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E-learning assisted AIR learning model to improve student's critical thinking skills

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ABSTRACT

A learning innovation that combines innovative learning with online learning needs to be done to bridge pandemic conditions such as Covid-19. One of them is the e-learning-assisted AIR learning model (e-AIR). The integration of e-learning into the AIR learning model is carried out to provide learning facilities for students so they can repeat learning material anytime and anywhere. One of the competencies expected to develop in physics courses is CBC. Developing critical thinking is crucial because it is a skill most students need when facing a problem. This study aimed to determine the increase in student CBC by applying the e-learning-assisted AIR learning model for the Physics Education Study Program students at Almuslim University. This quasi-experimental study with a one-group pretest and posttest design was conducted on all Physics Education students at Almuslim University with a sample of 9 students. The research instrument used was in the form of questions adapted to the KBK indicators. Data analysis using the n-gain test. The results of this study show that the e-learning-assisted AIR learning model can improve student CBC, as seen from the percentage obtained, namely as many as five students obtained a percentage of 56%, as many as three students obtained a percentage of 33% in the medium category. As many as one student received 11%, with a low category.

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INTRODUCTION

The rapid development of technology requires the implementation of the 4.0 education program so that it can evolve with the times. Therefore learning must be swiftly addressed by applying digital-based learning methods. The learning process is one of the spearheads in the education system. In the 21st century, learning is not just an activity designed for students to understand or know some knowledge. Still, one must develop thinking skills, literacy, and apply technology in life (Zaini, 2021). Learning aims to improve students' abilities and skills (Safarati & Zuhra, 2021). However, learning in the 21st century focuses more on the goal of developing students' thinking skills (Safarati & Zuhra, 2021), learning in the 21st century focuses more on the purpose of developing students' thinking skills (Nugraheny et al., 2019: Susilawati et al., 2020).

Based on the analyzed educational system according to current development, some transformations are called the 21st-century educational system.

In the 21st century, education has changed with a pattern of transformation in several forms, such as learning activities where students are required to participate actively during the learning process (Chuntala, 2019; Frache et al., 2019; Cruz & Dominguez, 2020; Minan et al., 2021). Critical Thinking Skills (CTS) is one of the thinking skills that can be developed. Learning activities should emphasize the development of CTS so that students can practice and transfer information (Azizah et al., 2018). Critical thinking skills are among the most important life skills for humans in the 21st century (Fajari, 2020). CTS is important in education because critical thinking (CT) is solving a problem, making decisions, and conducting analysis in various studies (Zuhra et al., 2021). All aspects of CT are skills needed in life because CT is a logical and reflective way of thinking that focuses on student decision-making. It deepens students' thinking skills when interpreting information, making the information they receive more meaningful.

In the 4.0 revolution era, various efforts have been made to develop students' CTS. One is implementing digital-based learning so students are more open to technological developments. E-learning is digital-based learning where the learning system combines electronic media in an application to support learning activities with Internet media (Marlina et al., 2021).

Each learning model applied has its advantages and disadvantages, as well as the use of e-learning. One of the disadvantages of e-learning is that students find it challenging to understand the information lecturers convey (Pulungan et al., 2021). This deficiency can be complemented by collaborative learning models that require students to be more proficient in lecture activities so that students can understand information more quickly and the learning process can run more pleasantly. Luthfiana & Wahyuni (2019) state that the AIR (Auditory, Intellectual, Repetition) learning model is an adequate model, and it can be applied to encourage active and creative students to take part in lectures because this AIR model assumes that learning will be more effective if it prioritizes hearing, thinking skills and repetition (Hutagalung & Harahap, 2018; Mustika & Kinanti, 2018; Sugiarni & Ifanda, 2020)

Auditory means hearing. It uses the sense of hearing (ears) to listen and pay attention to information, convey information, and argue. Intellectually implies the ability to think and practice through reasoning, creating and solving problems, and processing and applying data. Repetition means repeating. It is for the information obtained by students can be comprehended more in-depth and must be trained by working on questions, giving assignments and tests (Alan & Afiansyah, 2017; Martini et al., 2018; Risdianti et al., 2019). The studies that are relevant to this AIR research by Siswanto et al. (2018), Siregar et al. (2020), and Rahayuningsih (2017) learning the AIR learning model that can improve students' problem-solving abilities (PSA). The problem-solving abilities (PSA) are one of the indicators of CTS. The result of the study (Nurhayati & Zuhra, 2020) is that students are delighted with using e-learning in the learning process.

