Analysis of madrasah Tsanawiyah students for statistical literacy abilities

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Abstract. Junior high school students’ low statistical literacy ability was the focus of the problem in this study. The purpose of this study was to analyze statistical literacy ability of VII grade students Madrasah Tsanawiyah Negeri 1 Kabupaten Garut Academic Year 2016/2017 in statistics material especially statistics material that is related with data distribution and data centralization based indicators of statistical literacy abilities in terms of reading statistical data, understanding the concept of statistics, communicating statistical data processing, and presenting the results of statistical data processing. The research method used in this study was descriptive qualitative study with study case design. 35 students became subjects for this study. The result of data analysis shown students’ abilities in reading statistical data given in the form of table, diagram, and chart was 35%, students’ abilities in understanding concept was 32%, students abilities in communicating data processing was 28%. As for the conclusion from the data analysis could be categorized as low because there were many students that below the minimum mastery criteria.

1. Introduction
In school educational curriculum statistics material is integrated with statistic subject. Based on Permendikbud No. 24 Year 2016 related to basic abilities on statistical materials, namely: a) analyzing data mean, median and mode and data distribution in purposes to find conclusion, making decision, and making prediction, b) presenting and solving problems related to data distribution, mean, median, mode and data distribution in purpose to find conclusion, making decision, and making prediction [1]. The previous study about senior high school student’s statistical literacy that was conducted shown that students read the data started from observing chart title then finding information which presented in the chart, in interpreting and concluding the data, student noticed general pattern, data fluctuation, and use general data trends to predict data and determine the average value of certain data [2]. Statistical literacy survey that used to provide two forms practical parallel instrument in various high schools. Code book was developed as part of the project, incorporated in the Appendix, but the coding was not done by classroom teacher instead it was done by researcher assistant [3].

In order to develop statistical literacy ability in junior high school or madrasah tsanawiyah students there are some indicators that needs to be analyzed namely: a) reading statistics data, b) understanding concept of statics, d) communicating the process of statistical data processing. In the context of this study students read statics means student is able to find information which are presented. Understanding statistics data means students able to comprehend statistics ideas that can be used as solution in solving
statistical problems. Communicating the process of statistical data processing means student is able to deliver the process of statistical data processing both oral and written. Presenting statistical data processing result means students able to present statistical data processing result by using different way and alternative display.

Simply put literacy can be interpreted as awareness in oneself to think critically and creatively based on reading-writing tradition. But along development in meaning, the nature and categorization of literacy become widespread. Generally, literacy is person's ability to read, write, and to calculate. Literacy is the ability to read write and often associated with numeracy [4]. The word literacy is also often associated with other words that make domain or basis of certain knowledge. There are 9 types literacy namely 1) information literacy, 2) statistical literacy, 3) technology literacy, 4) visual literacy, 5) critical literacy, 6) data literacy, 7) digital literacy, 8) financial literacy and 9) health literacy [5].

In regards to statistical literacy ‘Statistical Literacy’ is the ability to understand and critically evaluate statistical results that permeate our daily lives – coupled with the ability to appreciate the contributions that statistical thinking can makes in public and private, professional and personal decisions [6]. Statistical literacy can be understood by some people to show minimum knowledge (maybe formal) of basic concepts and statistical procedures [7]. The statistical literacy as suggested focused on decisions making by using statistics as evidence. Statistical Literacy involves two reading abilities: comprehending and interpretation [8].

This article describes the statistical literacy abilities of junior high school or madrasah tsanawiyah students by analyzing student answers in accordance with predetermined statistical literacy capacity indicators. This study also describes presumptions analysis of students’ difficulties in understanding statistics material. The researcher explained the result of students' answer analysis in the result of the study and discussion.

2. Methods
This study was a descriptive qualitative study in the form of case study towards 35 research subject i.e. VII grade students in one of Madrasah Tsanawiyah Negeri Garut academic year 2016/2017.

The data were collected by the researcher through analysis of students' written assignment. Triangulation is done in order to obtain validity from the data that has been collected. The process of data analysis in this study refers to Miles, M. B. & Huberman, A. M. data reduction; (2) data exposure; and (3) conclusion and verification.

