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**The Effect of the MMP (Missouri Mathematics Project) Learning Model on Mathematical Literacy Skills in a Gender Perspective at Senior High School 7 Pinrang**

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**Abstract**

The low mathematical literacy ability is caused by learning activities that are more educator-centered. Understudies are less dynamic in the growing experience, as a result of which students have difficulty in solving mathematical problems. So that new innovations in learning are needed to develop these capabilities. This study aims to determine the influence of the MMP (Missouri Mathematics Project) learning model on mathematical literacy skills in a gender perspective. This research method is quantitative research with the quasy experimental design type. The data collection technique carried out is through tests and documentation. The data analysis technique uses two-path variance analysis (ANAVA). The results of this study show that there is an influence on differences in the mathematical literacy ability of students who are taught using the Missouri Mathematics Project model. There is no influence between male and female genders on the mathematical literacy ability of students. There is no interaction between learning models and gender differences in mathematical literacy skills. The mathematical literacy ability of male learners who use the Missouri Mathematics Project learning model is higher than the mathematical literacy ability of students who use the Direct Instruction learning model. The mathematical literacy ability of female students who use the Missouri Mathematics Project learning model is higher than the mathematical literacy ability of students who use the Direct Instruction learning model.

**Keywords**: Gender; Mathematical Literacy Skills; Missouri Mathematics Project

**Abstrak**

Kurangnya kemampuan literasi matematika dikarenakan oleh proses belajar yang lebih monoton pada guru. Kurangnya keaktifan siswa dalam proses pembelajaran menyebabkan mereka kesulitan dalam menyelesaikan soal matematika. Studi ini akan menentukan apakah MMP (*Missouri Mathematics Project)* dapat mengembangkan keterampilan literasi matematika lebih efektif daripada model pembelajaran langsung. Selain itu, akan diekplorasi bagaimana gender mempengaruhi efektifitas MMP. Metode yang peneliti gunakan adalah kuantitatif dengan desain *Quaisy Experimental.* Sebanyak 70 siswa yang dijadikan sebagai sampel diambil dengan teknik simple random sampling, Pengumpulan data dilakukan melalui tes dan dokumentasi. Teknik analisis data menggunakan analisis varians dua jalur. Penelitian tersebut menemukan bahwa siswa yang diajar dengan model pembelajaran *Missouri Mathematics Project* lebih melek matematika dibandingkan siswa yang diajarkan menggunakan pembelajaran langsung. Kemampuan literasi matematika siswa perempuan lebih tinggi daripada laki-laki. Tidak ada interaksi antara gender terhadap kemampuan literasi matematis. Kemampuan literasi matematika siswa laki-laki yang menerapkan *Missouri Mathematics Project* dibandingkan dengan yang menerapkan pembelajaran langsung. Kemampuan literasi matematika siswa perempuan dengan menerapkan *Missouri Mathematics Project* lebih tinggi dibandingkan kemmapuan siswa yang menerapkan pembelajaran langsung.

**Kata Kunci**: Gender; Kemampuan Literasi Matematis; Missouri Mathematics Project

**Introduction**

Math is a widespread science that underlies the imlopment of current innovation. Arithmetic education is an effort to improve students' mathematical abilities and intelligence. The mathematical abilities in question are numerical thinking, numerical portrayal, numerical associations, numerical correspondence and numerical critical thinking. The development of this mathematical ability is a supporter of mathematical literacy skills (M. Yusuf T, 2016).

 Kusumah suggested that literacy is related to written communication skills, namely the ability to write and the ability to read. Mathematical literacy ability is an individual's ability to formulate, use, interpret mathematics in various contexts(Ahmad Khoirudin, Rina Dwi Setyawati, 2017). Several studies related to mathematical literacy ability say that with mathematical literacy skills, humans can solve problems related to various contexts in life mathematically according to mathematical principles (Hayati, TR, & Kamid, 2019).

