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The correlation between critical thinking skills of junior high school students with decision-making on the use of plastic bags

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ABSTRACT

This study was based on the urgency of critical thinking skills and decision-making as part of Higher Order Thinking Skills which students need to master, in addition to the abundance of issues about the dangers resulting from the use of plastic bags related to the environmental pollution topic. The aims of this study were to describe the critical thinking skills and decision-making; and to identify the correlation of critical thinking skills with decision-making. The method of this study was correlational which involved 30 students of 7th grade of junior high school in SMPN 1 Lembang. The research data were collected by using critical thinking skills test and decision-making skills test in the form of an essay. The correlation of both skills was analyzed by using Spearman's rho Correlation Test using SPSS 16.0, as for interview as the complement. The findings of this study showed that the mean values of both skills are categorized as good. In critical thinking, question at issue, information, and assumptions indicators are categorized as "moderate"; indicator of concept, interpretation and inference, also the implication and consequences are categorized as "good"; while indicator of purpose and point of view is categorized as "excellent". In decision-making, defining problems and evaluation indicators are categorized as "good", while indicators of generating alternatives, checking risks and consequences, and selecting alternatives are categorized as "excellent". Critical thinking skills and decision making of students on the use of plastic bags were found to have a significant correlation, positive, and moderate correlation level with 0.458 correlation coefficient. Therefore, it can be concluded that critical thinking skills have a positive correlation with student's decision-making skills on the use of plastic bags.

INTRODUCTION

The development of science and technology in the 21st century has implications for the field of education that are required to adapt in competencies. Study results from Dermawan et al. (2021) said that Minister of Education and Culture Regulation No. 21 of 2016 on content standards explains that 6 aspects of skills must be developed in the 2013 curriculum. These six abilities convey Indonesia's educational vision, which states that students must acquire various abilities, there are identifying, evaluating, and solving problems creatively using higher-order thinking skills (HOTS) especially at school. Critical thinking, problem solving, and collaboration are included in 21st century skills (Alismail & McGuire, 2015).

Critical thinking is a concept that has taken on multiple meanings and uses, is active rather than passive, a higher-order, abstracts nature (Shaw, 2014) and how to think about a problem where the thinker can improve the quality of his thinking by using the fundamental structures of thinking and applying intellectual standards (Paul & Elder, 2013). The fundamental structures of thinking are known as indicator of critical thinking skills. The indicators of critical thinking skills are used in this study, namely question at issue, purpose, information, concepts, assumptions, point of view, interpretation and inference, and implication and consequences indicator (Paul & Elder, 2013).

Meanwhile, decision-making is the behavior displayed when selecting and implementing a series of actions from among alternatives with the aim of dealing with a particular situation or problem. In decision-making there is a process of selecting a preferred solution or action based on given criteria or strategies. There is a process of comparing and selecting a series of actions, giving judgments, and making choices to achieve goals (Howie et al., 2016; Thabet, et al., 2017). The indicators of decision-making skills are used in this study, namely define problem, generate alternatives, check risks and consequences, select alternative, and evaluation indicator (Mincemoyer & Perkins, 2003).

Critical thinking skills contribute to build public awareness in making decision about a problem. Plastic bag waste is one of the problems in community. River plastic mass inputs to oceans. Between 1.15 and 2.41 million tons of plastic currently flows from the global riverine system into the oceans every year (Lebreton et al., 2017). Data from Jambeck et al. (2015), Indonesia became the second-largest contributor to marine plastic pollution after China in 2010. Indonesia identified as a major contributor on the Asian continent, with four Javanese rivers being of particular concern. Computed a midpoint annual emission of 200,000 tons (14.2% of global total) from Indonesian rivers and streams, mainly coming from the Islands of Java and Sumatra (Lebreton et al., 2017).

In Indonesia, the topic of using plastic bags is related to the subject matter of environmental pollution that is taught for 7th grade in second semester (Kulkarni, 2018). Students in that class are early adolescents. An age range of 12-14 years old or early adolescence is an important period to learn to make good decisions (Mincemoyer & Perkins, 2003). Thus, this study wanted to involve junior high school students who are early adolescents as the research subjects.

