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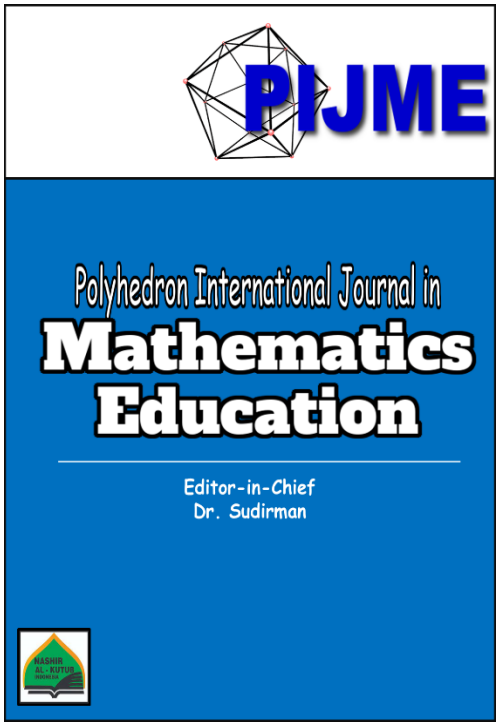

Analysis of Student Statistical literacy Using Test Questions integrated with Indonesian Education Issues as a form of Contextual approach

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Analysis of student statistical literacy using test questions integrated with Indonesian education issues as a form of contextual approach

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Abstract
This study aims to analyze the ability of SL using statistical literacy ability test questions integrated with Indonesian education issues through a quantitative descriptive research approach to 116 students of the Elementary School Teacher Education Study Program at Muhammadiyah University Muara Bungo. The results showed that students were still low in Statistical Literacy skills. Data collected through the distribution of test questions was analyzed descriptively, while the interview technique helped researchers dig deeper into information. These results can be seen from 75% of students who scored below 60 and 25% of students who scored above 60 on the Statistical Literacy ability test. Then, it can be seen from the average ability of students to solve SL test questions based on Indicators, namely 71.33% in indicator 1, 53.16% in indicator 2, and 57.18% in indicator 3. At the same time, the average student who can solve SL questions is 28.67% in indicator 1, 46.84% in indicator 2, and 42.82% in indicator 3. Based on in-depth interviews, researchers see the main factor in the low SL ability of students being that they have not mastered descriptive statistics. The Indonesian Education Issue approach is the main factor that helps students solve SL questions. Researchers suggest that further research needs to be done to improve students' SL skills through the application of learning models, the development of learning models, or the application of learning strategies to solve SL problems.
Keywords: Statistical Literacy, Indonesian Education Issues, Contextual Approach.

1. Introduction

The discussion about Statistical Literacy (SL), which has yet to reach a consensus, continues to be an exciting topic of conversation. However, many researchers think that this skill (statistical literacy) has its appeal to be integrated into the learning curriculum (Callingham & Watson, 2017; Schield, 2022), mainly statistical learning at the university level. Related to the phenomenon that is very close to SL is the era of the Industrial Revolution 4.0 and the era of Society 5.0, which requires humans to be able to adapt to the ability to read, present, describe, and interpret data/information in the form of numbers to be used as a reference in decision making in human daily life (Lipia & Ovsenik, 2020).

Seeing the importance of Statistical Literacy to be owned by humans, there is still a contradiction with the situation found, one of which is that students are still weak in understanding statistical material (Habibie & Hidayat, 2022; Nio, 2021), especially in the descriptive statistics section which includes data presentation and data interpretation. This weakness is of particular concern to researchers because these two things are one of the abilities that humans must be able to possess in the current era of data disruption.

For this reason, there needs to be special attention to increasing student Statistical Literacy, such as increasing it through the application of learning models (Noll et al., 2015; Purwadi, 2021), learning media (Susilawati & Rusdinal, 2022), teaching materials (Marsitin & Sesanti, 2021; Nurul Farida, 2021) to measuring instruments. This research focuses on improving SL through measuring instruments (test questions). An excellent measuring instrument will produce accurate and objective data/information (Purwanto, 2018). However, there is no standardized measuring instrument for SL, so it needs to be developed according to

the desired objectives because, in social research, the reference is to variables (Purwanto, 2018), which in this case is Statistical Literacy.

