

Research Article**THE EFFECT OF CREATIVE INTERACTIVE WEB AND SEAMLESS LEARNING (CRI-WES) MODEL TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS****^{1,*}DyahIstami Suharti, ²Tukiran and ³Raharjo**

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Abstract

The 21st century has four skills that must be mastered. One of them is critical thinking skills. Learning at school is an effort that can be made to form these skills. The independent curriculum was created to face the challenges of the 21st century, including the formation of critical thinking skills. It is not enough to just implement an independent curriculum. Educators need the right learning strategy, one of which is the use of learning models. This research was conducted to apply the CRI-WES learning model to improve students' critical thinking skills. This research is a quantitative experimental design with a pretest-posttest control group design. The subjects of this research consisted of 96 students from three schools in East Java, who were divided into two groups. The data collection technique used in this research was a test to measure students' critical thinking skills. The data analysis used in this research is an independent sample t-test. The results of this study indicate that the group that was taught using the CRI-WES learning model obtained better critical thinking skills scores than the group that was taught without the CRI-WES model. These findings indicate that the CRI-WES learning model has a positive effect on improving students' critical thinking skills.

Keywords: Creative, Seamless, Critical thinking, Interactive.

INTRODUCTION

We have now entered the 21st century, marked by rapid advancements in science and technology. In this dynamic era, individuals need to acquire a set of vital skills, including creativity, critical thinking, collaboration, and communication (Erdoğan, 2019). One significant avenue for developing these skills is education. In Indonesia, education is grounded in the principles of the applied curriculum. However, historical trends suggest that these curricula have not been as effective in nurturing students' cognitive abilities (Darlis *et al.*, 2022). Indonesia's educational system emphasizes a policy of fostering freedom in learning, thought, innovation, and independent and creative expression. This approach empowers both teachers and students, granting them the freedom to shape their learning experiences (Handoko, 2017). Independent learning plays a pivotal role in cultivating independent thinking and self-expression (Darlis *et al.*, 2022). By integrating independent learning into the curriculum, students are provided with a robust platform and ample opportunities to critically analyze and address the myriad problems and challenges they encounter. Independence Policy Student learning can develop according to their potential and skills because, with an independent curriculum, they get critical, quality, expressive, applicative, varied, and progressive learning (Rahayu *et al.*, 2022). Freedom of learning provides learning opportunities as freely and comfortably as possible for students to study in a calm, relaxed, and happy manner, without stress and pressure, taking into account the natural talents they have, without forcing them to study or master a particular area of knowledge. Apart from that, it creates quality human beings who can compete in various fields of life (Sibagariang *et al.*, 2021). The implementation of independent learning was also triggered by a decrease in the quality of education services and Indonesian education graduates, as well

as the decreased competitiveness of Indonesian education graduates in the industrial era 4.0 (Sudarman, 2021). Creative thinking skills are one of the important key factors for overcoming various complex problems in the industrial era 4.0 (Rif 'at *et al.*, 2020; Santoso & Wulandari, 2020; Yanti *et al.*, 2020; Zainuddin *et al.*, 2020). Based on the results of an initial study conducted in three public Madrasah Aliyah schools in East Java, it was found that learning so far has not taught students who have the thinking ability to realize what has been learned. One reason is that schools have experienced learning loss after the pandemic, so schools have experienced learning loss. Since the pandemic occurred, all learning activities which were initially carried out face-to-face, eventually began to be carried out with distance learning (online). Online learning is a learning process where students do not come to school, students simply study at home according to the teacher's instructions via Zoom, Google Forms, and assignments. Testing students' abilities through the results of individual assignments, group work, and tests with Google Forms and other applications (Argaheni, 2020). The implementation of such learning should provide space for students to be able to develop their thinking. In addition to the impact of learning loss, learning that is carried out in schools so far has not fully implemented (not maximized) learning strategies that motivate students to think critically. The learning model applied by the teacher does not teach students to think creatively and has not motivated students to be able to implement the material concepts obtained from learning activities (Herdhiansyah *et al.*, 2020). Students' critical thinking skills need to be given appropriate learning strategies, and teachers provide appropriate facilities in any subject. One of the subjects that needs to be given reinforcement of students' critical thinking is biology. Rumithi (2016) in his research also suggested that science learning in biology through concept discovery does not involve students' active role, because the biology learning process does not empower students. Teachers still use the conventional learning model as the only learning model,

