AlphaMath
Journal of Mathematics Education, 10(1) May 2024
p-ISSN 2477-409X, e-ISSN: 2549-9084
Available online: https://jurnalnasional.ump.ac.id/index.php/alphamath/

Statistical Literacy Analysis Viewed from Curiosity in PBL Assisted by the Sway Application

Nurokhmi Wahyu Setiani*[1], Stevanus Budi Waluya[2], Nuriana Rachmani Dewi[3], Herdian[4]
[1,2,3]Department of Postgraduate Mathematics Education, Universitas Negeri Semarang, Indonesia
[4]Nanjing Normal University, China
nurokhmi17@gmail.com*[1], budiw@mail.unnes.ac.id[2], nurianaramadan@mail.unnes.ac.id[3], herdianpsi@gmail.com[4]

https://doi.org/10.30595/alphamath.v10i1.19470

ABSTRACT

This research aims to: (1) analyze the effectiveness of PBL assisted by the Sway application on students' curiosity and statistical literacy; (2) describe students' statistical literacy in PBL learning assisted by the Sway application in terms of curiosity. The research uses mixed methods. The research subjects were students of XII TKJ, SMK Komputama Jeruklegi. The research results obtained: (1) PBL learning assisted by the Sway application is effective for students' statistical literacy; (2) statistical literacy patterns were found for each curiosity category, such as: (a)students with very high curiosity, very able to fulfill indicators of understanding data and drawing conclusions, able to calculate, present and interpret data; (b)students with high curiosity, very capable of meeting the indicators of understanding data and drawing conclusions, able to calculate, present and interpret data with few errors; (c)students with moderate curiosity, able to fulfill the indicators of understanding, calculating, presenting data and drawing conclusions, quite capable of interpreting data; (d)low curiosity students, able to fulfill the indicators of understanding, calculating and presenting data, quite capable of interpreting data and drawing conclusions; (e)students' curiosity is very low, they are quite able to fulfill the indicators of understanding data and are not yet able to calculate, present, draw conclusions and interpret data. Based on research, it is known that there is an influence of curiosity after learning the PBL model assisted by the Sway application of 51.9%. Teachers are advised to use PBL assisted by the Sway application to increase students' statistical literacy.

Keywords: Curiosity, Problem Based Learning, Statistical Literacy, Sway

ABSTRAK

Penelitian ini bertujuan untuk: (1) menganalisis keefektifan PBL berbantuan aplikasi Sway terhadap curiosity dan literasi statistik siswa; (2) mendeskripsikan literasi statistik siswa pada pembelajaran PBL berbantuan Aplikasi Sway ditinjau dari curiosity. Penelitian menggunakan mixed method. Subyek penelitian adalah siswa XII TKJ, SMK Komputama Jeruklegi. Hasil penelitian diperoleh: (1) pembelajaran PBL berbantuan aplikasi Sway efektif untuk literasi statistik siswa; (2) ditemukan pola literasi statistik setiap kategori curiosity, seperti: (a) siswa curiosity sangat tinggi, sangat mampu memenuhi indikator memahami data dan menarik kesimpulan, mampu menghitung, menyajikan, dan menafsirkan data; (b) siswa curiosity tinggi, sangat mampu memenuhi indikator memahami data dan menarik kesimpulan, mampu menghitung, menyajikan, dan menafsirkan data dengan beberapa kesalahan; (c) siswa curiosity sedang, mampu memenuhi indikator memahami, menghitung, menyajikan data, dan menarik kesimpulan, cukup mampu menafsirkan data; (d) siswa curiosity rendah, mampu memenuhi indikator memahami, menghitung, dan menyajikan data, cukup mampu menafsirkan data dan menarik kesimpulan; (e) siswa curiosity sangat rendah, cukup mampu memenuhi indikator memahami data dan belum mampu menghitung, menyajikan, menarik kesimpulan, dan menafsirkan data. Berdasarkan penelitian diketahui ada pengaruh curiosity setelah pembelajaran model PBL berbantuan aplikasi Sway sebesar 51.9%. Guru disarankan menggunakan PBL berbantuan aplikasi Sway untuk meningkatkan literasi statistik siswa.

Kata kunci: Literasi Statistik, *Problem Based Learning*, Rasa Ingin Tahu, *Sway*

Received : September 28, 2023
Accepted : May 15, 2024
Published : May 16, 2024

Introduction

The Program for International Student Assessment (PISA) is a program organized by the Organization for Economic Co-operation and Development (OECD) which is carried out regularly once every three years since 2000 to determine the literacy of 15-year-old students in reading, mathematics, and science literacy. PISA's aim in organizing this program is to assess mathematical knowledge and skills acquired at school, as well as the ability to apply them to everyday problems (Abidin et al., 2018). One of the skills needed by students in solving problems is statistical literacy. Statistical literacy is a person's ability to read (understand), analyze, interpret, and represent data either in the form of tables or graphs (Hafiyusholeh et al., 2017). Statistical literacy skills are an important thing that must be owned by the community, so they don't get lost and trapped in the middle of an explosion of information (Hidayati et al., 2020).

Previous research has been conducted to analyze the statistical literacy of Madrasah Tsanawiyah students in statistics material. The study concluded that students' statistical literacy in completing material can be categorized as low because it is still below the minimum completeness criteria (Maryati & Priatna, 2018). Based on the results of data analysis on the statistical literacy test (Marlina et al., 2019), the results obtained were that 8% of students had very high abilities, 17% of students had high abilities, 28% of students had moderate abilities, 33% of students had low abilities, and 14% of students had very low abilities. Based on the research conducted by Marlina, it can be seen that the percentage of students who have very high statistical literacy is only 25%. In addition, in his research (Nishfani et al., 2017) concluded that the statistical literacy of high school students in the city studied was included in the moderate classification. This is influenced by several factors including student knowledge, student motivation, student psychological conditions, school facilities and infrastructure, the influence of the subject teacher, and the state of the school environment.

Besides, observations made by researchers on grade XII students at SMK Komputama Jeruklegi also showed the students' low statistical literacy. Almost all of the class made mistakes in presenting data in number 1. Figure 1 is an example of one student's answer.