This study intends to analyze students' statistical literacy using student Statistical Literacy ability test questions that are integrated with educational issues in Indonesia as an effort to take a contextual approach as well as a form of national literacy because various previous studies confirm that there is a need for a contextual approach (Hariyanti & Wutsqa, 2020; Khaerunnisa & Pamungkas, 2017; Muñiz-Rodríguez, 2020; Poljičak Sušec et al., 2014; Wild & Pfannkuch, 1999) in learning statistics.

Statistical Literacy

Statistical Literacy is one of the abilities that is believed to be a provision for living in the midst of the information and data era. Not a few scientists are interested in discussing the definition of SL, such as Walker (Walker, 1951), D.G Haack (HAACK, 1979), Wallman (Wallman, 1993), Gal (Gal, 2002), delMas (DelMas, 2002), Watson (J. M. Watson, 1997), (Ben-Zvi & Garfield, 2004), dan Sharma (Sharma, 2017). In this study, the SL indicator adopted from Gal emphasizes that SL is the ability to understand data, present data, and interpret data because considering the statistical material used in question development is descriptive statistical material (Data Presentation, Central Tendency, and Data Deviation).

2. Method

Descriptive quantitative research is the choice of this research method, which aims to describe students' SL (Winata et al., 2021). A total of 116 students of the Elementary School Teacher Study Program of Universitas Muhammadiyah Muara Bungo became the sample of testing SL questions integrated with Indonesian Education Issues. The instrument used is a test instrument in the form of SL questions consisting of 9 items (details in Table 1). The processed test question data will be analyzed descriptively and supported by deeper study through interviews.

Table 1

Statistical Literacy Indicators

No	Indicators	Distribution of Question Items
1	Students are able to understand the data	1,4,8
2	Students are able to analyze data	2,5,7
3	Students are able to interpret data	3,6,8

3. Results and Discussion

The following test results given to 116 students are presented in Figure 1. From Figure 1, it is obtained that 75% or 87 students have a score below 60, which leaves 29 students, or 25% who have a score above 60. This means that more than 50% of students have a score below the Minimum Ability Criteria of 60, so it can be said that students still have difficulty understanding SL questions.

Figure 1

Frequency of Students' SL Score

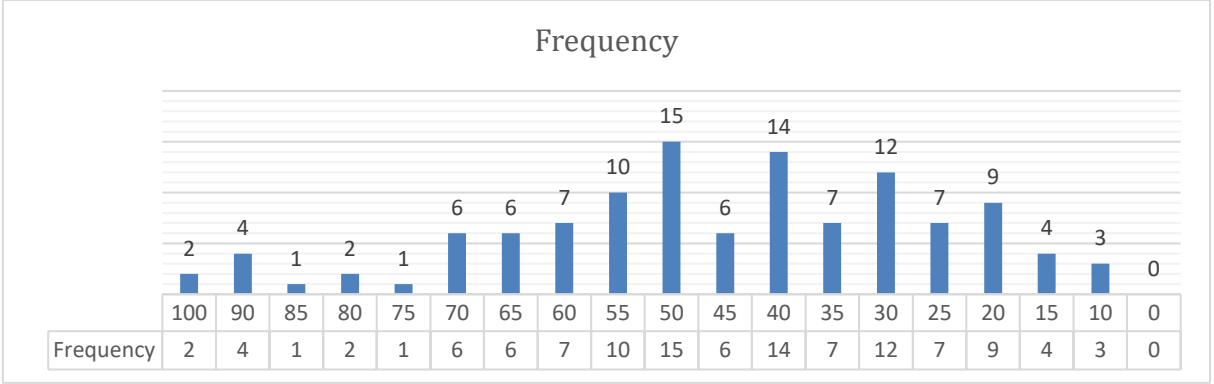
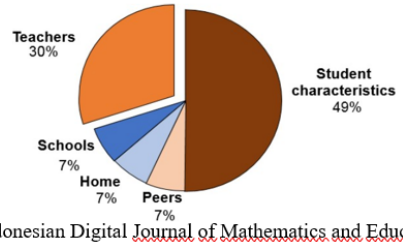


