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## Critical Thinking as Learning and Innovation Skill on 21st Century

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**Abstract:** The essential element to encouraging national competitiveness in the revolutionary era industry 4.0 is preparing a more innovative learning system and enhance the competence of graduates who have 21st-century skills (Learning and Innovations Skills). There is 4C (Critical thinking, Creativity, Collaboration, and Communication). Critical thinking is all about solving skills problem. This research aims to determine the relationship between critical reading skills and critical thinking skills in EFL students, with a population of 28 students. The technique used to analyze the data is the correlation analysis using the formula  $r$  Product Moment. The results showed a positive correlation between critical reading skills with critical thinking skills. Thus, it can be concluded that there is a relationship between critical reading strategy with critical thinking skills. To make this research perfect, the researcher suggests to the next researcher to conduct this research using experimental research. Providing a strategy that can improve students` ability to think critically is can be done.

**Keywords:** critical reading; critical thinking skills

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### Introduction

Facing the industrial revolution 4.0 is certainly not an easy thing, so it must be prepare for things related to this. One of the essential elements that must be of concern to encourage economic growth and national competitiveness in the revolutionary era Industry 4.0 is preparing a learning system that is more innovative, and improving competency of graduates who have 21st century skills (Abdullah & Osman, 2010). As the trend in the 21st century more focuses on specific specialties, hence educational goals Indonesian nationality must be directed towards shaping the skills and attitudes of the individual 21st century. Education plays a vital role in developing the skills, knowledge values and attitude which enable people to contribute to sustainable future (Sari, 2016). The education needs to equip students with the skills they need to become responsible, active and engaged citizens (Zubaidah, Corebima, Mahanal, & MIstianah, 2018).

The five main domains of 21st century skills are digital literacy, intensive thinking, effective communication, high productivity and spiritual and moral values (Osman, Hiong, & Vebrianto, 2013). Griffin & Care (2015) classifies 21st century skills and attitudes as ways to thinking (knowledge, critical and creative thinking), ways to learning (literacy and soft skills), and ways to learn with other (personal, social, and civic responsibilities). Competencies required in the 21st century are critical thinking skills, creative skills, communication skills, and collaboration skills (Zivkovil, 2016). These competencies are known as 4C competencies. The educators have to complement all of those subjects with the 4Cs so that the students can compete in this industrial revolution on proficient critical thinkers, creators, collaborators and communicators.

Critical thinking skills are fundamental skills in solving problems (Guo, 2016). This skill is important for students to find the source of the problem and how to search for and find the right solution above problems encountered. Critical thinking skills can be instilled in a variety of disciplines. Lecturers play an important role in designing and developing learning programs that is more focused on empowering these skills (Sari, 2019).



Nowadays there are many learning models that emphasize the ability to think critically. Critical thinking is an intellectual thought process in which thinkers use reflective and rational thinking (Griffin & Care, 2015). The benefits of critical thinking are students can express ideas, assess observations, review information, and make arguments. Through critical thinking, they will be able to improve the quality of their ability to analyze, assess and construct (Brown, 2015). This is in line with the views of Erdogan (2019) who explains that critical thinking skills can be built through: (1) critical reading; (2) increase analytical power; (3) developing the ability to observe; (4) increase curiosity, the ability to ask and reflect; (5) metacognition; and (6) meaningful discussions

Integrating critical thinking and foreign language learning requires in-depth consideration of the nature, purpose, process and assessment (Greenstein, 2012). Educational practitioners need to further explore the uniqueness of the language context and cultural context of students before designing the implementation of the integration of critical thinking in language learning. In practice, the difference between the essays quality of native speaker learners and second language learners is only the linguistic expression factor while the critical thinking skills are not different (Errihani, 2012).

The lecturers should teach how to think not what to think. Therefore, a lecturer does not only ask the students to read and understand a text, but he/she should also expose strategies how to read effectively (Sari, 2019). Critical thinking accustoms students to think effectively and productive, namely the concept of thinking which involves evaluation and proof (Fandino, 2013).

Basically critical thinking aims to shape students to be able to think neutral, objective, reasonable, logical, clear and precise. For this purpose, students are trained to make decisions by giving reasons regarding the truth about value a statement; and take action in a condition (Sari, 2019). This process is expected to be implanted in students inclination to think critical or dispositions of critical thinking, namely: (1) looking for clarity thesis or problem and reason as well alternative; (2) wanting to know and mention reliable sources as well open minded; (3) seeing the problem thoroughly without deviating from the core of the problem; (4) taking and changing attitudes because of evidence and reason; and (5) being aware of feelings, level of knowledge, and degree other people's sophistication.

