

## The Effect of 7E Learning Cycle Model on the Students' Critical Thinking Skills

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### Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran *Learning Cycle 7E* terhadap kemampuan berpikir kritis peserta didik terutama pada materi sistem sirkulasi. Metode penelitian yang digunakan adalah *Quasi Experimental* dengan desain penelitian *Nonequivalent Control Group Design*. Penentuan sampel menggunakan teknik *Purposive Sampling*. Instrumen pengumpulan data dilakukan dengan tes berupa soal pilihan ganda, observasi keterlaksanaan pembelajaran serta angket respon peserta didik. Indikator kemampuan berpikir kritis dalam penelitian ini yaitu *Elementary clarification, Basic support, Inference, Advanced clarification, dan Strategy and tactic*. Hasil analisis data rata-rata tes akhir kelas eksperimen sebesar 79,88 (baik) dan kelas kontrol sebesar 70,66 (baik). Persentase observasi keterlaksanaan pembelajaran dengan model *Learning Cycle 7E* sebesar 85,25 % (sangat baik). Angket respon peserta didik terhadap pembelajaran dengan model *Learning Cycle 7E* sebesar 83 % peserta didik merespon sangat baik dan 17 % merespon baik. Berdasarkan uji statistik menggunakan SPSS22 diperoleh bahwa penerapan model *Learning Cycle 7E* berpengaruh signifikan terhadap kemampuan berpikir kritis peserta didik pada materi sistem peredaran darah.

**Kata Kunci:** Keterampilan Berpikir Kritis, *Learning Cycle*

### Abstract

This research has a goal to obtain information about the effect of *Learning Cycle 7E* model on students' critical thinking skills in the circulatory system material for the eleventh-grade students of SMA Negeri 1 Indralaya Utara. Quasi experiment method with nonequivalent control-group design was used. The sample was determined with purposive sampling technique, obtaining XI Science 1 as the experimental class and XI Science 2 as the control class. The data were collected using a test in the form of multiple-choice questions, observation of learning implementation, and student response questionnaires. The indicators of critical thinking skills include elementary clarification, basic support, inference, advanced clarification, and strategy and tactic. Based on the results of the post-test mean score analysis, the experimental class obtains 79.88 (good) and the control class 70.66 (good). The percentage of observations on the implementation of learning with the *7E Learning Cycle* model is 85.25% (very good). From the questionnaire, it is known that 83% of students respond very well and 17% respond well. Based on statistical tests using SPSS22, it was found that the application of the *7E Learning Cycle* model significantly effects students' critical thinking skills in the circulatory system material.

**Keywords:** Critical Thinking Skill, *Learning Cycle*

**How to Cite:** Sari, N. I., Meilinda, & Yenny, A. (2020). The effect of 7E learning cycle model on the students' critical thinking skill. *Sriwijaya International Journal of Lesson Study*, 1(2), 23-30

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## INTRODUCTION

Critical thinking is one of the four competencies that students must have in the 21<sup>st</sup> century. The four competencies are known as 4C (Critical thinking and problem solving, Creativity, Communication skills, and Collaboration) (Avinda, 2018). As a reflective thinking ability, critical thinking skills are focused on patterns of making decisions about what to believe and what to do (Ennis, 2011). There are 5 indicators of critical thinking skills, namely elementary clarification, basic support, inference, advanced clarification, and strategy and tactics (Ennis, 2011).

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The emphasis of critical thinking skills in classroom learning is quite reasonable because these skills are not mastered by students yet. This is shown by the results of the Trends in International Mathematics and Science Study (TIMSS) survey in 2011, where Indonesia ranked 40<sup>th</sup> out of 42 countries, and the results of the 2015 Program for International Student Assessment (PISA) survey which put Indonesia in the 62<sup>nd</sup> rank from 72 countries (Utomo, 2011; OECD, 2015). Studies conducted by TIMSS and PISA show that the scores of Indonesia are still below the international average. The questions used in the TIMSS and PISA studies consist of problems to measure higher order thinking skills, one of which is critical thinking skills.

The learning process in class is generally still not optimal, especially in teacher's selecting and using appropriate learning models to deliver learning material and objectives. Many teachers still use direct learning that trains the critical thinking skills of students less optimally (Jumaisyaroh *et al.*, 2015). Besides, students are not given the opportunity to construct their knowledge, making them less involved in the learning process and tend to be passive; this is what causes low critical thinking skills of students (Danisa *et al.*, 2016).