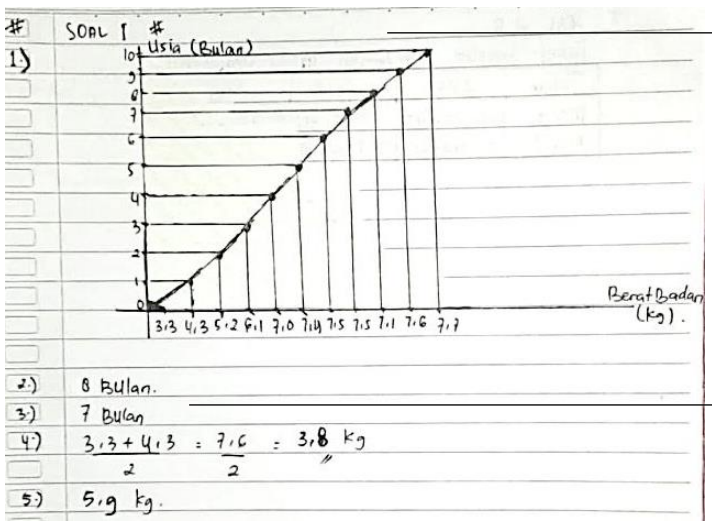


Figure 1. Student Errors in Solving Problems Using Statistical Literacy Ability

Subsequent observations were made by providing articles, students were asked to represent these articles in tables, graphs or diagrams. The result is that some students have difficulty reading the data and understanding the meaning of the reading. This is evident from the students' answers when writing numerical data in the table which are still wrong. In addition to difficulties in reading data, students also had difficulties in presenting data in the form of graphs or bar charts. In addition to the factor of reading data that is still wrong, students also do not understand the rules for presenting good data. This can be seen in Figure 2.

Based on the results of previous research and the results of observations made by researchers, it can be seen that students' statistical literacy is still low. In addition, the results of an interview with one of the mathematics teachers at Komputama Jeruklegi Vocational School said that most of the students had difficulty working on questions or problems in the form of word problems, especially when faced with long readings. One of the materials in question is statistics. Students are still confused in determining and understanding the important things from the questions given. Students also lack initiative when instructed to make another view of data related to data presentation. Then during the lesson, when asked if they had understood the questions given, they answered they understood but when asked or ordered to conclude, some of them could not answer at all. This can show the low statistical literacy of students. Therefore, students need to be guided so that their statistical literacy can improve and increase.

Statistical literacy is important because in the end students will be faced with their role as producers or consumers of data (Hafiyusholeh, 2015). In addition, important factors

that influence statistical literacy are curiosity and high awareness of learning and its needs (Nishfani et al., 2017). Students who are aware of the importance of learning will understand the nature of learning, and that learning is not just a process from not knowing to knowing. However, they will understand learning as a science that is applied in everyday life by making wise decisions.

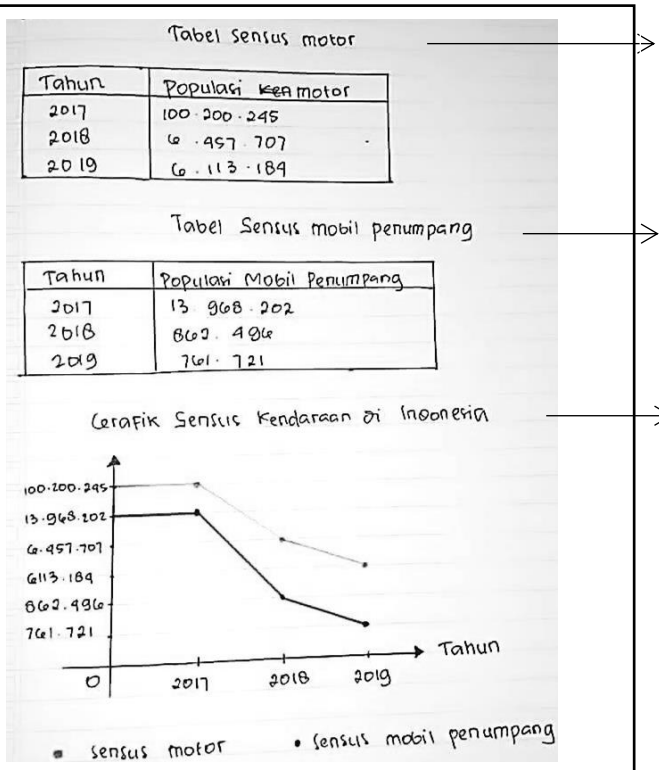


Figure 2. Students Have Difficulty Reading Data So That the Data Presentation Becomes Wrong

Curiosity is a great desire in a person to find answers to a given problem (Zetriuslita, 2016). Curiosity cannot arise by itself but needs to be honed and trained. The way to train curiosity is to provide challenging and confusing problems so that various questions arise in students. Problem-solving can be applied to students using a Problem-Based Learning (PBL) model. In addition, learning is currently inseparable from the use of technology, so applications can be used in the learning process, one of which is the Sway application. This application can make students more interested and not bored according to the results of learning simulations (Usodo et al., 2016).

Based on the background of the problems above, the authors are interested in conducting a study to further study the statistical literacy of vocational students in terms of curiosity in the Sway application-assisted PBL model.

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

Research Methods

This research uses mixed methods, namely research that combines quantitative and qualitative research. This type of research model uses a sequential explanatory model, namely the first sequence uses quantitative methods and the second sequence uses qualitative methods (Sukestiyarno, 2020). This research was conducted at SMK Komputama Jeruklegi. The population used was all class Qualitative research uses purposive sampling techniques. Implementation of learning in the experimental class uses the PBL model assisted by the Sway application. The instruments used are statistical literacy test sheets, curiosity questionnaires, documentation, and interview guides, all of which have been validated. Curiosity is divided into 5 categories, namely very high, high, medium, low and very low curiosity categories (Belecina & Ocampo, Jr., 2016)**.** Two samples were taken from each category for in-depth interviews. Quantitative data analysis carried out included normality tests, homogeneity tests, then hypothesis testing. Hypothesis testing includes: 1) statistical literacy completeness test of students who use the PBL model assisted by the Sway application reaches > 75%, 2) average test of students' statistical literacy is more than KKM, 3) the proportion of statistical literacy completeness of students who receive PBL learning assisted by the Sway application more than direct learning, 4) the average statistical literacy of students who receive PBL model learning assisted by the Sway application is higher than direct learning, 5) the influence of curiosity on statistical literacy.

Result and Discussions

This section describes the research results which include: 1) The effectiveness of PBL learning assisted by the Sway application; 2) Analysis of statistical literacy in PBL model learning assisted by the Sway application. The research was carried out by taking two sample classes, namely class XII TKJ 2 as the experimental class and class XII TKJ 1 as the control class. The main material chosen is statistics. Learning uses the PBL model assisted by the Sway application in the experimental class and direct learning in the control class.

Preliminary Data Analysis

Initial data for experimental class and control class students was obtained from the initial statistical literacy test. A summary of the initial data for the experimental class and control class is presented in Table 1.

Table 1. Summary of Initial Data of Experimental and Control Classes

Number	Aspect	Experiment Class	Control Class
1	Lots of students	25	25
2	Average value	58.16	60.80
3	Maximum value	80	81

Number	Aspect	Experiment Class	Control Class
4	Min Value	32	35
5	Variance	182,807	133.667
6	Standard Deviation	13.521	11,561

The initial data was tested for normality, homogeneity and similarity of averages using SPSS. Based on SPSS, the significance values obtained for normality of initial ability data in classes XII TKJ 1 and XII TKJ 2 were 0.200 each; so sig. > 0.05. So, it can be stated that H_0 is accepted. This shows that the initial statistical literacy value data is normally distributed. Furthermore, for data homogeneity using the Levene Statistics test, a significance value of 0.300 was obtained so that sig. > 0.05. So, it can be stated that H_0 is accepted, so that the variance of class XII TKJ 1 is the same as the variance XII TKJ 2. The initial data similarity test obtained a significance value of 0.742 > 0.05; then H_0 is accepted, which means there is no difference in the average between the two classes.