Figure 2
Test Question Number 1 on Indicator 1 (Understanding Data)

1. Choose the right statement in the following image.

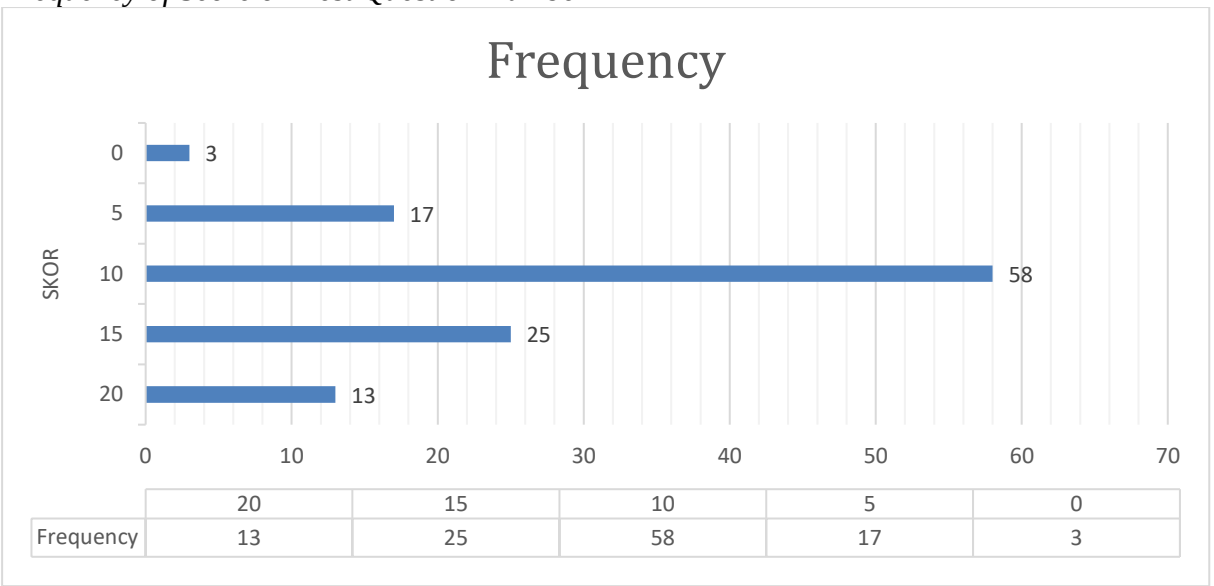
Factors influencing the achievement of student learning outcomes



Source: Indonesian Digital Journal of Mathematics and Education

a. Student character is more dominant compared to the other four factors (teachers, school, home environment, peers).
   Yes ( ) No ( )
b. If the four factors are combined consisting of (teachers, school, home environment, peers) then the results are more influential in achieving student learning outcomes).
   Yes ( ) No ( )
c. If the three factors that affect the achievement of learning outcomes (school, home environment and peers) are combined, the role of the teacher is less influential in achieving learning outcomes.
   Yes ( ) No ( )
d. Three factors that have the smallest influence on student learning achievement are school, home environment, peers.
   Yes ( ) No ( )