To become an excellent decision maker, someone must become an excellent thinker. Becoming an excellent decision maker is not separatable from becoming a good thinker (Paul & Elder, 2013). There is a presumption that critical thinking skills are correlated to decision-making (Paul & Elder, 2013). Preliminary studies showed a significant correlation between critical thinking and clinical decision-making (Dwyer et al., 2014; Heidari & Ebrahimi, 2016). The result of study is also found a positive correlation with a weak correlation level between critical thinking and decision-making from a sample of 110 respiratory nursing students ($r = 0.32$) (Hill, 2002). This finding supports the belief that has good critical thinking skills, the decision-making skills will also be good. Unfortunately, the condition of environmental education in Indonesia is that teachers transmitted knowledge to students that doubts as a truth. Schools in Indonesia do not teach critical thinking and decision-making skills properly. Students do not understand how to use their

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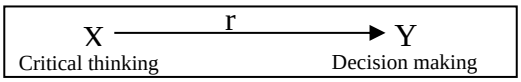
knowledge to solve world problems about the environment. In addition, this study was based on the recommendation of Emery et al. (2016) that critical thinking skills allow students to make well informed decisions about environmental issues.

Based on the preliminary studies, also the urgency of critical thinking skills and decision-making as part of Higher Order Thinking Skills, and the abundance of issue about the dangers resulting from the use of plastic bags, then conducted a study entitled "The Correlation between Critical Thinking Skills of Junior High School Students with Decision-making on the Use of Plastic Bags". This study was aimed to analyze the critical thinking skills and students' decision-making, and also identify the correlation between critical thinking skills and students' decision-making on the use of plastic bags in terms of the correlation between the value of critical thinking skills and students' decision-making.

METHODS

The method of this study is correlational to identify the correlation of critical thinking skills with students' decision-making on the use of plastic bags. The design of correlational research in this study is illustrated below:



X: independent variable of critical thinking skills
Y: dependent variable of decision-making skills
r: correlation coefficient

Determination of research subjects was conducted by cluster random sampling. A total of 30 students took the test of critical thinking skills and decision-making, while three students took part in the interview session. Students in the 7th grade of junior high school was chosen because they were studying the topic of environmental pollution in the second semester of the 2017/2018 academic year.

The research instruments used in this study included critical thinking skills test, decision-making skills test, and interviews with students. The critical thinking skills test consisted of 10 open essay questions given to the students in one meeting after learning environmental pollution topic as shown in Table 1.

Table 1. The grid of student's critical thinking skills test based on eight indicators

No	The indicator of critical thinking skills	The description of critical thinking skills indicator	Total of items	Number of items
1	Question at issue	Make questions related to the information in the discourse.	1	1
2	Purpose	Examine the purpose of an action.	1	2
3	Information	Describe the information based on the data presented.	1	3
4	Concept	Analyze problems with concepts.	1	4
5	Assumptions	Choose assumptions based on the problem.	1	5
6	Point of view	Express an opinion.	1	6
7	Interpretation and inference	Summarize a data.	2	7,8
		Formulate alternative solutions to a problem.	1	9a
8	Implication and consequences	Describe the positive and negative impacts of each alternative solution made.	1	9b
Total of Questions			10	

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The decision-making skills test consisted of 11 open essay questions are shown in Table 2.

Table 2. The grid of student's decision-making skills test based on five indicators Mincemoyer & Perkins (2003)

No	The Indicator of Decision-making Skills	The Description of Decision-making Skills Indicator	Total of Items	Number of Items
1	Define problem	Make questions that are relevant to the information in the discourse.	1	1
		Finding the main problem from the information in the discourse.	1	2
2	Generate alternatives	Formulate alternative solutions to a problem.	1	3a
3	Check risk and consequences	Describe the positive and negative impacts of each alternative solution made.	2	3b, 5
4	Select alternative	Choose an alternative solution to a problem.	2	4a, 6a
5	Evaluation	Assess the weaknesses of decision-making.	2	4b, 6b
		Outlines the considerations when changing or not changing a decision.	2	4c, 6c
Total of Questions			11	

Test of decision-making skills given to the students in one meeting after the critical thinking skills test. The type of interview used in this study was semi-structured interview. Interviews were conducted to three students with the answers found to be negative extreme (students with code A.14 and A.22) and positive extreme (Student A.3) as complementary data.