Learning Effectiveness

Learning is a learning process that is repeated causes conscious changes in behaviour and tends to be permanent (Thobroni, 2017). The effectiveness of learning can be seen from planning, implementation and assessment of learning. Effectiveness is a measure of goal achievement as a result or effect of an activity carried out (Rahmawati & Suryadi, 2019). Effectiveness in learning can be called effective learning.

The learning planning stage is carried out so that the learning objectives can be achieved. The planning stage includes making learning tools consisting of a syllabus, lesson plans, Sway application media, statistical literacy initial ability tests, final statistical literacy ability tests, curiosity questionnaires, and interview guidelines. Based on the research results, it can be seen that the average score for learning tools is in the very good category, namely 93%. This meets the criteria where planning is said to be of quality if it meets the good category (Danielson, 2018).

The implementation stage of learning in the classroom is seen from the aspect of the implementation of learning and students' responses to learning with a minimum good predicate. The results of the learning implementation obtained an average score of 3.69 so it is included in the very good category. The learning outcomes assessment stage is measured quantitatively using statistical literacy tests and student curiosity questionnaires. Analysis of the assessment data includes prerequisite tests, namely the normality test and homogeneity test, as well as hypothesis testing, namely 1) statistical literacy completeness test of students using the PBL model assisted by the Sway application reaching > 75%, 2) test of the average statistical literacy of students more

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

than KKM, 3) the proportion of complete statistical literacy of students who received Sway application-assisted PBL learning was higher than direct learning, 4) the average statistical literacy of students who received Sway application-assisted PBL learning was higher than direct learning, 5) the effect of curiosity on statistical literacy.

The final data results were tested for normality and homogeneity, and the hypothesis was tested using SPSS and manual calculations. The normality test using SPSS assistance with the Kolmogorov Smirnov test obtained the significance value of the experimental class and control class respectively 0.200 > 0.05 so that it was stated that H_0 was accepted. This means that the data on the results of the final statistical literacy scores of students for the experimental class and the control class are normally distributed. The homogeneity test results for statistical literacy final data using SPSS obtained a significance value of 0.823 > 0.05; so that H_0 is accepted, which means that the variances of the experimental class and the control class are the same.

Next, testing hypothesis 1 using the proportion test is obtained as shown in Table 2 below.

Table 2. Hypothesis 1

z_{count}	z_{table}	Decision	Conclusion
1,96299	1,65	$z_{count} > z_{table}$ namely 1,96299 > 1,65; which means H_0 is rejected	Statistical literacy using the PBL learning model assisted by the Sway application is completed classically.

Hypothesis 2 is the completeness test using the average test, namely the statistical literacy of students using the PBL model assisted by the Sway application can achieve KKM as shown in Table 3 below.

Table 3. Hypothesis 2

t_{count}	t_{table}	Decision	Conclusion
6,939	1,711	$t_{count} > t_{table}$ namely 6,939 > 1,711; so reject H_0	The average statistical literacy score in the PBL model assisted by the Sway application reaches the KKM.

Testing hypothesis 3, namely the difference in proportion aims to determine the proportion of students' mastery in statistical literacy in the PBL model learning assisted by the Sway application is higher than the direct learning model. Based on calculations such as Table 4 below.

Table 4. Hypothesis 3

z_{count}	z_{table}	Decision	Conclusion
3.627	1,64	$z_{count} > z_{table}$ namely 1,8405 > 1,64 so H_0 is rejected	The proportion of students' statistical literacy mastery in the PBL model learning assisted by the Sway application is higher than in the direct learning model.

Hypothesis 4 test was carried out to find out if the statistical literacy of students in the PBL model learning assisted by the Sway application was higher than the statistical literacy of students who used direct learning. Based on calculations such as Table 5 below.

Table 5. Hypothesis 4

t_{count}	t_{table}	Decision	Conclusion
3,627	1,677	$t_{count} > t_{table}$ namely 3,627 > 1,677 so H_0 is rejected	The average statistical literacy of students in PBL model learning assisted by the Sway application is higher than the average statistical literacy of students in direct learning

Test hypothesis 5, namely the influence test to determine the effect of curiosity (X) as the independent variable on statistical literacy (Y) as the dependent variable The results of a simple linear regression test using SPSS are as shown in Table 6 below.

Table 6. Hypothesis 5

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	913,373	1	913,373	24,853	0,000[a]
	Residual	845,267	23	36,751		
	Total	1758,640	24			

a. Predictors: (Constant), X

b. Dependent Variable: Y

Based on Table 6, it can be seen that the sig. = 0.000; so, sig. < 0.05. Therefore H_0 is rejected, which means there is an influence of curiosity on statistical literacy. The magnitude of the contribution of the curiosity variable to statistical literacy can be seen through R^2 (R Square) in the Model Summary output in Table 7 below.

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

Table 7. Test the Influence Between Variables

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,721[a]	0,519	0,498	6,062

a. Predictors: (Constant), X

The influence of the curiosity variable on students' statistical literacy was 51.9%, while 48.1% was influenced by other factors.

Based on the results and discussion it is known that through the proportion test and the average statistical literacy test students in the PBL model assisted by the Sway application achieve classical mastery. This is in line with research (Paloloang et al., 2020) that the implementation of PBL in Indonesia is quite effective because it has a high positive effect in increasing literacy. Furthermore, the test of the proportion between statistical literacy using PBL assisted by the Sway application is higher than statistical literacy using direct learning. The proportion results are in line with research (Agustin et al., 2022) which shows that the proportion of the experimental class (PBL model) is better than the control class (direct learning model). Mayasari's research is also aligned because it takes research at the SMK level (Agustin et al., 2022). Then test the average statistical literacy of the experimental class is higher than the average statistical literacy of the control class. This is in line with research using the PBL model which shows that apart from being fun, the use of PBL has a positive effect and can improve students' mathematical abilities (Amalia et al., 2017; Astuti, 2018; Indah et al., 2016; Paloloang et al., 2020).

Statistical Literacy Analysis on Sway Application Assisted PBL Learning Based on Students' Curiosity

The curiosity test is carried out by administering a curiosity questionnaire consisting of 30 question items. Data from the results of the questionnaire were analyzed to divide students into 5 categories, namely very high, high, medium, low and very low curiosity students. The grouping of students' curiosity is presented in Table 8 below.

