

Statistical Literacy Ability Viewed from the Student's Field of Expertise and Curiosity

Nurokhmi Wahyu Setiani*, Nuriana Rachmani Dewi, Rochmad
 Program Studi Pendidikan Matematika, Universitas Negeri Semarang, Indonesia
 *nurokhmi17@gmail.com

ABSTRAK

Penelitian ini bertujuan untuk mendeskripsikan kemampuan literasi statistik berdasarkan bidang keahlian dan *curiosity* siswa kelas XII SMK Komputama Jeruklegi. Jenis penelitian yang digunakan adalah penelitian deskriptif kualitatif. Pengambilan sampel dilakukan dengan teknik purposive sampling. Penelitian ini mengambil empat subyek dari masing-masing kategori pada setiap bidang keahlian di SMK Komputama Jeruklegi. Pengumpulan data menggunakan angket, tes literasi statistik, dan pedoman wawancara. Uji validasi yang digunakan adalah uji triangulasi teknik. Hasil penelitian menunjukkan bahwa dari dua bidang kejuruan yang diambil, siswa dapat mencapai dua hingga empat indikator literasi statistik. Siswa bidang keahlian teknologi informasi dan komunikasi dengan *curiosity* sangat tinggi dapat memenuhi semua indikator kemampuan literasi statistik. Siswa dengan *curiosity* tinggi memenuhi indikator memahami data, menyajikan data dan menarik kesimpulan. Siswa dengan *curiosity* sedang memenuhi indikator memahami data dan menarik kesimpulan, sedangkan siswa dengan *curiosity* rendah memenuhi indikator menyajikan data dan menarik kesimpulan. Kemudian hasil dari siswa pada bidang keahlian bisnis dan manajemen menunjukkan bahwa siswa dengan *curiosity* sangat tinggi dan tinggi memenuhi indikator memahami data, menyajikan data, dan menarik kesimpulan. Siswa dengan *curiosity* sedang memenuhi indikator memahami data dan menyajikan data. Sedangkan siswa dengan *curiosity* rendah memenuhi indikator memahami data dan menarik kesimpulan. Penelitian ini diharapkan dapat memberikan kontribusi terkait kemampuan literasi statistik siswa, sehingga dapat memberi gambaran pada penelitian selanjutnya.

Kata kunci: Bidang Keahlian, *Curiosity*, Literasi statistik

ABSTRACT

This study aims to describe statistical literacy skills based on the field of expertise and curiosity of grade XII student of SMK Komputama Jeruklegi. The type of research used is qualitative descriptive research. Sampling was done by purposive sampling technique. The study took four subjects from each category in each field of expertise in SMK Komputama Jeruklegi. Data collection using questionnaires, statistical literacy tests, and interview guidelines. The validation test used is a technical triangulation test. The results showed that of the two fields of expertise taken, students achieved two to four indicators of statistical literacy. For students of information and communication technology with curiosity is very high can meet all indicators of statistical literacy ability. Students with high curiosity meet indicators understand the data, present the data and draw conclusions. Students with curiosity are meeting indicators understanding the data and drawing conclusions. While students with low curiosity meet the indicator presents the data and draws conclusions. Then the results of students in the fields of business expertise and management show that students with very high curiosity and high meet indicators of understanding data, presenting data, and drawing conclusions. Students with curiosity are meeting indicators understanding the data and presenting the data. Whereas students with low curiosity meet the indicators understand the data and draw conclusions. This research is expected to contribute to students' statistical literacy skills, so that they can provide an overview of future research.

Key words: Field of Expertise, Curiosity, Statistical literacy

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Introduction

Education is a necessity for every human being. In Law No. 20 of 2003 on the national education system, it is mentioned that secondary education in the form of High School (SMA), Madrasah Aliyah (MA), Vocational High School (SMK), and Vocational Madrasah Aliyah (MAK), or other similar forms. One form of secondary school is vocational school, generally Cornered in Vocational High School (SMK) in Indonesia as contained in the Regulation of the

Director General of Primary and Secondary Education No: 06/D.D5/KK/2018 consists of 9 fields of expertise, 49 skills programs, and 146 competencies of expertise. Students from each field/program/competency expertise certainly have different characteristics and abilities.