Critical thinking is now part of the issue of learning foreign languages. This issue is in line with the main competency paradigm of 4R international education (reading, writing, arithmetic, and reasoning). Etymologically, critical thinking is rooted in the ancient Greek lexicon of critics tracing decisions and standard criteria, meaning the process of developing traceability based on certain standards (Pithers & Soden, 2001). In general, critical thinking is characterized by the ability to reason appropriately, systematically and logically in understanding concepts or beliefs, to take action and solve problems based on the conceptual analysis and argumentation mechanism (Pithers & Soden, 2001).

Critical thinking includes the component skills of analyzing arguments, making inferences using deductive and inductive reasoning, assessing or evaluating, and making decisions or problem solving. Critical thinking involves cognitive skills and even prominent dispositions in all the skills or abilities expected to be obtained by students through the type of education provided. Critical thinking emerges prominently in all the skills or abilities students expect through the type of education provided (Anderson & Krathwohl, 2001). On the other hand, critical thinking involves determining the meaning and importance of what is observed or expressed, or regarding a conclusion or certain arguments, determine whether there is an adequate justification for accepting these conclusions as true.

Critical reading is one of the strategies to help them understand a text. Critical reading is good to be implemented because it does not only develop the cognitive aspect (understanding the text) but also the affective aspect (reading behavior). Critical reading refers to a careful, active, reflective, and analytic reading (Rajabi & Tabatabaee, 2015). Critical reading strategies are the strategies which lead the students to read critically and then they would develop their critical thinking. In other words, it is a kind of reading strategies for comprehending a text. The students can develop their critical thinking by reading critically (Kadir, 2014).

Critical reading is valued as an essential part for students' reading proficiency. The students engaged with critical reading discourse when they were facilitated with scaffolding and opportunities to practice (Macknish, 2011). Meanwhile, Nasrollahi (2015) suggest the steps of critical reading strategies are annotating, previewing, contextualizing, outlining, analyzing opposition, summarizing, paraphrasing, synthesizing, questioning, and reflecting. Moreover, Yu (2015) states that critical reading strategies lead to better comprehension in English reading, and the most frequently used reading strategies in college classroom teaching are: (1) pre-reading, (2) reading in context, (3) questioning and

answering, (4) reflecting after reading, and (5) outlining and summarizing. Therefore, employing critical reading strategies is really helpful for the reader to obtain the deep understanding beyond the text.

The ability to achieve critical thinking is not only intended for secondary school students but also for undergraduate education. Undergraduate students are people who have arrived at the ability to think critically, namely the ability to analyze, solve a problem and make decisions. This ability also applies to STKIP PGRI Sidoarjo undergraduate students. But until now there has been limited information about the extent to which critical thinking activities have occurred in undergraduate students of STKIP PGRI Sidoarjo.

The discussion is expected that students will be able to develop their own knowledge and skills through a variety of activities such as searching to get the journal address on the website. In the discussion activities, students can share information about experiences gained after searching reading/research articles as shown in the student discussion activities. Learning is obtained through collaboration between students, by using various learning resources both from module teaching materials as the main teaching material as well as other reading material that can be downloaded from various sites. Thus the invitation of lecturers to browse through the reading can be an effort to improve students' thinking abilities in conducting reflective and critical thinking (Egan, Maguire, Christophers, & Rooney, 2017).

### Methodology

This research uses quantitative approach to the method survey, which is research aimed to study both large populations and small by selecting and reviewing the sample chosen from that population to find incidence, distribution, and the relative interrelation of variables (Cresswell, 2014).

In quantitative research, the data was gathered on an instrument that measures attitudes, and the information was examined using statistical procedures and hypothesis testing. The researcher collected the data using some instruments and analyzed it statistically. It purposed to test whether the hypothesis is accepted or not.

Ha : More than 70% students in critical reading class have high ability to think critically.

Ho : Less than 70% students in critical reading class have high ability to think critically.

The creations are:

Ha accepted if  $t\text{-value} > t\text{-table}$

Ho accepted if  $t\text{-value} < t\text{-table}$

This research would be conducted in STKIP PGRI Sidoarjo. The students of critical reading class of English Education Department are as the subject. The researcher selected the class because of the reason that based on researcher study; critical reading class serves the students to learn how to think critically.

In this research, the population was all students of critical reading class of 2018 A STKIP PGRI Sidoarjo. In this study, researcher did not have sample. All of the population is researched because the number of population was fewer than 100. It is based on Cresswell's statement that for presupposition, if the subject was less than 100, it would be better to take all of the subjects (2014). It was population research.