Figure 3
Frequency of Score on Test Question Number 1



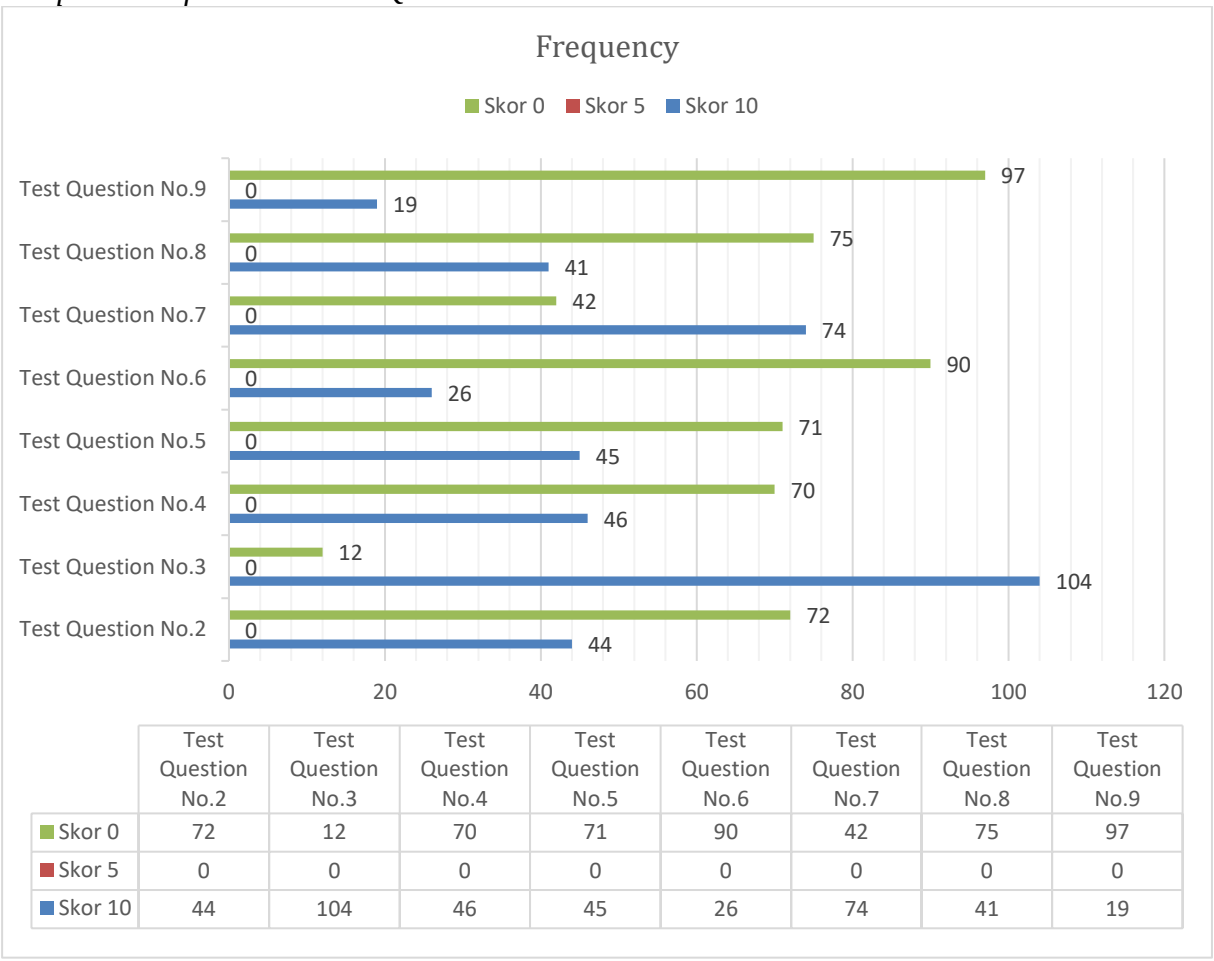
	20	15	10	5	0
Frequency	13	25	58	17	3

In Figure 3, it can be seen that the number of students who obtained a score of 10 was the highest at 58% of the 116 students who answered, 11% at a score of 20, 22% at a score of 15, 15% at a score of 5, and 3% at a score of 0. This means that students who get a score of 20 can answer all questions in question number 1 (figure 2), while 89% of students cannot answer all questions in question number 1. Then, in questions number 4 and 8 in Figure 4, it can be seen that students who cannot solve SL problems are greater than students who are able to solve SL problems by 60.34% or as many as 70 students in question number 4 and by 64.66% or as many

as 75 students in question number 8. So, it can be interpreted that students still have a low understanding of data.