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especially in biology (science) lessons. The model commonly used tends to be one-way lectures where students are required to memorize without the process of thinking and developing the material presented by the teacher. Students at the high school level experience learning difficulties due to the lack of development of teaching materials carried out by the teacher, students tend to accept what is conveyed by the teacher without any thinking and development processes. The learning model applied by the teacher, especially in biology subjects, is mostly still monotonous, This tends to cause boredom in participating in learning, and the delivery of material delivered by the teacher is not understood by students so students are less motivated to learn. Moreover, the learning process that is applied online is categorized as a new way of learning and must be carried out by students and teachers, this requires time to adapt. The condition of the online learning process indirectly requires students to be able to accept any conditions. If so, the teacher must prepare a learning model that can provide a fun and not boring learning experience, can motivate students to stimulate and hone their critical thinking skills, and is easy to implement online. One of the efforts to use a learning model that can be a forum for solving these problems is by using the creative interactive web and seamless learning (CRI-WES) model. This learning model is a combination of the use of the interactive web and learning that is carried out seamlessly. The CRI-WES learning model has characteristics appropriate to 21st-century learning including, 1) student-centered; 2) teachers are ready to listen to students' opinions; 3) teachers and students must be creative and innovative; 4) students are facilitated to collaborate; 5) the learning model applies ICT; teachers must pay attention to the characteristics of each student; 6) each subject can be integrated with other subjects. Thus the purpose of this study was to determine the effect of the CRI-WES learning model on students' critical thinking skills.

METHODS

This study uses a quantitative approach to determine the effect of the CRI-WES learning model on students' critical thinking skills. The research design used in this study was the pretest-posttest control group design (Creswell & Creswell, 2018). The subjects in this study were students from Madrasah Aliyah Negeri schools in East Java, totaling 96 students who were divided into two groups. The first group is students doing learning activities using the Creative Interactive Web and Seamless Learning (CRI-WES) learning model, and the second group is students doing learning activities using traditional models. The data collection technique used in this study was a test to measure students' critical thinking skills. An independent sample t-test is used as a technique for analyzing the data in this study. There are twelve critical thinking indicators described by Ennis and Fisher, including: 1) focusing questions; 2) analyzing arguments; 3) asking and answering questions; 4) Considering the legitimacy of the source; 5) making observations and considering the observation report; 6) make deductions and consider the results; 7) perform induction and consider the results; 8) make and determine the results of the consideration; 9) define terms and consider a definition; 10) identify assumptions; 11) determine an action; and 12) interact with other people (Ennis, 1991). In addition, there are six other indicators of critical thinking, including 1) identifying problems; 2) collecting various relevant information; 3) compiling several alternative

solutions to problems; 4) drawing conclusions; 5) expressing opinions; and 6) evaluating the instrument (Fisher, 2001).

RESULTS

The pretest is carried out to obtain students' critical thinking skills in the early stages before learning is implemented. The pretest was carried out on two groups and showed that both groups had the same initial abilities. Furthermore, learning was carried out in both groups. The first group is the experimental group, using the CRI-WES learning model, and the second group is the control group, using the traditional learning model. Then the data was tested for normality (see table 1) and homogeneity (see table 2) for further analysis (see table 4). Normality and homogeneity tests were carried out to find out if the data obtained was normally distributed and homogeneous.

Table 1. Normality Test Results

		Score	
		Learning Models	
		CRI-WES	Traditional
Kolmogorov-Smirnov ^a	Statistic	.095	.091
	df	49	48
	Sig.	.200*	.200*
Shapiro-Wilk	Statistic	.961	.974
	df	49	48
	Sig.	.108	.351

The results of the data normality test are presented in Table 1, showing the significance value of the Kolmogorov-Smirnov test for the experimental group using the CRI-WES learning model (0.200 greater than 0.050) and the control group using the traditional learning model (0.200 greater than 0.050). The results of the Shapiro-Wilk test in the experimental group obtained a significance value of 0.108 greater than 0.050, and gains in the control group obtained a significance value of 0.351 greater than 0.050. Based on The results of the normality test, showed that all data were normally distributed, and then a homogeneity test was carried out.

Table 2. Variance Homogeneity Test Results

Test of Homogeneity of Variances	
Score	
Levene Statistic	1.325
df1	1
df2	95
Sig.	.253

After carrying out the normality test, it was found that all the data were normally distributed. Furthermore, the homogeneity test of variance was carried out using Levene's homogeneity test. The gain in the homogeneity test (see Table 2) obtained a significance value of 0.253 greater than 0.050, which indicates homogeneous research data.

Table 3. Results of Critical Thinking Skills

Group Statistics		
	Score	
	Learning Models	
	CRI-WES	Traditional
N	49	48
Mean	66.18	63.25
Std. Deviation	3.212	3.949
Std. Error Mean	.459	.570

Table 4. Independent Samples T-Test Results

		Score	
		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	1.325	
	Sig.	.253	
t-test for Equality of Means	t	4.017	4.009
	df	95	90.462
	Sig. (2-tailed)	.000	.000
	Mean Difference	2.934	2.934
	Std. Error Difference	.730	.732
	95% Confidence Interval of the Difference	Lower Upper	1.484 4.383

Based on the results of the normality test and homogeneity test, all data is normally distributed and homogeneous. Furthermore, the data was analyzed using an independent sample t-test (see Table 4) to determine differences in scores of students' critical thinking skills. Based on The data obtained in Table 3, shows the mean students' critical thinking skills between the experimental group using the CRI-WES learning model and the control group using the traditional learning model. The data shows that the experimental group students' critical thinking skills (CRI-WES learning model) were acquired at 66.18. The mean is larger than the control group (Traditional learning model) of 63.25. In the test results of the independent samples t-test, it is clear that the significance value (2-tailed) is 0.000, which is less than 0.050. This proves that there is a significant difference between the experimental group using the CRI-WES learning model and the control group using the traditional learning model. The only difference is the application of the CRI-WES model given to the experimental group.

