Lectura: Jurnal Pendidikan
Volume 14, Nomor 2, Agustus 2023, Halaman 340-351
P-ISSN: 2086-4876
E-ISSN: 2549-063X
DOI: https://doi.org/10.31849/lectura.v14i2.15030
Link: https://journal.unilak.ac.id/index.php/lectura/article/view/15030

Promoting Critical Thinking Skills through Contextual Teaching and Learning

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Submitted: 07-07-2023 Accepted: 21-07-2023 Published: 01-08-2023

Abstract
Critical thinking skills are one of many skills that should be acquired by students in the 2013 curriculum, and it allows students to be able to think critically in learning. However, the delicacy of the learning methods or models used in biology learning was found since the teacher mostly used lecture methods and assignments. In order to overcome these problems and achieve educational goals, the role of teachers who acquire appropriate learning methods and models according to the subject they teach is very important, and the Contextual Teaching and Learning is one of many appropriate methods that can be used. Therefore, this study aims at determining the impact of the Contextual Teaching and Learning regarding to students' critical thinking skills at *Sekolah Menengah Atas Negeri (SMAN) 16 Pekanbaru*. Moreover, a quantitative research was used as the method of the research. According to the data analysis, it was found that the average score of the critical thinking test in the control class was 2.33 and it was classified into moderate. In other hand, and the average score in the experimental class was 2.53 and it was categorized as high. As a result, the Contextual Teaching and Learning was able to give siginificant influence related to students critical Thinking Skills. This was occured since the method is focused on describing the competencies that teachers should achieve first at the beginning of learning.

Keywords: contextual teaching and learning, critical thinking, students

INTRODUCTION

Educating as aspiring human beings is important and able to pursue the best aspects of culture and the achievements of each generation for the benefit of a generation of young people who continue to live and shape their lives within their socio-cultural context. For every public institution, as an educator, always prepares the public to continue the public renewal that accompanies it. This required an education beyond family rules to enhance individual dignity and individuality and to make them more intelligent and holistic (Wigati, 2013).

Education is an activity, a human endeavor, to improve character through the development of individual potentials: mental (thoughts, intentions, taste, creativity, conscience) and physical (senses and abilities). Education is also an attempt to help people lead meaningful lives so that both individuals and groups can lead happy lives. As a process, education requires a planned, stable system and clear goals that are easy to achieve in the intended direction. Education is a conscious effort, forming a process of activity with a solid foundation and a clear direction as the goal to be reached. A develop country is influenced by the quality of its education, therefore, education is proven to be able to foster the development of the quality of human being. Therefore, education should develop from different sciences, because quality education can improve the intelligence of the nation. Lifelong education is an absolute need that is met throughout life.

Moreover, by ruling out education, no group of people can live and develop according to their outlook on life, according to the ideals of progress, well-being and happiness (Gaol et al., 2022). The development of time and technology demands rapid development in various areas of life, including the area of education. Quality education also produces quality resources. The development of education is inseparable from the learning process in the classroom. For classroom learning to progress rapidly, students must develop critical thinking skills while learning (Shanti et al., 2018). Learning is also any effort that someone makes to produce a learning activity. These efforts include the transfer of knowledge, the use of a variety of methods to organize and build learning environment systems to enable students to effectively and efficiently carry out learning activities and achieve optimal learning outcomes.

Additionally, the purpose of education is to change students' ability to think. Thought comes from the etymology "think" which means reason, mind, wishful thinking and memory. Thinking is the mental process of considering and deciding actions and conversations. There are three levels of her thinking: (1) low level i.e. thinking level through stages of remembering, knowing and understanding, (2) intermediate level i.e. stages through application process, (3) high level i.e. thinking level through stage analysis, evaluation , problem solving, critical and creative thinking. The Critical thinking is part of higher thinking skills and that is the activity of contemplating ideas and ideas related to a particular concept or problem being explained. Therefore, the Critical Thinking is related to the potential thoughts that existed and to be developed in order to attain optimal competence (Susanto, 2013).