The step of critical thinking skills and students' decision-making analysis begun with examining the student answer sheet, then the weights of the scores were calculated according to the scoring procedure. Student's scores were processed into values using a scale of values 1-10 (Gazzaz et al., 2018; Leppink et al., 2013). The value of critical thinking and students' decision-making was calculated by the formula:

$$\text{Student value} = (\sum \text{student score})/(\sum \text{ideal score}) \times 10$$

The values of critical thinking skills and students' decision-making were categorized based on the numerical value category. The categories are shown in Table 3. The data presentation of critical thinking skills and students' decision-making are shown in tables, analyzed descriptively, completed with interviews, and associated with the theories.

Table 3. Skills value category scale

Numerical Value	Category
8.1 – 10	Excellent
6.6 – 8.0	Good
5.6 – 6.5	Moderate
4.1 – 5.5	Low
0 – 4.0	Failed

(Sarwoto et al., 2020)

Because of the research data that have been tested by the Shapiro-Wilk Normality Test showed not normally distributed result, then the data were tested by the Spearman's rho Correlation Test using SPSS 16.0 software. The correlation coefficient was interpreted to

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determine the level of the correlation between the variables tested. The level of correlation can be seen from the correlation coefficients as shown in Table 4.

Table 4. Correlation coefficient interpretation

Correlation coefficient	Correlation level
0.80 – 1.00	Very strong
0.60 – 0.799	Strong
0.40 – 0.599	Moderate
0.20 – 0.399	Weak
0.00 – 0.199	Very weak

(Sarwoto et al., 2020)

The data presentation of correlation between critical thinking skills and students' decision-making are shown in tables, and then analyzed descriptively based on the theoretical studies. The research data are equipped with interview data regarding to the additional information about critical thinking skills and students' decision-making.

RESULTS AND DISCUSSION

The recapitulation for the values of critical thinking skills and decision-making students are presented in Table 5 below.

Table 5. The recapitulation for the values of critical thinking skills and students' decision-making on the use of plastic bag

Information	Skills	
	Critical Thinking	Decision-making
Number of Students (N)	30	30
Mean Value	7.2	7.9
Maximum Value	10	10
Highest Value	8.5	9.3
Lowest Value	5.0	4.8

According to the skills value category scale of Arikunto (in Sarwoto et al., 2020) as shown in Table 3, the mean value of critical thinking skills and decision-making of each student (Table 5) was categorized as good. These results confirm the statements of Paul & Elder (2013) that becoming a good decision maker is not separatable from becoming a good thinker. To become an excellent decision maker, someone must become an excellent thinker.

Critical thinking

This study obtained students' critical thinking skills category data generally as shown in Table 6 below.

Table 6. The category of students' critical thinking skills in general

Critical thinking skills category	Mean value	Number of students (%)
Excellent	8.4	13%
Good	7.6	60%
Moderate	6.0	17%
Low	5.3	10%
Failed	-	0
Total	-	100%

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The percentages of students in Table 6 were obtained from the calculation of the number of students that belong to a particular skill category divided by the total number of students as many as 30 students, then multiplied by 100%. From these calculations, obtained data on the percentage of students in each category as shown in Table 6. Thus, students' critical thinking skills generally belong to good category with a mean value of critical thinking skills is 7.6 and the percentage of students is 60%. This research is important to prove that early adolescents can learn to think critically well.

In the first, second, and third meeting of learning activities were implemented one of the learning objectives, which was the implementation of eight indicators of Paul & Elder's (2013) critical thinking skills, such as students in their groups were required to set experiment goals, make questions related to the experiment, and choose assumptions that must be written in the Student Worksheet. The exercises on critical thinking skills questions were also given to work in groups. Because of the learning activities contained the objective of implementing critical thinking, it helped training students' critical thinking skills.