Table 8. Classification of Student Curiosity

Average	Category	Many students	Percentage
4.51 – 5.00	Very high	1	4%
3.51 – 4.50	High	3	12%
2.51 – 3.50	Moderate	15	60%
1.51 – 2.50	Low	4	16%
1.00 – 1.50	Very low	2	8%

The results of the curiosity questionnaire for all categories were then analyzed to be selected as research subjects. Sampling was based on purposive sampling and obtained 9 subjects. This is because there is only 1 student in the very high category. The following is a description of statistical literacy based on the results of statistical literacy tests, observation sheets, and interviews in terms of the student's curiosity category.

Statistical Literacy Very High Curiosity Category

The statistical literacy indicator understands the problem, namely SCST-1 can understand the problem given. The subject can explain the purpose of the question by mentioning what is known, and what is desired or asked from the problem. The subject has no difficulty in conveying what he understands from the problem. SCST-1 can work on question number 1a correctly, including an explanation on the answer sheet. SCST-1 in working on question number 3 also created an additional column in the table to make things easier. Examples of student answers when working on group data median questions in Figure 3 are as follows.

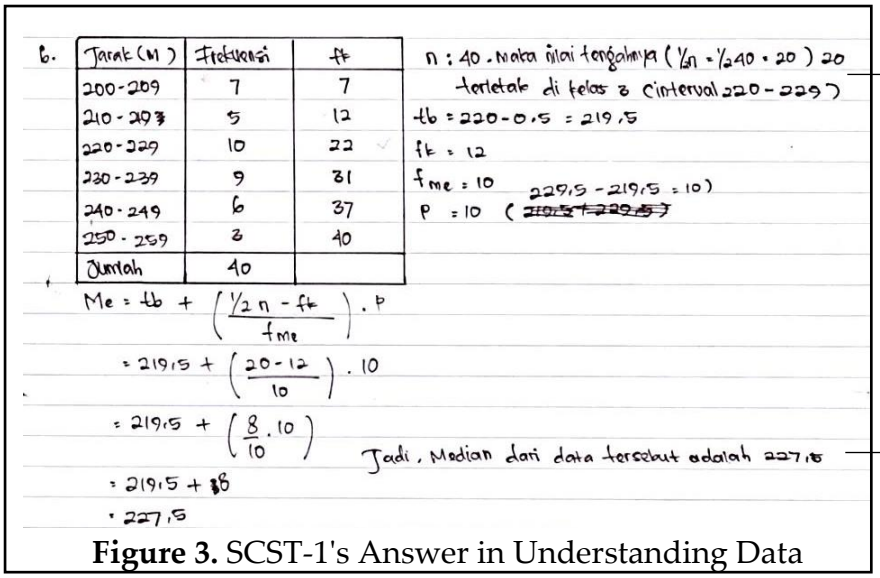


Figure 3. SCST-1's Answer in Understanding Data

Based on Figure 3 students write down information in each step that is written. When in an interview SCST-1 can explain well what he wrote. Students also answered the researcher's questions confidently.

The indicator for calculating SCST-1 data can solve almost any problem that requires calculation. However, there were numbers where the subject made a mistake in calculating because he was not careful in multiplying the numbers. However, during

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

the interview the subject realized the mistake and was able to correct the correct answer.

Indicators of presenting data SCST-1 can present data well. This can be seen from the way the students work on the problems in number 1b, namely making tables and in number 2a, namely making line diagrams. SCST-1 Subject even considers intervals when creating the x-axis and y-axis of line charts. The results of the line diagram made by SCST-1 are shown in Figure 4 below.

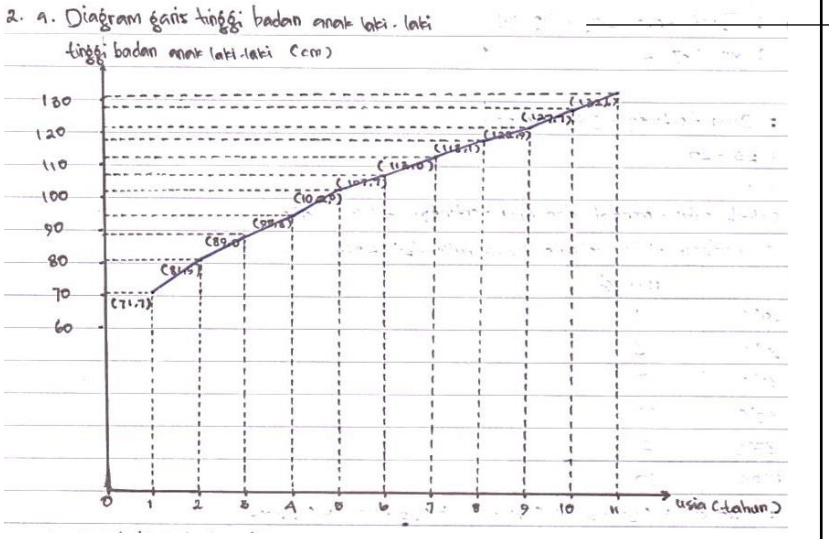


Figure 4. SCST-1 Data Presentation in Making a Line Chart

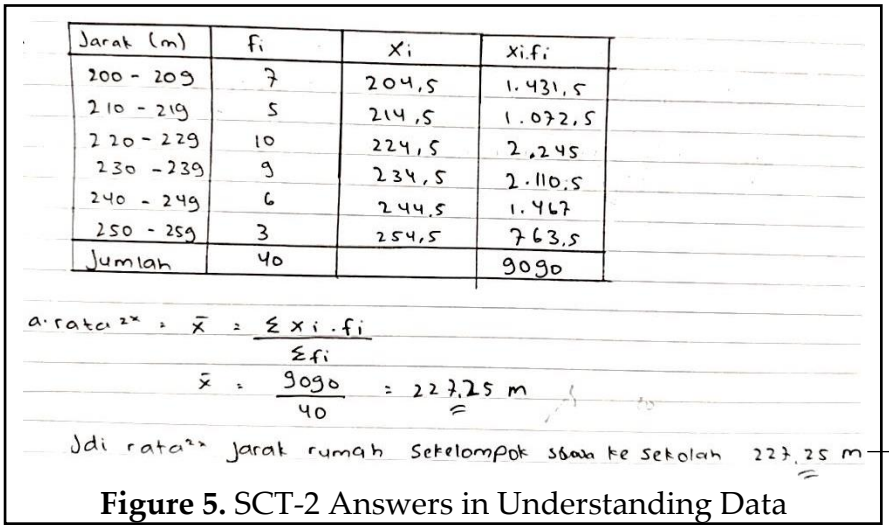
Based on Figure 4, SCST-1 tries to make a proportional line chart. In addition to paying attention to the interval, the subject also wrote a description of the boy's height at each point. SCST-1 can use the ruler tool to make diagrams properly.