Skills that matter to students should be developed in the learning process so that they can develop in a deeper, more scientific way the abilities that exist naturally in themselves and their surroundings. Thinking critically means thinking rationally and thoughtfully, focusing on deciding who to trust and what to do (Kuswana, 2012). Thinking Skills Critical thinking is the advanced thinking that students need to face future problems, and not just when they learn it in the classroom (Astari et al., 2020). Critical

thinking is an intellectual thinking process in which thinkers consciously assess the quality of their thinking and use introspective, independent, clear and rational thinking (Ahmatika, 2017).

Critical thinking skills are also the ability to think reflectively to decide what to do. Critical thinking skills are required to train students to solve problems that are relevant not only to their learning in school, but also to real life problems. Critical thinking skills need to be developed so that students can more easily understand concepts, understand and solve problems, be sensitive to problems that arise, and be able to apply concepts in a variety of situations (Mahmudah et al., 2018).

One of the core aspect of competencies 21st century learning is critical thinking skills and the students are demanded to gain the skills. It is in line with Abbas & Fathira (2022) who stated that 21st century skill (one of that skills is critical thinking skill) shoud be built in learning process. At the level of general education as a way of life and life among others refers to developing the entire human personality in relation to social life and other living environments. Critical abilities can help students to adapt to the environment and be able to overcome problems when they are already working (Fadillah et al., 2017; Sari & Maryani, 2016).

However, one of the lessons that will be delivered was using a supporting model, namely the Contextual Teaching and Learning learning models (CTL). It is a draft learning which help Teacher connect material Which taught with circumstances real student and push student to make connection between his knowledge with knowledge with its application in life (Wulandari, 2018). The Contextual Teaching and Learning model includes seven components, namely: inquiry constructivism, asking, learning communities, modeling, reflection, and actual assessment (Andarini et al., 2013).

The Contextual Teaching and Learning (CTL) learning model is considered appropriate when applied to viral teaching materials as it allows students to understand the process of viral infection in humans and the ongoing phenomenon of the Covid-19 pandemic. I'm here. In addition, the Contextual Teaching and Learning (CTL) learning model helps students think about concepts, and those who are capable of thinking provide the right direction in thinking, working, defining concepts, and interacting with others. is thought to be able to help between one thing and another. more accurate. Therefore, thinking skills are required in the process of problem-solving, solution-finding, and investigation. Educators also need to be able to capitalize on the phenomena that existed during the Covid-19 pandemic. The learning model chosen is expected not only to allow students to memorize what they have learned, but also to facilitate and deepen the knowledge they acquire and to be able to relate that knowledge to their application in student life.

Therefore, the learning method requires the teacher's creativity to relate the subject matter to the student's real life so that the material can be more easily interpreted by the student. Several studies have been conducted on the use of her CTL learning model for students' critical thinking skills. This includes a study by Maulana (2022); Rumaini (2018) state that contextual teaching and learning models influence students' critical thinking.

Additionally, this model helps teachers to relate the subject matter to real-world situations. This model encourages students to connect their knowledge with its application in everyday life. This learning model aims to motivate students to understand what they are learning by relating it to the context of their daily lives. Also, this model

emphasizes the students' participation by finding and relating the concepts to be studied to real-world situations and encouraging them to apply them in their daily lives.