The mean value of each students' critical thinking skills indicators shown in Figure 1.

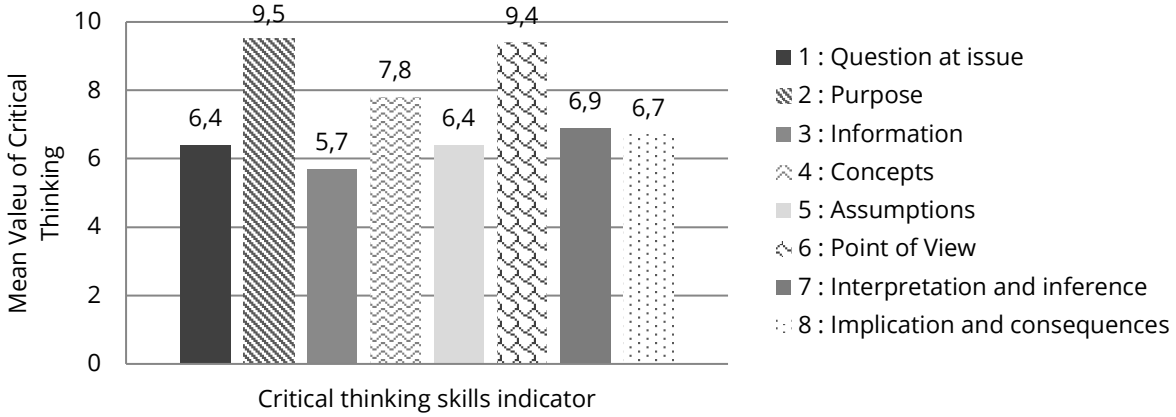

Figure 1. Mean value of each indicator for critical thinking skills

Figure 1 shows that the highest mean value of critical thinking skills indicators is 9.5 for the purpose indicator, while the lowest mean value of critical thinking skills indicators is 5.7 for the information indicator. The mean values of critical thinking skills indicators are sorted from the highest to the lowest starting from purpose (9.5), point of view (9.4), concepts (7.8), interpretation and inference (6.9), implication and consequences (6.7), questions at issue and assumptions with the same mean value (6.4), and information (5.7).

The categorization of critical thinking skills indicators into the skills category of Arikunto (in Sarwoto et al., 2020) based on the mean value of each critical thinking skills indicators shown in Table 7.

Table 7. The categorization of each students' critical thinking skills indicators

Critical thinking skills category	Critical thinking skills indicators
Excellent	• Purpose • Point of view
Good	• Concepts • Interpretation and inference • Implication and consequences
Moderate	• Question at issue • Assumptions • Information
Low	-
Failed	-

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The following discussion will describe the reason behind the information indicator is only categorized as moderate with lowest mean value.

For answering the information indicator questions, the students' answers would be right if they wrote information related to the data presented in detail. After examining the students' answers, there were also students who have tried to write information related to the data, but not in detail. Most of the students only wrote information from the writing and direction of the arrow, but did not write information from the picture. Other students wrote information that was not related. The following statement is the example of student's answer. This information was written by Student A.19: *"The process of collecting waste in the city of Bandung which is correct."*

Student A.19 wrote an information that was not appropriate with the picture of waste management in Bandung, because there were no words or pictures in the data that wrote about waste collection. Moreover, Student A.19's answer did not represent information from the picture of waste management in Bandung.

During the interview, Student A.14 claimed that he only paid attention to the writing as source of important information, but not to the pictures. So, it can be found that students have not yet realized the pictures as sources of important information. This result is consistent with Sari et al. (2016) who found that students were not able to determine important information from questions. This might be due to the lack of available sources of information in the form of pictures in the learning activities when students were required to collect information, coupled with a lack of evaluations about the results achieved by students on the information indicators. Students are thought to be unfamiliar to interpret information in the form of pictures. The following discussion will describe the reason behind the purpose and point of view indicator are in excellent category.