The indicators for interpreting the data for SCST-1 can be seen in questions 2c and 2d. SCST-1 subjects can find concepts in making data estimates. Students can explain the method or steps they use. However, due to an error in counting, the answer to that number is not correct. However, SCST-1 subjects were able to give the correct answers when being interviewed. The last statistical literacy indicator is concluding. SCST-1 subjects always write conclusions at the end of their work, even though the questions do not contain instructions to conclude. Based on the results of research conducted and previous research (Hafiyusholeh et al., 2017) in this category it shows that from the same indicators, the subjects have almost the same abilities.

Statistical Literacy High Curiosity Category

The statistical literacy indicator of understanding the problem was taken by two SCT-1 and SCT-2 subjects. The two subjects had no difficulty in solving problems that required the ability to understand data. Problem number 3 which requires the ability to understand the data of the two students can solve it as shown in Figure 5.

Based on Figure 5, SCT-2 adds columns to the table to find x_i and $x_i . f_i$ Students already understand what steps must be taken before calculating or working on the problem. Likewise, when the subject is asked questions directly. They can explain the steps they wrote down with reasons.



Jarak (m)	fi	xi	xi.fi
200 - 209	7	204,5	1.431,5
210 - 219	5	214,5	1.072,5
220 - 229	10	224,5	2.245
230 - 239	9	234,5	2.110,5
240 - 249	6	244,5	1.467
250 - 259	3	254,5	763,5
Jumlah	40		9090

a. rata-rata : $\bar{x} = \frac{\Sigma x_i . f_i}{\Sigma f_i}$

$\bar{x} = \frac{9090}{40} = 227,25$ m

Jadi rata-rata jarak rumah sekelompok siswa ke sekolah 227,25 m

So, the average distance from a group of students' house to school is 227.25 m

Figure 5. SCT-2 Answers in Understanding Data

The indicator of calculating SCT-2 subject data can do question number 3 correctly and write down the steps systematically. However, SCT-1 is still not accurate in calculating so the answer becomes wrong. Furthermore, in number 1c both subjects can answer correctly.

Indicators present data, both subjects present data correctly in making tables and writing down data correctly. Question number 2a is to present data using a line diagram. Students write down their age and height according to the data. However, the SCT-1 subjects did not pay attention to the proportion of differences in height at each age.

The indicator interprets the data in numbers 2c and 2d, SCT-1 and SCT-2 both get the correct answer to question 2d. However, in question 2c the error in interpreting the data lies in the divisor. When initially interviewed with SCT-2, students did not realize their mistake in finding the average. However, after the researchers asked him to calculate the difference each year, the subject realized it. SCT-2 argued that he was

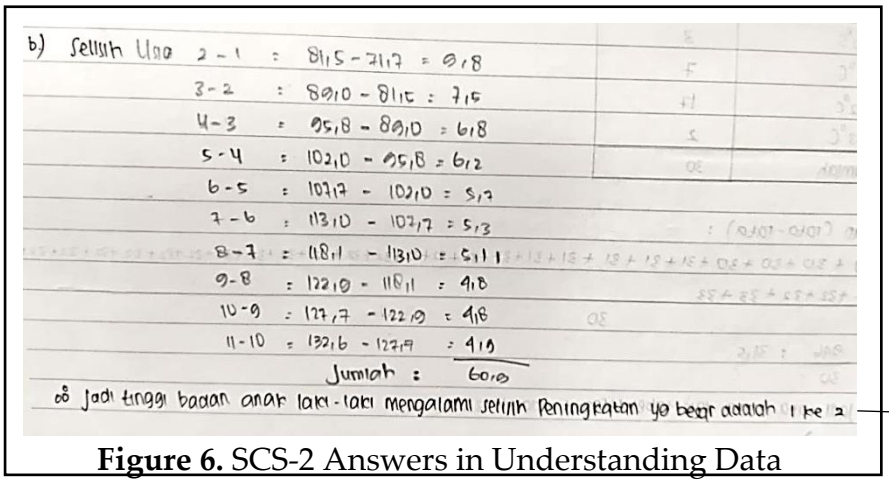
p-ISSN 2477-409X, e-ISSN: 2549-9084

wrong because he looked at the years presented in the questions ranging from ages 1 to 11 years. Indicators of concluding both subjects can conclude well. This is because the data used to conclude in question number 1 is also correct. SCT-1 and SCT-2 subjects were also able to explain the conclusions on each question when the researchers interviewed them. The results of this category are in line with research (Setiani et al., 2021) that in his research students with high and moderate curiosity categories were able to produce indicators of statistical literacy, including understanding data, calculating data, presenting data, and drawing conclusions from data.

Statistical Literacy Moderate Curiosity Category

Statistical literacy indicators understand data, both subjects have no difficulty in solving problems that require the ability to understand data. Question number 2b which contains indicators for understanding the data shows that SCS-2 wrote down the calculation of the age difference each year on the answer sheet to make it easier for him to understand the data. SCS-2's answers can be seen in Figure 6.

The indicator for calculating SCS-2 data does problem 1c correctly and there are steps for solving it. Whereas SCS-1 was able to work on question number 1c correctly but did not write down the steps in full. However, when the researcher asked the SCS-2 subject to do the interview, he was able to do it with the right answers.



So the height of boys experiences a large difference in increase from 1 to 2

Figure 6. SCS-2 Answers in Understanding Data

The indicator presents the data of the two subjects presenting data correctly in number 1b. Number 2a, namely presenting data using a line chart, both SCS-1 and SCS-2 write down the age and height according to the data. However, the two subjects did not write down the complete descriptions of the diagrams. SCS-1 makes a fairly proportional line and takes into account the difference in height for each age. But don't make guidelines that lead to the Y-axis so that the lines are made difficult to read.

The indicators interpret the data in numbers 2c and 2d, SCS-1 and SCS-2 have not been able to answer correctly. Both of them did not write down the steps to answer the question in full. However, during the SCS-2 interview, you can still be provoked and explain how to complete it. The indicator concludes the SCS-1 subject can conclude problem number 1d, but SCS-2 gives conclusions by not including the numerical results. Then SCS-1 also wrote the conclusion in question number 3 even though the question didn't ask the subject to write it down. The results on statistical literacy indicators are in line with research (Prihastari et al., 2023; Setiani et al., 2021) in the moderate curiosity category. However, medium-category students can experience increased statistical literacy by using assistance according to their abilities (Murod et al., 2019).

Statistical Literacy Low Curiosity Category

The statistical literacy indicator understands the problem, SCR-1 and SCR-2 have no difficulty solving problems that require the ability to understand data. SCR-1 subject solves questions that require understanding correctly. When interviewing the two subjects they can explain it well. They were able to explain the steps they wrote down and explain why they answered that way.