DISCUSSION

21st-century learning requires people to have critical thinking skills (Erdem, 2019; Erdoğan, 2019). Critical thinking skills can be obtained from learning activities at school (Lapuz& Fulgencio, 2020). Education in Indonesia has implemented an independent learning curriculum that supports the achievement of critical thinking skills for students. (Kurniawan *et al.*, 2020). Of course, the independent curriculum does not just go away, it requires the involvement of the teacher in implementing it. In addition, the appropriate learning strategies used by teachers can realize achievement in learning (Simsek& Balaban, 2020). Strategies that can be used by teachers are both in the form of classroom management strategies and strategies in selecting and using learning models. Some problems occur in several public Madrasah Aliyah schools in East Java. The school has not been able to build its students' critical thinking skills properly. Especially in biology subjects which are included in science. So far, the learning process applied by teachers in schools, which was originally a very teacher-centered learning process, has not been student-centered (Garrett, 2008). However, with the implementation of the independent learning curriculum, the learning process becomes student-centered. Science subjects require students to be able to think critically (Lieung *et al.*, 2020). So it is following the demands of the 21st century where critical thinking skills formed through science subjects can become a provision for students after finishing school. However, teachers still do not use the right learning model, so the independent curriculum that has been implemented has not been able to bring out students' critical thinking skills. Based on the problems, research was conducted using the Creative Interactive Web and Seamless Learning (CRI-WES) model to improve students' critical thinking skills.

The CRI-WES model is a learning model that has characteristics that can facilitate well and are suitable for supporting students' critical thinking skills. Apart from that, it provides easy access to online learning. Science is needed in the world of education, especially in the independent learning curriculum which requires teachers to be able to change teaching techniques. The implementation of the CRI-WES learning model is carried out through five phases. In the first phase, problem-solving, at this stage in determining the hypothesis students are expected to have a strong literacy basis to determine a solution plan related to the required data. Problem-solving can support the improvement of critical thinking skills (Fajari *et al.*, 2020). The second phase, brainstorming has the goal of stimulating the brain to think logically, spontaneously, and creatively. A teacher in the learning process in this phase expects students to be able to solve problems by discussing, and brainstorming among group members. All group members will explore and collect information used to solve problems. Brainstorming can be done by stimulating critical thinking (AlMutairi, 2015). The third phase of organizing creative selection is expected to have new ideas as a result of brainstorming with group members. These ideas are pre-selected according to the material being studied, but it is endeavored that the topics chosen show benefits for the community and the environment around us, especially those who experience problems and need solutions to overcome them.

In the fourth integrated and creative thinking phase students design a mindset that will be applied in research (experiments) on creative thinking skills with ideas that have been determined in the previous phases. In this phase, the target is expected to arrive at a description of the cognitive assessment and skills and attitudes of students. The fifth phase of research and conclusions must meet the target regarding expectations at the end of student learning activities complete with the implementation of ideas by compiling prototypes according to the topics raised. This phase is required to collaborate with other subjects by applying seamless learning and web learning that has been provided by the teacher in action research. Reports on learning activities are made coherently and uploaded with links in the form of reports on the results of critical analysis of articles/videos as well as practicum/research reports in the form of media. as well as products from new ideas raised by the material being studied. The findings from this study indicate that the group that was taught using the CRI-WES learning model showed a better acquisition of critical thinking skills. The acquisition of students' critical thinking scores with the CRI-WIS model is higher than that of students taught with the traditional learning model. The group of students who were taught with the traditional learning model tended to be mediocre in learning, showing participation as usual. Meanwhile, the group of students who were taught

using the CRI-WES model showed quite high participation. The series of learning phases provided by the CRI-WES model provides space for developing their critical thinking skills. The CRI-WES learning model has a positive influence on improving critical thinking skills.

Conclusion

The implementation of the CRI-WES learning model that has been carried out in three public Madrasah Aliyah schools in East Java has shown positive results for critical thinking skills. The implementation of the CRI-WES learning model is proven to have a significant impact on student's critical thinking skills. So that the CRI-WES model is effectively used in learning activities to support students' critical thinking skills in the 21st century.

Suggestion

21st-century skills are not only critical thinking, but have other skills including creative, collaborative, and communication skills. So it is necessary to carry out further research on the implementation of the CRI-WES learning model to other skills. This is useful to determine the effect of using this model in forming and supporting other required competencies of the 21st century.

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