Based on the student learning activities, students were given worksheets in each learning activity with one of the instructions requiring students to write the right purposes for the experiment conducted. Thus, students were thought to be accustomed to writing the right purposes in the worksheet. This is why the purpose indicator was categorized as excellent with the highest mean value of critical thinking skills indicators.

The real conditions observed by researchers in general were that students involved in this study are accustomed to expressing their point of views where learning activities have been thought to support this. When a group presented the results of the experiment, students in other groups could give their opinions orally. Students' learning experience in expressing the right opinions during discussion or question and answer session were likely support students' critical thinking skills at the point of view indicator. In addition, the exercises for the questions caused the students learnt to write their opinions. Therefore, generally students could communicate their opinions very well, not only verbally, but also in writing.

Based on the examination of the students' answers, point of view indicator was in excellent category because there was only one student who still in doubt to support or not for Regional Regulation No. 17 of 2012. This student was Student A.17 with statement below. The point of view of Student A.17: *"A little support, but not really. I am hesitant, because not only these actions can reduce waste. The regulation must look for replacement a new, plastic."* Student A.17's answer showed this immature thinking, because there were doubts in arguing where he was uncertain whether to support Regional Regulation No. 17 of 2012 or not.

From the students' answer, the result of critical thinking skills test indicated that most of students have been able to express their point of views that were related to the problem given precisely, because they understood what they read in point of view indicator question. This finding was reinforced by the statement of Paul & Elder (2019), that a critical thinker has an understanding of the point of view related to a problem being considered. In addition, the several students who expressed their point of views correctly in terms of the reasons they were written. The students' reasons found have been consistent with the student's point of view generally. This finding was also supported by the statement of Paul & Elder (2013) that the point of view needs to be stated

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clearly and consistently where the good thinkers consider the point of view through reason. That is why excellent category dominated the point of view indicator.

Decision-making skill

Information about the categories of students' decision-making skills in general showed in Table 8 below.

Table 8. The category of students' decision-making skills in general

Decision-making Skills Category	Mean Value	Number of Students (%)
Excellent	8.7	47%
Good	7.6	40%
Moderate	6.0	10%
Low	4.8	3%
Failed	-	0
Total	-	100

The percentages of students in Table 8 were obtained from the calculation of the number of students that belong to a particular skill category divided by the total number of students as many as 30 students, then multiplied by 100%. Table 8 shows that most of the students are in excellent category with a mean value of 8.7 and the percentage of students as many as 47% of all students. These findings are important to convey information that early adolescents are proven to be able to learn to make decisions very well. These findings reinforce a statement that early adolescents at 12-14 years old are in important period of learning to make good decisions (Mincemoyer & Perkins, 2003). Therefore, researchers conducted learning activities and given exercises for the decision-making skills questions to facilitate students learn to make good decisions and to be able to measure the students' decision-making skills.

Learning activity at the fourth meeting was conducted by implementing the five indicators of Mincemoyer & Perkins (2003) for decision-making skills, such as each learning group was required to formulate and select an alternative solution to the problem on the use of plastic bags. Students were also given question exercises about decision-making skills to be solved in their groups. The following discussion will describe about the mean values and categories of each decision-making skills indicators. The mean value of each decision-making skills indicators shown in Figure 2.