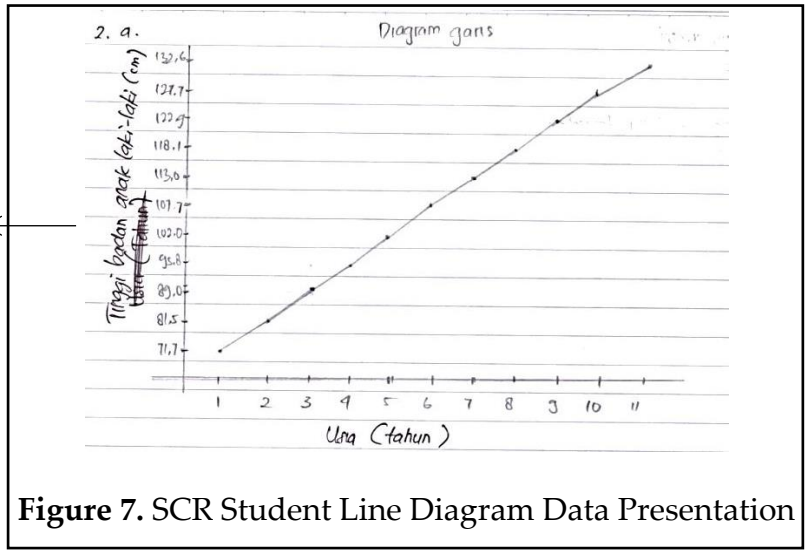


Figure 7. SCR Student Line Diagram Data Presentation

The indicator for calculating SCR-1 subject data can work on question number 1c correctly. SCR-1 can write down the steps to do it and explain when interviewed. However, for SCR-2 subjects there were errors because they calculated the mean, median, and mode using formulas for group data. This causes the calculation to be wrong.

The indicator of presenting data for both subjects can present table data correctly at number 1b. However, in number 2a, namely presenting data using a line chart, the

p-ISSN 2477-409X, e-ISSN: 2549-9084

subject has not been able to make a line chart properly. This can be seen in Figure 7 made by SCR-1. The subject draws a straight line regardless of the difference in the boy's height each year. The results of student answers are in Figure 7.

The indicator interprets the data on number 2c for SCR-1 quite well. Student 2d's answers are correct and 2c's are nearly correct. It's just that for number 2c students are still wrong because they are not careful in dividing the numbers. This can be seen in Figure 8.

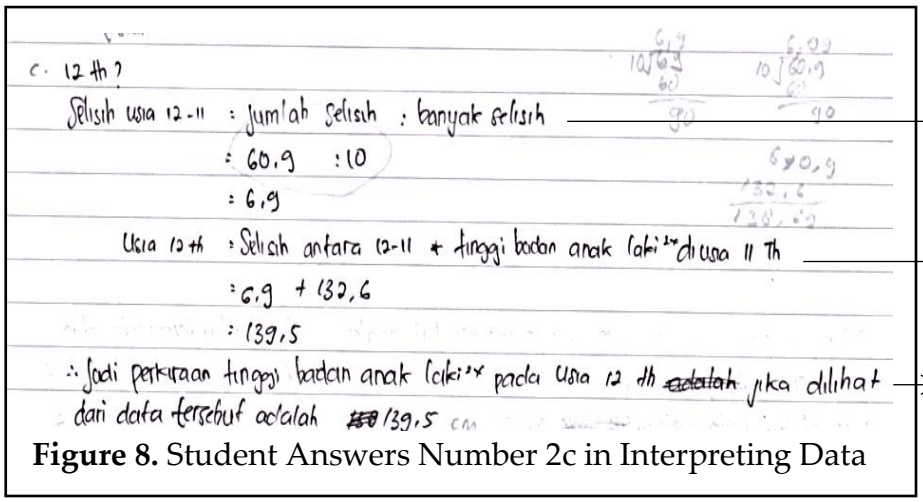


Figure 8. Student Answers Number 2c in Interpreting Data

Age difference 12-11 = number of differences: many differences

Age 12 years = the difference between 12-11 + the height of a boy aged 11 years

So, the estimated height of a boy at the age of 12 years if seen from this data is 139,5 cm

Based on Figure 8, it can be seen that students did not complete the answer sheet completely. When asked the reason for the answer, the student answered according to what he wrote. SCR-1 can even get correct answers during interviews. SCS-2 solves question 2c using the median concept, this makes the SCR-2 answer wrong. The indicator for concluding is that subject SCR-1 can conclude question number 1d correctly, but SCR-2 has not been able to conclude all the problems in number 1. SCR-2 is still confused about deciding what needs to be written in the conclusion. Apart from that, SCR-2 provides statements or information other than what was written in the question when interviewed. The results of the low curiosity category of statistical literacy in previous research (Utomo, 2021) stated that students with low ability were only able to explain mathematical problems, while (Maryati & Priatna, 2018) explained that statistical literacy was low because it was still below the minimum completeness criteria.

Statistical Literacy Very Low Curiosity Category

The statistical literacy indicator of understanding the problem was taken by two SCSR-1 and SCSR-2 subjects. One of the subjects had difficulty solving a problem on a question that required the ability to understand data. SCSR-1 subject can solve questions number 1a and 2b correctly. Subjects can also explain in interviews even

though they seem hesitant. Especially when the researcher asked question number 2b because the subject immediately gave the results on the answer sheet without any steps. Then for question number 1a, SCSR-2 answered wrong. SCSR-2 needs to be asked a lot of questions to get the right answers. The following is an excerpt of an interview with SCSR-2.

Researcher : "The problem is you read and then look at number 1 (subject reading), what information did you get from reading?"
SCSR-2 : "Searching for the difference between the lowest and highest temperature."
Researcher : "Anything else?"
SCSR-2 : "Air temperature in Purwokerto, BMG data in degrees Celsius."
Researcher : "Then what is the answer?"
SCSR-2 : "15 degrees Celsius."
Researcher : "Where did it come from?"
SCSR-2 : "Temperature 29 degrees Celsius there is 1; 30 degrees Celsius there are 3; 31 degrees Celsius there are 7; 32 degrees Celsius there are 17; and 33 degrees Celsius there are 2. Then I add up, divide by 2."
Researcher : "If it's like before what you explained is true or not?"
SCSR-2 : "Wrong ma'am."
Researcher : "Why is it wrong? So now if you ask me to answer again, what would the answer be?"
SCSR-2 : (confused)
Researcher : "The question is the difference, do you add up the difference or not?"
SCSR-2 : "No."
Researcher : "What does that mean? (researchers give a lot of questions to provoke the subject)"

Based on the conversation excerpts, the researcher gave more questions to direct the subject. Therefore subjects with very low curiosity simply understand the information contained in just a few questions.