The Contextual Teaching Learning (CTL) connects all learning materials and topics to real life. Linking can be done in a variety of ways other than directly related to the facts. Materials can also be tricked into providing illustrations and examples (learning resources, media, etc.) that directly or indirectly link to real-life experiences (Ismiati, 2020). Besides, according to Johnson & Johnson (2009) this method directly teaches steps that can be used for critical and creative thinking and provides opportunities to develop the thinking skills that are used. Providing helps develop the intellectual potential of the students at a higher level

The Contextual Teaching and Learning (CTL) model is also seen as a learning model that allows students to apply their understanding and academic skills in a variety of situations. The learning model of contextual teaching and learning points the emmergence of students on building their own knowledge and developing their own new knowledge and skills through active participation in the teaching and learning process. It has been. Contextual teaching and learning models also emphasize higher-level thinking. This learning model trains students to think critically when collecting data, understanding problems, or solving problems. This process can be carried out in inquiry activities where there is a transition process from observation to understanding. Therefore, enhancing students' critical thingking skill is expected to be achieved by using this learning model (Mahmudah et al., 2018).

Furthermore, according to Rohmah (2017), learning is interaction two direction between teacher and student, exists communication which directed between them going to objective which has determined previously. Kosasih (2014) states that study is something business (teaching) Which can motivating student For Study. Learning is an effort to convey knowledge to students at school. According to Huda (2013) learning consists from results memory, circumstances and metacognition. A number of factor Which influence achievement objective learning between other Teacher, student, environment, method learning, And media. As a source of learning, educators have a responsibility to provide a creative environment for students for learning activities. One of the educator's tasks is to choose and determine a model that meets educational goals.

Learning is the most important activity in educational institutions and schools. Learning is a process of communication for both teachers and students, also for the elements involved. The purpose of educating is to change students' positive behaviors and achieve maximum learning outcomes. Good learning leads to good learning outcomes (Gaol et al., 2022). Moreover, Rusman (2014) argues that model learning can be defined as changing the curriculum (planning study time over an extended period of time), designing practical or classroom learning, or otherwise guides learning in the context of Furthermore, a learning model is a conceptual framework that serves as a guide for conducting learning activities (Fathurrohman, 2015). A learning model is a pattern that serves as a guide for classroom lesson planning and typically describes the steps or processes teachers follow to create effective, efficient and interesting learning activities (Subur, 2015). During the learning process, students are supported to develop their intellectual potential. Students should no longer be seen as mere objects of learning, but should be active participants and partners in the learning process (Fathurrahman et al., 2019).

Based on observations and interviews with the biology teachers in SMAN 16

Pekanbaru, it is known that the students' achievement in the first grade was not meet the passing grade especially regarding viruses, are suboptimal. What happens in the study of biology is a weak learning system that runs in the learning process. The method used in biology classes or model learning is the conventional teaching method that commonly used in lectures and assignments. The conventional teaching methods means that teachers are always active, reciting orally, lecturing all day, and giving assignments every day (Rizky & Zainil, 2021). The learning conditions are not favorable because the learning process is not maximized. Many students do not pay attention to their teachers and often do things other than their learning activities, such as chatting with friends or dozing off. In addition, students no longer have the courage to express their opinions or ask questions they do not understand. Lecture-style learning and the absence of interesting learning media means that students are not engaged during the teaching and learning and this affects students' achievement.

As a result, learning in a learning model that focuses on teachers and absentee media has made process learning tedious. Students are only given material without any connection to their real life, so their ability to apply the material and knowledge they have is very limited. Applied model results show that students are unaware of the learning material and are not yet adept at gathering knowledge in factual form. Students are performing poorly because they have not mastered the concepts.

Hence, through Contextual Teaching and Learning (CTL), students expect scientific, logical and rational attitudes about themselves. All of these are necessary for the formation of creativity in learning. For example, Contextual Teaching and Learning (CTL) can be used in conjunction with other learning models to not only study material, but also enhance specific skills such as critical thinking. Consequently, the researches are expected that the Contextual teaching and learning (CTL) model learning with real life can be applied in a variety of ways and, moreover, and directly relate what is learned to factual situations, such as gift illustrations and examples. Moreover, the goal of this study is to find out whether the model of learning that is Contextual Teaching and Learning affects students' critical thinking skills Class X IPA Biology students in SMAN 16 Pekanbaru.