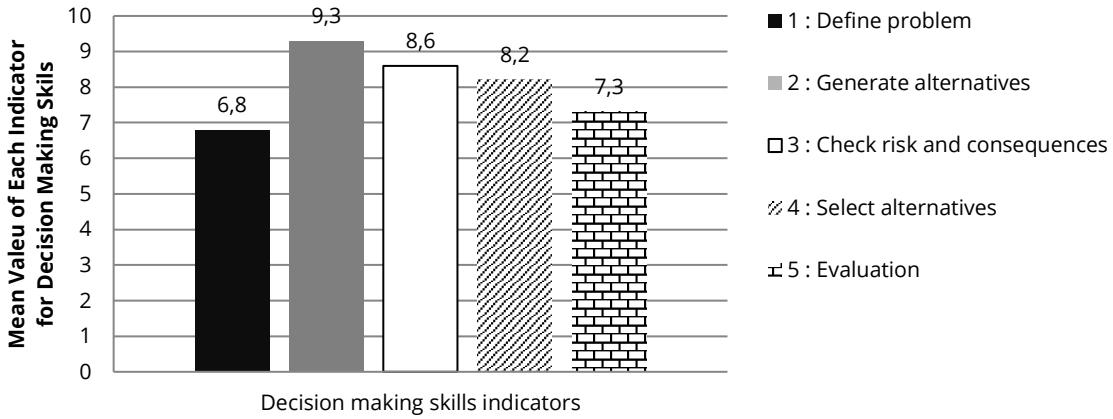

Figure 2. Mean value of each indicator for decision-making skills

Figure 2 shows that generate alternatives indicator has the highest mean value of decision-making skills (9.3), while the define problem indicator has the lowest mean value of decision-making skills (6.8).

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When it is compared to the preliminary studies, the mean value of students' decision-making skills is sorted from the highest to lowest value is generate alternatives (9.3), check risks and consequences (8.6), select alternative (8.2), evaluation (7.3), and define problem (6.8). The order of the mean value of students' decision-making skills from the highest to lowest value is generate alternatives (M=3.729), evaluation (M=3.702), define problem (M=3.629), select alternative (M=3.606), and check risks and consequences (M=3.514). The order of the mean values of students' decision-making skills are found different due to the differences of research design and real condition happened.

The categorization of decision-making skills indicators into the skill category scale of Arikunto (in Sarwoto et al., 2020) based on the mean value of each decision-making skills indicators as shown in Table 9.

Table 9. The categorization of each students' decision-making skills indicators

Decision-making Skills Category	Decision-making Skills Indicators
Excellent	• Generate alternatives • Check risks and consequences • Select alternative
Good	• Evaluation • Define problem
Moderate	-
Low	-
Failed	-

Table 9 shows that generate alternatives, check risks and consequences, and select alternative are indicators in excellent category, the remaining indicators are categorized as good.

The highest mean value of decision-making skills indicator in this study is generate alternatives. It had the highest mean value because of the learning activities and questions exercises that trained students' skills to generate alternatives (Im et al., 2015). This is supported by the statements of students interviewed as follows.

Student A.3 who was interviewed claimed that knowledge from learning activities really helped her to answer the questions about critical thinking skills and decision-making. Similar answers were also given by the other students with negative extreme data, which was Student A.14 who was in moderate category in critical thinking skills, but low in decision-making skills with lowest mean value among the students, and another student, she was Student A.22 who got the lowest mean value of critical thinking skills among the students. Student A.22 was categorized as low in critical thinking skills, but good in decision-making skills. The three students who were interviewed agreed that practical activities, discussions, and questions exercises were useful to improve their critical thinking skills and decision-making on the use of plastic bags.

Furthermore, the lowest mean value in this study was 6.8 which found in define problem indicator. This finding is not consistent with preliminary studies by Mann et al. (1989) who found that adolescents were less able to check risks and consequences. For more detail, Mann et al. (1989) found that early adolescents were less able to identify choices and understand or predict risks and benefits. The reason behind define problem indicator as the indicator with lowest mean value is described below.

In the define problem questions, students were required to make questions and determine the main problem based on the information from a discourse. According to the students' answers that have been examined, most of the students were skill-less to process information in the discourse into questions or process information to find the main problem. Because of that, define problem indicator became the indicator with lowest mean value.

Questions and possible answers that students wrote to answer the questions about define problem indicator were considered to be appropriate if they were related to the content of the discourse titled The Dangers on the Use of Plastic Bags. By examining students' answers, most of

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the students have been able to write relevant answers, but still found questions made by the students that were not related to the information in the discourse and there were also sentences of students' questions that were not arranged properly. The example of student's question that was incomplete and not related to the discourse. Example of question written by Student A.1: *"Replacing plastic bags?"*. Example of possible answer written by Student A.1: *"With cloth bags."*

Student A.1 was an example of students who has not mastered the use of language properly so that it would influence his decision-making skills. In language skill, someone is required to understand, develop vocabulary, and compose words into sentences, but the answer of Student A.1 above that showed there were still students who have not yet had an understanding of the discourse content, so he composed the ambiguous words until he could not define problem correctly.