Vocational High School aims to create people who can enter the world of work (Febriantika, 2020). Therefore, students studying at vocational school are equipped with various skills to get them ready to enter the world of work after they graduate. Although soft skills are very important for vocational school students, mathematics learning is no less important to encourage the development of mindsets, as a basis for improving skills, can even be used as an effective and efficient decision maker. In addition, in mathematics learning there are many examples of character education that students can obtain, including confidence, curiosity, creative, hard work, and proficient in using digital technology (Utami, 2021). Therefore, both knowledge, skills, and attitudes/characters become an important provision for students.

Furthermore, one of the educational objectives in mathematics learning in the 21st century is for students to be statistically literate. Statistical literacy means that students must have an understanding of the data. This is according to the statement that eventually students will be faced with their role as producers or consumers of data (Hafiyusholeh, 2015). Data producers mean students need to be able to present data well in order for others to understand it easily, while data consumers need to be able to understand the data presented by others both implied and expressed.

The ability of statistical literacy according to Wallman is the ability to understand and critically evaluate the statistical outcomes that permeate our daily lives – coupled with the ability to appreciate the contributions that statistical thinking can make in public and personal, professional and personal decisions (Budgett and Rose, 2017). With this ability one can understand information well so that it is useful to decide the truth of an information obtained effectively and efficiently in everyday life.

Statistical literacy involves a component of knowledge (consisting of five cognitive elements: literacy skills, statistical knowledge, mathematical knowledge, context knowledge, and critical questions) and a disposition component (consisting of two elements: critical attitudes, and beliefs and attitudes) (Gal, 2002). Then, in a study (Maryati, 2018) writes to develop static literacy skills in junior high school students or madrasah tsanawiyah need to first analyze based on indicators in terms of: reading statistical data, understanding the concept of statistics, communicating the process of processing statistical data, and presenting the results of statistical data processing. In addition, other studies (Amalia, 2020) list statistical literacy indicators include: interpreting data; write down known information from the data; managing data; draw conclusions from the data; and present data in a variety of alternative ways or views. In this study the indicators used are understanding the data, interpreting the data, presenting the data, drawing conclusions from the data.

However, students' statistical literacy skills in secondary schools are still low. This is evidenced by the results of an interview with one of the teachers of mathematics subjects at SMK Komputama Jeruklegi who said that most of the students have difficulty working on problems related to problems in daily life. Students feel unconfident and lazy when faced with long readings. Students also say that when they see a long story they will go through the question and despite reading it repeatedly, they are still confused in understanding the important things of reading. Because of the difficulty, students become reluctant to ask questions and find out

how to solve the problem. Then the teacher said in an interview related to statistical subjects that in presenting data students can only present data according to what is exemplified by the teacher. In addition, in reading a presentation of data some students still have constraints. The teacher also added an example of difficulty understanding the data seen when students are given a table-shaped lesson schedule at the beginning of the semester. Although the lesson schedule seems familiar but there are still students who have difficulty in reading the schedule and need help in order to understand it.

From the problems presented by teachers and students indicate that students' statistical literacy skills are still low and also the lack of curiosity of students. This is in accordance with the analysis of the statistical literacy skills of Madrasah Tsanawiyah students on statistical material, the study concluded that students' statistical literacy in completing the material could be categorized as low because it was still under the minimum completeness criteria (Maryati, 2018). Then another study also concluded that the results of data analysis on the statistical literacy ability test showed that 8% of students had very high abilities, 17% of high-ability students, 28% of students with moderate abilities, 33% of students with low abilities, and 14% of students with very low abilities (Marlina, 2020). From the research conducted Marlina seen that the percentage of students who have statistical literacy skills is very high and high only 25%, so that from the percentage is still fairly statistical literacy students can be said to be low.

Then, the resulting impact if a person has a low curiosity is that there is a gap in information and knowledge that can lead to not being able to solve a problem (Fitriana, 2018). Therefore, curiosity is also important for students to have. In line with the statement that curiosity and high awareness of learning and needs are important factors of statistical literacy skills (Nishfani, 2017). Students who realize the importance of this will try to apply knowledge in daily life by making wise and effective decisions. Furthermore, curiosity according to Daniel Berlyne (Litman, 2003) is divided into four dimensions namely epistemic curiosity, perceptual curiosity, specific-absorption, and diversive-exploration. The four dimensions can be used to measure students' curiosity.

Based on the description above, the researchers will describe the statistical literacy skills reviewed from the field of expertise and curiosity of students.