Based on the results of research by “The Trends in International Mathematics and Science Study (TIMSS) in 2018, out of three categories grouped, namely countries with above average achievements, countries with average achievements, and countries with below average achievements. , Indonesia is in the third category. Then in the results of the Program for International Student Assessment (PISA) in 2012-2018, Indonesia was ranked 73 out of 78 participating countries with a student math score of 379 (highest score = 591). This shows that the mathematical literacy ability of Indonesian students is still very low compared to other countries” (Masfufah, Risma, 2021).

One of the skills needed in the global era is mathematical literacy. Mathematical literacy skills need to be developed, considered, and built in students, through mathematical literacy students can think mathematically that occurs in the learning process (Habibi, 2020). The literacy abilities of students are also different, one of the factors that can affect mathematical literacy skills is gender differences. Gender is the nature and behavior or division of roles as explained that there are differences in gender, knowledge, behavior, attitudes, personality, abilities and so on. According to the American Psychological Association, based on a recent analysis of international research, women around the world are no worse off in math than men, even though men have more confidence than women in math (Hasanusi, 2018).

One of the targets of learning arithmetic is to maximize student learning outcomes which are still relatively low. Through mathematical literacy, students can reason mathematically in the learning process (Fithri Mujulifah, Sugiatno, 2015). Therefore, learning mathematics in schools should aim to develop mathematical literacy and improve each student's ability to use and apply mathematical knowledge to solve real-life problems or situations (Sumirattana, 2017).

Based on the results of an interview with a mathematics teacher for class X MIPA at SMA Negeri 7 Pinrang on Saturday, April 2, 2022, it was stated that the mathematical literacy ability of male and female students was still relatively low due to the lack of students' understanding of math problems, and still Many students have not been able to solve the problems given. In the learning process, students quickly get bored of receiving material so that students are not actively involved during the learning activities (Ummu Salma Rasak S.Pd, “Observations and Interviews,” 02 April 2022).This is because students rarely ask questions when they do not understand the problems given by the teacher. So that students are passive, this passive nature causes teachers to not know the extent of students' understanding and mathematical reasoning abilities to the problems given.

Knowing the problems above, educators can apply good learning models such as the MMP learning model. The Missouri Mathematics Project learning model is a learning model developed by Thomas L. Good and Douglas Grows. They defined the Missouri Mathematics Project (MMP) as follows; “The Missouri Mathematics Project or MMP is a program designed to help teacher use practices that have been identified from earlier correlation research to be characteristic of teachers whose student made outstanding gains in achievement”. The definition says that the Missouri Mathematics Project (MMP) is a program designed to assist teachers in the effective use of exercises so that students achieve extraordinary improvements (Laila Fitriana, Kartika Endah Fatmawati, 2019).

The Missouri Mathematics Project Learning Model has five stages, specifically survey, improvement, controlled work out, seatwork/ autonomous work and tasks. At the survey stage, the teacher reviews the past learning materials related to the material to be studied. The development stage is carrying out activities in the form of presenting new ideas, discussions related to the continuation of the previous material. In a controlled exercise, students are asked to form a group to answer questions or questions that are given under supervision by the teacher. In the seatwork stage, students are given questions as an exercise in expanding the concept of the material that has been studied in order to find out how much material understand the students. The assignment stage of students and teachers both provide conclusions on the material that has been studied. In addition, the teacher also gives assignments to students in the form of homework as an additional exercise (Meri Ismi Susanti, Hobri, 2014).

Based on the descriptions above, the authors are interested in applying the MMP learning model with the expectation that the learning interaction can be more enjoyable and can further develop the numerical proficiency abilities of both male and female students. So the title of this research is the impact of the MMP (Missouri Mathematics Project) learning model on mathematical literacy skills in a gender perspective at SMA Negeri 7 Pinrang.

**Method**

This examination is an exploratory research. The kind of trial utilizes is Quasy Experimental Design. The purpose of the Quasy Experimental Design research is to investigate possible causal relationships by using treatments and comparing the results with the untreated control group (I Putu Ade Andre Payandnya, 2018).

