

Solar Eclipse: Concept of “Science” and “Language” Literacy

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Abstract. The purpose of this study was to evaluate the concept of science and language literacy of solar eclipse. The study was conducted through a survey to 250 students with different ages (from 17 to 23 years old), grades, and majors in Universitas Pendidikan Indonesia. The survey was completed with a questionnaire consisting of 41 questions. In the case of the language literacy, experimental results showed that various expressions in facing the solar eclipse phenomenon are found. Relating to the science literacy, most students have good science understanding to the solar eclipse phenomenon. In conclusion, the understanding about the solar eclipse is affected by formal science education and religion understanding that they have been accepted since their childhood. These factors have also influenced the belief of Indonesian people to the solar eclipse myth and the way of expressions a language literacy.

1. Introduction

Solar eclipse is a spectacular phenomenon [1, 2], which occurs when the position of the moon is between the sun and the earth (virtual solar system project: building understanding through model building) [3]. Solar eclipse causes the day becomes dark; therefore, many people have an enthusiasm to face this event [4]. There are many interesting expressions that found around the people related with their understanding about solar eclipse [5]. These expressions are communication language that well known in around society [6].

Many language literacy research such as in education [7, 8] and sociocultural [9]. Combining science and language literacy also have been developed in these fields [10]. This method empowering research. [11]. However, there was no research using this method in facing solar eclipse.

Here, the purpose of this study was to evaluate the concept of Indonesian students (who are studying in Universitas Pendidikan Indonesia) about science and language literacy of solar eclipse on the necessity for science education. Beside science and language literacy, this research also investigated the education that influences student understanding about solar eclipse phenomenon and student belief on knowing solar eclipse myths in Indonesia.

2. Research Methodology

To evaluate the concept of Indonesian students about science and language literacy of solar eclipse, we took a survey to students who are studying in Universitas Pendidikan Indonesia that located in Bandung, where Bandung experienced a partial solar eclipse of 9 March 2016. The number of subject in this research was 250 students. We also took subjects with different ages, levels and majors, which were between 17 and 23 years old.



The survey was completed with a questionnaire consisting of 41 questions. The questions were divided into two sections. 26 questions relates to language literacy, whereas the other is science literacy and understanding. The questionnaire was divided into two types. First, questions with four-point multiple choice (right-wrong questions to assess student concept) and the other one is questions with three-point multiple choice were described their understanding of solar eclipse. The result of the survey was then analyzed using a SPSS software to get a precise trend about the students' responses about solar eclipse. The survey was taken from 25 to 28 March 2016.

3. Results and Discussion

Figure 1 shows student responses to the questionnaire about language literacy related the solar eclipse. Figures 1a and b are the result for vocabulary used when facing solar eclipsed in English and Indonesian local language, respectively. We selected several Indonesian local language, such as Javanese (for “gerhono”), Sundanese (for “samagaha”), and Batak (for “holom”).

Based on Figure 1a, 46.4% of students used vocabulary “see” when solar eclipse occurred. This vocabulary was well-known among people [12].

Regarding Indonesian local language (see Figure 1b), 40.8% of students knew vocabulary “gerhono”. The respondents selected this word because the structure of Javanese language is not too different with Indonesian [13]. Usually, it only needs to change “a” to “o”, for example “jawa” “jowo” [14, 15]. The term of “samagaha” is not popular among respondent [16]. Term “samagaha” was heard strange even for sundanese people [17].

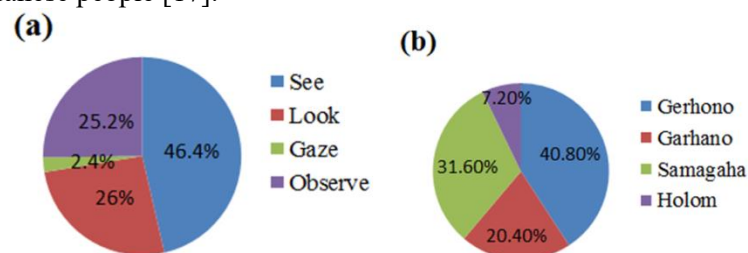


Figure 1. Student responses to the questionnaire about language literacy related solar eclipse. (a) vocabulary which is used when solar eclipsed and (b) vocabulary of solar eclipse in local language.

Figure 2 shows student responses to the questionnaire about expression relating solar eclipse myths. Based on this figure, 69,6% of students selected frowned expression when they heard myths about the solar eclipse. This gesture expression is face expression that show a confusion and doubtful about information that they got [18, 19]. We also found that they have less believe regarding the solar eclipses myth that spread out in around them.

In addition to the disbelied on myth, the students have already get knowledge about correlation solar eclipse and myth by formal science education and religion understanding since their childhood [20, 21]. This results was also supported by the fact that majority of Indonesian people is a Moslem [22]. Thus, they would rather believe to do religious activity during this event [23]. Based on this experimental result, we can conclude that nowadays myths of solar eclipse have lost among Indonesian people [24, 25].