This research is to find out the relationship between critical reading ability as the dependent variable (Y) which is owned by students with independent variables namely critical thinking as (X) ones researched.

The relationships of the two variables can be illustrated in Picture as follows:



Image 1. Constellation of Research Problems

The data were taken from the data that the researcher got from test and questionnaire. Measurement of critical reading skills using test instruments as many as 18 multiple choice questions. Measurement of critical thinking using as many questionnaire instruments 21 statement items.

Presentation of descriptive analysis in this study include three variables namely: (Y) ability variable critical reading, (X) variable thinking critical. Each variable was presented as distribution frequency and histogram, size centralization of data, and size spread.

### Results

Based on the calculation results validity for ability variables critical reading obtained 18 valid items, so theoretically, the score is in the range between 0-18. The lowest score of 0 indicates multiplication between the wrong answer score (0) with number of statement items (18), whereas a score of 18 indicates multiplication between Correct answer score (1) by number statement items (18).

The research result shows the lowest value that is obtained for the ability variable Critical reading is 1 and value the highest is 17 so the range the data is 16 (17-1). For value an average of 12, mode = 11, median = 12, standard deviation = 2.745, and the variant = 7,536.

Table 1. Distribution Frequency of Research Scores

Interval Class	Absolute Frequency	Relative Frequency	Cumulative Frequency
1-2	1	0,49	0,49
3-4	1	0,49	0,99
5-6	8	3,94	4,93
7-8	16	7,88	12,81
9-10	35	17,24	30,05
11-12	69	33,99	64,04
13-14	39	19,21	83,25
15-16	27	13,30	96,55
17-18	7	3,45	100,00
Total	203	100,00	

Based on the table seen score variable reading ability critical is dominant in the interval class between 11 - 12 (33.99%), then followed by scores on class intervals 13-14 (19.21%), and 9-10 (17.24%). Next is the score at class intervals 15-16 = 13.30%, 7 - 8 = 7.88%, 5 - 6 = 3.94%, 17-18 = 3.45%, and the lowest score is at class intervals 1 - 2 and 3 - 4, respectively 0.49%.

Statement items are valid for variable critical thinking ability totaled 21 statements, so a score of critical thinking skills theoretical range between 21 - 63. The lowest score is 21 multiplication between the number of statement items with alternative scores the answer is no agree that is 1 (21x 1), while the score the highest is 63, is multiplication between the number of items with statement alternative score answers agree (21 x 3).

Descriptive statistical results show the lowest or minimum score obtained for the ability variable critical thinking is 39, the highest score (maximum) 63, and the data range (range) = 24. For the average value, mode and median respectively amounted to 54, 54 and 54. Standard the deviation = 4.353 and the variance = 18,952. Frequency distribution of variable critical thinking ability based on the data obtained can seen in the following table.

Table 2. Distribution Frequency of Critical Thinking Skill Scores

Interval Class	Absolute Frequency	Relative Frequency	Cumulative Frequency
39-41	1	0,49	0,49
42-44	4	1,97	2,46
45-47	13	6,40	8,87
48-50	21	10,34	19,21
51-53	36	17,73	36,95
54-56	64	31,53	68,47
57-59	44	21,67	90,15
60-62	15	7,39	97,54
63-65	5	2,46	100,00

Based on the table, known to the majority of critical thinking scores are in class intervals between 54-56, which amounted to 31.53% and followed with data at intervals of 57-59 by 21.67%. Then the score is are in class intervals between 51-53 = 17.73%, 48 - 50 = 10.34%, 60-62 = 7.39%, 45 - 47 = 6.40%, 63 - 65 = 2.46%, 42 - 44 = 1.97% and 39 - 41 = 0.49%.

Number of items valid statement for the variable read interest is 18, so the score of read interest is theoretically in the range between 18-54. The lowest score is 18, constitutes multiplication between the number of statement items with alternative scores the answer is no agree, which is 1 (18 x 1), while the score the highest is 54, constitutes multiplication between the number of statement items (18) with alternative answers scores agree (3).