Figure 4

Frequencies of Score on Test Question Number 2-9



	Test Question No.2	Test Question No.3	Test Question No.4	Test Question No.5	Test Question No.6	Test Question No.7	Test Question No.8	Test Question No.9
Skor 0	72	12	70	71	90	42	75	97
Skor 5	0	0	0	0	0	0	0	0
Skor 10	44	104	46	45	26	74	41	19

Then, in Figure 4, the frequency of students' scores on questions number 2, number 5, and number 7 (questions that represent indicators of data analysis) is the highest for those who get a score of 0 (null). This means that 62.07% of students were unable to answer question number 2, 61.21% in question number 5, and 36.21% in question number 7. However, in question number 7, there was a difference. Namely, 63.79% of the students who were able to solve question number 7 were greater than the students who were unable to answer by 36.21%. Even so, of the 3 (three) questions presented to represent the indicator of analyzing data, 2 (two) of the students were unable to answer. So, it can be interpreted that students are still low in analyzing data.

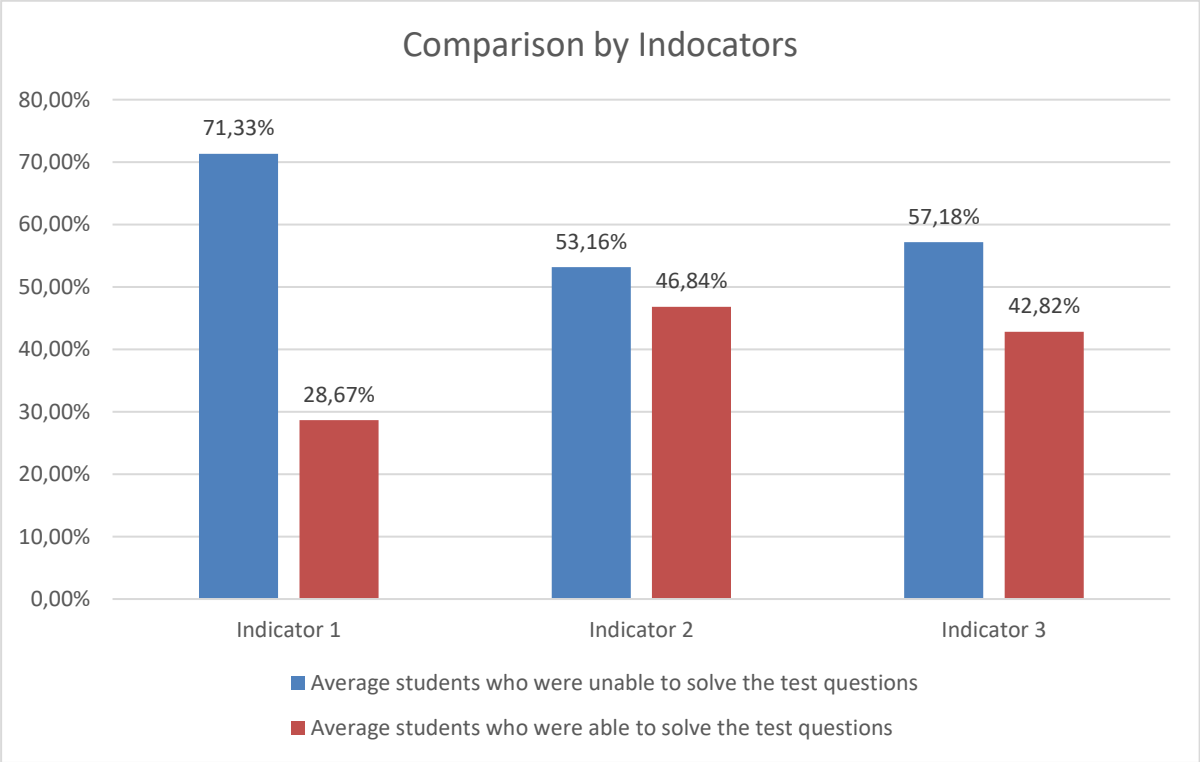
Furthermore, in Figure 4, the data results illustrate that only in problem number 3 students who were able to solve SL problems were 89.66% (104 students) and 10.34% or as many as 12 students who were unable to solve problem number 3. However, in problem number 6, with the same problem material and the same SL indicators, students have difficulty understanding SL problems. It can be seen that 29 students or 22.41% of students can solve the problem, this is less than one-third of the number of students who were able to solve problem number 6, namely a total of 90 students or 77.59%. So, it means that students are still low in doing SL problems. So, it can be interpreted that students are still low in interpreting data.