Methods

The research method used is qualitative descriptive research method conducted at SMK Komputama Jeruklegi. The research was conducted in grade XII students in the field of Information and Communication Technology and Business and Management (Bisman) of the 2020/2021 school year in the even semester. Of the two fields of expertise, one student was selected for each curiosity category from both Information and Communication Technology and Bisman.

The data collection technique used a test to obtain statistical literacy ability data and a questionnaire to determine the character of curiosity students. The interview method was used as reinforcement in obtaining information from students about the process of working on statistical literacy test questions. Triangulation techniques are used to see the validity of the data and compare the results of statistical literacy tests and interview results. Data analysis refers to the qualitative data analysis process which includes data reduction, data presentation, and drawing conclusions.

Results and Discussion

Based on the problems and research methods described above, the first step is to determine the research subject. The research subjects were obtained from the results of a student's curiosity questionnaire given to students in the field of Information and Communication Technology and Bisman class XII SMK Komputama Jeruklegi. Curiosity is divided into 5 categories, namely very high, high, moderately, low, and very low (Belecina, 2016). From the results of the questionnaire, it was then discussed with the mathematics teacher for sampling. The results were taken 4 students of Information and Communication Technology expertise and 4 students of Bisman expertise with very high, high, moderately, and low curiosity categories. Sampling was only four students for each field of expertise because there were no students in the very low curiosity category from the completed questionnaire. In addition, students are also selected with the consideration that these students can communicate well, and have equal mathematical abilities. The research subjects taken are listed in Table 1 below.

Table 1. List of research subjects

Field of expertise	Student Code	Average Score	Category
Information and communication technology	NS	4,53	Very high
	AFT	3,90	High
	MF	3,27	Moderately
	ASL	2,47	Low
Business and management	NK	4,60	Very high
	RD	3,60	High
	RAM	3,03	Moderately
	LA	2,30	Low

After the research subjects were obtained, the researchers then gave statistical literacy test questions. To see the suitability of students' answers, the researchers then conducted interviews with the subject. This is not only used to check the validity of the data, it is also done so that researchers can find out more about how students solve problems. The following is a discussion of students' statistical literacy skills.

Students' Statistical Literacy Ability in Information and Communication Technology

The first indicator for statistical literacy skills is understanding the data. Understanding the data here means that students can read information from the data displayed either explicitly or implicitly and understand the meaning of reading/display well. Of the four students in the field of information and communication technology expertise taken as samples, these students can read the data well if the direct answer can be seen from the questions given. However, when it comes to understanding data that requires other skills, for example calculation or reasoning, students in the low curiosity category still have problems. In the given problem, the student's error when calculating the average. Students use the divisor not by the number of data but by adding up the values of the data in question. So that the answer to the next question is wrong, as in the figure 1.

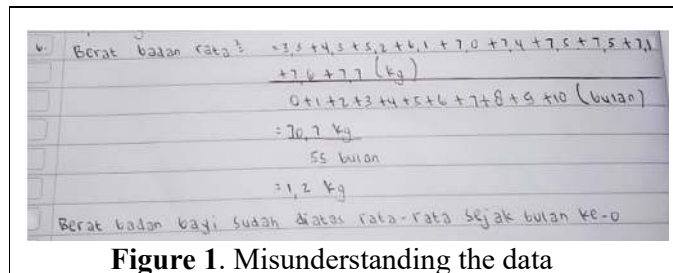


Figure 1. Misunderstanding the data

The second indicator is interpreting the data. The purpose of interpreting data is that students can estimate or predict what is being asked by looking at patterns on the display/reading and using logical reasons in determining the results. Of the two questions that contain indicators of interpreting data, only students with very high curiosity categories can complete them well. Students with high curiosity category completed one correct question after the interview. Errors due to lack of accuracy in reading the questions. However, students with high categories can explain how to get answers logically and can immediately correct them when they realize their mistakes with the guidance of the teacher. Students in the category of moderate and low curiosity have difficulty in interpreting the data indicators. This is because students have not been able to find or predict general trends from the data displayed.

In the indicator presenting data, two questions are given. In the first question, students present data with a predetermined display, namely a line diagram, while in the second question students are given the freedom to represent data in the form students want. In the first question all students can make a line diagram. In the second question, students with very high curiosity category displayed data presentation of more than two types of presentation well. Then students with high curiosity display the presentation of data correctly and can even write down implied information from the questions given, such as writing down unknown data in questions by looking for differences to make the presentation of the data. Students in the curiosity category are determining the numerical data correctly but the presentation of the data has not been made well even though the numerical data is correct. Meanwhile, students with low curiosity can make various data presentations, but there is one error in presenting the data, namely the lack of accuracy in writing numerical data in the table.