For another define problem indicator question, students' answers were considered appropriate if they could write down the main problems that were related to the information in the discourse. In examining process to the students' answers, there were still problems written by the students that were irrelevant. There were also students who have written problems according to the discourse, but have not been able to identify the main problems. The following is the example of student's answer that was not the main problem. The problem written by Student A.20: *"Uncontrolled use of plastic, without conscious using it excessively".*

The main problems expected from students' answers were the dangers on the use of plastic bags toward the environment or the impacts on environmental pollution. In order for students to learn to make decisions, issues based on real evidence are needed (Van der Kleij et al., 2015). However, the Student A.20's answer shows that he did not understand about the main problem in the discourse, because he explained about the habit of using plastic bags, not the dangers. The lack of understanding of some students on the discourse for define problem indicator made the indicator had the lowest mean value.

This finding occurred because the study involved students aged 15 years old. It is known that 15 years old belongs to middle teens where it has an age range of 15-18 years old. Middle adolescents are more mature than early adolescents generally, because middle adolescents have mastered decision-making skills to solve everyday life problems (Mann et al., 1989). It is in contrast to this study conducted on early adolescents.

After investigating, the reason behind the check risks and consequences indicator could be categorized as excellent is due to the students already have initial skills that were categorized as excellent, namely generate alternatives skill. Because in this study the two indicators were interconnected where a student could analyze the positive and negative impacts that were appropriate if they could generate alternatives appropriately. In addition, check risks and consequences indicator can be categorized as excellent in this study, because the students understood what they were reading, also supported by the learning activities and questions exercises.

The correlation between critical thinking skills of junior high school students with decision-making on the use of plastic bags

The recapitulation of the descriptive statistics test result is shown in Table 10.a.

Table 10.a. The recapitulation of the descriptive statistical test result

Information	Critical thinking skills test	Decision-making skills test
Number of students	30	30
Mean value	7.2	7.9
Maximum value	10	10
Highest value	8.5	9.3
Lowest value	5.0	4.8

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According to the descriptive statistics test, the mean value of students' critical thinking skills is 7.2 and the mean value of decision-making skills is 7.9 of the total amounts of 30 students. The mean values of both those skills are categorized as good. Furthermore, the Shapiro-Wilk Normality Test was conducted, then resulted data were not normally distributed. These results are both known from the test scores of critical thinking skills and students' decision-making which have a significance value < 0.05. The significance value of critical thinking skills test is 0.007 < 0.05 and the significance value of decision-making skills is 0.012 < 0.05. The recapitulation of the Shapiro-wilk normality test result is shown in Table 10.b.

Table 10.b. The recapitulation of the Shapiro-Wilk normality test result

Information	Critical thinking skills test	Decision-making skills test
Sig.	0.007	0.012
α	0.05	0.05
Interpretation	Sig. < α	Sig. < α
Conclusion	Unnormal	Unnormal

In consequence, the statistics test was continued with Spearman's rho Correlation Test. The analysis of correlation between critical thinking skills of junior high school students with decision-making on the use of plastic bag was conducted by examining the correlation between critical thinking skills and students' decision-making values.

Based on the Spearman's rho Correlation Test above, the significance value obtained is less than α (0.011 < 0.05), so that the correlation found in this study is significant or at the 95% significance level. In addition, the correlation coefficient is 0.458. The recapitulation of the spearman's rho correlation test result is shown in Table 10.c.

Table 10.c. The recapitulation of the spearman's rho correlation test result

Spearman's rho Correlation Test Result	
Correlation Coefficient	0.458
Sig.	0.011
α	0.05
Interpretation	Sig. < α
Conclusion	Moderate Correlation

According to the interpretation of correlation coefficient in Table 10.c, the level of correlation is moderate. The moderate correlation level is due to the presence of several students who had the values of critical thinking skills that were categorized as good, but the values of decision-making skills were categorized as excellent, and vice versa. There were some students who were categorized as moderate in critical thinking skills, but were low, good, or even excellent at decision-making skills. It was also found that students who were low in critical thinking skills, but were moderate, good, or even excellent at decision-making skills. The correlation coefficient (0.458) also shows the direction of a positive correlation.