From the calculation results, descriptive statistics of the lowest score or the minimum is 30, the highest score (maximum) is 54, the data range (range) is 24, average value = 48, mode = 50 and the median = 48. Next to the standard deviation equal to 4,240 and the variant = 17,974. Distribution frequency of interest variables read based on the data obtained can be seen in the following table:

Table 3. Distribution Frequency of Critical Reading

Interval Class	Absolute Frequency	Relative Frequency	Cumulative Frequency
30-32	1	0,49	0,49
33-35	1	0,49	0,99
36-38	6	2,96	3,94
39-41	11	5,42	9,36
42-44	26	12,81	22,17
45-47	47	23,15	45,32
48-50	62	30,54	75,86
51-53	39	19,21	95,07
54-56	10	4,93	100,00
Total	203	100	

Score variable partial read interest large are at intervals of 48 - 50, ie as much as 30.54%, then followed by the score at intervals of 45 - 47 = 23.15%. Order Next is the score in class intervals between 51 - 53 = 19.21%, 42 - 44 12.81%, 39 - 41 = 5.42%, 54 - 56 = 4.93%, and 36 - 38 = 2.96%. While the smallest score are in the class interval 30 - 32 and 33 - 35 each as many 0.49%.

The result analysis of the t test used to test the hypothesis shows the results 10,662. The value of  $t_{table}$  using a significance level  $\alpha = 5$  and the degree of freedom is 201, i.e. 1,972. Decision making criteria for hypothesis testing is: if  $t_{count} < t_{table} (\alpha, df)$ , then nothing critical thinking relationship with critical reading skills.

Conversely, if  $t_{count} > t_{table} (\alpha, df)$ , Critical thinking has a connection critical reading skills. Because the value of t is  $10.662 > t_{table} (1.972)$ , therefore it can be concluded that there is positive and significant relationship between critical thinking and critical reading. T-test calculation results, shows the value of tcount of 10.887, while the ttable value uses significance level  $\alpha = 5$  and degree of freedom of 201, which is 1.972. By because  $t_{count} (10.887) > t_{table} (1.972)$ , then it can be concluded that there is positive and significant relationship between critical reading and critical thinking.

From the results of the calculation of the test significance of the multiple correlation coefficient the  $F_{count} = 107.314$  is greater from  $F_{table} = 4,712$ , so it can be it was concluded that the correlation coefficient between critical thinking and critical reading skills is significant. In a sense: there is a positive relationship and significant between critical thinking and critical reading skills. From the correlation coefficient can be the coefficient of determination is known amounted to 0.382 or 38.2%. It means that 38.2% of ability variations critical reading can be explained by critical thinking through Regression equation  $\hat{Y} = -8,839 + 0,182X_1 + 0,222X_2$ . The constant value of -8,839 can be explained that at the time variable critical thinking and critical reading value 0, then critical reading has a value of 8,839. From the equation above too known variable regression coefficients critical thinking = 0.182, and critical reading = 0.222.

This shows that every increase is one unit critical thinking and critical reading will followed by an increase in critical reading skills of 0.182 of critical thinking and 0.222 from critical reading.

Moreover, in this research, the critical thinking assessment (test) sheet consisted of eight questions where seven questions were about critical thinking tools and one question was about students` thinking related to critical thinking and the further reading. The further result of the critical thinking test with the research subject who taught critical thinking can be seen in the table 4 below.

Table 4. Result of the Test

No	Research Subject	Items								$\Sigma$	%
		1	2	3	4	5	6	7	Part 2		
	$\Sigma$ FX	54	51	69	34	35	35	56	61	395	395
	Mean	1,8	1,7	2,3	1,13	1,17	1,17	1,87	2,03	13,17	13,2

Based on the finding after conducting the test, the students' ability to think critically was categorized as "low". From the table above, researcher got that the average of students' score was 13, 17 which means low. It means that the students' ability to think critically was low.

Then, the researcher gave the students 5 items which have to be answered. The questions were related to critical thinking. Each question has four choices in which each choice has different value. The further result of the research through questionnaire was presented below.

Table 5. Result of Questionnaire

No	Research Subject	Score Per Item				
		1	2	3	4	5
	$\Sigma$	79	75	79	89	75
	Mean	2,7	2,5	2,3	2,9	2,5

Based on the finding after distributing the questionnaire, it can be said that: 1) When the students analyze information, data (facts and figures) or ideas, either at work or in class, generally they can report what they have read or heard with only a few mistakes; 2) When the students try to apply formulas, procedures, principles, or themes to a new problem, assignment, or situation, usually they can think of the right formula or concept, but they often have trouble using it correctly; 3) When the students try to think about a subject, problem, or situation from more than one point of view, they can see two sides of any issue, but tend to think one of them is right; 4) When the students try to come to a conclusion about something they are thinking, they can create a conclusion that is logical and that reflects their ideas, too; 5) When students try to pull ideas together to get the big picture, they can arrange most ideas into a pattern, if it's not too complicated.