One learning model that is thought to improve critical thinking skills is 7E Learning Cycle. The stages of this model consist of eliciting, engaging, exploring, explaining, elaborating, evaluating, and extending (Eisenkraft, 2003). Research on the 7E learning cycle model has been conducted by Apriani *et al.* (2012) showing that the application of this model can improve learning outcomes and generic science skills of students. Similar research was also conducted by Rahmayani *et al.* (2017) indicating that the 7E Learning Cycle model can improve students' critical thinking skills.

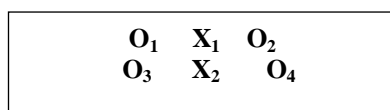
Based on this explanation, the researcher has conducted the research entitled "The Effect of 7E Learning Cycle Model on the students' Critical Thinking Skills". The formulation of the problem is *How does the 7E Learning Cycle model influence the critical thinking skills of students on the circulatory system material*

Thus, this research seeks to determine the effect of this model on students' critical thinking skills. This research gives benefits for students to improve their critical thinking skills, for teachers to consider in choosing an effective learning model to improve students' critical thinking skills in Biology learning, for schools as input and contribution to increase students' critical thinking skills in learning, and for researchers as knowledge to arrange and implement learning using 7E Learning Cycle model.

## METHODS

### *Research Design*

Quasi experiment method with nonequivalent control-group design was employed in this research. The research design is illustrated below:



(Sugiyono, 2015)

Remark:

O1 and O3: Pretest

O2 and O4: Post-test

X1: Learning with Learning Cycle 7E

X2: Learning with lesson plans from school

### **Population and Sample**

The research population were all eleventh-grade science students at SMA Negeri 1 Unggulan Indralaya Utara which consisted of two classes, namely class XI Science 1 and XI Science 2. The samples were selected using purposive sampling technique, which is a method of taking samples with certain criteria (Sugiyono, 2015). XI Science 1 was made as the experimental class and XI Science 2 as the control class.

### **Research Instrument**

The learning instruments used in this research consist of syllabus, lesson plans (Learning Cycle 7E for experimental class and discovery learning for control class), student worksheet, and objective test with 30 multiple-choice questions. The instruments were tested for their reliability and validity of the items. The assessment rubric for critical thinking skills was used to measure the dependent variable and refers to the critical thinking indicators of Ennis (2011).

### **Research Procedure**

The data were collected through pretest and post-test in the odd semester from November 11 to 27, 2019 with 4 meetings on the human circulatory system material. The research procedure consists of three stages, namely preparation, implementation, and completion. In the preparation, the researcher made the learning instruments, made observations at the school, selected samples, and applied for the research permit. At the implementation stage, the researcher gave pretest to the experimental class and the control class, carried out learning by applying the 7E Learning Cycle model in the experimental class and according to the school lesson plans in the control class, and gave post-test. At the completion stage, the data were analyzed, discussed, and concluded.

### **Data Analysis Technique**

Analysis of critical thinking skill test data of students:

$$\text{Score} = \frac{\text{Raw Score}}{\text{Ideal Maximum Score}} \times 100$$

(Sudijono, 2012)

Then, the test scores are converted in Table 1 below.

**Table 1.** Categories of student learning outcomes

Score Interval	Category
80 – 100	Very Good
66 – 79	Good
56 – 65	Enough
40– 55	Poor
0 – 39	Failed

(Arikunto, 2013:281)

## RESULTS AND DISCUSSION

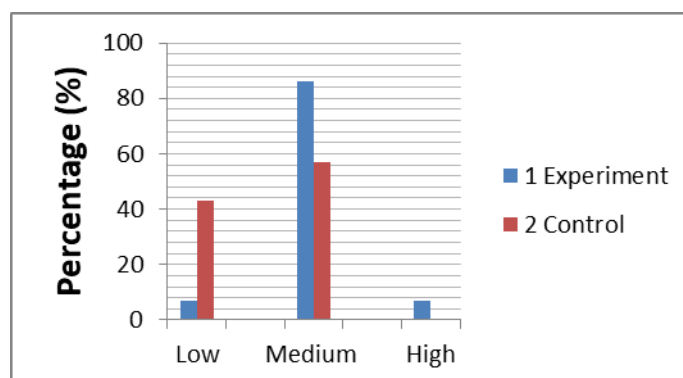
Data on students' critical thinking skills were obtained through an objective test of 30 multiple-choice questions with 5 answer choices. The mean scores for the pretest, post-test, and gain can be seen in Table 2.