Design sthatused in this study is a factorial design $2×2 $by taking two classes from the population, in particular the exploratory class and the control class. The exploratory class was dealt with utilizing the MMP learning model and the control class was dealt with utilizing the immediate guidance model. The factorial plan of this study should be visible in table 2.

|  |
| --- |
| Table 2. Study factorial design |
| moderator variable | Learning model |
|  | *Missouri Mathematics Project*$(A\_{1})$Treatment variable | *Direct Instruction*$(A\_{2})$ |
| Man$(B\_{1})$ | $$A\_{1}B\_{1}$$$$\left[X,Y\right]\_{11k}$$$$k=1,2,…,n\_{11}$$ | $$A\_{1}B\_{2}$$$$\left[X,Y\right]\_{21k}$$$$k=1,2,…,n\_{22}$$ |
| Woman$(B\_{2})$ | $$A\_{2}B\_{1}$$$$\left[X,Y\right]\_{12k}$$$$k=1,2,…,n\_{12}$$ | $$A\_{2}B\_{2}$$$$\left[X,Y\right]\_{22k}$$$$k=1,2,…,n\_{22}$$ |

Description :

 $A\_{1}$ : *Missouri Mathematics Project* learning model

$A\_{2}$: Direct Instruction learning model

 $B\_{1}$ : male student

 $B\_{2}$ : female student

 $A\_{1}B\_{1}$ : the group using the MMP learning model with male gender.

$A\_{1}B\_{2}$ : the group using the MMP learning model with female gender.

$A\_{2}B\_{1}$ : the group using the direct instruction model with male gender.

$A\_{2}B\_{2}$ : the group using the direct instruction model with female gender.

X : students’ mathematical literacy scores before getting treatment.

Y : math literacy score learners after getting treatment.

k : sample group.

Based on the data and data analysis, this research is a quantitative exploration. Because the data collected is in the form of numbers. Quantitative research was used in this study because it was in accordance with the purpose of the study, namely to obtain data related to the math literacy abilities of male and female students in class X MIPA at SMA Negeri 7 Pinrang. To determine the effect of the data variables, the analysis data technique used two-way analysis of variance.

The variables used in this study are independent variables and dependent variables. The independent variable is a variable that affects the ability of students or is called variable X. The independent variable (X) in this study is the MMP learning model and gender differences (the dependent variable is the variable that is influenced or the aspect measured in the This research is commonly referred to as the Y variable. The dependent variable (Y) in this study is mathematic literacy. The instruments used in this research are math literacy test questions and documentation.$X\_{1}X\_{2})$

The data analysis technique in this study was carried out by testing the prerequisite hypotheses, namely using the normality test and homogeneity test. After the prerequisite tests for normality and homogeneity are met, it is possible to test the hypothesis using two-way ANOVA.

**Results**

The data collected in this study was in the form of test data for students' mathematical literacy skills on trigonometry material. This test was given to 70 students who were divided into 2 classes, namely 35 people from the experimental class and 35 people from the control class. However, before taking the test, the researcher first carried out learning activities for 4 meetings in the experimental class using the MMP learning model and using the direct instruction model in the control class.

1. Description of observed data
* The results of observations on the implementation of mathematics learning through the MMP learning model

The results of observations on the implementation of learning using the MMP learning model on trigonometry material can be seen in Table 3.

|  |
| --- |
| Table 3. Description of the implementation of mathematics learning using the MMP learning model |
| **the meeting** | **Percentage of Learning Implementation** | **Average** |
| Teacher activities | Student activities |
| 1 | 92.30% | 87.50% | 89.90% |
| 2 | 96.15% | 91.66% | 93.91% |
| 3 | 96.15% | 91.66% | 93.91% |
| 4 | 98.07% | 100% | 99.04% |
| Average | 95.67% | 92.70% | 94.19% |
| Category | Very good |

 Based on Table 3, the average percentage of learning implementation carried out for all meetings is 94.19% with a very good category.

* The results of students' mathematical literacy skills

After the data from the variable results are collected, it is then used for testing research hypotheses. Complete data on the summary of students' mathematical literacy scores for each group is presented in table 4.