METHOD

In this research, the researchers employed an experimental research. This research was consisted of control class and experimental class. Thus, pre-test and post-test were performed in both classes, and the treatment was performed in the experimental class. The study was conducted at SMA N 16, Pekanbaru City, Riau and the data were collected during the 2022/2023 academic year. The students in grade X IPA SMA N 16 Pekanbaru were used as the population. Sampling techniques in this study were performed using a total sampling method. Thus, the class X IPA 1 was chosen as the control class and class X IPA 2 was chosen as the experimental class. There were 36 students in the control class and 36 students in the experimental class.

This study used a non-test-oriented tool in the form of a critical thinking and the test given to control and experimental classes. The test used in this study consisted of 60 statements and it answered by 31 students. The test consists of five metrics: Argument analysis, ability to ask questions, ability to answer questions, reasoning and evaluation and evaluation skills. Next, the validity of the test is checked.

Moreover, the validity test was performed to see if the test was valid. Then, the validity is tested by calculating the number of correlations or r numbers of each respondent's response value for each utterance item and comparing it to the r table. Each statement element is considered valid if the value of r count is greater than r table (r count > r table). The test used in this study consisted of 60 statements answered by 31 students. Therefore, the r table for this study was 0.355. Moreover, the table below displays the Validation Test Results Summary:

Table 1. Recapitulation of Validation Test Results of Each Indicators

No	Indicator	Category	Amount	Statement number	
				+	-
1	Analyzing Arguments	Valid	7	1, 9, 12	3, 4, 6, 8
		Invalid	5	2, 5, 10, 11	7
2	Able to Ask	Valid	6	15, 17, 19, 20, 23	14
		Invalid	6	13, 16, 18	21, 22, 24
3	Able to Answer Questions	Valid	7	25, 30, 33, 34	28, 35, 36
		Invalid	5	27, 31,	26, 29, 32
4	Making Conclusions	Valid	8	37, 40, 44, 47	39, 41, 45, 48
		Invalid	5	42, 46, 49	38, 43
5	Evaluating and Assessing Skills	Valid	7	56, 58	51, 52, 54, 55, 60
		Invalid	4	50, 57	53, 59
		Amount	60	32	28
Valid Amount			35		

(Source: SPSS Processing Version 23)

The above table presents the validity test of the statement in critical thinking test that revealed 35 valid statements and 25 invalid statements. Furthermore, the researcher conducted a test reliability test. This reliability test was performed to see if the test was reliable. Reliability test using Cronbach's alpha formula using SPSS version 23. A statement is considered reliable if r count is greater than r table. Based on critical thinking description, Cronbach's alpha score is 0.856. Reliability test results are shown in the Table 2.

Table 2. Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
0.856	60

Source: (SPSS Version 23 processing)

The scores obtained by students were then analyzed using a Likert scale score. As for the Likert scale scores in this study, the researchers used a multilevel scale with four answer instruments, as shown in the Table 3.

Table 3. Alternative Answer Test Score

Alternative Answer	Rating Weight	
	Positive	**Negative**
Strongly Agree	4	1
Agree	3	2
Disagree	2	3
Strongly Disagree	1	4

(Source: Mulyatiningsih, 2012)

The score obtained was then calculated using the following formula:

$$S = (\text{Each Frequency} \times \text{Rating Weight}) / 4 \times 100$$

$$P = (F/N) \times 100\%$$

Information:
S = Score
P = Number of Percentage
F = Percentage of Frequency
N = Number of
100% = Fixed number

The weight of the assessment obtained by the respondents was described as follows:

Table 4. Test Value Criteria

Range of Score	Category
86-100%	Very Good
76-86%	Good
56-75%	Fair
55-59%	Poor
0-54%	Very Poor

(Source: Abdurrahman & Muhidin, 2007)

FINDINGS AND DISCUSSION

The data obtained by researchers in analyzing a critical thinking test consisting of 5 indicators with a total of 60 statements. The indicators that serve as benchmarks in critical thinking are analyzing arguments, being able to ask questions, able to answer questions, make conclusions as well as evaluate and assess skills. The Contextual Teaching and Learning (CTL) methodology has a significant effect on students' critical thinking skills and biological learning outcomes. This was discovered because the overall average of the students' experimental class score was greater than that of the control

group. It was therefore believed that the Contextual Teaching and Learning models may have an impact on the students' critical thinking abilities in SMAN 16 Pekanbaru.

