and numeracy are connected to the capability to examine data presented in


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diverse formats, including graphics, tables, and graphs, and then utilize the interpretation of the analysis results to forecast and determine actions. In straightforward terms, numeracy refers to the ability to apply numerical concepts and skills in daily life, including calculation operations and understanding the numerical data that surrounds us. (Ministry of Education and Culture 2017).

This capability is demonstrated by feeling at ease with figures and the ability to utilize mathematical skills effectively to fulfill the challenges of existence. This skill likewise pertains to the recognition and comprehension of information expressed mathematically, like graphs, charts, and tables. Numeracy differs from mathematics. Ability. Both are founded on the same principles. Understanding and abilities exist, yet the distinction lies in the strengthening of these understandings and abilities. Only mathematical knowledge does not ensure a person possesses numeracy abilities. Numeracy encompasses the ability to utilize mathematical principles and regulations.

These abilities emerge when the issue is frequent. Unstructured, offers numerous solutions, or even without a complete answer, and is connected to factors that are not mathematical.

## II. METHOD

This study employs descriptive research to describe a situation that occurs based on facts during research at SMP Negeri 4 Ciamis.

The type of research employed in this study is correlational research to examine if there is a relationship between differentiated learning management in the classroom and authentic mathematics learning outcomes of middle school students. The participants in this research are all grade 7 students from the sample, comprising two classes. Through population sampling, the implementation technique involves taking all samples from the population.

This study analyzed the validity and reliability of data collection tools, specifically attitude scales, questionnaires, and test results, to examine the correlation between classroom differentiation, learning management, and students' numeracy literacy ability in realistic mathematics learning. The research procedure carried out includes the following stages: 1) the preparation stage; 2) the implementation stage; 3) the data analysis stage.

The preparation stage includes: a) carrying out observations; b) preparing the main and supporting learning tools in the form of test instruments, student activity sheets, and class VII learning implementation plans; c) preparing supporting instruments for attitude scales/questionnaires.

The implementation stage includes: a) taking research samples and determining the research schedule that is adjusted to the mathematics learning schedule at the school; b) Carry out mathematics learning with the management of learning differentiation of research classes; c) giving test questions to classes that have implemented realistic mathematics learning with classroom differentiation


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learning management; d) providing questionnaires to grade VII students; e) collect the results of the mathematics test in the form of scores after the implementation of mathematics learning.

The stage of data analysis encompasses: The phase of data analysis in this research comprises: a) scoring the results of the questionnaire; b) calculate the average student learning outcomes; c) calculate the correlation of classroom differentiation learning management to students' numeracy literacy ability in realistic mathematics learning; d) calculate the percentage of correlation strength; e) make conclusions based on correlation calculations and analysis of questionnaire results.

To analyze the first sub-problem, which examines the correlation between classroom differentiation, learning management, and mathematics learning achievement in realistic mathematics learning in SMP Negeri 4 Ciamis, the following formula was used (Sugiyono, 2007).

$$r_{xy} = \frac{n\Sigma XY - \Sigma X \Sigma Y}{\sqrt{[n\Sigma X^2 - (\Sigma X)^2][n\Sigma Y^2 - (\Sigma Y)^2}}$$

Dimana :
r = Pearson r correlation coefficient
N = jumlah sampel

Table 1.
Interpretation Of Koefisien Korelation

| Interval | Interpretation |
|---|---|
| 0 - 0,199 | Very weak |
| 0,20-0,399 | Weak |
| 0,40-0,599 | Currently |
| 0,60-0,799 | Strong |
| 0,80-1,0 | Very strong |

After calculating the correlation coefficient, the researcher conducts a hypothesis analysis, with the criteria for testing the hypothesis:

1) If rxy counts more than rxy tail, then Ha is accepted and H0 is dismissed, there is a significant relationship between the implementation of classroom differentiation, learning management, and mathematics learning achievement in realistic mathematics learning in grade VII of SMP Negeri 4 Ciamis.

2) If rxy calculates less than the rxy table, Ha is rejected and H0 is accepted, meaning that there is no relationship between classroom differentiation, learning management, and students' numeracy literacy ability in realistic mathematics learning in grade VII at SMP Negeri 4 Ciamis.

To analyze sub-problem two related to how much differentiated learning management contributes to students' numeracy literacy ability in realistic mathematics learning, using the formula:

$$KD = r^2 x 100\%$$

Where KD = coefficient of determination

To analyze sub-problem three related to other factors that affect learning management differentiation on numeracy literacy ability in realistic mathematics learning, using the formula:

$$Other\ Factor = 100\% - K$$

## III. RESULT AND DISCUSSION

The research was conducted at SMP Negeri 4 Ciamis, located in Ciamis Regency, with a sample of 10 grade VII students. The calculation of the Correlation of Product Moment, which assesses the correlation between classroom differential learning management and numeracy literacy ability


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in realistic mathematics learning, is based on data from respondents' results and student scores. The table of respondents' values and data is presented as follows:

Table 2.
Respondent data and Student Score data

| No Subject | Data Respondent | Student Score |
|---|---|---|
| 1 | 74 | 77 |
| 2 | 73 | 76 |
| 3 | 71 | 73 |
| 4 | 69 | 68 |
| 5 | 65 | 74 |
| 6 | 70 | 74 |
| 7 | 68 | 73 |
| 8 | 80 | 80 |
| 9 | 76 | 76 |
| 10 | 64 | 68 |

According to the outcomes of the analysis conducted with SPSS 23 software, the input is obtained as follows.

Table 3.
Outcome of the analysis

| | | Differentiation learning management | Literasi Numerasi |
|---|---|---|---|
| Differentiation learning management | Pearson Correlation | 1 | .806** |
| | Sig. (2-tailed) | | .005 |
| | N | 10 | 10 |
| Literacy Numeracy | Pearson Correlation | .806** | 1 |
| | Sig. (2-tailed) | .005 | |
| | N | 10 | 10 |

**. Correlation is significant at the 0.01 level (2-tailed).

## IV. CONCLUSION

The conclusion of this study are: The correlation power obtained from the calculation results using the Correlation Coefficient formula, the result is that classroom differentiation learning management is positively correlated with numeracy literacy ability in realistic mathematics learning at SMP Negeri 4 Ciamis, with a robust correlation criterion, namely a correlation number of 0.81; The contribution of classroom diphenated learning management to numeracy literacy ability in realistic mathematics learning is 66%. For percentages using the KD formula, which is to square the results of the correlation coefficient and multiply the result by 100%, a result of 0.66% is obtained; and Other factors that affect the correlation between classroom differentiation, learning management, and students' numeracy literacy ability in realistic mathematics learning by 34%

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