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| --- |
| Table 4.Data on students' mathematical literacy test scores based on statistical measures. |
| **Gender (B)** | **Learning model** | $$Σ$$ |
| **Missouri Mathematics Project (A1)** | **Direct Instruction (A2)** |
| **Xi** | **Yi** | **Xi** | **Yi** | **Xi** | **Yi** |
| **Male (B1)** | N | 11 | 11 | 10 | 10 | 21 | 21 |
| Min | 65 | 80 | 60 | 75 | 60 | 75 |
| Max | 80 | 95 | 75 | 85 | 80 | 95 |
| Mo | 70 | 80 | 72 | 75 | 70 | 80 |
| Me | 70 | 84 | 70,50 | 80 | 70 | 81 |
| SD | 6.12 | 5.20 | 4.49 | 4.08 | 5.64 | 5.43 |
| $$\overline{X}/\overline{Y}$$ | 73.09 | 85.00 | 69,20 | 79.30 | 71.24 | 82.29 |
| **Female (B2)** | N | 24 | 24 | 25 | 25 | 49 | 49 |
| Min | 68 | 83 | 65 | 75 | 65 | 75 |
| Max | 95 | 100 | 89 | 95 | 95 | 100 |
| Mo | 75 | 90 | 75 | 90 | 75 | 90 |
| Me | 79.5 | 91 | 75 | 84 | 79 | 89 |
| SD | 6.98 | 5.18 | 5.86 | 4.88 | 6.74 | 6.39 |
| $$\overline{X}/\overline{Y}$$ | 80.42 | 92.33 | 76.04 | 84.40 | 78.18 | 88.29 |
| $$Σ$$ | N | 35 | 35 | 35 | 35 | 70 | 70 |
| Min | 65 | 80 | 60 | 75 | 60 | 75 |
| Max | 95 | 100 | 89 | 95 | 95 | 100 |
| Mo | 79 | 90 | 72 | 75 | 75 | 90 |
| Me | 79 | 90 | 72 | 82 | 75 | 85 |
| SD | 7.47 | 6.17 | 6.27 | 5.17 | 7.14 | 6.68 |
| $$\overline{X}/\overline{Y}$$ | 78.11 | 90.03 | 74.09 | 82.94 | 76.10 | 86.49 |

1. Testing requirements analysis
2. Normality test by group

Test the normality of the data using liliefors on the results of the mathematical literacy ability test of students carried out in each data group, namely the experimental class and the control class. The normality test data are presented in table 5 below:

|  |
| --- |
| Table 5. Normality test by group |
| Literacy Ability Test Results | Group | Statistics | df | Sig. |
| $$A\_{1}$$ | .104 | 35 | .200\* |
| $$A\_{2}$$ | .117 | 35 | .200\* |
| $$B\_{1}$$ | .146 | 21 | .200\* |
| $$B\_{2}$$ | .129 | 49 | .102 |
| $$A\_{1}B\_{1}$$ | .173 | 11 | .200\* |
| $$A\_{1}B\_{2}$$ | .174 | 24 | .078 |
| $$A\_{2}B\_{1}$$ | .254 | 10 | .067 |
| $$A\_{2}B\_{2}$$ | .131 | 25 | .200\* |

 Fromthe results of the normality test that were tested using SPSS, conclusions were drawn by paying attention to the column sig > 0.05 then the data stated that for each group was accepted or normally distributed.

1. Homogeneity test of variance by class

The purpose of using the homogeneity test is to determine whether the sample has the same variances or not. Homogeneity test was conducted between the experimental class and the control class. In this homogeneity test using the homogeneity of variances test with the application of IMB SPSS Statistic 25 for Windows at a significance level of 5% or 0.05. The statistical requirement is the fulfillment of a homogeneous distribution with sig > 0.05 then$H\_{0}$received from the calculation of the homogeneity test of mathematical literacy skills based on class, the value of sig = 0.335 is obtained. Based on the results of these calculations indicate that the value of 0.335> 0.05 means$H\_{0}$accepted or it can be concluded that the data comes from a homogeneous population.