After giving test and questionnaire, the researcher calculated meaning of the test and questionnaire. Then, calculating was done to know standard deviation and analyzed the result by using statistical of t-test formula. The result of the calculation was presented as below:

Table 6. Standard Deviation (SD)

Criteria	N	Mean	Standard Deviation
Students' ability to think critically	26	13.17	2.829

Table 7. T-test and t-table

Criteria	N	t-value	t-table
Students' ability to think critically	30	- 7.352	1.699

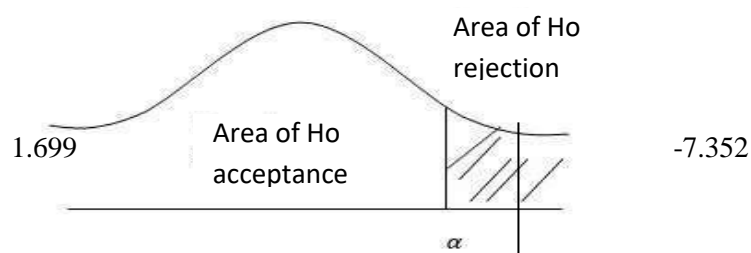
Table 8. One sample statistics

	N	Mean	Standard Deviation (SD)
Value	30	13.17	2.829

Table 9. One Sample t-test

	Test Value = 100		
	T	Df	Sig. (1 tailed)
Value	-7.352	29	0,05

From the calculation above, it can be drawn as below:



After knowing the calculation above, it can be concluded that t-value is lower than t-table (t-value < t-table). It means that  $H_a$  rejected and  $H_0$  accepted. It means that less than 70% students on critical reading class have high ability to think critically.

### Discussion

In this research, the average of the students' score of critical thinking test is 13.17. The average percentage of the students' score was 13,2 %. It can be said that students' ability to think critically is low. Only 13,2% of the students who have high ability to think critically. The students' score was low because they were not answer the question clearly. There are only some students who provided deductive or inductive reasoning, examples or inferences. Some of the students also answer the questions with the sentences which contain ambiguity. Most of the students could analyze critical thinking tools on the article, but they did not provide evidence or example when answering the questions.

Answering the critical thinking test, the students need to understand the critical thinking tools in order to make them easy to do the test. There were seven tools of critical thinking that needs much attention. They are purpose of reading, ideas and information to support the answer of questions based on the text, providing supporting details, make sure are there any assumptions and biases made by the author, understand the conclusions, implications, and consequences of the text, understand the point of view, and analysis the text (Kivunja, 2014).

According to the questionnaire, the student's level is on developing. It means that they can report what they have read with only a few mistakes, can see two sides of any issue, but tend to think one of them is right, and can arrange most ideas into a pattern, if it's not too complicated. The results of this study indicate that there is a positive relationship critical thinking and interest in reading with critical reading skills. This matter complement and strengthen results previous studies which stated that level of thinking critically has a clout significant on ability critical reading (Leen, Kwan, & Ying, 2014).

The others relevant research results stated that the students' critical reading ability with high critical thinking, better than students who have low critical thinking, so it can be concluded that the higher critical thinking ability, the ability to critical reading high increasingly (Ko, 2013)

### Conclusion

Conclusions can be made as follows: 1) thinking ability criticism has a positive relationship and significant with ability critical reading of EFL students by 0.364 or 36.4%. Thus, students' high critical reading ability can be explained by variable critical thinking ability 36.4%. This means that the higher students' critical thinking ability is also critically high, 2) critical thinking has a positive relationship and significant with students' critical reading skills of 0,369 or 36.9%. Thus, high critical reading ability

36.9% of them explained by the critical reading variable. This means that the higher students' critical reading has high critical thinking skill too, 3) critical reading have positive and significant relationship with critical thinking skills. From the coefficient correlation can be known coefficient the determination is 0.382 or 38.2%. This means that 38.2% variations in critical thinking skills can be explained by critical reading ability through a regression equation  $\hat{Y} = -8,839 + 0,182X_1 + 0,222X_2$ .

The students' ability to think critically was low. It is based on the average of the students' ability to think critically is 13,17 in which the maximum score would be 32. The average percentage of the students' score was 13,2 %. Those calculation had meaning that only 13,2 % of the students who have high ability to think critically. Based on the hypothesis analysis, t-table (1.699) is higher than t-value (-7.352) which means that  $H_a$  rejected and  $H_o$  accepted. It means that less than 70% students on critical reading class of English Education Department have high ability to think critically. The students' score was low because they were not answer the critical thinking test based on the criteria (should give evidence and proof and elaborate it with their thinking clearly and precisely). To make this research perfect, the researcher suggests to the next researcher to conduct such this research using experimental research. Providing a strategy which can improve students' ability to think critically is can be done.

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