3. Results and Discussion
The findings and discussion of students’ statistical literacy which includes a) reading statistics data, b) understanding concept of statistic, c) communicating the process of statistical data process and d) presenting statistical data processing result abilities will be explained in this findings section. Generally the findings of students’ statistical literacy ability can be presented on the table below:

| Indicators                               | Percentage |
|-----------------------------------------|------------|
| Reading statistics data                 | 35         |
| Understanding concept of statistic      | 32         |
| Communicating of statistical data process | 20     |
| Presenting the result of statistical data processing | 28 |

Based on the table above students' statistical literacy abilities obtains small percentage in each indicator. Here is an example of students’ tasks and work results that researchers obtained and analyzed based on the indicators:
3.1. Reading statistics data
To analyze students' work result can be seen from following figure:

![Figure 1. The Ability to Read Statistics Data.](image)

Figure 1 above shown students' ability in reading statistic data specifically in reading table which was presented in item. The student still made mistakes which were not careful in determining whether the data is a single data or compound data, thus making a mistake in determining the mean of the data.

Students should first do multiplication between obtained score with its’ frequency so total of the multiplication is 633 then the total of multiplication should be divided by the total of frequency which is 100 resulting in mean 6.33.

3.2. Understanding Concept of Statistic

![Figure 2. Ability to Understand statistical concept.](image)
Figure 2 above shown students' ability in understanding concept of median and mode. The student didn’t understand that they should first arrange the data from the smallest to the biggest thus the student also made mistake in determining median and also the student did not understand the concept of mode so the consequence was that they didn't able to deliver answer of the problem given.

Supposedly the student should first arrange the data from the smallest to the biggest as seen here. 2, 3, 4, 4, 5, 6, 7, 7, 7, 8, 8. Because the amount of those data was odd number thus it's easy to determine the median, median is data which is located in the middle in this case the median is 6. And the mode is data which is often comes up in this case 7. c) Communicating the Process of Statistical Data Processing

To find out students’ assignment result in ability to communicate data processing systematically as seen below:

![Figure 3. The ability to communicate statistical Data Processing.](image)

Figure 3 shown that the student did not able to communicate process of statistical data processing systematically.

The student should first calculate mean and median from the data as seen below:

| City Name | Mean     | Median   |
|-----------|----------|----------|
| Bogor     | 16,21    | 50       |
| Manado    | 19,28    | 41       |
| Makassar  | 12,31    | 43       |
| Banda     | 31,42    | 78       |
| Aceh      | 31,42    | 78       |

Based on calculation of mean and median above we can find answers for proposed questions. a). Median of rainfall intensity for Banda Aceh is 50; b). City with the highest rainfall intensity’s median is Banda Aceh; c) City with the lowest rainfall intensity’s mean is Makassar; d) The highest rainfall intensity’s median occurred in April; e). The highest rainfall intensity's mean occurred in May.

The student did not able to convey statistical ideas into table form, also the student could not done calculation of mean and median.
3.3. Presenting the Result of Statistical Data Processing

To analyze students' assignment result in presenting statistical data processing findings can be seen from the following picture:

Figure 4. Ability to Presenting Data Processing Result.

The analysis result of figure 4 above shows the students' ability to present data processing result. The student did not able to point out data processing result that can provide information on the problems given. The student could not present the location of quartile 1, quartile 2, quartile 3, interquartile range, and quartile deviation correctly.

Supposedly, the student should first arrange all data started from the lowest data to the highest. So the data that should be obtained are:

120 120 123 124 125 126 127 130 130 150 156 160 176 178

So K1 = 124 ; K2 = (127+130)/2 = 128,5 ; K3 = 156

Interquartile Range = K3 – K1 = 156 – 124 = 32

Quartile deviation = ½ x (K3 – K1) = ½ x 32 = 16

Where as, overall students’ statistical literacy abilities is still low because the average score that obtained by student is 4,5 which is still far from mastery criteria that is 6,5.

4. Conclusion

From the analysis of students’ assignment above it can be concluded that the statistical literacy abilities of grade VIII Madrasah Tsanawiyah students is still low. It is allegedly because the students have not mastered the statistical literacy concept thus resulted in fail to understand other statistical abilities such as reading data, communicating statistical data processing, and fail in presenting the results of statistical data processing.

5. References

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