1. Homogeneity test by gender

The homogeneity test based on gender was conducted between the experimental class (male and female students) and the control class (male and female students). The homogeneity test was carried out using the homogeneity of variances test with the IMB SPSS Statistic 25 for Windows application with a significance level of 5% or 0.05. The statistical requirement is the fulfillment of a homogeneous distribution with sig > 0.05 then$H\_{0}$received. From the calculation of the homogeneity test of mathematical literacy skills based on gender, the value of sig = 0.307 is obtained. Based on the results of these calculations indicate that the value of 0.307 > 0.05 means that it is accepted or it can be concluded that the data comes from a homogeneous population.$H\_{0}$

1. Barlett test

The test uses the Barlett test to test the homogeneity of variance of the four groups, namely$A\_{1}B\_{1}, A\_{1}B\_{2}, A\_{2}B\_{1}, dan A\_{2}B\_{2}$This is done through an examination of the variance of students' mathematical literacy ability test scores. This test is carried out using the SPSS application with the decision-making criteria, namely if Sig> 0.05 then the data is homogeneous. Based on the calculation of the Barlett test for the homogeneity test of the four sample groups, the value of Sig = 0.868, which means Sig > 0.05. So it can be concluded that the data for the four groups are homogeneous.

1. Hypothesis test

The hypothesis test in this study is related to the mind effect of the independent variables, namely the Missouri Mathematics Project and Direct Instruction learning models. In addition, hypothesis testing is also related to testing the interaction between the MMP learning model and gender differences on students' mathematical literacy abilities. The data analysis technique used in testing this research hypothesis is the ANOVA treatment by test$ 2×2$.

The results of the analysis of variance in the two-way analysis of variance table show that the variance based on the learning model is obtained by a Sig value of 0.000, meaning that the Sig value <0.05 is rejected. It can be concluded that there are differences in students' mathematical literacy skills between students who are taught using the MMP learning model and students who use the Direct Instruction learning model. The results of the analysis of variance on the learning model can be seen that students who use the MMP learning model in the experimental class get a higher average score than the control class students. So that the MMP learning model is better to apply than using the direct learning model $H\_{0}$

Result analysis of variance based on gender obtained a Sig value of 0.000, meaning that a Sig value <0.05 is accepted. So it can be concluded that there is no effect of male and female gender differences on students' mathematical literacy abilities. The results of the interaction between the learning model and gender obtained a Sig value of 0.389. This means that the value of Sig> 0.05 is accepted. So there is no interaction between learning models and gender differences on students' mathematical literacy abilities.$H\_{1}H\_{0}$

The results of the analysis of variance based on the learning model for male students obtained a Sig value of 0.012, meaning that the value of Sig < 0.05 was accepted. It can be concluded that there is an effect of learning models in the experimental class and control class on male students on mathematical literacy abilities. The results of the analysis of variance based on the learning model for female students obtained a Sig value of 0.000, meaning that the value of Sig <0.05 was rejected. It can be concluded that there is an effect of learning models in the experimental class and control class on female students on mathematical literacy skills.$H\_{1}H\_{0}$

**Discussion**

There is three things are discussed in this study, namely gender, mathematical literacy skills, and the MMP learning model. This research is viewed from learning outcomes, mathematical literacy skills, and the influence of learning models.

Based on the results of hypothesis testing, it was found that the Missouri Mathematics Project learning model could improve students' mathematical literacy skills. The Missouri Mathematics Project is also a learning model that is able to train students to be more active and independent in completing the given practice questions. The results of this study also follow the results of research conducted by (Komalia et al., 2016) where the MMP learning model makes students more independent in solving contextual problems that exist in everyday life. So that students have a great opportunity to build their own knowledge. The stages in the MMP learning model play a role in improving student learning outcomes. Learning activities with this learning model involve students more actively both individually and in groups in solving the problems given.

The application of the MMP learning model can improve the results of students' mathematical literacy skills. In the application of the learning model, the teacher must actively guide students in group and individual activities so that students are more active in the learning process. Missouri Mathematics Project is a program designed to assist teachers in learning effectiveness by using exercises so that students achieve extraordinary progress (Laila Fitriana, Kartika Endah Fatmawati, 2019). The MMP learning model involves students actively, both individually and in groups, in solving a given problem.

Learning using the Missouri Mathematics Project provides relaxation time so that students do not feel bored and are not pressured when learning mathematics. In this learning model, there are stages where students and teachers review the material that has been studied. Then, students also provide conclusions at the end of the lesson related to the material that has been studied. Learning using the Missouri Mathematics Project is fun but still challenging. So that the mathematical literacy skills of both male and female students can be managed properly.