To obtain the findings, researchers analyzed the test using Microsoft Excel 2010 software. Based on the survey data conducted, here are the results of the critical thinking test.

Table 5. Results of the Control Class Critical Thinking Test

No	Indicator	Percentage	Category
1.	Analyzing Arguments	38.31%	Very Poor
2.	Able to Ask Questions	75.35%	Good
3.	Able to Answer Questions	69.79%	Fair
4.	Making Conclusions	57.64%	Poor
5.	Evaluating and Assessing Skills	50.00%	Very Poor
Average		58.22%	Poor

According to Table 5, it can be inferred that the average score for all critical thinking control measures is categorized into the poor category 58.22% of the time. The highest average score was an indicator of ability to ask questions, falls into the good category with a high percentage of 75.35%, and the lowest average score was an indicator of argument, falls into the very poor category with the lowest percentage was 38.31%.

Table 6. The Results of the Experimental Class Critical Thinking Test

No	Indicator	Percentage	Category
1.	Analyzing Arguments	65.06%	Fair
2.	Able to Ask Questions	88.59%	Very Good
3.	Able to Answer Questions	85.00%	Good
4.	Making Conclusions	71.89%	Fair
5.	Evaluating and Assessing Skills	67.81%	Fair
Average		75.67%	Good

From the Table 6, it displays the test result. Thus, the average score was 75.67% for all critical thinking indicators in the experimental class that was categorized as good. The highest average score was 88.59% that was an indicator of able to ask questions that belongs to the very good category. And, the lowest average score was 65.06% that was the indicator of analyzing arguments. Thus, the figure 1 displays a proportion based on the average scores on the students' Critical Thinking test between the control class and experimental class.

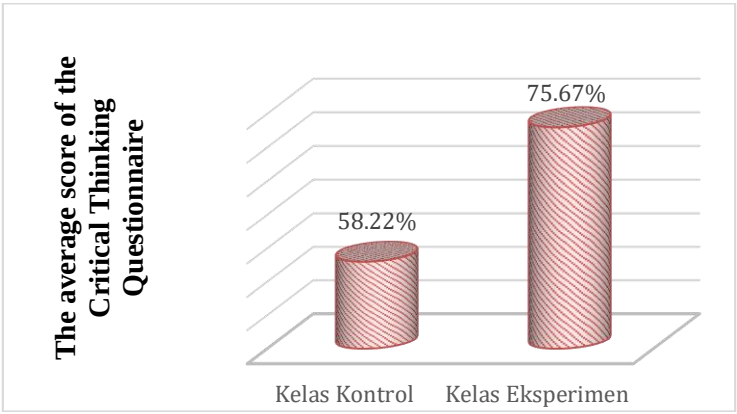

Figure 1. Comparison of the Average Critical Thinking Test Scores in the Control Class and the Experimental Class

The Figure 1 displays the average score of students' critical thinking test. The table shows the score for the control class that was 58.22% and was included into the medium category. Reciprocally, the average score on students' critical thinking test score for the experimental class was 75.67% and was classified as the good category. As conclusion, it was found that the average score in experimental class was higher than control class. This means that the Contextual Teaching and Learning model influences the students' critical thinking ability in Class X of SMAN 16 Pekanbaru.