As a result, it was found that students who obtained a score of 10 and a score of 0 in problem number 6 could solve problem number 3 because the problems associated with the problem were about strings, which were very close to the daily circumstances of students as active users

of strings and also in problem number 3 students were not asked to find/calculate but rather read the data and then interpreted. In contrast, in problem number 6, students who had a score of 0 had difficulty solving the problem because they were asked to interpret the data with an average search step. Students had difficulty applying the average calculation if one or more values/data were changed.

Figure 5

Frequencies of Score on Test Question Number 2-9



From the overall results based on indicators (Figure 5), it can be seen that the average student unable to solve SL problems is greater than the average student who is able to answer, namely 71.33% in indicator 1, 53.16% in indicator 2, and 57.18% in indicator 3. At the same time, the average student who is able to solve SL problems is 28.67% in Indicator 1, 46.84% in Indicator 2, and 42.82% in Indicator 3. So, it can be interpreted that students are still low in SL ability.

The above review proves that students are still weak or low in SL. Then, researchers further observed this problem through interviews, and it was found that students' initial abilities regarding descriptive statistics were not very good. Hence, students had difficulty understanding, analyzing, and interpreting data. In the opinion of researchers, this difficulty is a serious problem, considering that in the current era, it is expected that humans can adapt to information/data that is massively spread (Batur & Baki, 2022; Budgett & Renelle, 2023; Koga, 2022; McMaster, 2022; Rizou et al., 2022; Sutherland et al., 2022), then all aspects currently work with data such as decision making (Spartanburg Comunity College Library, 2023; Umbach, 2022).

Furthermore, from the results of digging deeper information, the researcher also found that students who obtained the maximum score (Score 20 and Score 10) because of the Indonesian Education issues that the author presented in the research instrument really helped students understand the problem (Phadke et al., 2022). This means that the contextual approach, in this case, Indonesian Education Issues, helps students solve problems, understand the meaning of the problem, understand the strategy to solve the problem and increase the enthusiasm and interest of students to solve problems or can be said to be motivated.

In addition, researchers also found from the results of interviews with students who obtained the maximum and minimum scores that the questions presented in the form of essays with the narrative of Indonesian Education Issues could broaden students' insights. This is in accordance with the expectations of the Indonesian government, which emphasizes literacy (Kemendibud-Ristek, 2015) as an implementation movement in the Indonesian Education sector (Kemendibud-Ristek, 2015; Kemendikbud, 2018), as well as strengthening questions with a contextual approach (Indonesian Education issues) really help improve students' Statistical Literacy.

4. Conclusion

Based on the results and discussion above, researchers can conclude that students are still low in Statistical Literacy skills. These results can be seen from 75% of students who scored below 60 and 25% of students who scored above 60 on the Statistical Literacy ability test. Then, it can be seen from the average ability of students to solve SL test questions based on Indicators, namely 71.33% in indicator 1, 53.16% in indicator 2, and 57.18% in indicator 3. At the same time, the average student who is able to solve SL test questions is 28.67% in indicator 1, 46.84% in indicator 2, and 42.82% in indicator 3. Based on in-depth interviews, researchers see the main factor as students' SL skills still being low because they have not mastered descriptive statistics. Then, the main factor is that students are able to solve SL test questions using the Indonesian Education Issue approach. From this study, researchers suggest that further research needs to be carried out to improve students' SL skills through the application of learning models, the development of learning models, or the application of learning strategies to solve SL test questions.

Acknowledgments

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Declarations

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