There is a difference in effectiveness between learning using the MMP model with Direct Instruction in both classes after being given treatment. Learning with the MMP model is more effective than Direct Instruction in terms of gender and mathematical literacy skills. Descriptively it is known that the average score in the experimental class (MMP) is higher than the average score in the control class (Direct Instruction).

**Conclusion**

Based on the data analysis and hypothesis testing that have been carried out, it can be concluded that the first is the influence of the MMP (Missouri Mathematics Project) learning model on students' mathematical literacy abilities. Second, there is no different effect on literacy skills between the gender of male and female students. Third, there is no interaction between the MMP learning model and gender differences on students' mathematical literacy abilities. Fourth, there is the influence of the Missouri Mathematics Project and Direct Instruction learning models on male students on mathematical literacy skills.

**References**

Ahmad Khoirudin, Rina Dwi Setyawati, & F. N. (2017). Profil Kemampuan Literasi Matematika Siswa Berkemampuan Matematis Rendah Dalam Menyelesaikan Soal Berbentuk PISA. *Pendidikan Matematika Universitas PGRI Semarang*, *Vol.8*, *No.*, h.33-42.

Fithri Mujulifah, Sugiatno, H. (2015). Literasi Matematis Siswa Dalam Menyederhanakan Ekspresi Aljabar. *Jurnal Program Studi Pendidikan Matematika FKIP Untan, Pontianak*, *2*.

Habibi, & S. (2020). Literasi Matematika dalam Menyambut PISA 2021 Berdasarkan Kecakapan Abad 2021. *Jurnal Kajian Pendidikan Matematika*, *Vol.6 No.1*, h.58.

Hasanusi, F. S. (2018). Kemampuan Tingkat Gender Siswa terhadap Hasil Belajar Matematika Kelas XII SMA Negeri 1 Ketapang Kalimantan Barat. *Universitas Indraprasta PGRI*, 130–142.

Hayati, T. R., & Kamid, K. (2019). Analysis of Mathematical Literacy Processes in High School Students. *International Journal of Trends in Mathematics Education Research*, *Vol.2 No.3*, h.116.

Jayantika, I. P. A. A. P. & I. G. A. N. T. (2018). *Panduan Penelitian Eksperimen Beserta Analisis Statistik dengan SPSS*. Deepublish.

Komalia, K., Waluya, S. B., Sri, T., & Asih, N. (2016). *Kemampuan Literasi Matematika Siswa dengan Model Pembelajaran Missouri Mathematics Project dengan pendekatan RME*.

Laila Fitriana, Kartika Endah Fatmawati, S. (2019). Eksperimentasi Model Pembelajaran Missouri Mathematics Project (MMP) dengan pendekatan Open-Ended pada materi teorema pythagoras Ditinjau dari kemampuan penalaran siswa kelas VIII SMP Negeri 3 Mojosongo. *Jurnal Pendidikan Matematika Dan Matematika (JPMM)*, *Vol.III*, *N*, h.403.

M. Yusuf T, M. A. (2016). Pengaruh Mind Map Dan Gaya Belajar Terhadap Hasil Belajar Matematika Siswa. *Jurnal Keguruan Dan Ilmu Tarbiyah*, *Vol.1*, *No.*, h.87.

Masfufah, Risma, and E. A. A. (2021). *Analisis Kemampuan Literasi Matematis Siswa Melalui Soal PISA*. *Vol.10*, h.291-300.

Meri Ismi Susanti, Hobri, T. B. S. (2014). Penerapan Model Pembelajaran Missouri Mathematics Project (MMP) untuk Mengatasi Kesalahan Siswa Menyelesaikan Soal Sub Pokok Bahasan Segitiga dan Segiempat Kelas VII D SMP Negeri 7 Jember Tahun Ajaran 2012/2013. *Kadikma*, *Vol.5*, *No.*, h.64.

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*, *Vol.3*, *No.*, h.307-315.

Ummu Salma Rasak, S. P. (n.d.). *Observasi dan Wawancara*.