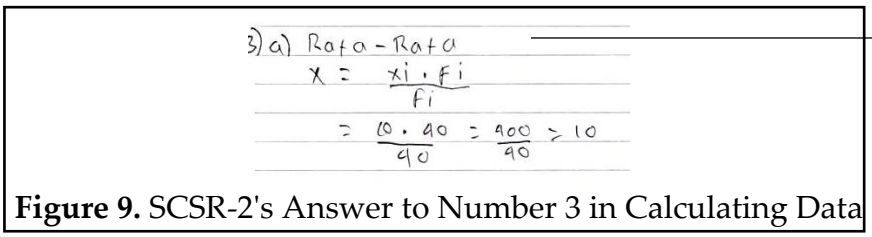


Figure 9. SCSR-2's Answer to Number 3 in Calculating Data

The indicator for calculating SCSR-1 data can work on question number 1c correctly. It's just that in calculating the average student does not write down the numbers after the decimal point specifically. However, SCSR-1 was able to explain in interviews.

p-ISSN 2477-409X, e-ISSN: 2549-9084

Good reasons for calculating the average, median, or mode. For different questions containing counting indicators, SCSR-2 still answers using the same method as in Figure 9.

It turns out that the answer has the same method as the concept of calculating the average number 1c in the previous question. This was confirmed in an interview with the following subject.

Researcher : "For the first, what is the average?"
SCSR-2 : "10"
Researcher : "10, how do you find them?"
SCSR-2 : "This is xi multiplied by fi divided by fi. So the result is 10. So 10 is from the highest, 40 from the total frequency."
Researcher : "It means that the method is still the same as the previous question."
SCSR-2 : "Yes ma'am…"

The indicator of presenting data for both subjects can present table data correctly at number 1b. However, in number 2a, namely presenting data using a line chart, SCSR-2 was not able to make a line chart properly, while SCSR-1 was quite capable of making a line chart, even though there was an explanation of unwritten height data. This can be seen in Figure 10 made by SCSR-2.

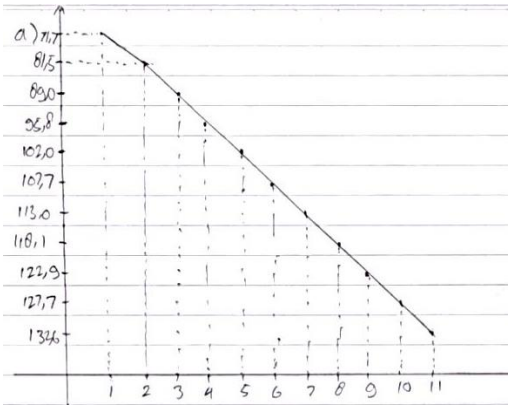


Figure 10. Presenting SCSR-2 Line Chart Data

The indicators interpret the data in numbers 2c and 2d, both subjects have not been able to interpret the solutions to both problems correctly. SCSR-2 does not answer question 2c and SCSR-1 does not answer question 2d. Even though SCSR-1 answered question number 2c, the student's answer was still wrong. SCSR-1 works by subtracting the largest value from the lowest.

The indicator for concluding, SCSR-1 can conclude question number 1d according to its understanding. However, SCSR-2 did not write any answers to question 1d. However, when prompted to answer SCSR-2 in the interview, he was quite able to provide a conclusion. The research results show that students with very low curiosity categories need a lot of help from other people to solve problems. This is because very low-category students experience more obstacles than those experienced by students in other categories (Marlina et al., 2019).

Based on the results of the description above regarding statistical literacy, the following is a summary of the research results regarding statistical literacy in terms of student curiosity which is presented in Table 9.

Table 9. Summary of Results of Statistical Literacy Analysis of Students in PBL Assisted by Sway Applications Based on Curiosity

Statistical literacy indicator	Curiosity Category				
	Very High	High	Moderately	Low	Very Low
Understanding data	Very able to understand the information contained in the questions and able to explain back in the form of written or oral answers.	Very able to understand the information contained in the questions and able to explain back in the form of written or oral answers	Able to understand the information contained in the question and be able to explain it back in the form of written or oral answers	Able to understand the information contained in the question and be able to explain it back in the form of written or oral answers	It is sufficient to understand the information contained in the question and is sufficiently capable of explaining it back in the form of written or oral answers
Calculating data	Able to calculate data accurately and able to write steps to solve problems systematically	Able to calculate data accurately and still incomplete in writing steps to solve problems	Able to calculate data accurately and still incomplete in writing steps to solve problems	Able to calculate data with several errors and still incomplete in writing problem-	Haven't been able to calculate the data correctly and still incomplete in writing the steps to

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

Statistical literacy indicator	Curiosity Category				
	Very High	High	Moderately	Low	Very Low
				solving steps	solve the problem
Present data	Able to present data such as tables and diagrams appropriately and proportionally	Able to present data such as tables and diagrams appropriately and proportionally	Able to present data such as tables and diagrams with sufficient precision and proportionally	Able to present data such as tables and diagrams appropriately and proportionally enough for simpler problems	Haven't been able to present data such as tables and diagrams properly and don't pay attention to display proportionality
Interpreting data	Able to interpret data using the concepts of the material being studied	Able to interpret data using the concepts of material studied, but there are still errors	Sufficiently capable of interpreting data using the concepts of material studied, but there are still errors	Sufficiently capable of interpreting data using the concepts of material studied, but there are still errors	Not yet able to interpret the data using the concepts of the material being studied
Draw a conclusion	Very able to conclude the problems given	Very able to conclude the problems given	Able to conclude the problems given	Enough to be able to conclude the problems given	Have not been able to conclude the problems given

Conclusion

Based on the research results, it can be concluded as follows: 1) PBL learning assisted by the Sway application is effective for students' statistical literacy. This is demonstrated by assessments at three learning stages, namely: a. the planning stage, namely the learning tools and research instruments prepared are valid; b. the implementation stage of PBL learning assisted by the Sway application is in the very good category and students' responses to learning are also in the very good category; c. The assessment stage of PBL learning outcomes assisted by the Sway application is said to be effective. This effectiveness is demonstrated by the following: (a) students' statistical literacy in the PBL model learning assisted by the Sway application achieved

classical completion with a percentage of students who completed more than 75%, (b) students' statistical literacy in the PBL model learning assisted by the Sway application was completed on average, (c) the average statistical literacy of students in learning using the PBL model assisted by the Sway application is higher than the average statistical literacy of students in direct learning, (d) the proportion of statistical literacy completeness of students who receive PBL learning assisted by the Sway application is higher than in direct learning, (e) the influence of curiosity on students' statistical literacy. 2) Statistical literacy patterns were found in each curiosity category, such as: (a) students have very high curiosity, are very able to fulfill the indicators of understanding data and drawing conclusions, and are able to calculate, present and interpret data; (b) high curiosity students, very capable of meeting the indicators of understanding data and drawing conclusions, and able to calculate, present and interpret data with few errors; (c) students with moderate curiosity, able to fulfill the indicators of understanding, calculating, presenting data and drawing conclusions, and quite capable of interpreting data; (d) students with low curiosity, able to fulfill the indicators of understanding, calculating and presenting data, and quite capable of interpreting data and drawing conclusions; (e) students' curiosity is very low, they are quite capable of meeting the indicators of understanding data and are not yet able to calculate, present, draw conclusions and interpret data. Based on research, it is known that there is an influence on students' curiosity after learning the PBL model assisted by the Sway application with a statistical literacy test score of 51.9%.