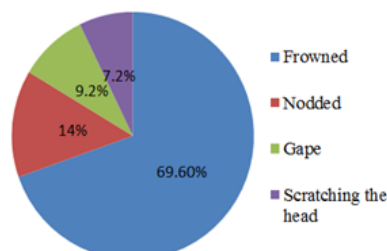


Figure 2. Student responses to the questionnaire about expressions related solar eclipse myths.

Table 1 shows student responses to the questionnaire about Indonesian total solar eclipse myth. 98% of respondents nodded to show their gesture in facing solar eclipse. 92.8% of students have already understood the vocabulary of “see” in showing expression to face solar eclipse. 92% of students used the vocabulary of “observe” in facing solar eclipse. 26.8% of respondents knew the lexical vocabulary of “gerhono”.

From the data in Table 1, students tended to use the common word to show their expression in facing solar eclipse phenomenon. As discussed above, the term of “Gerhono” was well known lexical term than the others [26].

Table 1. Student’s responses to the questionnaire about understanding total solar eclipse’s vocabularies.

Question	Responds (%)		
	Agree	Disagree	Not Know
In childhood, a solar eclipse has been told as a sign that a syaithon came.	19.6	22	61.6
In childhood, a solar eclipse has been told as a sign that an angel came.	8	25.6	67.6
Did you understand the vocabulary of "melihat"?	95.2	5.6	1.2
Did you understand the vocabulary of "memandang"?	90.8	8.8	0.8
Did you understand the vocabulary of "menonton"?	93.2	6.8	0.4
Did you understand the vocabulary of "mengamati"?	96.8	3.6	0
Did you understand vocabulary of “see”?	92.8	7.2	0.4
Did you understand the vocabulary of "look"?	90	9.6	0.8
Did you understand the vocabulary of "gaze"?	46.8	3.6	14
Did you understand the vocabulary of "observe"?	92	8.4	1.6
Did you understand the vocabulary of "gerhono"?	26.8	47.6	30
Did you understand the vocabulary of "garhano"?	17.6	48.8	36.8
Did you understand the vocabulary of "samagaha"?	26	39.2	39.2
Did you understand the vocabulary of "holom"?	10.4	45.2	46.8
Did you understand the gesture of "mengernyitkan dahi"?	94.8	4.8	2
Did you understand the gesture of "menganggukkan kepala"?	98	1.6	0.4
Did you understand the gesture of "menggaruk-garuk kepala"?	96.4	3.2	0.4
Did you understand the gesture of "melongo-longo tidak karuan"?	90.4	7.6	2
Did you understand the different of solar eclipse and total solar eclipse?	90.4	8.8	0.8

Table 2 shows students responses to the questionnaire about the total solar eclipse in science perspective. Based on Table 2, 53% of respondents answer the answer correctly. This experimental data showed that student’s knowledge were high. It was supported with the understanding of students about the question relating science literacy [9, 27].

Table 2. Student's responses to the questionnaire about total solar eclipse in science perspective.

Question	Responds (%)	
	True	False
How the position of the moon, the earth, and the sun in the event of a solar eclipse?	87.2	12.8
What have caused a total solar eclipse?	86.8	13.2
When did the occurrence of a solar eclipse?	32	68
When did the occurrence of a total eclipse of the sun?	6.8	93.2
When a total solar eclipse could happen the same place?	83.6	16.4
Why do we not allowed to see a total solar eclipse directly?	74.8	25.2
Where the total solar eclipse on march 9 2016 happened?	75.2	24.8
How long duration the total solar eclipse on the march 9 2016 in Indonesia?	4	96
Which the most dangerous rays in during the total solar eclipse?	66.8	33.2
How the earth condition when total solar eclipse happen?	96	4
How the intensity of light sun on earth when the total solar eclipse happen?	91.6	8.4

Table 3 shows students responses to the questionnaire about understanding of the total solar eclipse. According to this table, 65% of students have good science understanding in facing solar eclipse phenomenon.

Table 3. Student's responses to the questionnaire about understanding of the total solar eclipse.

Statement	Responds (%)		
	Believe	Not Believe	Not Know
Did you know that a solar eclipse has occurred in every 6 months?	33.2	22	47.2
Did you know that a total solar eclipse can happen in the same place within 300 years?	73.2	15.2	14.8

4. Conclusions

Based on the experimental result, we conclude that there were various expressions in facing the solar eclipse phenomenon. Showing effect of their language literacy. Relating to the science literacy, most students have science understanding to the solar eclipse phenomenon (more than 65%). Indeed, the student understanding about the solar eclipse is affected by formal science education and religion understanding that they have been accepted since their childhood. These have also influenced the belief of Indonesian people to solar eclipse myths. Therefore, when the solar eclipse experienced, they have high enthusiasm in facing and observing this event.

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