A positive correlation indicates that students' critical thinking skills increasingly, then students' decision-making skills will also increasingly, and vice versa. The correlation between students' critical thinking skills and decision-making is represented in bar graphs and can be seen in Figure 3. The mean value of critical thinking skills ranging from the low to the excellent category were found to increase, is 5.3 (low), 6.0 (moderate), 7.6 (good), and 8.4 (excellent) that is consistent with the increase of the mean value in each category of decision-making skills, starting from 4.8 (low), 6.0 (moderate), 7.6 (good), and 8.7 (excellent).

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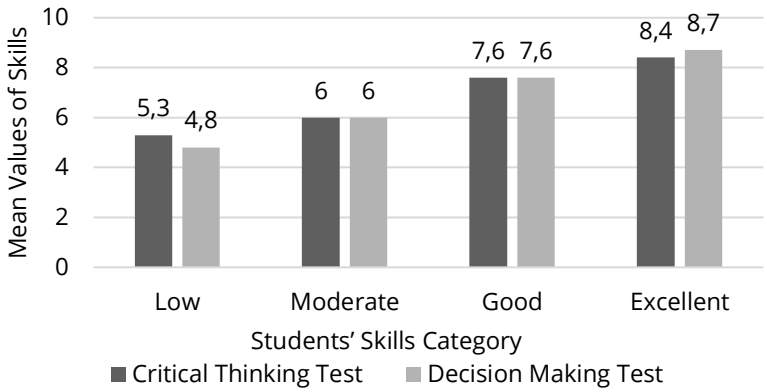

Figure 3. The increase of mean values of students' critical thinking skills in line with the increase of mean values of students' decision-making skills

The findings of this study reinforce the statement that to become an excellent decision maker, someone must become an excellent thinker. For becoming an excellent decision maker is not separatable from becoming a good thinker (Paul & Elder, 2013).

This study found the correlation between critical thinking skills of junior high school students and decision-making on the use of plastic bags with a positive correlation direction and moderate correlation level at 95% significance level. This finding is consistent with previous study about positive correlation, even with a weak and very significant ($r = 0.32$, $p < 0.01$) between critical thinking skills and decision-making (Hill, 2002). The results of this study are fresh and latest findings for education in Indonesia that there is a positive correlation between critical thinking and decision-making skills. The implication for teachers is to encourage educators to design teaching materials that can support students to critical thinking and decision-making. Meanwhile, students can train themselves to get ideas on how to use their critical thinking and decision-making skills to solve problems, especially environmental issues regarding the use of plastic bags.

This research finding can clarify the correlation between critical thinking skills and decision-making on the use of plastic bags. The sample in this study was the critical thinking and decision-making skills of junior high school students in 7th grade or early adolescence which is a very important period for educators to begin introducing and practicing the critical thinking skills and students' decision-making.

CONCLUSION

According to the findings and discussion previously described, it can be stated that the critical thinking skills of junior high school students are positively correlated with the decision-making on the use of plastic bags. The conclusion of this study is described below.

The mean value of students' critical thinking skills is in good category. Question at issue, information, and assumptions indicator are in moderate category. Concepts, interpretation and inference, also implication and consequences indicator are in good category, while purpose and point of view indicator are in excellent category.

The mean value of students' decision-making skills is categorized as good where define problem and evaluation indicator are categorized as good, while generate alternatives, check risks and consequences, and select alternative indicator are categorized as excellent.

The correlation between critical thinking skills of junior high school students with decision-making on the use of plastic bags has a positive and significant correlation at a moderate level of correlation. Suggestion for further research is how to compile teaching materials including learning models according to the latest curriculum, for example the independent curriculum, which is needed to develop students' critical thinking and decision-making skills.

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