Acknowledgement
The researcher would like to thank the Head of the Department of Mathematics Education at the University Muhammadiyah Purwokerto who always provides support for this research.

References

Abidin, Y., T, M., & H, Y. (2018). *Pembelajaran Literasi: Strategi Meningkatkan Kemampuan Literasi Matematika, Sains, Membaca, dan Menulis*. Jakarta: Bumi Aksara.

Agustin, T., Junarti, & Mayasari, N. (2022). Pengaruh Model PBL (Problem Based Learning) Terhadap Kemampuan Literasi Matematika pada Pokok Bahasan Statistik Siswa Kelas XI TKR SMKN 3 Bojonegoro. *Journal of Techonolgy Mathematics and Social Science)*, *1*(2), 28–35.

Amalia, E., Surya, E., & Syahputra, E. (2017). *The Effectiveness of Using Problem Based Learning (PBL) in Mathematics Problem Solving Abilility for Junior High School Students*. *3*(2), 3402–3406.

Astuti, A. D. K. P. (2018). Pengaruh Problem Based Learning Terhadap Kemampuan Literasi Matematis Siswa Kelas VII di SMP Negeri 1 Bobotsari. *AlphaMath: Journal of Mathematics Education*, *4*(2), 37–46.

https://doi.org/10.30595/alphamath.v4i2.7359

Belecina, R. R., & Ocampo, Jr., J. M. (2016). Mathematical Curiosity, Epistemological Beliefs, and Mathematics Performance of Freshman Preservice Teachers. *Mimbar Pendidikan*, *1*(1), 123–136. https://doi.org/10.17509/mimbardik.v1i1.1758

Danielson, C. (2018). The Framework for Teaching Evaluation Instrument 2013 Edition. In *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation*. https://doi.org/10.4135/9781506326139.n179

Hafiyusholeh, M. (2015). Literasi Statistik dan Urgensinya Bagi Siswa. *Wahana*, *64*(1), 1–8.

Hafiyusholeh, M., Budayasa, K., & Siswono, T. Y. E. (2017). Literasi Statistik: Siswa SMA dalam Membaca, Menafsirkan, dan Menyimpulkan Data. *Prosiding SI MaNIs (Seminar Nasional Integrasi Matematika Dan Nilai Isami)*, *1*(1), 79–85. http://conferences.uin-malang.ac.id/index.php/SIMANIS/article/view/41

Hidayati, N. A., Waluya, S. B., Rochmad, & Wardono. (2020). Statistics Literacy: What, Why and How? *Journal of Physics: Conference Series*, *1613*(1). https://doi.org/10.1088/1742-6596/1613/1/012080

Indah, N., Mania, S., & Nursalam, N. (2016). Peningkatan Kemampuan Literasi Matematika Siswa Melalui Penerapan Model Pembelajaran Problem Based Learning di Kelas VII SMP Negeri 5 Pallangga Kabupaten Gowa. *Jurnal Matematika dan Pembelajaran (MaPan)*, *4*(2), 198–210. http://journal.uin-alauddin.ac.id/index.php/Mapan/article/view/3247

Marlina, M., Sugiatno, & T, Ahmad Yani. (2019). Hambatan Belajar Siswa Dikaji dari Kemampuan Literasi Statistik di Sekolah Menengah Pertama. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa*, *8*(9), 1-9. http://dx.doi.org/10.26418/jppk.v8i9.35802

Maryati, I., & Priatna, N. (2018). Analisis Kemampuan Literasi Statistis Siswa Madrasah Tsanawiyah dalam Materi Statistika. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, *2*(2), 205–212. https://doi.org/10.31331/medives.v2i2.640

Murod, R. R., Priatna, N., & Martadiputra, B. A. P. (2019). The Scaffolding Approach to Enhance Senior High School Student's Statistical Literacy Ability. *Journal of Physics: Conference Series*, *1227*(1). https://doi.org/10.1088/1742-6596/1227/1/012028

Nishfani, N. M., Kusmanto, H., & Akbar, R. O. (2017). Analisis Tingkat Kemampuan Literasi Statistik Siswa SMA Sederajat Berdasarkan Mutu Sekolah. *Procediamath*, *1*(1), 33–47. https://www.syekhnurjati.ac.id/jurnal/index.php/semnasmat/article/view/2020

Paloloang, M. F. B., Juandi, D., Tamur, M., Paloloang, B., & Adem, A. M. G. (2020). Meta Analisis: Pengaruh Problem-Based Learning Terhadap Kemampuan Literasi Matematis Siswa Di Indonesia Tujuh Tahun Terakhir. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(4), 851. https://doi.org/10.24127/ajpm.v9i4.3049

Prihastari, E. B., Hidayah, I., Masrukan, & Susilo, B. Ek. (2023). Analisis Literasi

Statistik pada Mahasiswa PGSD dalam Mata Kuliah Statistik Pendidikan. *Basicedu*, *7*(1), 671–680. https://journal.uii.ac.id/ajie/article/view/971

Rahmawati, M., & Suryadi, E. (2019). Guru Sebagai Fasilitator dan Efektivitas Belajar Siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *4*(1), 49–54. https://doi.org/10.17509/jpm.v4i1.14954

Setiani, N. W., Dewi, N. R., & Rochmad, R. (2021). Statistical Literacy Ability Viewed from the Student's Field of Expertise and Curiosity. *AlphaMath: Journal of Mathematics Education*, *7*(2), 125–133. https://doi.org/10.30595/alphamath.v7i2.10897

Sukestiyarno. (2020). *Metode Penelitian Pendidikan*. Semarang: UNNES Press.

Thobroni, M. (2017). *Belajar & Pembelajaran: Teori dan Praktik*. Yogyakarta: Ar-Ruzz Media.

Usodo, B., Sutopo, H., Ekana, C., Kurniawati, I., Kuswardi, Y., Magister, P., & Matematika, P. (2016). Pelatihan Penerapan Beberapa Aplikasi dari Microsoft: Office Mix, Onenote, Sway dalam Pembelajaran Bagi Guru-Guru Matematika SMA di Kabupaten Sragen. *Jurnal Elektronik Pembelajaran Matematika*, *4*(9), 743–752. http://jurnal.fkip.uns.ac.id

Utomo, D. P. (2021). An Analysis of the Statistical Literacy of Middle School Students in Solving TIMSS Problems. *International Journal of Education in Mathematics, Science and Technology*, *9*(2), 181–197. https://doi.org/10.46328/IJEMST.1552

Zetriuslita, Z. (2016). Profil Sikap Ilmiah Rasa Ingin Tahu (Curiosity) Matematis Mahasiswa. *Jurnal Ilmu Pendidikan (JIP) STKIP Kusuma Negara Jakarta*, *8*(1), 41–46.