A learning innovation that combines innovative learning with online learning needs to be done to bridge pandemic conditions such as Covid-19. One of them is e-learning-assisted AIR learning (e-AIR). The integration of online learning in the AIR learning model will be carried out by offering flexible learning opportunities to students, which will allow students to access materials and assignments online. It helps students to repeat learning material anytime and anywhere due to this material can be accessed through online learning.

One of the skills developed in physics courses is CTS. Developing CTS is crucial because it is a skill most students need when facing a problem. There have been many attempts to develop critical thinking. Susilawati et al. (2020) state that one of the most effective ways to develop CTS is to relate the subject matter to students' real-life experiences. Based on these considerations, there should be further research on the e-learning-assisted AIR learning model for students' CTS.

Based on the description above, this study aimed to determine the increase in student CTS by applying the e-learning-assisted AIR learning model to the Physics Education Study Program students at Almuslim University. Auditory, Intellectually, and Repetition Models, integrated with e-learning and critical thinking skills, contribute to a variety of meaningful learning, not just remembering but approaching contextual information.

METHOD

The AIR learning model supported by e-learning is applied to work and energy materials. The AIR model is learned through auditory, intellectual, and repetition phases. In the auditory and intellectual phases, the task/exercise is carried out directly, while in the repetition phase, each task/exercise is given through online learning. Therefore, in each session, students will complete assignments/activities using e-learning. In addition, work and energy material is presented in e-learning so students can repeat learning material anytime and anywhere. This quasi-experimental study with a one-group pretest and posttest design was conducted on all students of the Physics Education Study Program, Universitas Almuslim, with a sample of 9 students. The research instrument used in this study was a test sheet based on the CTS indicator.

Susilawati et al. (2020) stated that indicators measured in the science process skills developed by Ennis are: (1) identifying questions; (2) advancing a hypothesis, (3) determining an action, (4) considering the use, (5) carrying out appropriate procedures, (6) recording observations, (7) interpreting questions, (8) identifying and managing the irrelevance, and (9) providing a definition. These nine indicators can be measured using the CTS test. The indicators used in this study were (1) identifying questions; (2) advancing the hypothesis; (3) determining an action; (4) interpreting the questions, and (5) providing definitions. Students' CTS test results were analyzed using the n-gain test with conversions in Table 1. The percentage of CTS achievement (Zahra et al., 2021) is interpreted descriptively based on Table 2.

Table 1. N-Gain Values

N-Gain Values	Category
$g < 0.3$	Low
$0.3 \leq g \leq 0.7$	Medium
$g > 0.7$	High

Table 2. Interpretation of Students' CTS

No.	Scores	Criteria
1.	80-100	Very Good
2.	66-79	Good
3.	56-65	Fair
4.	40-55	Low
5.	30-39	Very Low

RESULTS AND DISCUSSION

Results

Students' CTS was obtained through test sheets in the form of essay questions totaling ten questions on the pretest and posttest questions. Students were categorized as complete if the score or passing grade was≥ 75 for basic physics courses on work and energy material. The completeness of student learning using the e-learning-assisted AIR learning model can be seen in Figure 1.

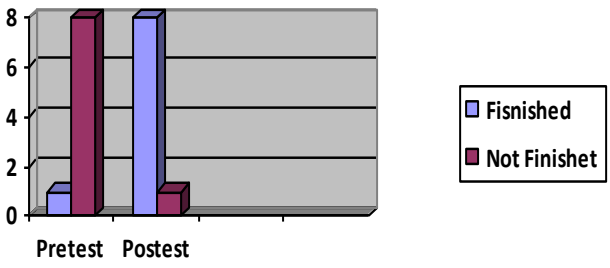

Figure 1. Comparison of Student Learning Completion

Based on Figure 1 it can be seen the comparison between the pretest and posttest results. The pretest scores obtained from 9 students showed that eight students were categorized as incomplete, and only one was categorized as complete. While for The posttest scores were acquired from 9 students, which led to 8 students being categorized as complete and only one as incomplete. The acquisition of pretest and posttest scores showed increased students' CTS on work and energy materials. The increase in value acquisition can be seen in Table 3.

Table 3. N-Gain Analysis Result

Category	Number of Students	Percentage (%)
High	5	56
Medium	3	33
Low	1	11
Total	9	100

Based on Table 3, it was found that there was an increase in the CTS of students using the e-learning assisted AIR learning model, with a high category of 5 students obtaining a percentage of 56%, with a medium category of 3 students obtaining a percentage of 33%, and with low category of 1 student obtaining a percentage of 11%. It could be seen based on data analysis carried out by field research.