Additionally, by comparing to the average scores of students' critical thinking in the experimental class, they are higher than the average score compared to the control class. This was because the model learning used in experiential learning develops the ability of students to think critically and gives them the opportunity to develop their skills through the process of solving complex problems. Rizky & Zainil (2021) states that small discussion groups is able to improve students' analytical, interpretative, evaluative, reasoning and explanatory skills over control classes using only traditional methods. Thus, it demonstrates the influence of appropriate models such as critical thinking skills.

The learning environment keeps students interested in learning and free to explore the information they need. Therefore, it is clear that fitting the right model when learning has a significance on students' critical thinking skills. This is consistent with the study of Amalia & Wilujeng (2018) that found the Critical Thinking Skills in classes using contextual teaching and learning learning models had improved significantly more than those in classes using traditional models. is consistent with Based on the results of this analysis, it can be concluded that learning models of contextual teaching and learning influence students' critical thinking skills. Consistent with other research by Juniwati & Sari (2019) that found its application of the CTL model in science learning has a significant effect on students' critical thinking.

Moreover, similar finding was also explored by Wakijo & Suprihatin (2016) that found that learning models such as Contextual Teaching and Learning (CTL) were superior to attract critical thinking skills compared to those whom receiving conventional learning model. This has proven that the use of Contextual Teaching and Learning (CTL) influences students' critical thinking skills. Also, the application of the Contextual Teaching and Learning (CTL) learning model is mostly effective when students actively participate in all classroom activities and have the opportunity to explore for themselves. Because this contextual teaching and learning model focuses on student activity, this strategy is often referred to as student-centered education. The teacher's role is to help students discover facts, concepts, and principles for themselves, rather than lecturing or directing all the activities in the classroom. One practical means of implementing the learning model is for teachers to know what is happening in the context of the material before they start learning. It means that we need to remind the minds of our students to be transmitted.

Moreover, this model involves concept of learning that brings students into the real world according to discussions and materials provided or presented to them. Because contextual teaching and learning (CTL) has difficulty connecting what is being discussed to the real world, the learning process uses contextual teaching and learning models to ensure that teachers only provide case studies that we experience frequently, from a case

study commonly experienced by ordinary people. Using these case studies, students engage in discussion and relate it to book concepts

According to Wulandari (2018) the Contextual Teaching and Learning (CTL) directly teaches steps which can be applied to critical and creative thinking, as well as opportunities to use skills that are higher world realities. This helps to develop the intellectual potential of students by providing a model by using the Contextual Teaching and Learning (CTL). By doing so, this gives students more opportunities to do, to try and to experience. Students are not just passive since this learning emphasizes practical knowledge and experience, higher-order thinking skills, learner-centered, activeness, evaluative and inventive students, and problem-solving skills. Students learn with fun and excitement using a variety of learning materials.

The Contextual Teaching and Learning (CTL) makes the subject matter more focused by describing the competencies that teachers should achieve first at the start of learning. Students absorb lessons faster because teachers connect lessons to students' real-life conditions and attract the students to connect existing comprehension in their real lives.

CONCLUSION

In summary, education plays an important role in the development and progress of individuals and societies that aimed to go beyond family rules and promote personal dignity, intelligence and holistic development. However, the traditional lecture-style learning approach and lack of student involvement can hinder the effectiveness of teaching. Furthermore, this research has been conducted at SMA N 16 Pekanbaru by comparing control and experimental groups and the validity of the model was validated through the use of a non-test-oriented critical thinking test. As a results, the Contextual Teaching and Learning (CTL) model positively impacts students' critical thinking skills and biology learning outcomes. This was found since the students' average score in the experimental class was higher than in control class. It was assumed that the Contextual Teaching and Learning models was able to influence the students' critical thinking skills in SMAN 16 Pekanbaru. Besides, the Contextual Teaching and Learning (CTL) assists the teachers to connect the materials in the classroom regarding students' real-life experiences and makes the materials more relatable and understandable. Hence, the researchers suggest that the future research and educators to develop critical thinking skills and create creative learning environments that engaged theoretical knowledge with real world applications.

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