The last indicator of statistical literacy ability in this study is to draw conclusions from the data. Making conclusions here is still general in nature, meaning that the conclusion can be said to be true if it does not contradict or is still in accordance with the data given from the problem. Of the four students, they can provide conclusions according to the data known in the question. At first, students in the moderate curiosity category who were sampled gave inaccurate conclusions. However, after conducting the interview, the intention that the students wanted to write was correct, it was just that students' written communication was still lacking. It is like the following interview with students.

Student answers:

It can be concluded that the baby's weight increases every month.

Q : "Try to re-read your answer to the first question point 7!"

S : (reading) "Yes ma'am"

Q : " So, explain to me the meaning of the answer you wrote!"

S : "The baby's weight increases every month."

- Q : "Already? Is there anything else that can be deduced?"
- S : (matching the table in question) "The baby's weight in the 6th and 7th months remained constant, then decreased in the 8th month. Up again in the 9th and 10th month"
- Q : "Fine. Does that mean the conclusion you have said earlier is the same as what you wrote?"
- S : "Not the same ma'am. What I wrote is still wrong."
- Q : "What is the correct conclusion?"
- S : "Baby weight for ten months does not always increase. The baby's weight increases from birth to the sixth month. The baby's weight remained constant at the seventh month and decreased at the eighth month and increased again at the ninth and tenth months. So the baby's weight goes up and down."

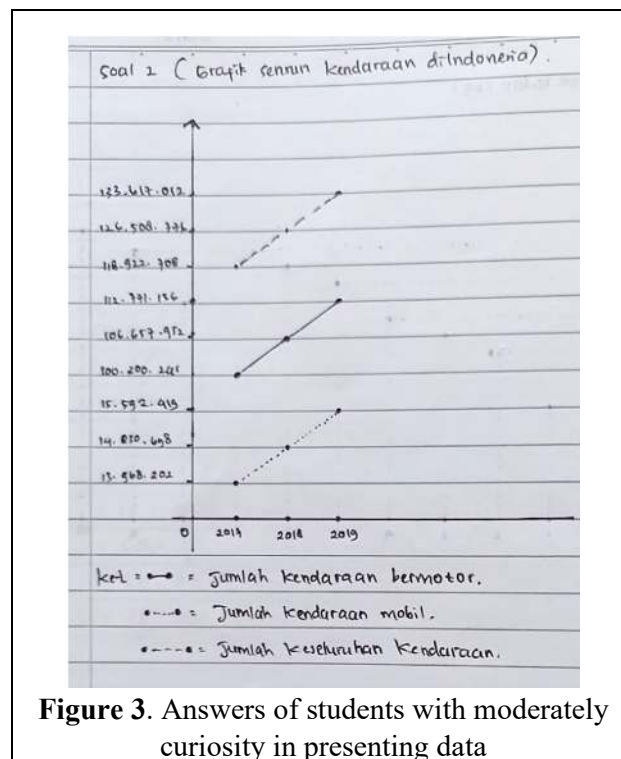
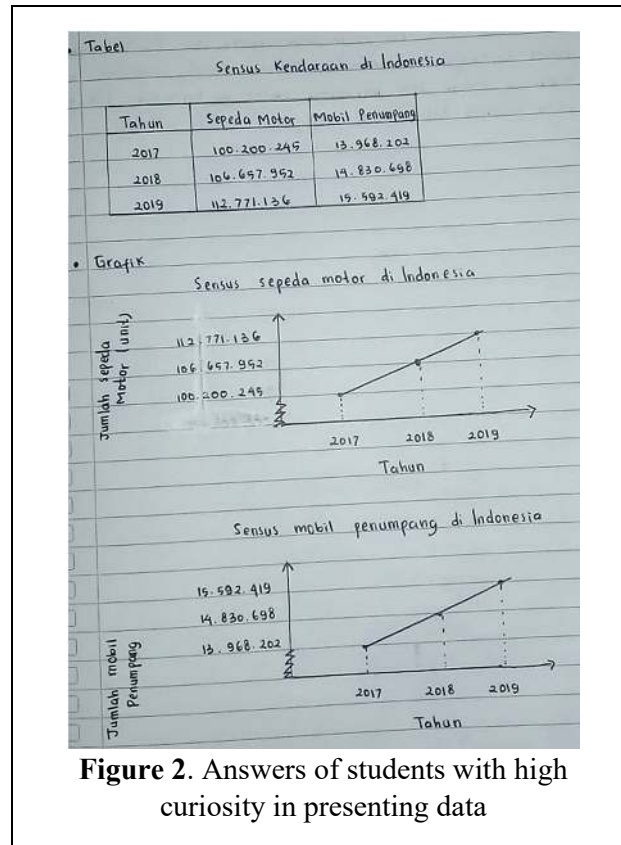
From the interview, it can be seen that students can conclude verbally and immediately realize their mistakes. Therefore, all categories of students' curiosity can meet the indicators of drawing conclusions from the data.