**Table 2.** Mean scores for pretest, post-test, and gain of critical thinking skills

No.	Indicators of Critical Thinking Skills	Experimental			Control		
		Pretest	Post-test	Gain	Pretest	Post-test	Gain
1.	<i>Elementary Clarification</i>	54.6	75.6	20.01	53.0	73.8	20.83
2.	<i>Basic Support</i>	60.2	72.8	12.64	52.8	65.1	12.30
3.	<i>Inference</i>	56.9	78.3	21.44	53.6	75.6	22.02
4.	<i>Advanced Clarification</i>	52.5	74.3	21.84	48.8	65.1	16.28
5.	<i>Strategy and Tactics</i>	51.7	87.4	35.63	47.6	73.8	26.19
Total TPK		55.18	77.68	22.31	51.16	70.68	19.52

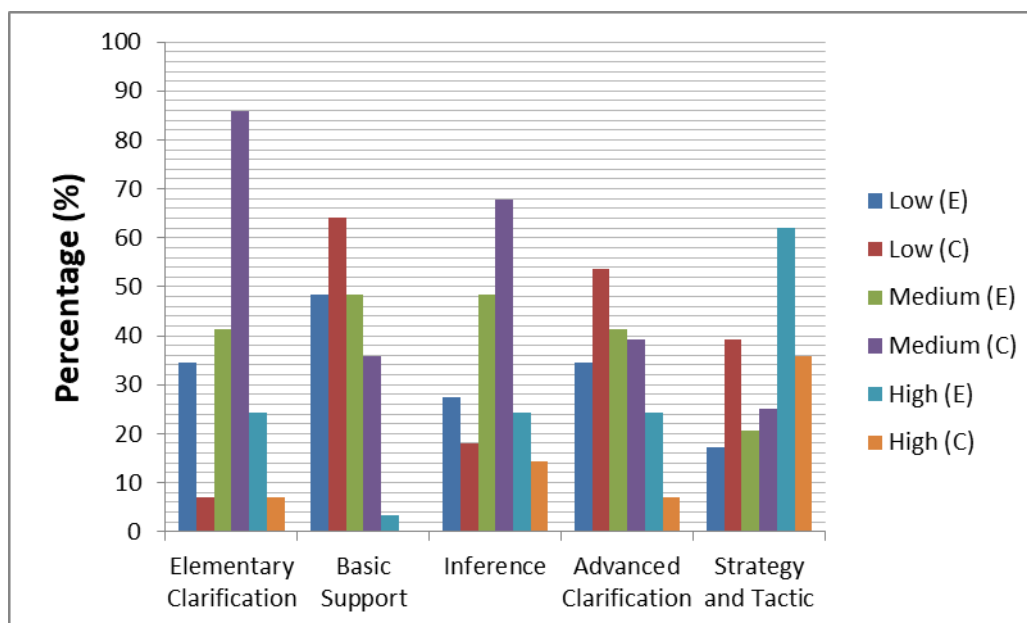
Remark: 80-100 (Very Good), 66-79 (Good), 56-65 (Enough), 40-55 (Poor), 30-39 (Failed)

To determine the increase in students' critical thinking skills using 7E Learning Cycle model, an analysis of n-gain percentage was carried out. The results of n-gain analysis of the experimental and control classes are described in Figure 1.



**Figure 1.** N-Gain percentage of critical thinking skills

For more details, the results of the n-gain percentage of critical thinking indicators can be seen in Figure 2.



**Figure 2.** N-Gain percentage of critical thinking skill indicators

The t-test of the pretest results showed that there was a significant difference between the two classes. This indicates that there are differences in students' critical thinking skills between the control class and the experimental class, which means that 7E Learning Cycle model affects students' critical thinking skills. The results of this research are in line with those of Dewi et al. (2017) showing that there are differences in critical thinking skills between students learning with the 7E learning cycle model based on local wisdom and those learning with conventional models. The research by Pranida et al. (2018) shows that 7E learning cycle model influences the critical thinking skills of students on the concept of environmental pollution.