Analysis of Students' CTS

Critical Thinking Skill (CTS) is a skill measured in this study. There were five indicators distributed through the questions given. These details can be seen in Table 4.

Table 4. The Details of CTS' Questions

No.	Sub Concept	Questions' Number
1	Identifying questions	1 and 5
2	Advancing hypothesis	4 and 6
3	Determining an action	7 and 8
4	Interpreting questions	2 and 3
5	Providing definition	8 and 5

Table 4 shows that the number of questions for the CTS test totaled ten questions, with each indicator consisting of 2 questions according to the results of the validity and reliability test items. Achievement of CTS was obtained by calculating the average percentage of students who answered the questions correctly for each indicator. Table 5 shows that in the five indicators used, the students' CTS achievement was in a good category, with an average score of 74.52.

Table 5. Average of Achievement Level of Student's CTS

No.	Sub Concept	Percentage of Achievement	Category
1	Identifying questions	71.42	Good
2	Advancing hypothesis	60	Very Good
3	Determining an action	78.57	Good
4	Interpreting questions	75	Good
5	Providing definition	76.92	Good
	Average	74.52	Good

Discussion

Based on the research results that researchers have carried out, the e-learning-assisted AIR learning model is applied to work and energy materials. Learning is carried out using the AIR learning model consisting of the Auditory, Intellectual, and Repetition stages. The task/exercise is performed directly at the auditory and intellectual stages. Through these two stages, students have explained the material and presentation of the material. Then students were trained in critical

thinking methods through reasoning, creating and solving problems, and constructing and applying based on the given material. Subsequently, students were given assignments/exercises at the Repetition stage, but each task/exercise was provided by using e-learning. So students complete assignments/exercises using e-learning at every meeting.

Based on the results of the analysis of research data obtained during the research, it can be said that there was a significant increase in the student's CTS by using the e-learning-assisted AIR learning model. Based on the analysis results, It can be seen that 56% of students were in the high category, 33% were in the medium category, and 11% were in the low category. The analysis of the number of questions for the critical thinking skills test was ten questions, with each indicator consisting of two questions following the test results of the validity and reliability of the items. Critical thinking skills were achieved by calculating the average percentage of students who answered questions correctly on each CTS indicator. From the five indicators used in this study, the achievement of students' critical thinking skills was in a good category, with an average value of 74.52.

This research was compatible with research that has been conducted by previous researchers, namely research conducted by Pujiastutik (2016). The research results indicate that applying the AIR (Auditory, Intellectual, Repetition) model can improve student learning outcomes. In addition, the results of classical learning by 80% and > 75% of students gave positive responses. The research conducted by Astuti et al. (2018) shows that the AIR learning model influences mathematical thinking skills, as evidenced by the final test scores of students using the AIR learning model, which were higher than conventional learning.

It is compatible with this research by Dwi and Putra (2015), learning activity with e-learning systems improves students' CTS. Fauji and Winarti's (2015) research results state that applying the AIR model has increased learning outcomes by 19.95% from cycle I to cycle II. Furthermore, research conducted by Astuti et al. (2018), after being analyzed using the t-test, obtained $t_{count}>t_{table}$ (0.05), namely 4.4603>2.011. It shows that AIR learning strategies can affect learning outcomes.

Based on the results and discussion above, it can be seen that the e-learning-assisted AIR learning model can improve students' CTS. It is also compatible with several studies conducted by several previous researchers. Through the AIR learning model, students are more challenged with the responsibilities given, thereby provoking students' CTS towards the assumptions given and taught. Following Fisher's opinion (Safarati & Zuhra, 2021) states that skills or ability in thinking of ideas must also exist in critical thinking, providing relevant questions, drawing short descriptions, thinking, and debating information continuously.

CONCLUSION

This study showed that the e-learning-assisted AIR (Auditory Intellectually Repetition) learning model can improve students' CTS (Critical Thinking Skills). The increase in student CBC by applying the e-learning-assisted AIR learning model for the Physics Education Study Program students at Almuslim University. This quasi-experimental study with a one-group pretest and posttest design was conducted on all Physics Education students at Almuslim University with a sample of 9 students could be seen from the percentage obtained. Five students received a percentage of 56% in the high category, three obtained a percentage of 33% in the medium category, and one obtained a percentage of 11% in the low category.

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