Student's Statistical Literacy Ability in Business and Management

The first indicator is understanding the data. In this indicator, all students in Bisman's field of expertise can meet these indicators. Of the three questions that require the ability to understand data, the curiosity categories are very high, high, moderately, and low, they can do it correctly. Students in the high and moderate curiosity categories were initially less thorough in answering the third question. Students are just looking for the average and don't realize that they haven't answered all the questions on the number. But when reading the questions again, students can then answer them correctly.

The second indicator of statistical literacy skills in this study is interpreting the data. Interpreting data becomes a problem for students with very high, high, moderately, or low curiosity categories. Based on the results of the interview, the difficulty was because students did not know the steps they had to take in estimating the results and in seeing existing patterns from the available data. When the data in question is between two known data, students work by choosing one of the data without trying to use estimates/interpretations. Then students with low curiosity did not even write down the answers because the data asked could not be answered or obtained just by looking at the questions. However, the student did not ask or use estimates to answer the problem.

The next indicator is presenting data. Students with very high, high, and moderately curiosity categories can display data presentation well. This can be seen from the answers of students in the high and medium categories in making data presentations from articles that researchers gave about the vehicle census in Indonesia taken from CNN Indonesia. The following are the answers of the two students in presenting the data.



Then, students with low curiosity are still not good at presenting data. In making the graph, the student does not clearly determine the value or point, so that the reader will be confused when reading the data. Then when making bar charts, students in the low curiosity category did not write down numerical data on the Y-axis (ordinate) specifically and did not write down the title of the presentation of the data made. However, for the three previous categories of curiosity, namely very high, high, and moderate curiosity, in addition to being able to present data in a varied and precise manner, they can also communicate/present it well. They can explain what they are doing both in writing and orally.

The fourth indicator, draw conclusions from the data. Students with very high, high, and low curiosity can draw conclusions from the data provided. Students with very high and high curiosity write conclusions according to known data in more detail, while students with low curiosity can conclude but not in detail. Although it is not detailed, what is written by this category is still in accordance with what is known or does not conflict with the information from the questions given. While the error of students with moderate curiosity is that students are still not precise in writing the variables written, for example writing down the age that should be weight so that the meaning contained is wrong.

Based on the description above, it can be made a table of achievement of statistical literacy indicators in terms of the fields of expertise and student curiosity as follows.

Table 2. Achievement of statistical literacy ability indicators

Fields of expertise	Curiosity category	Statistical literacy ability indicator			
		Understanding data	Interpret data	Presenting data	Draw conclusions from the data
Information and communication technology	Very high	√	√	√	√
	High	√	-	√	√
	Moderately	√	-	-	√
	Low	-	-	√	√
Business and management	Very high	√	-	√	√
	High	√	-	√	√
	Moderately	√	-	√	-
	Low	√	-	-	√

Conclusion

Based on the description, it can be concluded that students in the field of information and communication technology expertise with very high curiosity can meet all indicators of statistical literacy abilities. Students with high curiosity fulfill the indicators of understanding data, presenting data and drawing conclusions. Students with moderate curiosity met the indicators of understanding data and drawing conclusions, while students with low curiosity met the indicators of presenting data and drawing conclusions. Then the results from students in the field of business and management expertise show that students with very high and high curiosity meet the indicators of understanding data, presenting data, and drawing conclusions. Students with moderate curiosity met the indicators of understanding data and presenting data, while students with low curiosity met the indicators of understanding data and drawing conclusions.

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