This learning model can help achieve critical thinking skills better. There are 7 stages of the learning process in the 7E Learning Cycle group. In the first stage, eliciting, the teacher gives questions that stimulate students' prior knowledge so that a response arises from students' thoughts, and they become curious about the answers to the questions given by the teacher. The second stage, engaging, is used to focus the attention, stimulate thinking skills, and generate interest and motivation of students towards the concepts to be taught. The third stage is exploring where students gain direct knowledge and experience.

In the fourth stage, explaining, students are trained to explain their opinions and have logical reasons to strengthen their opinions. The fifth stage, elaborating, is to enable students to add new knowledge to what they already know. Next is evaluating, which is assessing the learning outcomes. The teacher observes and pays attention to students' abilities and skills to assess their level of knowledge and abilities before observing changes in their thinking towards their initial thinking. The last is extending that aims to think, look for, find, and explain examples of the application of the concepts learned (Rusyidi et al., 2018).

Based on the results of the hypothesis test per-indicator, three indicators are significantly different while the other two have no significant differences. Indicators that differ significantly are basic support, advanced clarification, and strategy and tactic. Indicators that do not differ significantly are elementary clarification and inference. The first indicator that is significantly different is basic support

because the experimental class students are given the opportunity to interact directly with the object of observation or the environment and hold social interactions at the exploring stage. This is in accordance with Rusydi's research (2018) that building basic skills (basic support) can increase a student's skill if he/she is accustomed to interacting directly with objects of observation and looking for information independently.

The next indicator is advanced clarification. There is a significant difference in this indicator because the 7E Learning Cycle model has elaborating and extending stages. In the elaborating stage, students can apply, link, and develop concepts learned in solving different problems and working on questions related to everyday problems. In extending, students connect the concepts obtained with new topics that have/have not been studied. This is in line with the research of Patmah et al. (2017) indicating that the implementation of the 7E Learning Cycle model provides opportunities for students to understand concepts through discussion, practicum, and applying concepts in everyday life that can improve their critical thinking skills, especially in the advanced clarification indicator.

The next indicator is strategy and tactics which consists of a sub-indicator of deciding on an action. In this indicator, students are required to be able to decide what to do, decide on possible alternatives, and select criteria for making solutions from the statements provided. They must be able to formulate alternatives and select supporting ideas to make the solution. This is as per Kasmadi's research (2016) that 7E Learning Cycle model allows students to construct, explore their own knowledge, explain, elaborate, and apply concepts in everyday life.

Indicators that do not differ significantly are elementary clarification and inference because students from both classes have good elementary clarification skills. This insignificant difference can also be caused by the similarity of the stages between the 7E Learning Cycle model at the eliciting and engaging stages and the discovery learning model at the stimulation stage.

At the eliciting stage, the researcher asks questions about a phenomenon in everyday life through perceptions related to the material to be studied. At the engaging stage, students are involved in demonstrations, discussions, and watching videos related to the material being taught, which will raise questions in students. This is in line with the research of Rusydi et al. (2018) stating that the eliciting and engaging stages (Learning Cycle 7E) increase critical thinking skills on the elementary clarification indicator. At the stimulation stage, students are faced with a complex problem that stimulates them to raise questions and to investigate for themselves. Students are given reading material and questions that lead to problem-solving preparation so that students will also consider their answers. At this stage, their ability to analyze arguments are also honed (Yusnia, 2017).

In the inference indicator, the two classes have been able to make conclusions from critical thinking questions. This insignificant difference can also be caused by the similarity in stages between the 7E Learning Cycle model at the explaining stage and the discovery learning model at the generalization stage. In the explaining stage, students not only explain the results of exploration but also are trained to make conclusions based on the data obtained (Anggraini, 2016). At the generalization stage, students make conclusions based on the information collected and explain it in front of the class (Dita, 2019).

Based on the results of the analysis of the learning implementation observation sheet, the total average of all aspects is 85.25%. In general, the learning process with 7E learning cycle model has been running well. Students respond to the learning carried out through a questionnaire given at the end of the class. Their responses to learning using 7E Learning Cycle model are very good and to the ability of teachers in teaching are good.

## CONCLUSION

Based on the findings, it can be concluded that 7E Learning Cycle model has a significant effect on the critical thinking skills of students. Thus, it can be used as an alternative model for learning biology. This model can also be applied to other concepts and subjects with improvements in the learning process.

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